FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS	NH 90(191)M, Etc.				1
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.	
15	BEXAR	2452	02	023	LP 1604	

LETTING DATE: October 13, 1993 ETC
WORK BEGAN: January 11, 1994
DATE ACCEPTED: June 20, 1996
CONTRACTOR: Gilbert Texas Const.
TOTAL COST:

TEXAS DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

BEXAR COUNTY - LOOP 1604
PROJECT NO. NH 90(191)M, Etc.

FROM 0.50 MILE WEST OF BABCOCK TO 1.2 MILES SOUTH OF SH 16

PROJ: NH90(191)M CSJ: 2452-02-023		PROJ: NH93(68)M CSJ: 2452-01-028	
ROADWAY LENGTH =	11,637.77 FT = 2.204 MI	ROADWAY LENGTH =	6,039.41 FT = 1.143 MI
BRIDGE LENGTH =	1,472.82 FT = 0.278 MI	BRIDGE LENGTH =	0.00 FT = 0.000 MI
TOTAL LENGTH =	13,110.59 FT = 2.483 MI	TOTAL LENGTH =	6,039.41 FT = 1.143 MI

GRAND TOTAL = 19,150.00 FT = 3.626 MI

FOR THE CONSTRUCTION OF THE CONVERSION OF A NON-FREEWAY FACILITY TO A FREEWAY FACILITY CONSISTING OF GRADING, STRUCTURES, BASE & SURFACE

DESIGN SPEED = 60 MPH
AREA OF DISTURBED SOIL = ~~[illegible]~~ ACRES

INDEX OF SHEETS

SHEET No.	DESCRIPTION
1	TITLE SHEET & 1A CHANGE ORDER SUMMARY
2-4	PROJECT LAYOUTS
5-6	TYPICAL SECTIONS
7-15	SEQUENCE OF WORK (PHASE I)
16-24	SEQUENCE OF WORK (PHASE II)
25-28,29A-32	DETOUR LAYOUTS A-H
33-35	BANDERA RD INERSECTION DETOUR
36	BARRICADES, SIGNS & TRAFFIC HANDLING SUMMARY
37-38A	GRADING SUMMARY
39	EARTHWORK SUMMARY
40	LARGE STRUCTURE SUMMARY
41	BRIDGE CLASS CULVERT SUMMARY
42	RETAINING WALL SUMMARY
43-46A	STORM SEWER & PIPE CULVERT SUMMARY
47	ILLUMINATION SUMMARY
48	SW3P SUMMARY
49	HAZARDOUS MATERIAL TRAP SUMMARY
50	DETOUR SUMMARY
51-51D	SPECIFICATION DATA & GENERAL NOTES
52-52D	ESTIMATE & QUANTITIES
53,53A-115	PLAN & PROFILE SHEETS
116-117	KYLE SEALE INTERSECTION LAYOUT & PROFILE
118-121	HAUSMAN RD INTERSECTION LAYOUT & PROFILE
122-128	SH 16 (BANDERA RD) INTERSECTION LAYOUT & PROFILE
129-131	MINOR INTERSECTION LAYOUTS
132-145	RAMP LAYOUTS & PROFILES
OMIT 148	MISCELLANEOUS ROADWAY DETAILS
149-157	LP 1604 OVERPASS AT KYLE SEAL (EB & WB MAINLANES)
158-165	LP 1604 BRIDGE AT HUESTA CREEK (EB & WB MAINLANES)
166-175	LP 1604 BRIDGE AT HUESTA CREEK (EB & WB FRONTAGE RDS)
176	PB-RD
177	PB-D-5-20
178-189	LP 1604 OVERPASS AT HAUSMAN (EB & WB MAINLANES)
190-195	LP 1604 OVERPASS AT SH 16 (BANDERA RD) (WB MAINLANES)
196-209	BRIDGE STANDARD DETAILS
210	BAT EXCLUDER (ACP OVERLAY)
211	OMITTED
212	RR8 & RR9
OMIT 213-216	RETAINING WALL LAYOUTS
217-222 223-226	RETAINING WALL STANDARD DETAILS
227-228 229-230	EMRW-88 & RW 4-(HC)1
231	EXTERIOR DRAINAGE AREA MAP
232-235	HYDRAULIC DATA SHEETS
236	HUESTA CREEK CHANNEL PROFILE
237-245	BRIDGE CLASS STRUCTURES
OMIT 246-254	INTERIOR DRAINAGE AREA MAPS
255 256-259	HYDRAULIC CALCULATIONS
OMIT 260 260A-267A,268-270	STORM SEWER PROFILES INCL. 260 & 4C
271	DRAINAGE EASEMENT LAYOUT
OMIT 272,272A-292	STORMDRAIN, SW3P, & UTILITY LAYOUT
292K-M 292A-292D	OMITTED
292E-292J	HAZARDOUS MATERIAL TRAPS 1 THRU 9 DESIGN COMPS, & PLAN PROFILES
292N-292Q	TEMP EROSION CONTROL EC(1,2,6,9)-93 (DIST 15)
292R - 292W	SRB(1,2,3,8,9,10)
OMIT 293 - 303	INLET & MANHOLE DETAILS
293,295 & 297 303A - 303B	SAFETY HMT INLET & PIPE DETAILS
304	MC7 - 3
305	MC8 - 3
306	MC9 - 1
307	SCNA
308 - 312B	PC-1 THRU PC-7
313	PD - SPR
314	MCW - P
315	MCW - P - 15°
316	MCW - P - 30°
OMIT 318 316A	MCW - P - 45°
316B	PW - N
317	CH II
319 - 320	MC - 15°
321 - 322	MC - 30°
323 - 324	MC - 45°
325	SWW
325A - 325B	RAIL TY T6

STANDARD SHEETS

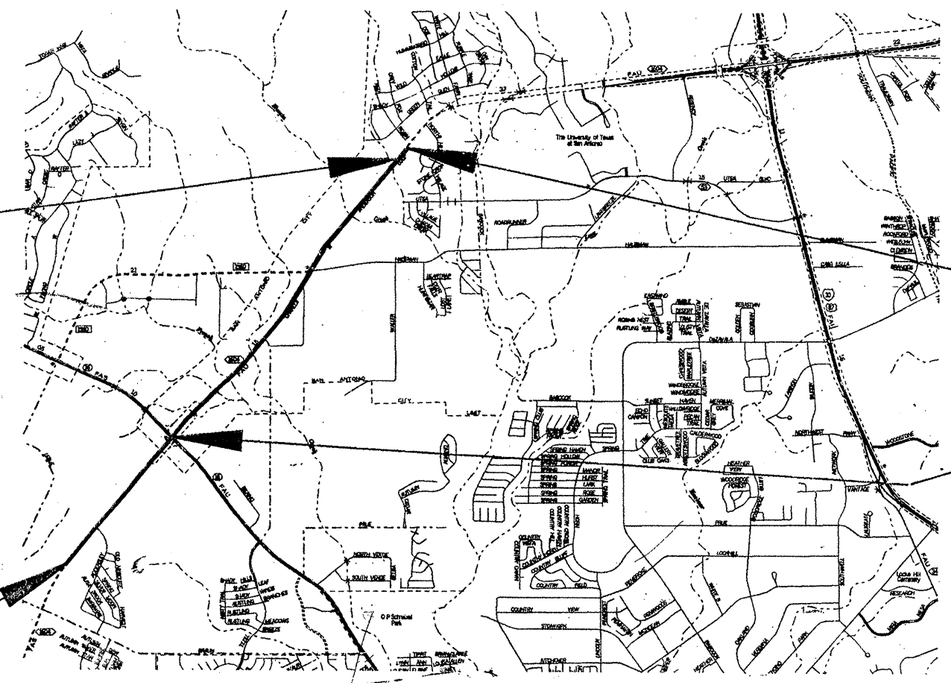
"THE CITY HEREBY CONSENTS TO THE CONSTRUCTION OF THIS HIGHWAY TRAFFIC SIGNAL AS TO LOCATION AND MANNER OF CONSTRUCTION AS INDICATED ON THESE PLANS, SAID INSTALLATION BEING PART OF AGREEMENT (TRAFFIC SIGNAL TYPE B) DATED JULY 12, 1990."

APPROVED: CITY OF SAN ANTONIO
CITY MANAGER — DATE 2/8/92

SPECIFICATIONS ADOPTED BY THE STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION, SEPTEMBER 1, 1982 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, APRIL, 1993).

BEGIN PROJECT NH 90(191)M
STA 10146+00
CONTROL: 2452-02-023
END INCIDENTAL WORK
REF MKR = 518+0.491

END PROJECT NH 93(68)M
STA 10337+50
CONTROL: 2452-01-028
REF MKR = 514+0.867



NO EQUATIONS
NO EXCEPTIONS
NO RAILROADS

BEGIN INCIDENTAL WORK
STA 10131+00

END PROJECT NH 90(191)M
END CONTROL 2452-02-023
BEGIN PROJECT NH93(68)M
BEGIN CONTROL 2452-01-028
STA 10277+10.59
REF MKR = 516+0.011

INDEX OF SHEETS (CONT'D)

SHEET No.	DESCRIPTION
326-332	ILLUMINATION LAYOUTS
OMIT 333-336	RID(I-4)92
337 337A-337D	ED(1-3)-92 & ED(4)DIST 15
338-339A	EC (1,2,3) - 93
OMIT 340-347	SANITARY SEWER ADJUSTMENT
361-362 348-373	WATER LINE ADJUSTMENT
374-378	TRAFFIC SIGNAL LAYOUTS
379-384	TRAFFIC SIGNAL DETAILS
385-387	MB-89
388	M-92
389	RPM(1)-92
390	VIA (SFPM) (MOD)
391	OMIT
392	D & OM(VIA)-92
393	BED-91
394	MBGF-92
394A	GET - 92
395	CTB TY 5 W/TRF
396	OMITTED
397	OMITTED
398-404	OMITTED
405-406	WZ (BTS-1 & 2)-92
407	WZ - BD - 92
408	WZ - STPM - 92
409	WZ - (CD) - 92
410	SSCB - (2) - 92
411 - 419	BC(1 thru 9) - 92

STANDARD SHEETS

"I hereby certify that these plans have been revised to reflect the project as actually constructed."
David R. Ball, P.E. — Date MAY 8, 1997
Area Engineer

"THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE AND SHEETS 176-177, 223-230, 292N-292Q HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT."
ROBERT E. MAGERS, P.E. — DATE 1-31-92

LAYOUT SCALE: 1 IN. = 2640 FT.

TEXAS DEPARTMENT OF TRANSPORTATION

RECOMMENDED FOR LETTING: April 1, 1993 — John C. Kraft, P.E., DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

RECOMMENDED FOR LETTING: April 1, 1993 — Richard Wiechert, P.E., DISTRICT ENGINEER

APPROVED FOR LETTING: 4-12-93 — Wiley [illegible], P.E., DIRECTOR OF BRIDGE AND STRUCTURES

APPROVED FOR LETTING: 4-14-93 — Robert R. Konur, P.E., for DIRECTOR OF HIGHWAY DESIGN

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
APPROVED: DIVISION ADMINISTRATOR — DATE

4 / 8424 — FINAL — SHEETS 565 — AP CARDS — 4 — G. Gavia — 3-San Antonio 1-GSD — Bexar — CONTROL — 2452-2-23 — 942 B5 — DATE FILMED — 10-18-98

COUNTY ____ PROJ. NO. ____
HWY. NO. ____ LETTING DATE ____
DATE ACCEPTED ____

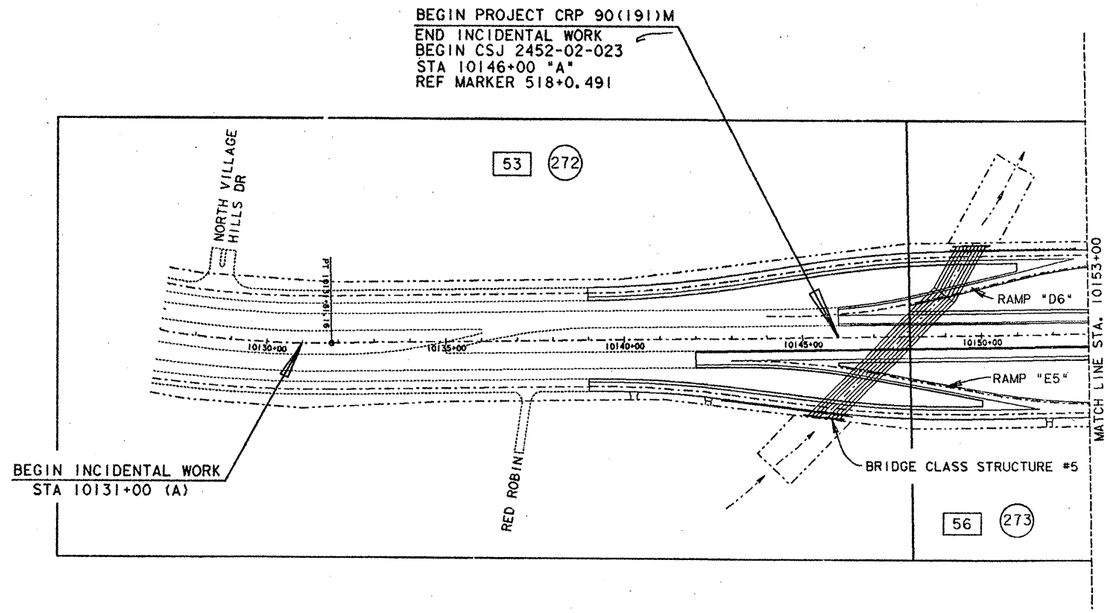
SHEET NOS.	CHANGE	DESCRIPTION
NA	SA#1	SUBSTITUTE ZIPSTRIP IN LIEU OF CONSTRUCTION JOINTS
NA	SA#3	ADD "C" WALL OPTION
260A(a), 260C(a), 261a-267a, 267A(a), 268a-270a	FC#1, SA#2	CPP PIPE IN LIEU OF RCP

SHEET NOS.	CO#	DESCRIPTION
7A, 8A, 16A, 25A, 35A-D, 50A	1	ADD DETOUR "E" & "F", ELIMINATE DETOUR "A"
NA	2	ADD FIBER MULCH SEEDING
NA	3	SUBSTITUTE THERMOPLASTIC IN LIEU OF PAINT
NA	4	INCREASE UNIT PRICE FOR PLANING
NA	5	PROVIDE OFF DUTY POLICE OFFICERS
5A	6	MODIFY TYPICAL SECTIONS STA. 227 - 337
NA	7	ADD DRILL SHAFT PAYMENT FOR UNSUITEABLE MATL
145A-D	8	CONSTRUCT CROSSOVERS AT SH 16
NA	9	CORRECT ¾" ASB DEFICIENCY
NA	10	ADD CONCRETE SADDLE ON SYSTEM "H"
NA	11	RESTOCKING CHARGES FOR SAWS RETURNED PIPE & FITTINGS
NA	12	FINAL CPP VIDEO INSPECTION
NA	13	BANDERA RD INTERSECTION MILLING
NA	14	MODIFY MEDIAN AT BANDERA ROAD
NA	15	MODIFY HAUSMAN RD MEDIAN FOR ACCESS TO DRIVE
NA	16	ADD BARRICADE MONTH
NA	17	ADDITIONAL SAWS WORK
NA	18	ELIMINATED
NA	19	ADD SAWS WATER FITTINGS

CHANGE ORDER SUMMARY

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	NH 90(191)M		1A
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP1604

PLAN /usr/d155802 1604cosm.dgn

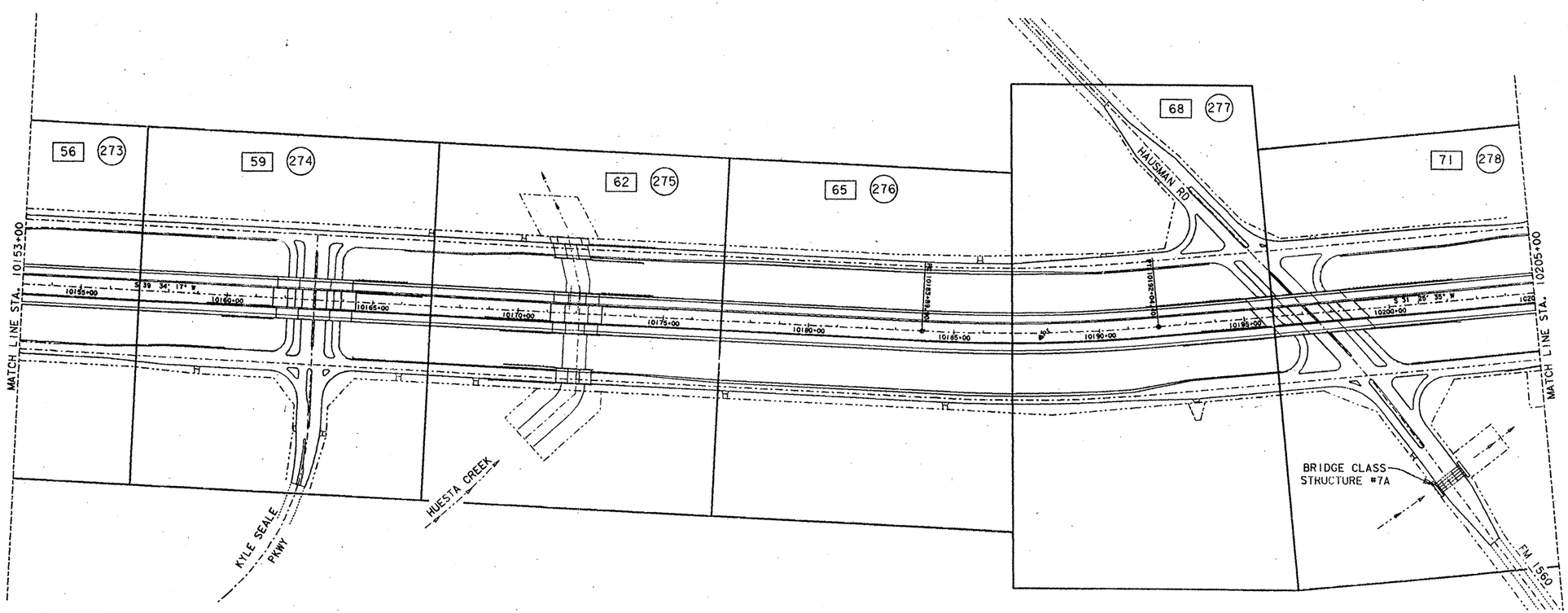


SCALE: 1"=200'

LEGEND

PLAN SHEETS

UTILITY & DRAINAGE LAYOUTS



SCALE: 1"=200'

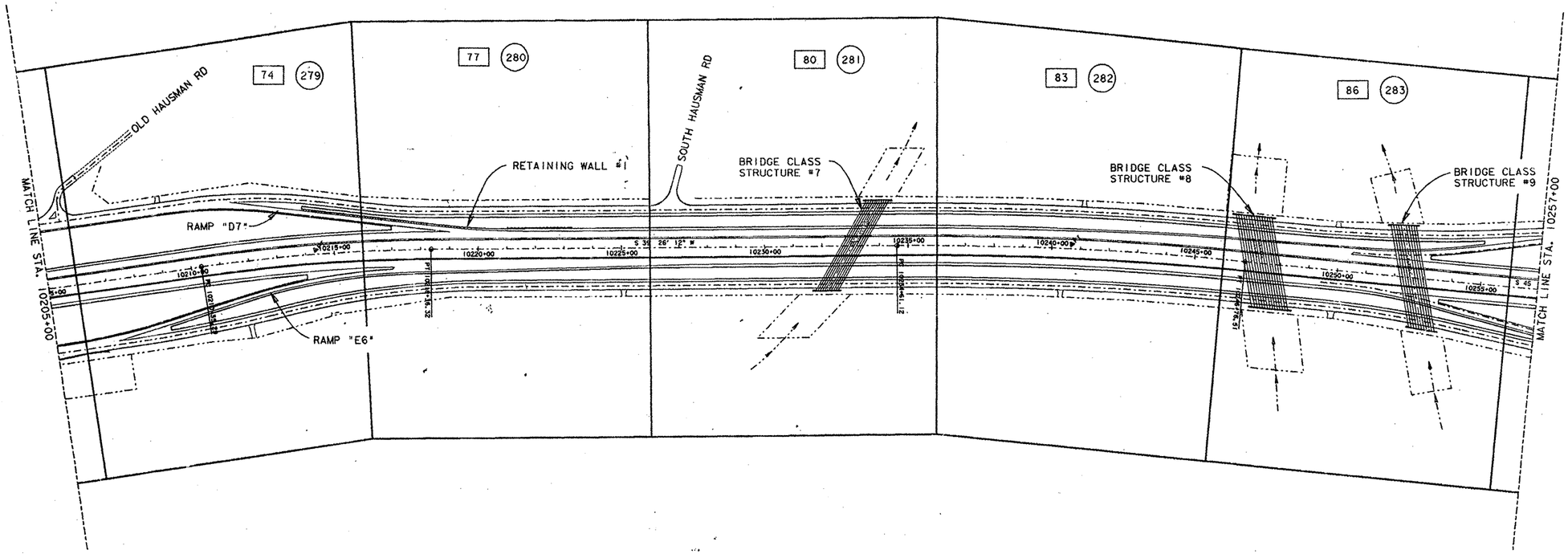
STATE OF TEXAS
CAROL GRIENER LUSCHEN
60450
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GRIENER LUSCHEN DATE

LP 1604
PROJECT LAYOUT
SHEET 1 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			2
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L2001.DGN

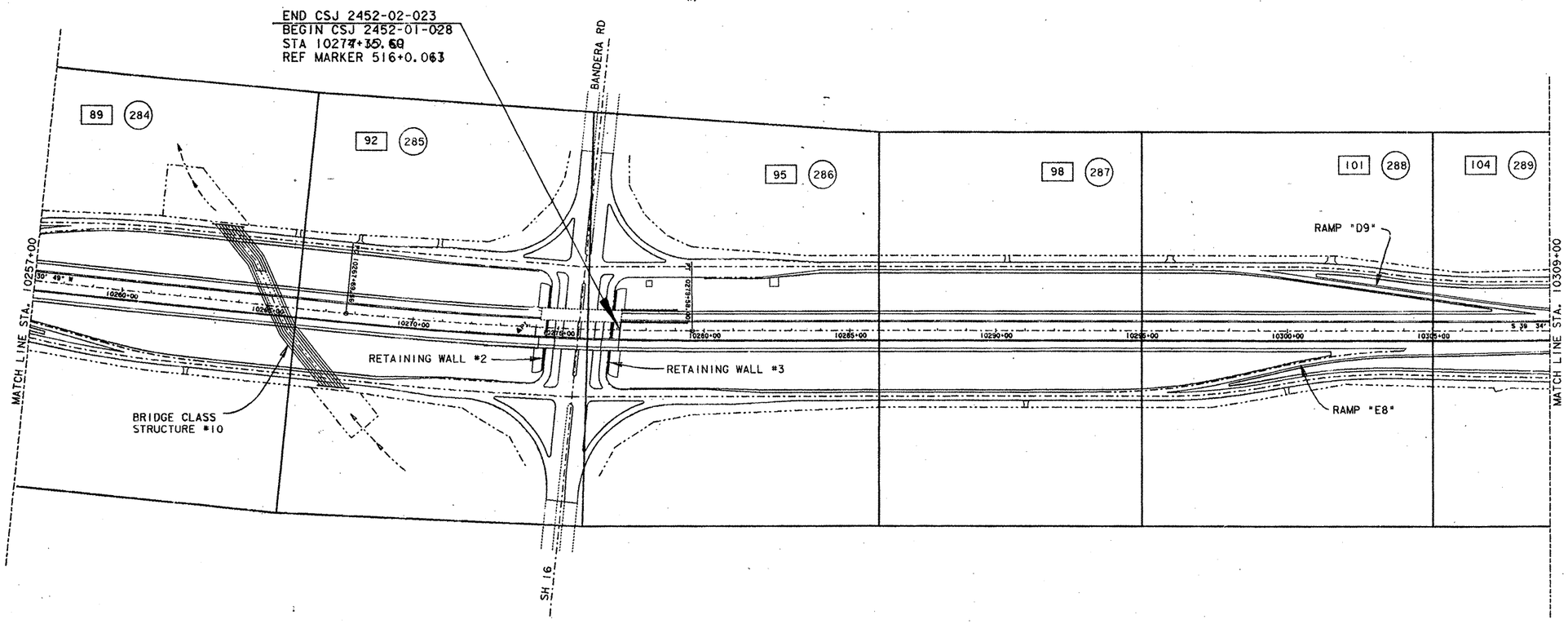


SCALE: 1"=200'

LEGEND

PLAN SHEETS

UTILITY & DRAINAGE LAYOUTS



SCALE: 1"=200'

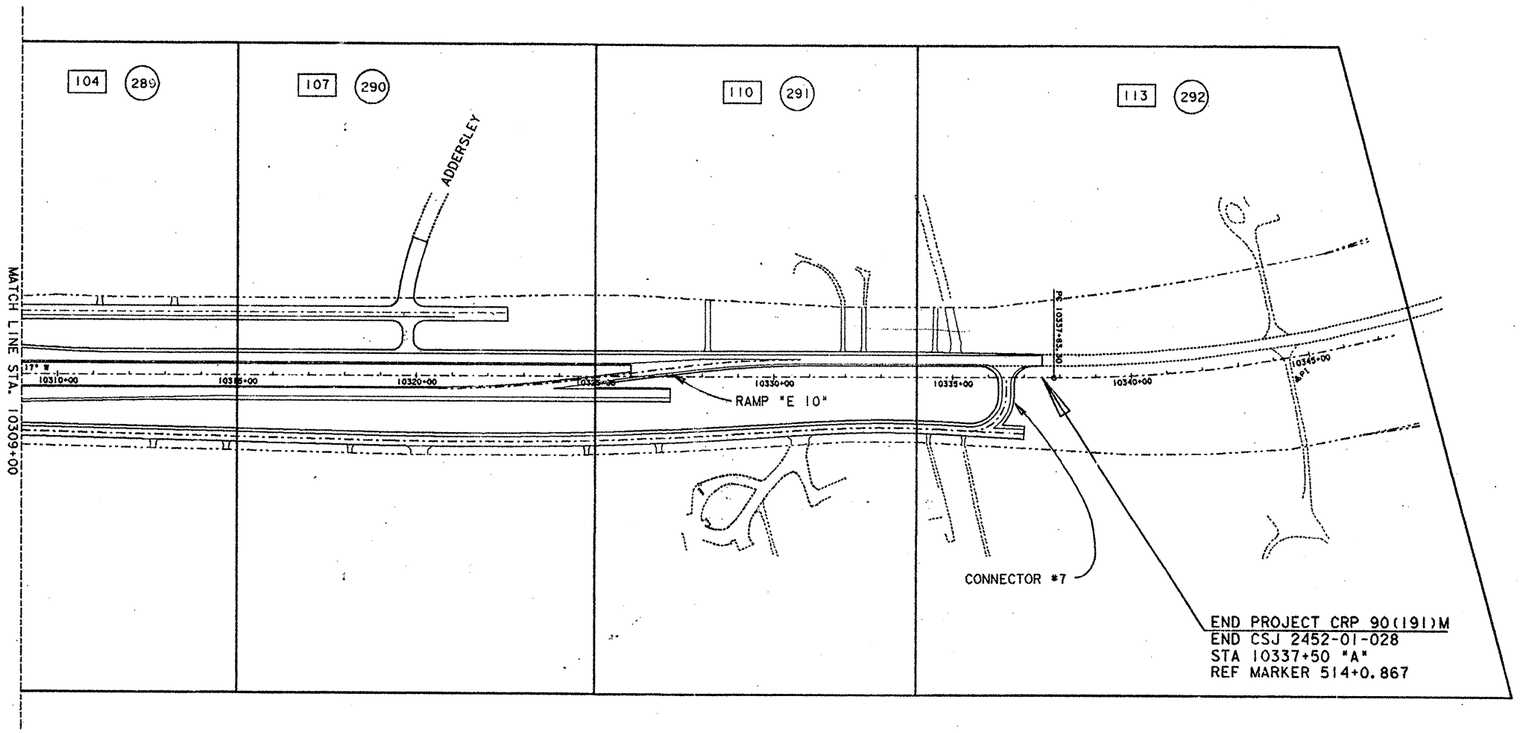
STATE OF TEXAS
CAROL GREINER LUSCHEN
60450
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

LP 1604
PROJECT LAYOUT
SHEET 2 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			3
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L2002.DGN



SCALE: 1"=200'

LEGEND

PLAN SHEETS

UTILITY & DRAINAGE LAYOUTS

STATE OF TEXAS
CAROL GREINER LUSCHEN
80450
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen 1-31-92
CAROL GREINER LUSCHEN DATE

LP 1604
PROJECT LAYOUT
SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			4
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L2003.DGN

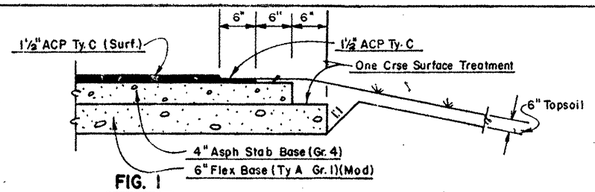


FIG. 1

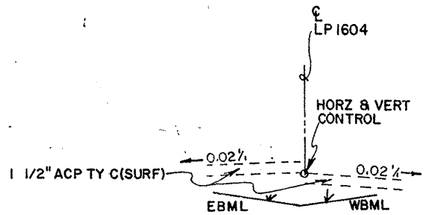
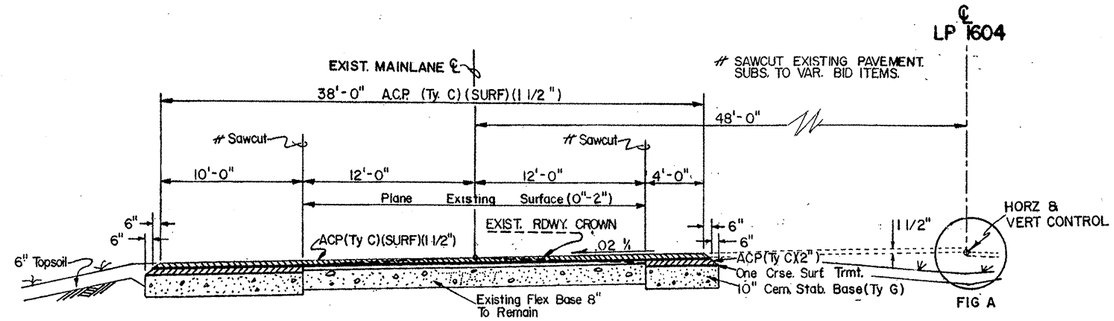
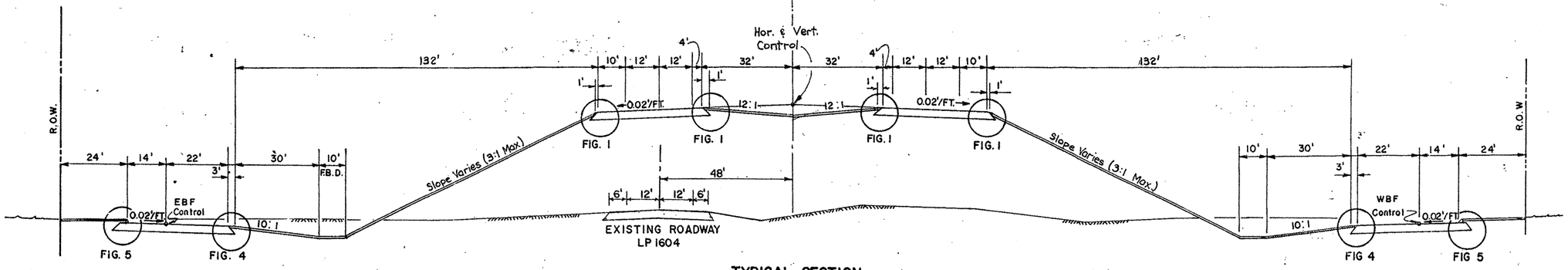


FIG. A



TYPICAL SECTION
EASTBOUND MAINLANE WIDENING
(STATION 10277+00-10337+00)

Note: Intent Here Is To Show That The Exist. Rdwy. To Be Widened From Sta. 10277+00 Thru Sta. 10337+00 Consists of a Crowned Section. Ploning Is Provided To Remove The Exist. Crown Which In Turn Shall Be Followed Up With a 1½" Type C (Surf) Level-Up As Shown In Typical Above & Fig. A.



TYPICAL SECTION
AT FILL

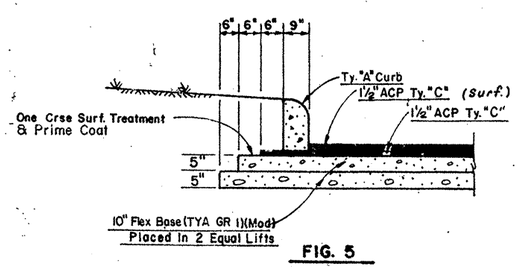
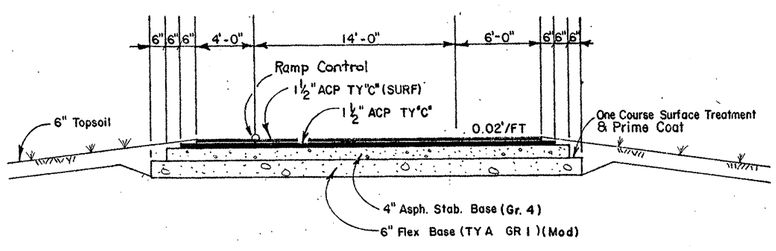


FIG. 5



TYPICAL RAMP SECTION

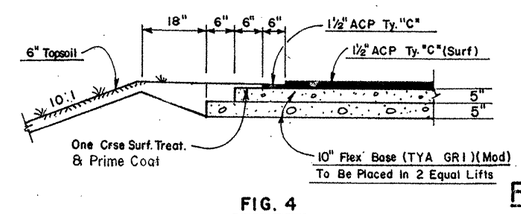


FIG. 4

STATE OF TEXAS
ROBERT E. MAGERS
2429
REGISTERED PROFESSIONAL ENGINEER
ARIZONA

R. E. Magers P.E. 9-20-90
Date

LOOP 1604
FROM: .5 MILE WEST OF BABCOCK RD.
TO: 1.2 MILES WEST OF S.H. 16

SHEET 1 OF 2

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS	CRP 90(1.)M				5
STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR		2452	02	023	LP1604

FTC

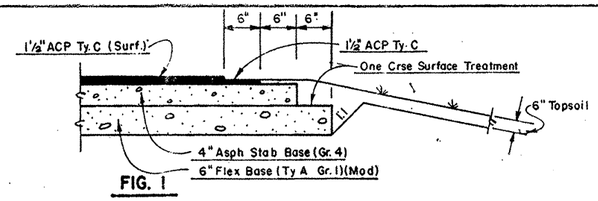


FIG. 1

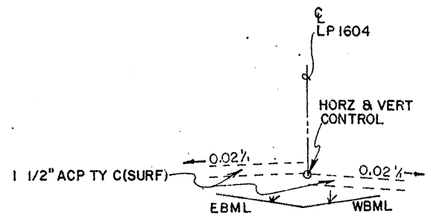
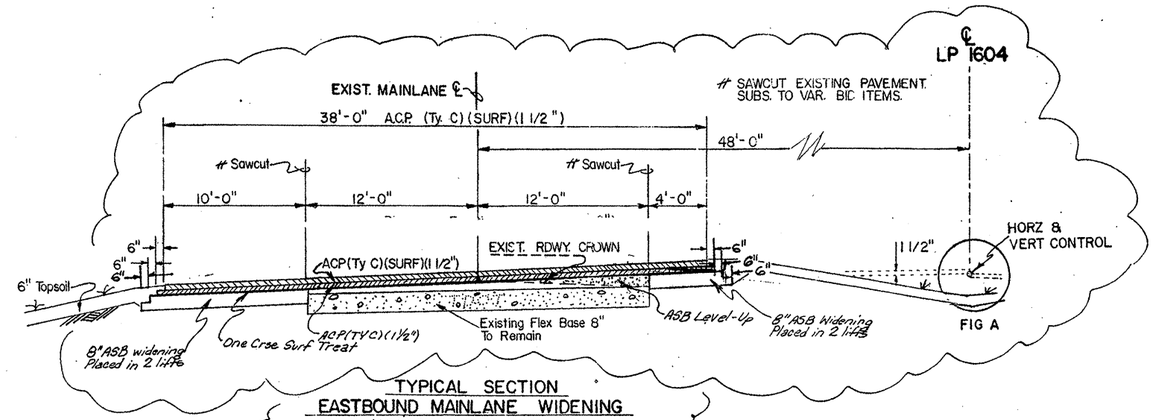
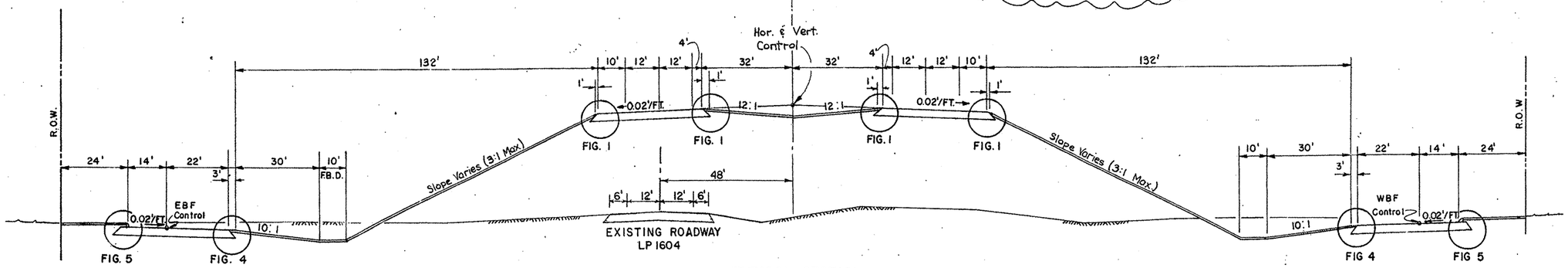


FIG. A



TYPICAL SECTION
EASTBOUND MAINLANE WIDENING
(STATION 10277+00-10337+00)

Note: Intent Here Is To Show That The Exist. Rdwy. To Be Widened From Sta. 10277+00 Thru Sta. 10337+00 Consists of a Crowned Section. ASB Level-Up shall be used to remove the existing Crown which In Turn shall be Followed Up with a 1½" Type "C" & 1½" Type "C" (Surf) As Shown In Typical Above & Fig. A.



TYPICAL SECTION
AT FILL

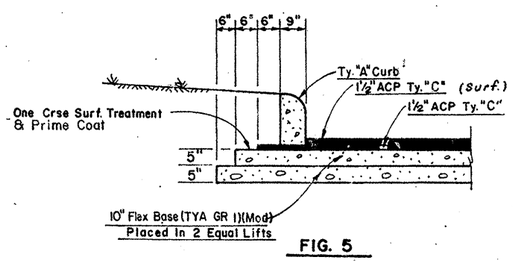
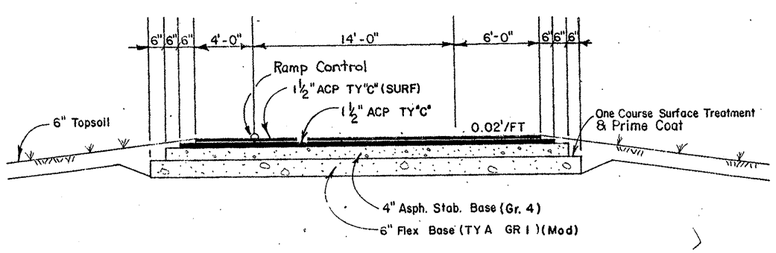


FIG. 5



TYPICAL RAMP SECTION

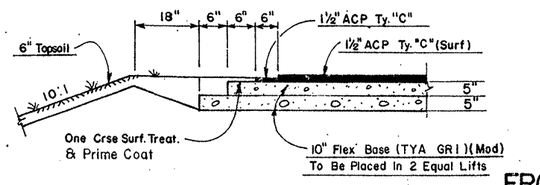


FIG. 4

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED PROFESSIONAL ENGINEER

Gregory A. Biediger P.E.
3-13-1997

Change Order #6

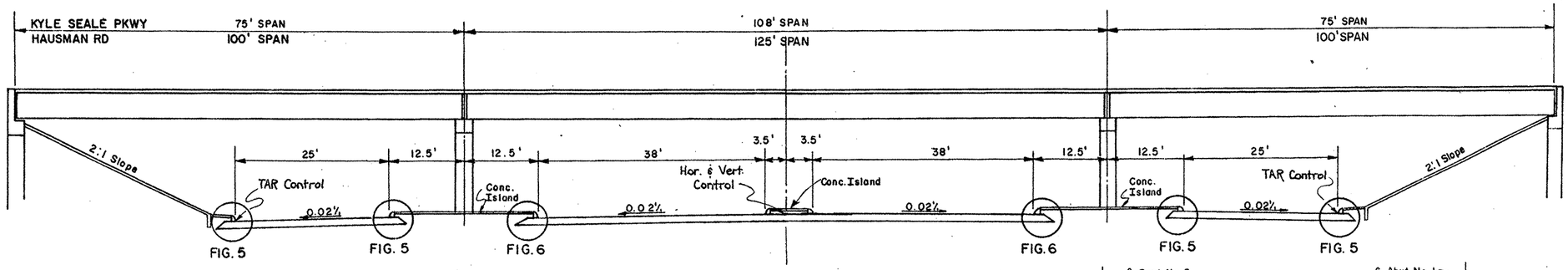
LOOP 1604

FROM: .5 MILE WEST OF BABCOCK RD.
TO: 1.2 MILES WEST OF S.H. 16

SHEET 1 OF 2

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			SHEET NO.
6	TEXAS	CRP 90(191)M			5A
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

ETC.



TYPICAL SECTION
FOR THE INTERSECTIONS AT
KYLE SEALE PKWY
HAUSMAN RD.

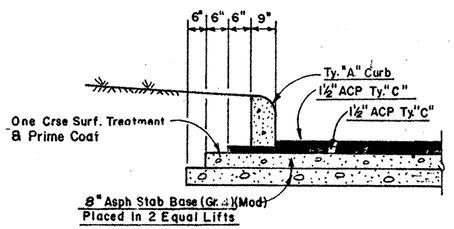


FIG. 6

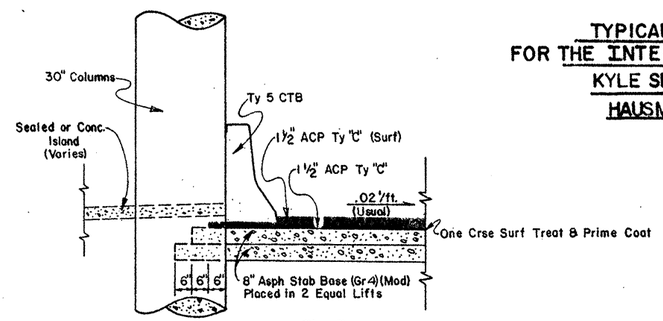
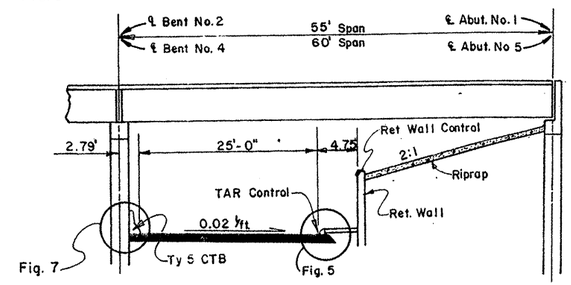
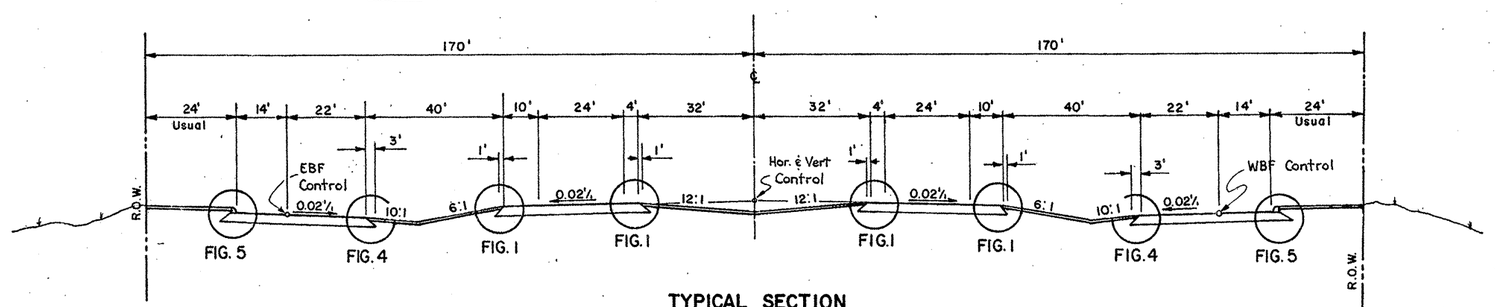


Fig. 7



SH16

Typical WTAR @ SH16
(Mirror View for ETAR @ SH16)



TYPICAL SECTION
AT GRADE

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 2-3-92
Date

LOOP 1604
FROM .5 MILE WEST OF BABCOCK RD
TO 1.2 MILES WEST OF S.H. 16

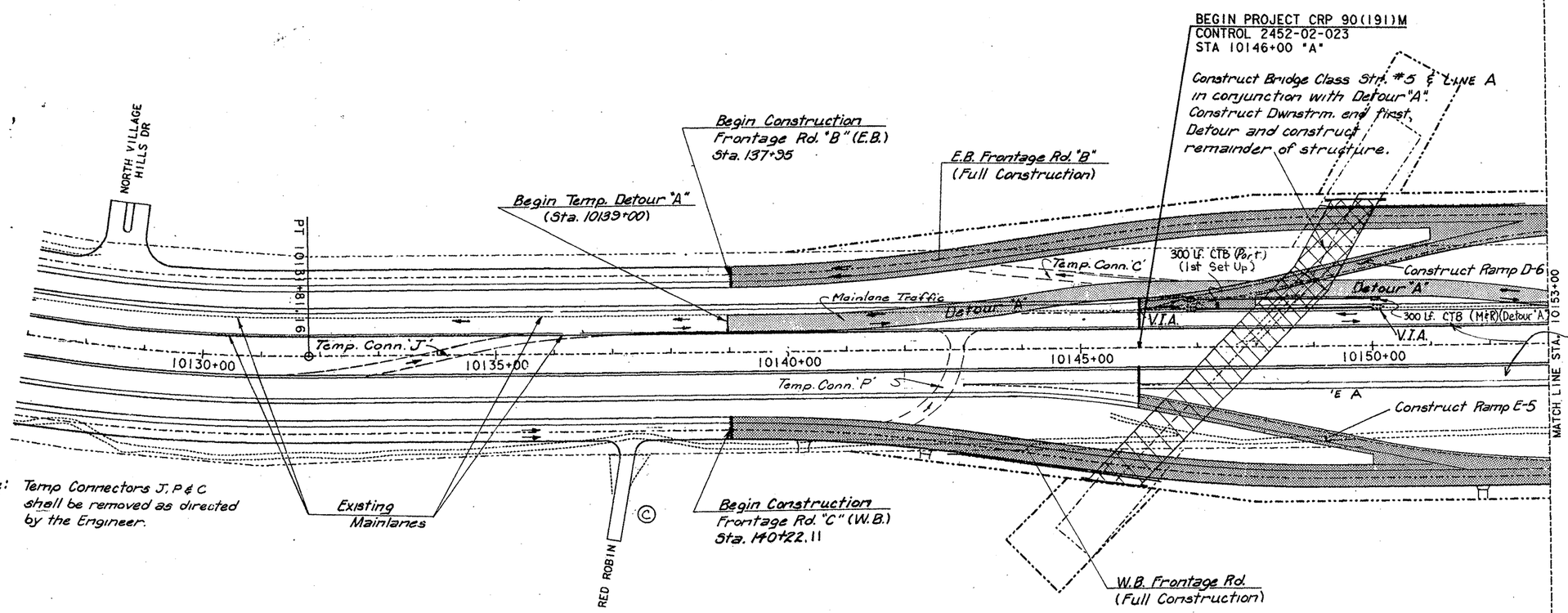
SHEET 2 OF 2

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			SHEET NO.
6	TEXAS	CRP 900( )M			6
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR	2452	02	023	LP 1604

Estimated Quantities		CSJ 2452-02-023
Item	Unit	Qty.
Conc Traf Bar (Port)	Lf.	300
Vehicle Impact Attenuator Assem.	Ea.	30
Conc Traf Bar (M & R)	LF	300
Veh. Impact Attenuator Assem.(M&R)	Ea	30

Dwnstrm. end of B.C. Culvert

Note: It is the responsibility of the Contractor to maintain flow between the proposed and existing culverts without any damage to the proposed or existing roadway. It is also the Contractor's responsibility to provide temporary drainage under all Detours and temporary Driveways. All temporary drainage will be subsidiary to the various bid items and no direct payment will be made.



Note: Temp Connectors J, P & C shall be removed as directed by the Engineer.

SCALE: 1"=100'

PROP. HMS TO BE BUILT IN PHASE II

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 10-9-90
Date

LP 1604
SEQUENCE OF WORK
PHASE I

SHEET 1 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			7
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

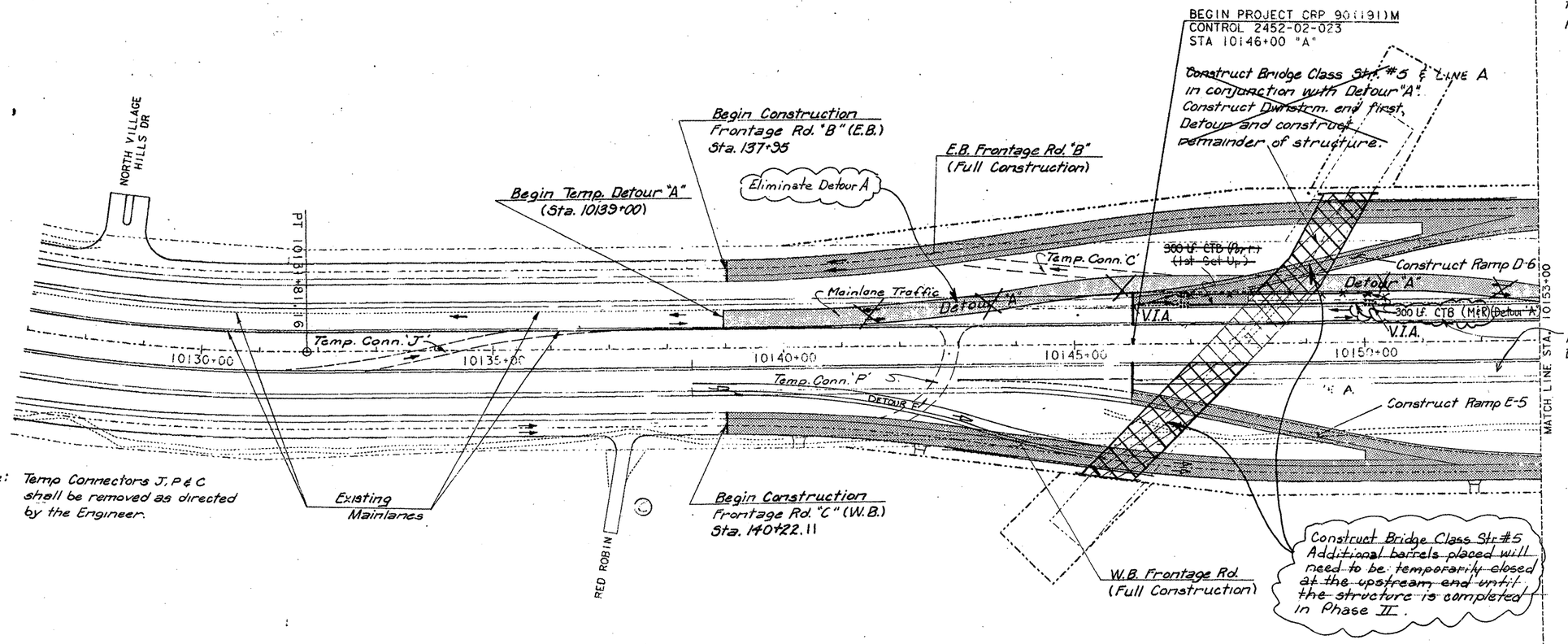
1604L001.DGN

Estimated Quantities		CSJ 2452-02-023
Item	Unit	Qty.
Conc Traf Bar (Port)	Lf.	300
Vehicle Impact Attenuator Assem.	Ea.	30
Conc Traf Bar (M & R)	LF	300
Veh. Impact Attenuator Assem. (M&R)	Ea	30

Note: Detour Quantities See Detour Layout Sheets

Portion of Culvert to be constructed in ~~Dwnstrm. end of B.C. Culvert~~ Phase I.

Note: It is the responsibility of the Contractor to maintain flow between the proposed and existing culverts without any damage to the proposed or existing roadway. It is also the Contractor's responsibility to provide temporary drainage under all Detours and temporary Driveways. All temporary drainage will be subsidiary to the various bid items and no direct payment will be made.



Note: Temp Connectors J, P & C shall be removed as directed by the Engineer.

SCALE: 1"=100'

STATE OF TEXAS GREGORY A. BIEDIGER 61429 REGISTERED PROFESSIONAL ENGINEER

Gregory A. Biediger 2-7-95 for Change Order No. 1

STATE OF TEXAS ROBERT E. MAGER 23726 REGISTERED PROFESSIONAL ENGINEER

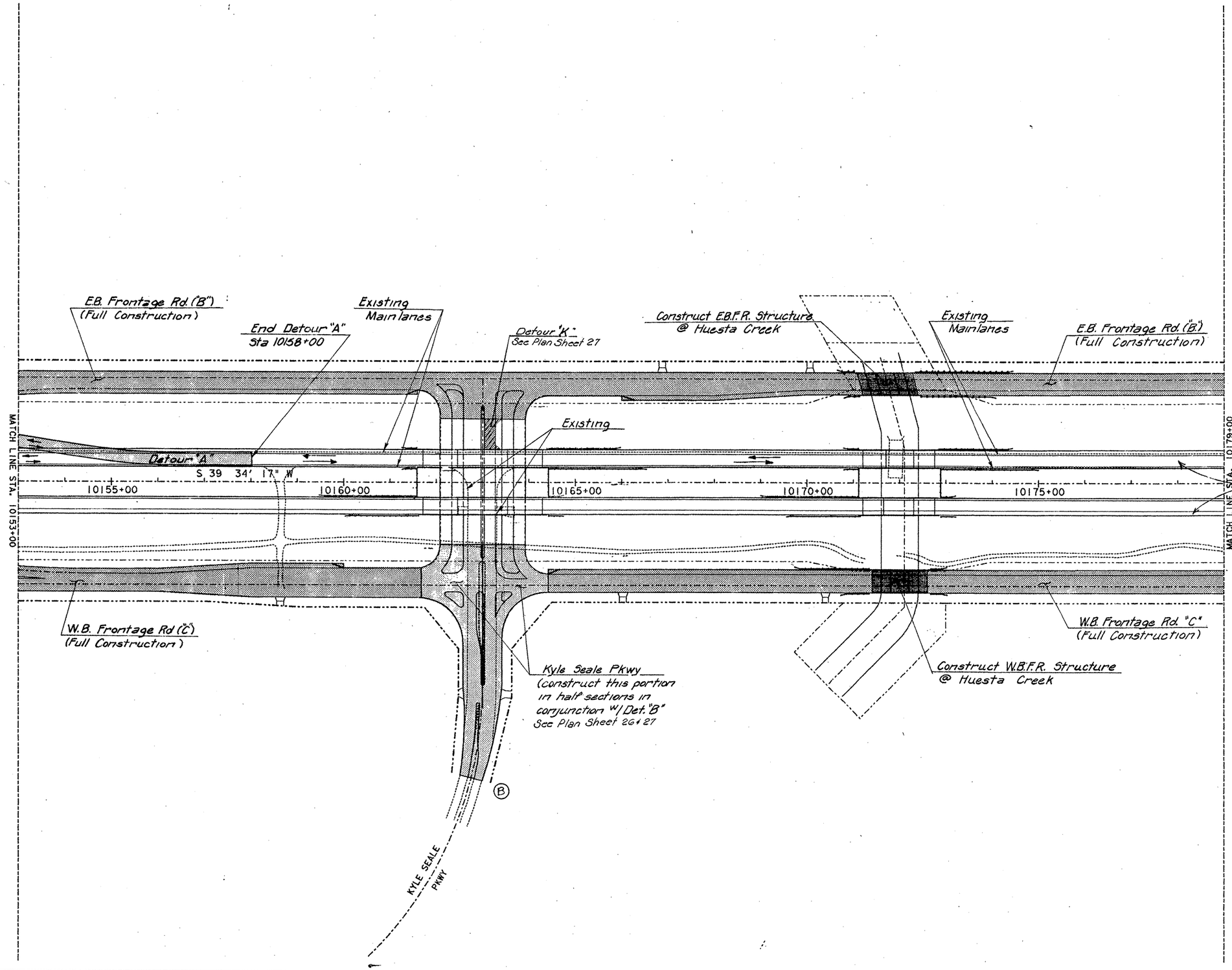
Robert E. Mager 10-9-90

LP 1604
SEQUENCE OF WORK
PHASE I
SHEET 1 OF 9

CHANGE ORDER NO. 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	NH 90(191)M		7A
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L001.DGN



SCALE: 1" = 100'

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

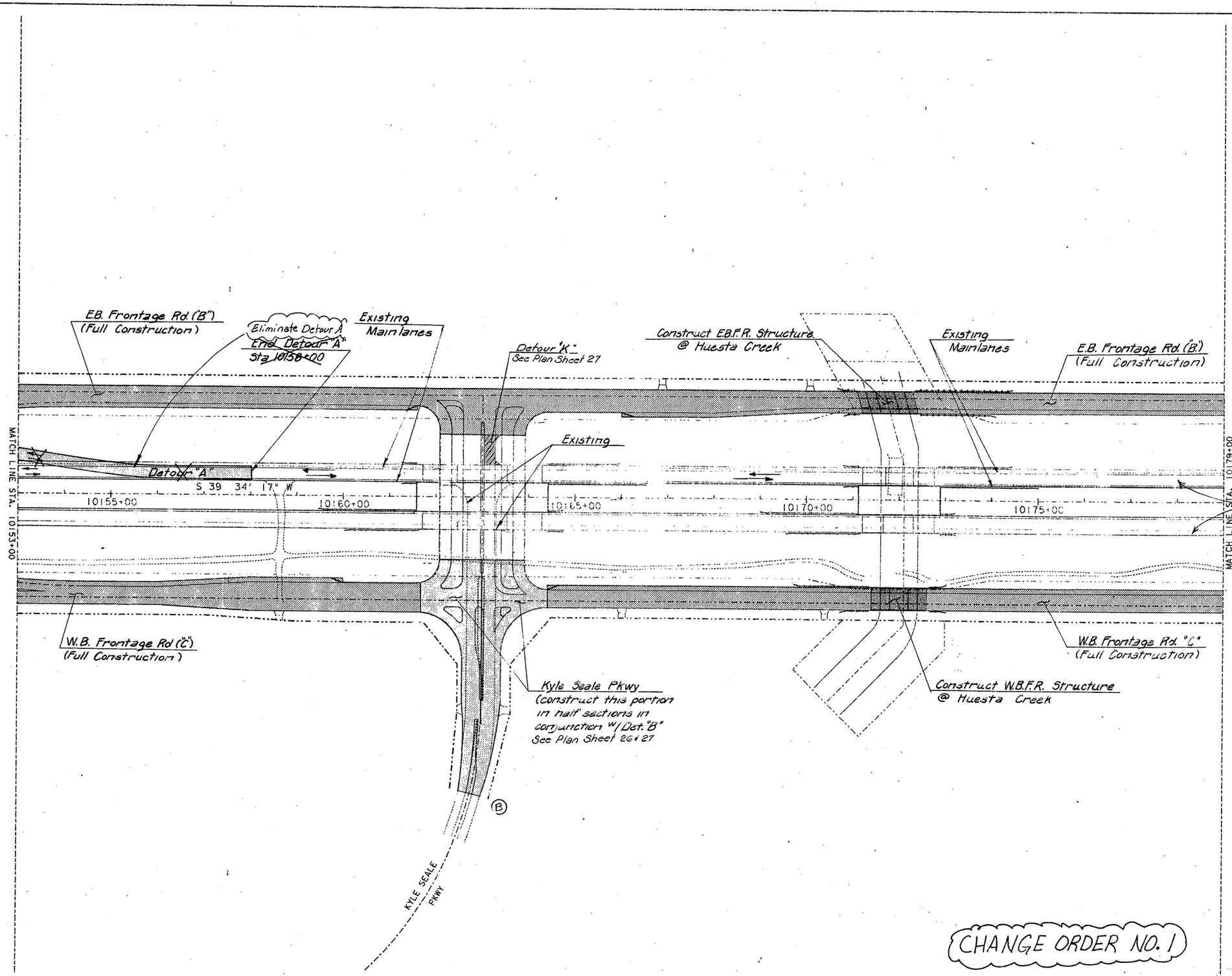
Robert E. Magers P.E. 10-9-90
Robert E. Magers Date

LP 1604
SEQUENCE OF WORK
PHASE I

SHEET 2 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			8
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L002. DGN



STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED
PROFESSIONAL ENGINEER

Gregory A. Biediger
2-7-95
* for Change order #1

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E.
10-3-90
Date

LP 1604
SEQUENCE OF WORK
PHASE I

SHEET 2 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	NH 90(191)M		8A
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP 1604

1604L002.DGN

Dwnstrm. end of B.C. Culvert.

HAUSMAN RD.

B

E.B. Frontage Rd. ("B")
(Full Construction)

Construct this portion of
Hausman Road Intersection
in conjunction w/ Det. "C".
See Plan Sheet 28

E.B. Frontage Rd. ("B")
(Full Construction)

Existing
Mainlanes

Existing
Mainlanes

MATCH LINE STA. 10179+00

10183+89.90

10192+04.10

10180+00

10185+00

10190+00

10195+00

10200+00

S 31 25' 35" W

MATCH LINE STA. 10205+00

M's TO BE BUILT
IN PHASE II

W.B. Frontage Rd. ("C")
(Full Construction)

Construct this portion of
Hausman Road Intersection
in conjunction w/ Det. "C"

W.B. Frontage Rd ("C")
(Full Construction)

Construct Bridge Class Str. # 7A
in conjunction with Detour "C".

B

FM 1560

SCALE: 1" = 100'

STATE OF TEXAS
ROBERT E. MAGERS
54279
REGISTERED
PROFESSIONAL ENGINEER

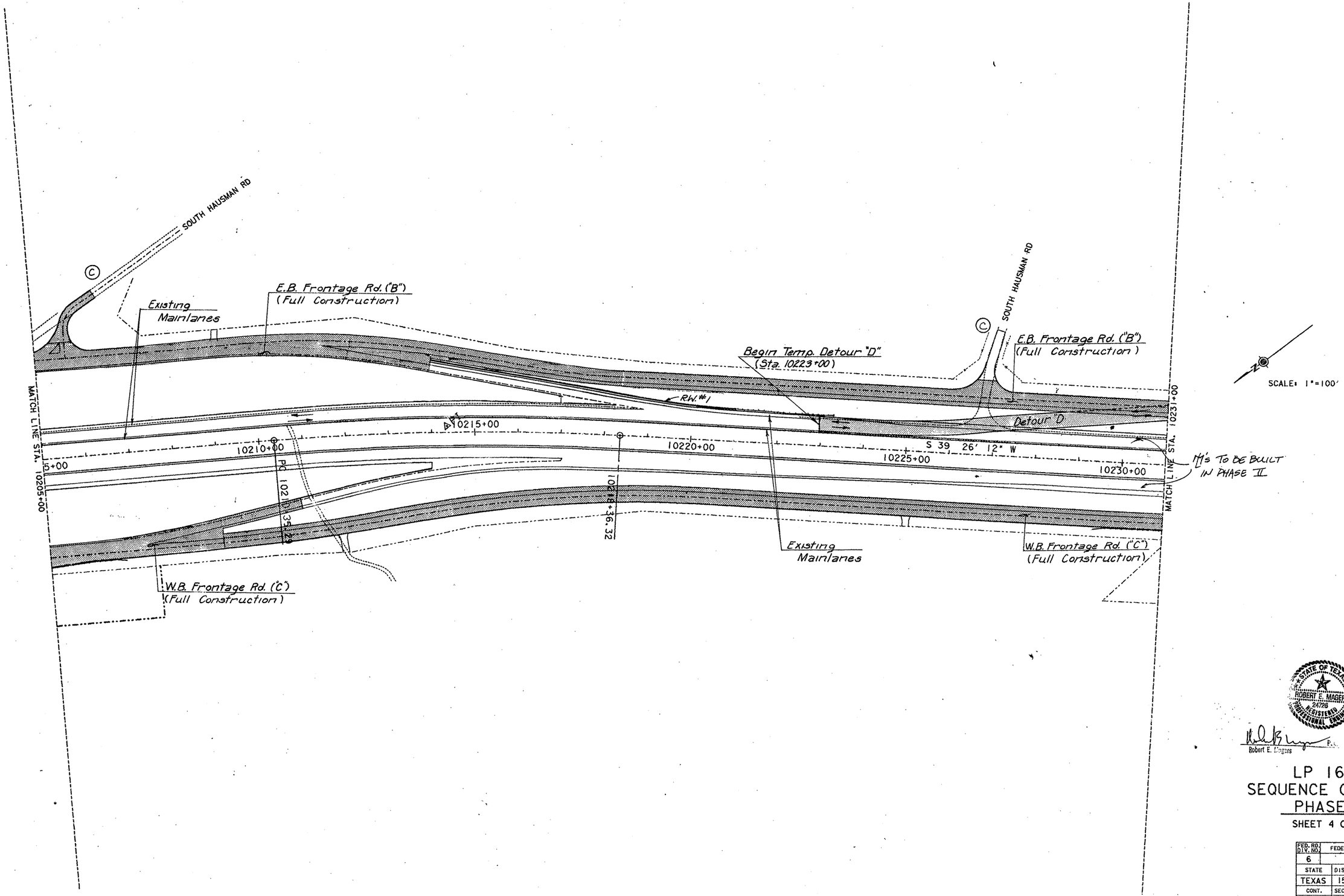
Robert E. Magers P.E. 10-9-90
Date

LP 1604
SEQUENCE OF WORK
PHASE I

SHEET 3 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			9
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L003. DGN



STATE OF TEXAS
ROBERT E. MAGERS
94728
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 10-9-90
Robert E. Magers Date

LP 1604
SEQUENCE OF WORK
PHASE I

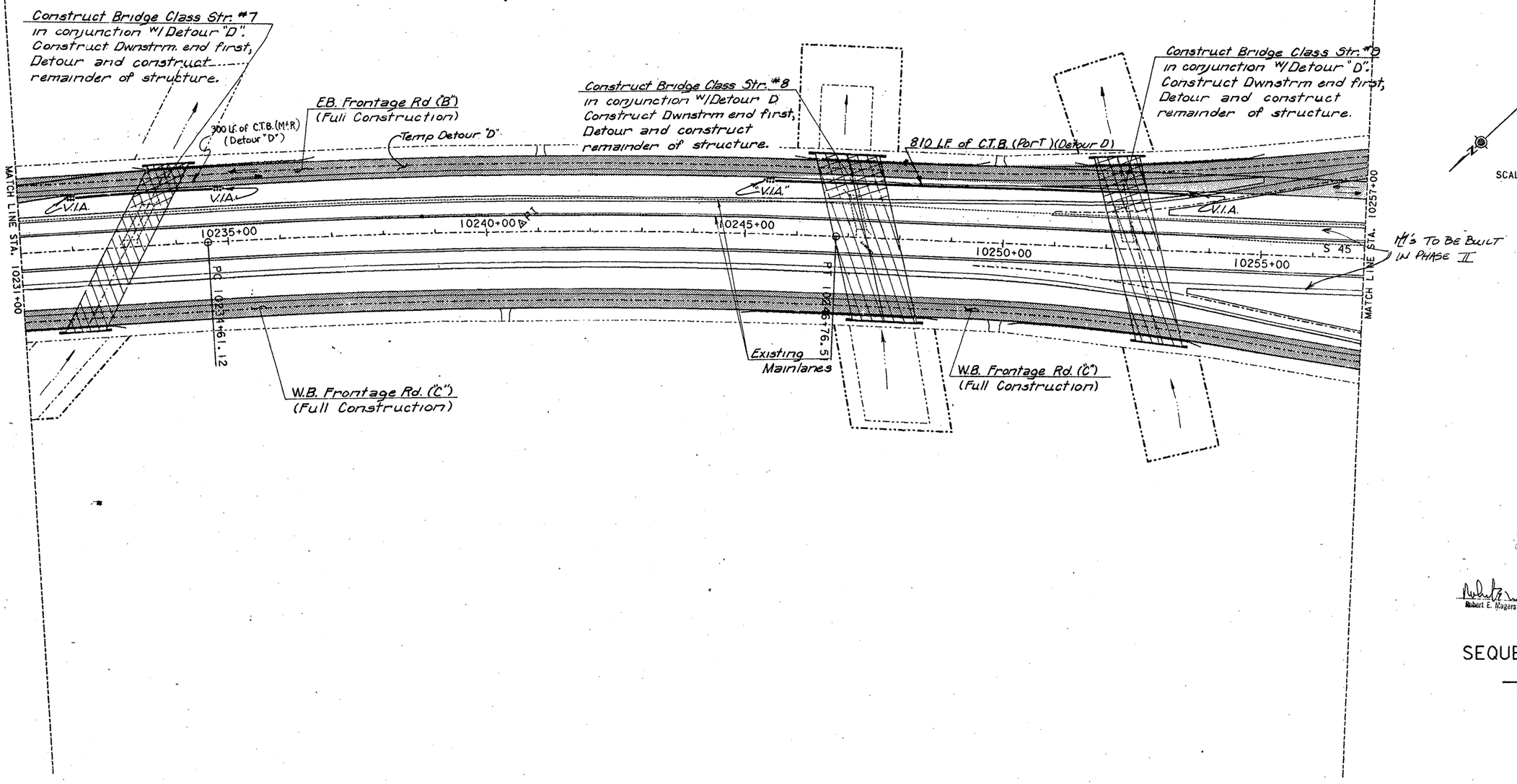
SHEET 4 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			10
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L004.DGN

Estimated Quantities		CSJ 2452-02-023
Item	Unit	Qty.
Conc Traffic Barrier (Move + Reset)	Lf	300
Vehicle Impact Attenuator Assem.	Ea	60
Conc Traf Bar (Port)	LF	810
Veh Impact Attenuator Assem. (Remov)	EA	60

Dwnstrm. end of B.C. Culvert



STATE OF TEXAS
ROBERT E. MAGERS
24728
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 10-9-90
Robert E. Magers Date

LP 1604
SEQUENCE OF WORK
PHASE I

SHEET 5 OF 9

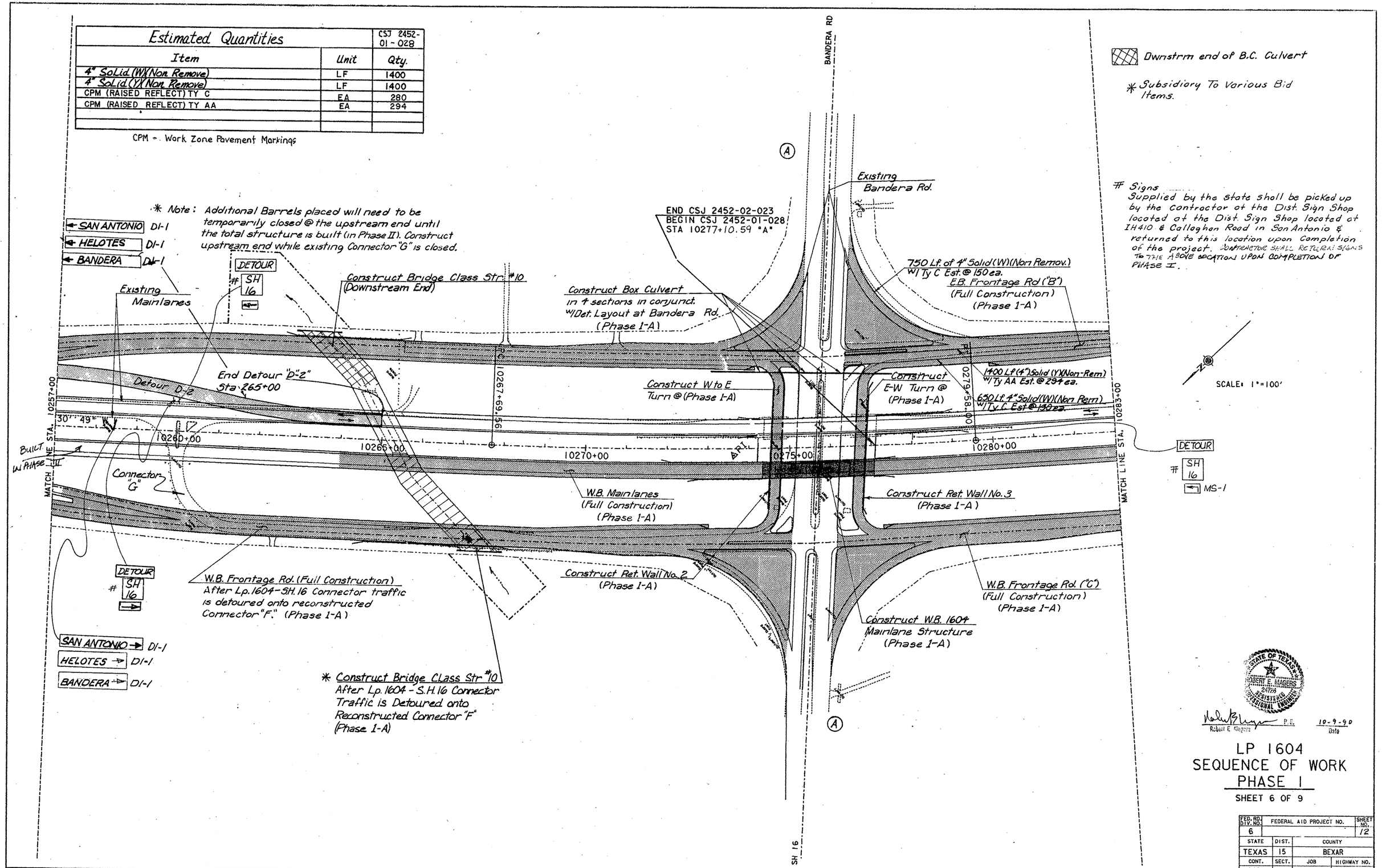
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			11
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L005.DGN

11

Estimated Quantities		CSJ 2452-01-028
Item	Unit	Qty.
4" Solid (W)(Non Remove)	LF	1400
4" Solid (Y)(Non Remove)	LF	1400
CPM (RAISED REFLECT) TY C	EA	280
CPM (RAISED REFLECT) TY AA	EA	294

CPM - Work Zone Pavement Markings



STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 10-9-90
Date

LP 1604
SEQUENCE OF WORK
PHASE I

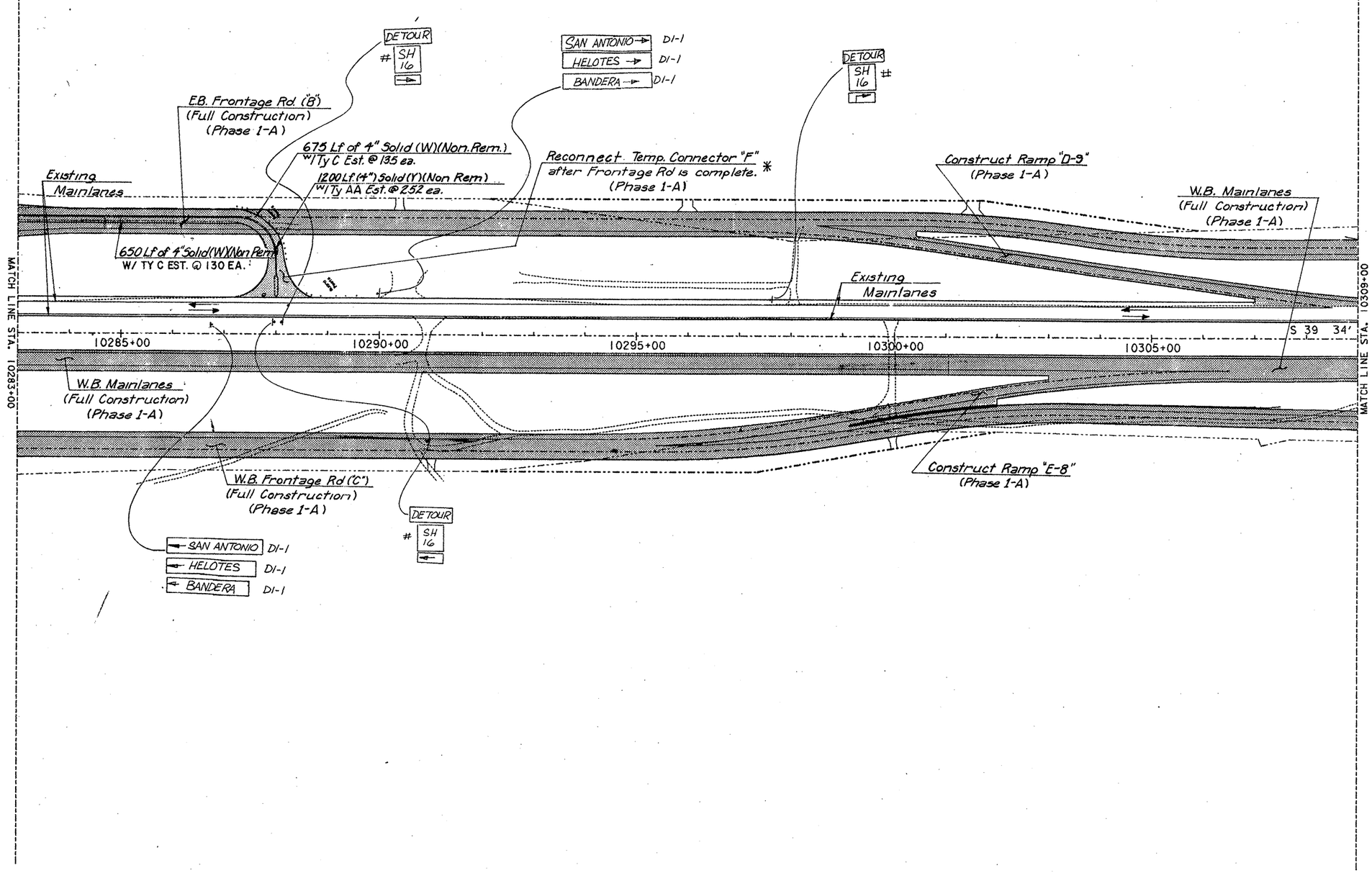
SHEET 6 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			12
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L006.DGN

ESTIMATED QUANTITIES		CSJ 2452-01-028
ITEM	UNIT	QTY.
CPM 4" SOLID (W) (NON-REMOV)	LF	1325
CPM 4" SOLID (Y) (NON-REMOV)	LF	1200
CPM (RAISED REFLECT) TY C	EA	265
CPM (RAISED REFLECT) TY AA	EA	252

CPM -- Work Zone Pavement Markings



* Subsidiary To Various Bid Items.

SCALE: 1"=100'

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers

10-9-90
Date

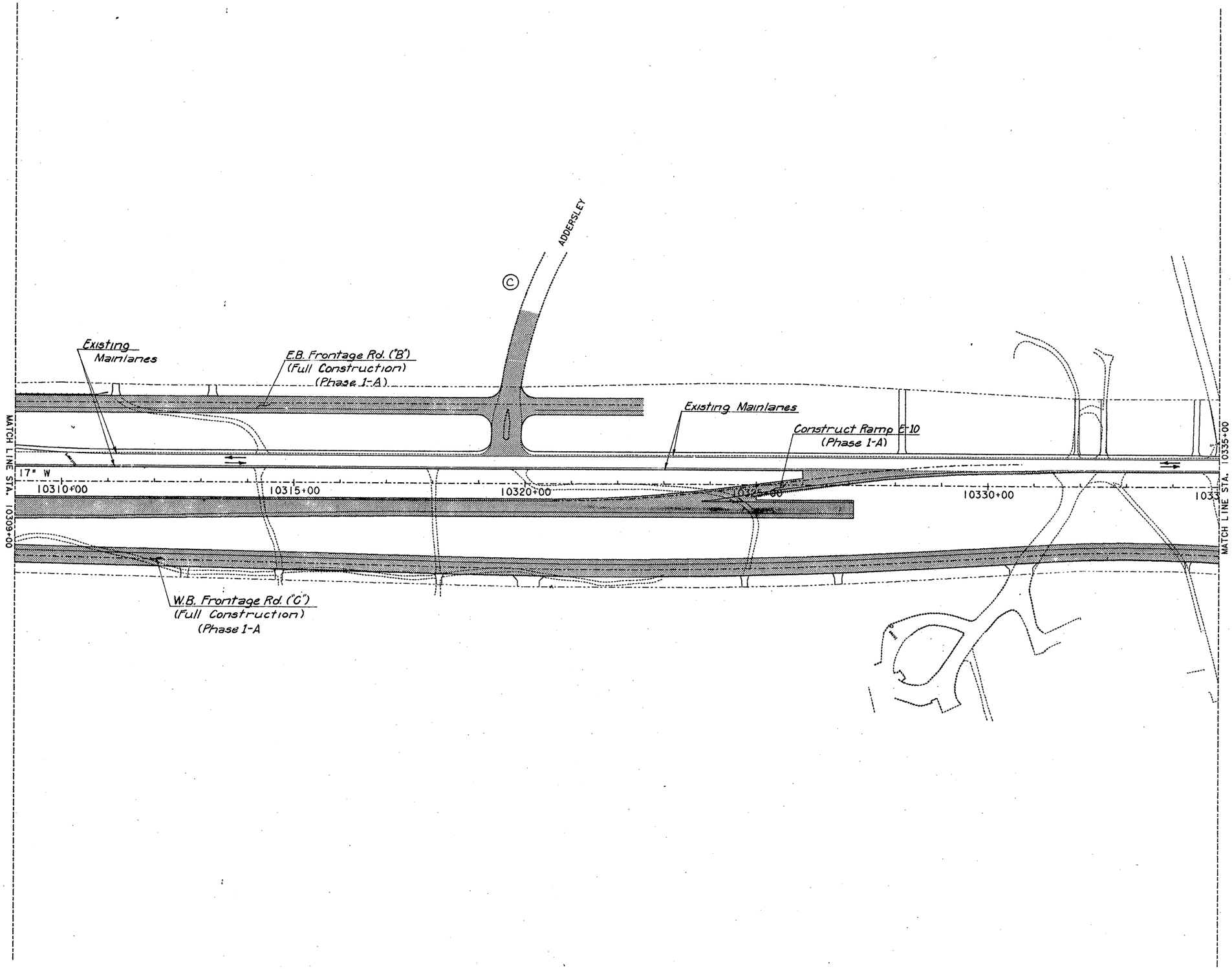
LP 1604
SEQUENCE OF WORK
PHASE I

SHEET 7 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			13
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L007.DGN

13



SCALE: 1"=100'

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E.
Robert E. Magers

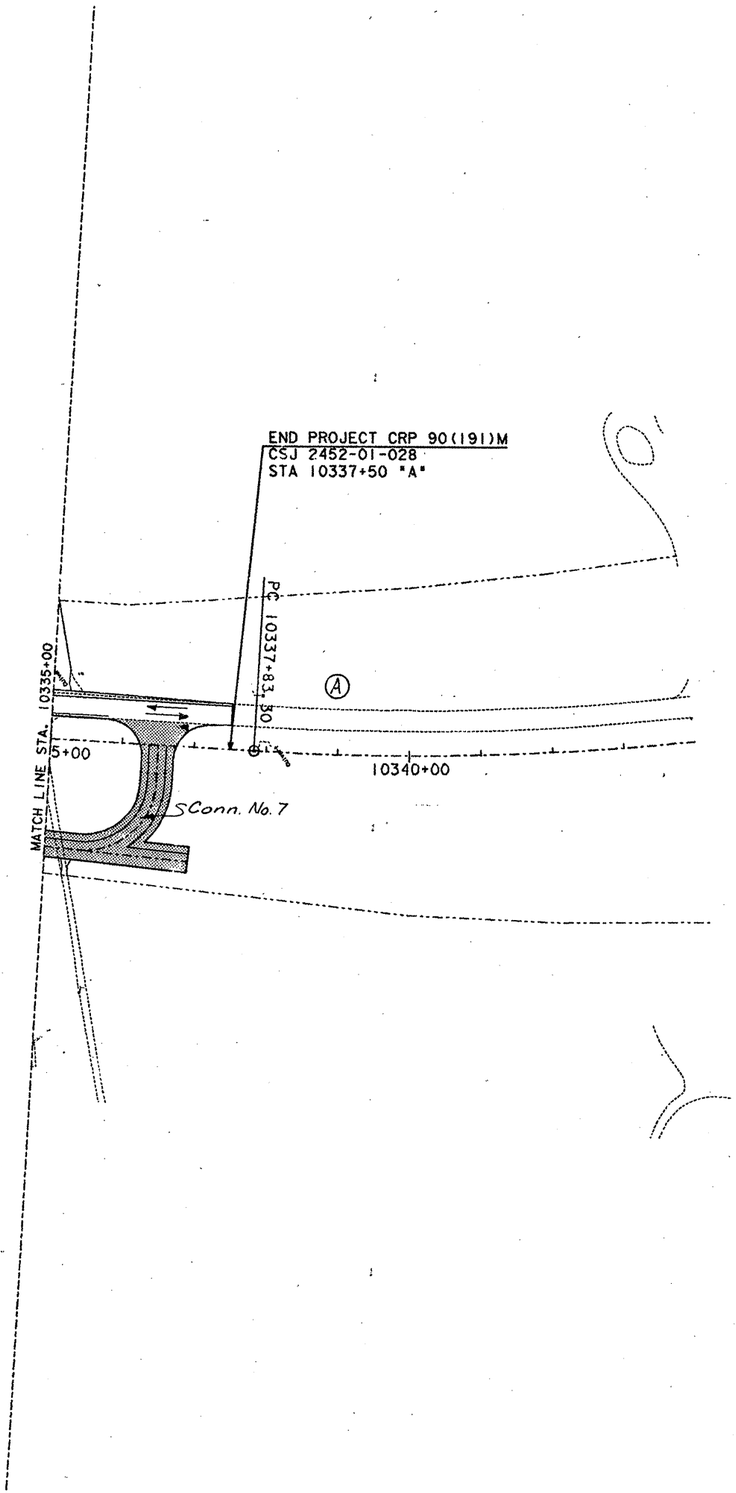
10-9-90
Date

LP 1604
SEQUENCE OF WORK
PHASE I

SHEET 8 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			14
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L008.DGN



SCALE: 1"=100'

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E.

10-9-99
Date

LP 1604
SEQUENCE OF WORK
PHASE I

SHEET 9 OF 9

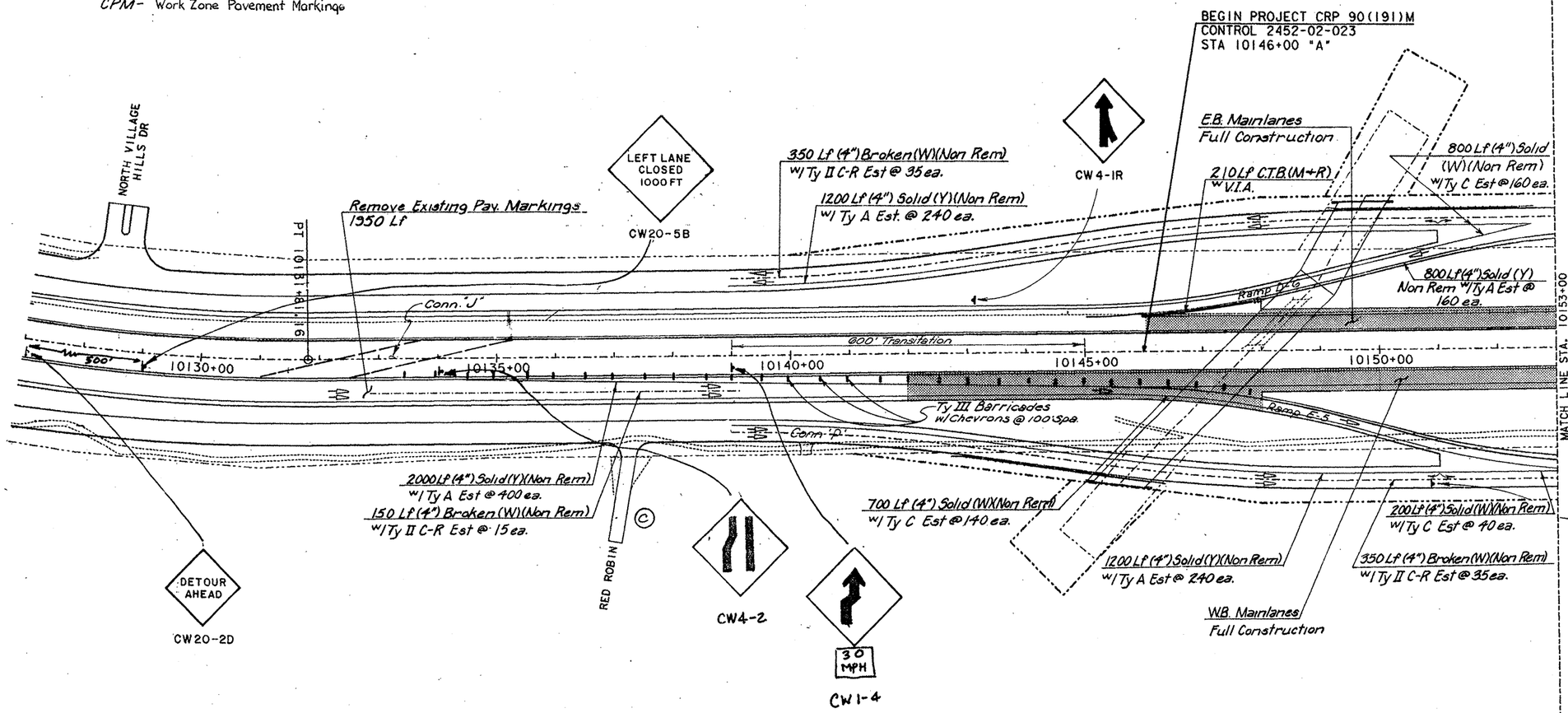
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			15
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

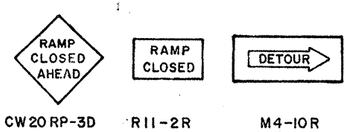
1604L009.DGN

Estimated Quantities		CSJ - 2452-02-023
Item	Unit	Qty.
CPM(Non Remove)(4")(W)Solid	LF	1,700
CPM(Non Remove)(4")(W)Broken	LF	850
CPM(Non Remove)(4")(Y)Solid	LF	5,200
CPM(Raised Reflect)(Ty "A")	EA	1,040
CPM(Raised Reflect)(Ty "C")	EA	340
Traffic Button (Ty II C-R)	EA	85
CTB(Remove)	LF	210
Veh. Impact Attenuator Assem. (Remov)	EA	15
Remove Pavement Markings (4")	LF	1,950
Conc. Traffic Barrier (Move + Reset)	LF	210
* Vehicle Impact Attenuator Assem. (M & R)	EA	15

CPM- Work Zone Pavement Markings

Note: It is the responsibility of the Contractor to maintain flow between the proposed and existing culvert without any damages to the proposed or existing roadway. It is also the Contractors responsibility to provide temporary drainage under all Detours and Temporary Driveways. All temporary drainage shall be considered subsidiary to the various bid items and no direct payment shall be made.





* W.B. Entrance Ramp West of Babcock Rd to be closed. These signs shall be placed on the W.B. Frontage Road.

STATE OF TEXAS ROBERT E. MAGERS 24723 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 10-9-90 Date

LP 1604
SEQUENCE OF WORK
PHASE II

SHEET 1 OF 9

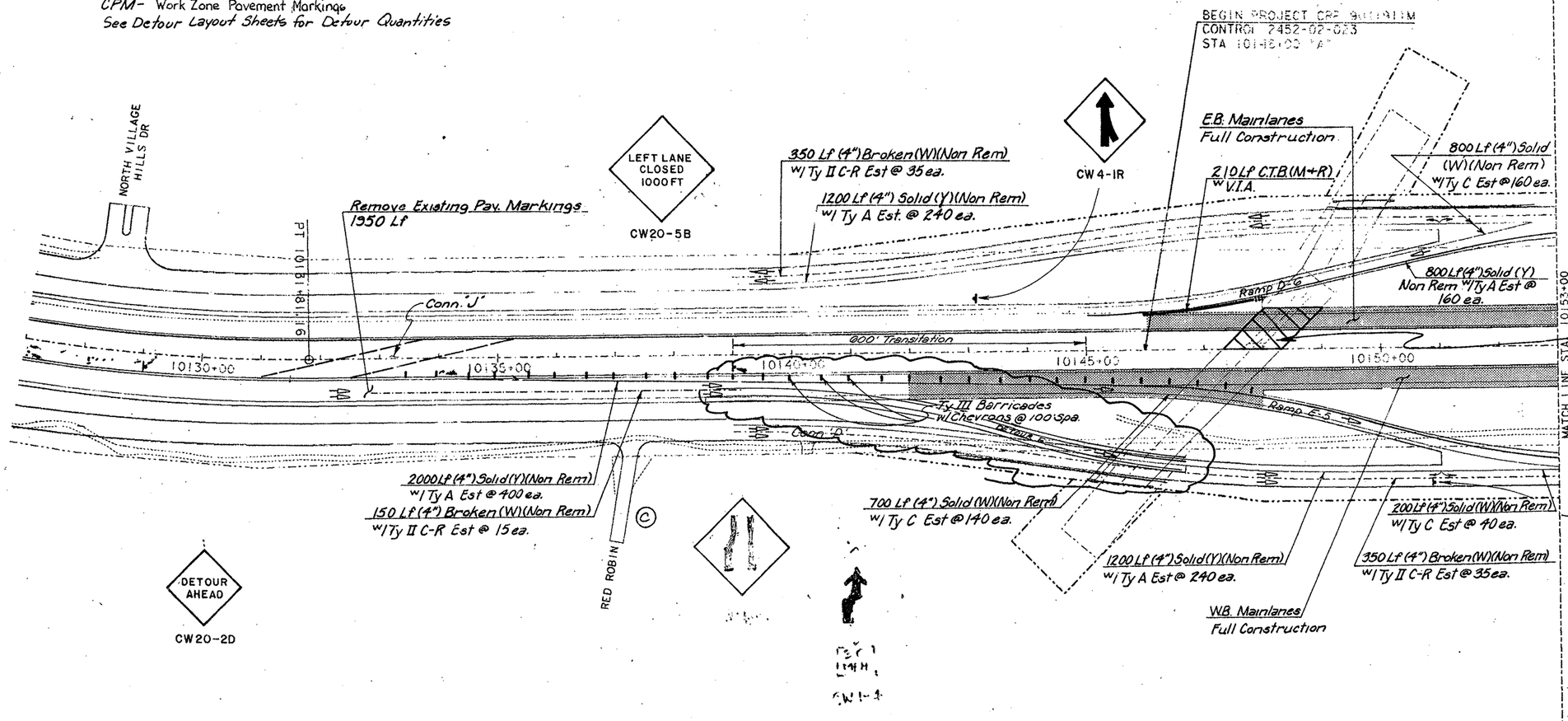
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			16
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L001.DGN

Estimated Quantities		CSJ - 2452-02-023
Item	Unit	Qty.
CPM(Non Remove)(4")(W)Solid	LF	1,700
CPM(Non Remove)(4")(W)Broken	LF	850
CPM(Non Remove)(4")(Y)Solid	LF	5,200
CPM(Raised Reflect)(Ty "A")	EA	1,040
CPM(Raised Reflect)(Ty "C")	EA	340
Traffic Button (Ty II C-R)	EA	85
CTB(Remove)	LF	210
Veh. Impact Attenuator Assem. (Remov)	EA	15
Remove Pavement Markings (4")	LF	1,950
Conc. Traffic Barrier (Move + Reset)	LF	210
* Vehicle Impact Attenuator Assem. (M & R)	EA	15

CPM- Work Zone Pavement Markings
See Detour Layout Sheets for Detour Quantities

Note: It is the responsibility of the Contractor to maintain flow between the proposed and existing culvert without any damages to the proposed or existing roadway. It is also the Contractors responsibility to provide temporary drainage under all Detours and Temporary Driveways. All temporary drainage shall be considered subsidiary to the various bid items and no direct payment shall be made.



* W.B. Entrance Ramp West of Babcock Rd to be closed. These signs shall be placed on the W.B. Frontage Road.

CHANGE ORDER NO. 1

STATE OF TEXAS GREGORY A. BIEDIGER 61429 REGISTERED PROFESSIONAL ENGINEER

* Gregory A. Biediger 2-7-95
* for ~~Field Change No~~ Change Order No. 1

STATE OF TEXAS REGISTERED PROFESSIONAL ENGINEER

Robert E. Higgins P.E. 10-9-90
Date

LP 1604
SEQUENCE OF WORK
PHASE II

SHEET 1 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			K-9
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L001.DGN

Estimated Quantities		CSJ 2452-02-023
Item	Unit	Qty.
CPM(Non Remove)(4")(W)Solid	LF	700
CPM(Non Remove)(4")(W)Broken	LF	2525
CPM(Non Remove)(4")(Y)Solid	LF	5,400
CPM(Raised Reflect)(Ty "A")	EA	1,080
CPM(Raised Reflect)(Ty "C")	EA	140
Traffic Button (Ty II C-R)	EA	253

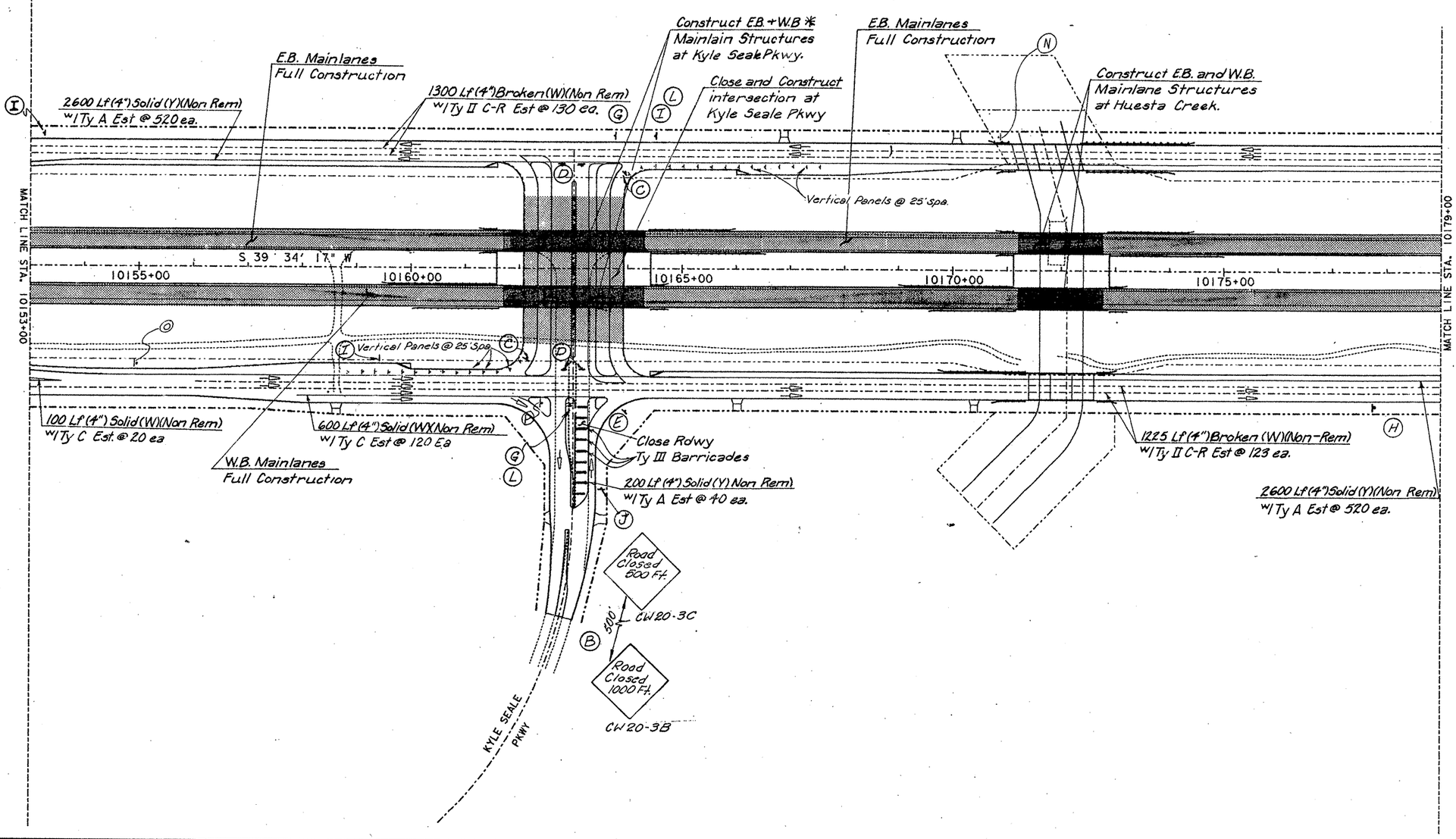
CPM- Work Zone Pavement Markings

	ROAD CLOSED	DETOUR	YIELD	DETOUR	EAST	WEST	FM 1604		LP 1604		DETOUR KYLE SEAL	DETOUR		JCT	NORTH	SOUTH		DETOUR	DETOUR	HAUSMAN RD
	R11-2	M4-10R/L	R1-2	M4-8	M3-2	M3-4	#	M6-1	#	M6-3	#	M4-9S	D1-1	M2-1	M3-1	M3-3	M5-1	M4-9S R/L	M4-9A R/L	#
C	1																			
D	1	1																		
E			1																	
F				1				1												
G				1			1	1												1
H				1			1			1										
I			1△								1	1△								
J				1	1			1	1											
K				1						1										1
L				1		1		1	1											
N				1		1	1		1								1			
O			1								1								1	
P											1							1		

* Hausman Rd. intersection must be completed before closing Kyle Seale.

\# Supplied by State See Sheet 32 for Note.

△ Note : Two more complet installations of Signs I will be required at Babcock with the appropriate M4-9S or M4-10R



SCALE: 1"=100'

STATE OF TEXAS
ROBERT E. MAGERS
24723
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers 10-9-90
Date

LP 1604
SEQUENCE OF WORK
PHASE II

SHEET 2 OF 9

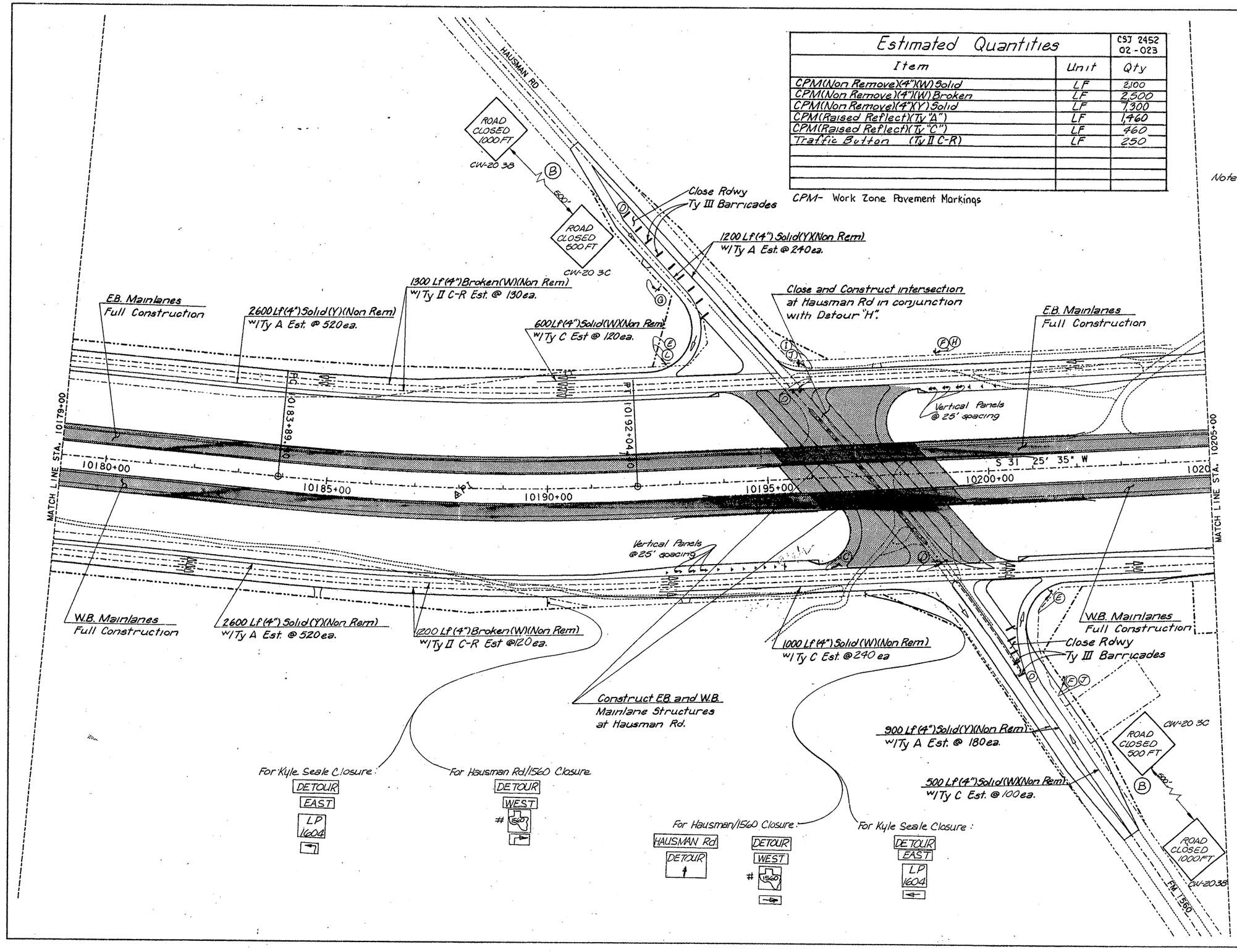
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			17
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L002.DGN

Estimated Quantities		CSJ 2452 02-023
Item	Unit	Qty
CPM(Non Remove)(4")(W) Solid	LF	2,100
CPM(Non Remove)(4")(W) Broken	LF	2,500
CPM(Non Remove)(4")(Y) Solid	LF	7,300
CPM(Raised Reflect)(Ty "A")	LF	1,460
CPM(Raised Reflect)(Ty "C")	LF	460
Traffic Button (Ty II C-R)	LF	250

CPM- Work Zone Pavement Markings

Note: See Sheet 12 for Schedule of Barricades



SCALE: 1" = 100'

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 10-9-90

LP 1604
SEQUENCE OF WORK
PHASE II

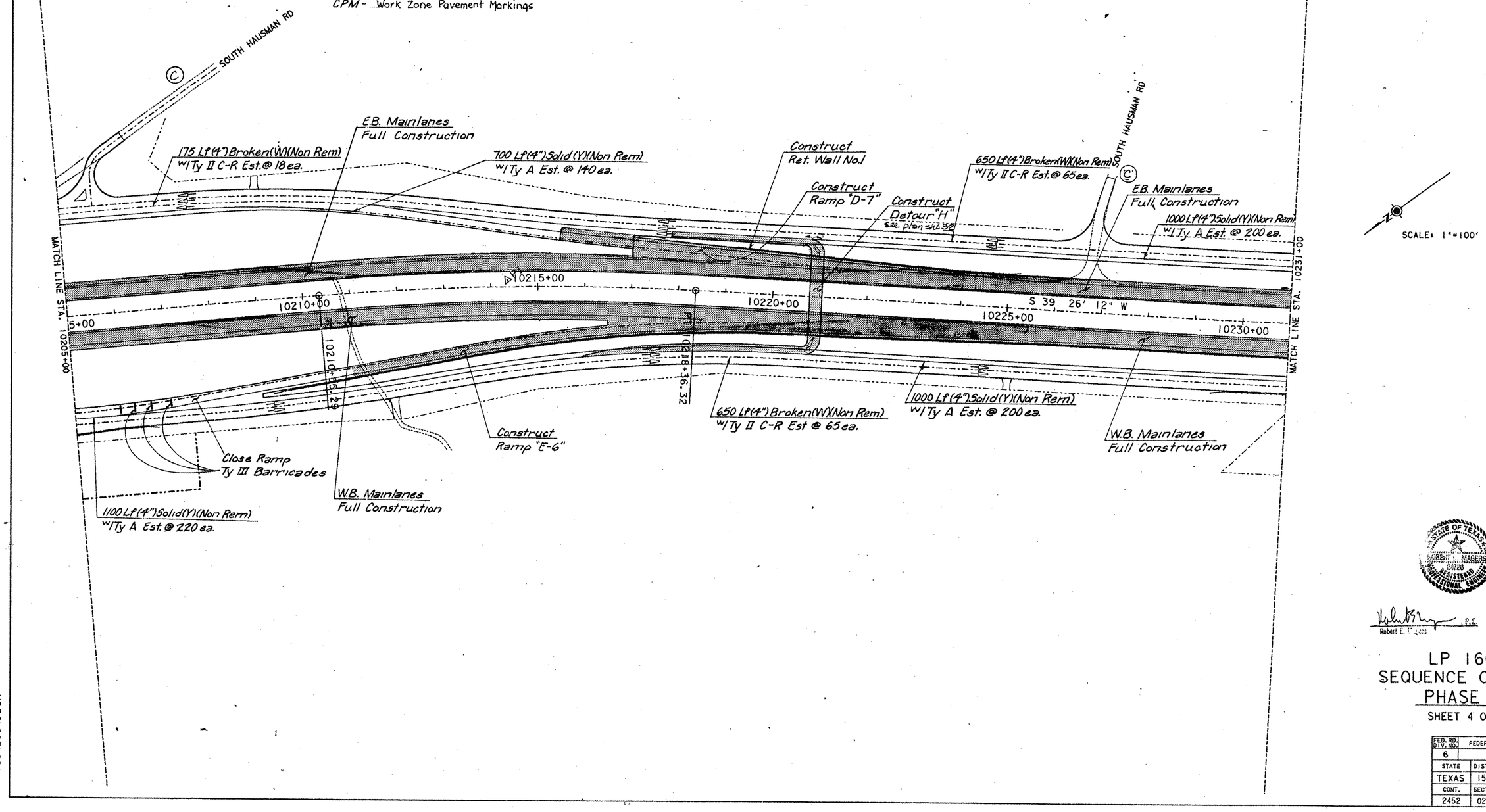
SHEET 3 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			18
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L003.DGN

Estimated Quantities		CSJ 2452-02-023
Item	Unit	Qty.
CPM(Non Remove)(4")(W)Broken	LF	1475
CPM(Non Remove)(4")(Y)Solid	LF	3800
CPM(Raised Reflect)(Ty "A")	EA	760
Traffic Button (Ty II C-R)	EA	148

CPM - Work Zone Pavement Markings



1604L004.DGN

STATE OF TEXAS
ROBERT E. MAGERS
53720
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 10-9-90
Robert E. Magers Date

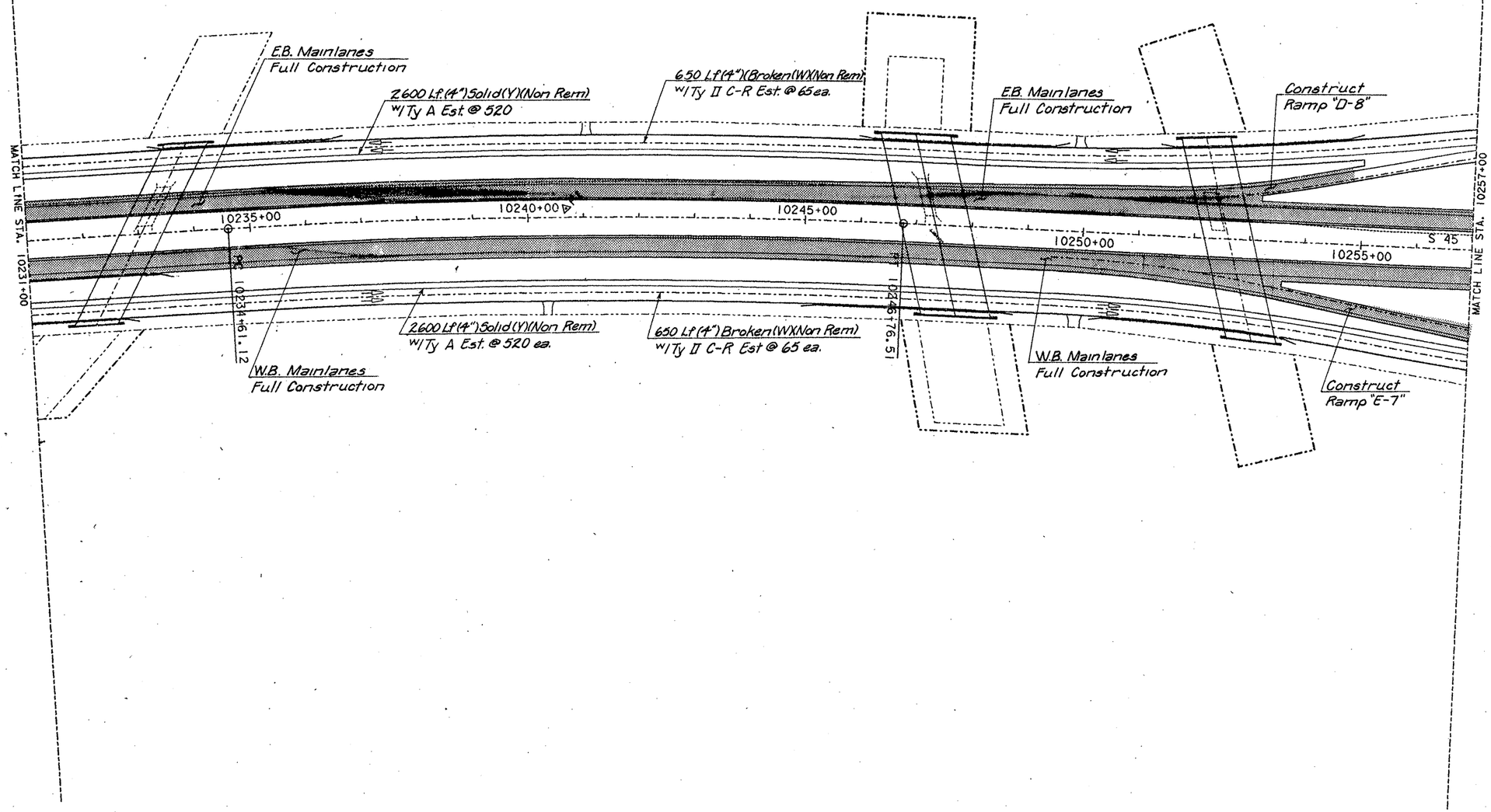
LP 1604
SEQUENCE OF WORK
PHASE II

SHEET 4 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			13
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

Estimated Quantities		CSJ 2452-02-023
Item	Unit	Qty.
CPM(Non Remove)(4")(W)Broken	LF	1,300
CPM(Non Remove)(4")(Y)Solid	LF	5,200
CPM(Raised Reflect)(Ty "A")	EA	1,040
Traffic Button (Ty II C-R)	EA	130

CPM- Work Zone Pavement Markings



SCALE: 1" = 100'

STATE OF TEXAS
ROBERT E. MAGERS
74728
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 10-9-90

LP 1604
SEQUENCE OF WORK
PHASE II

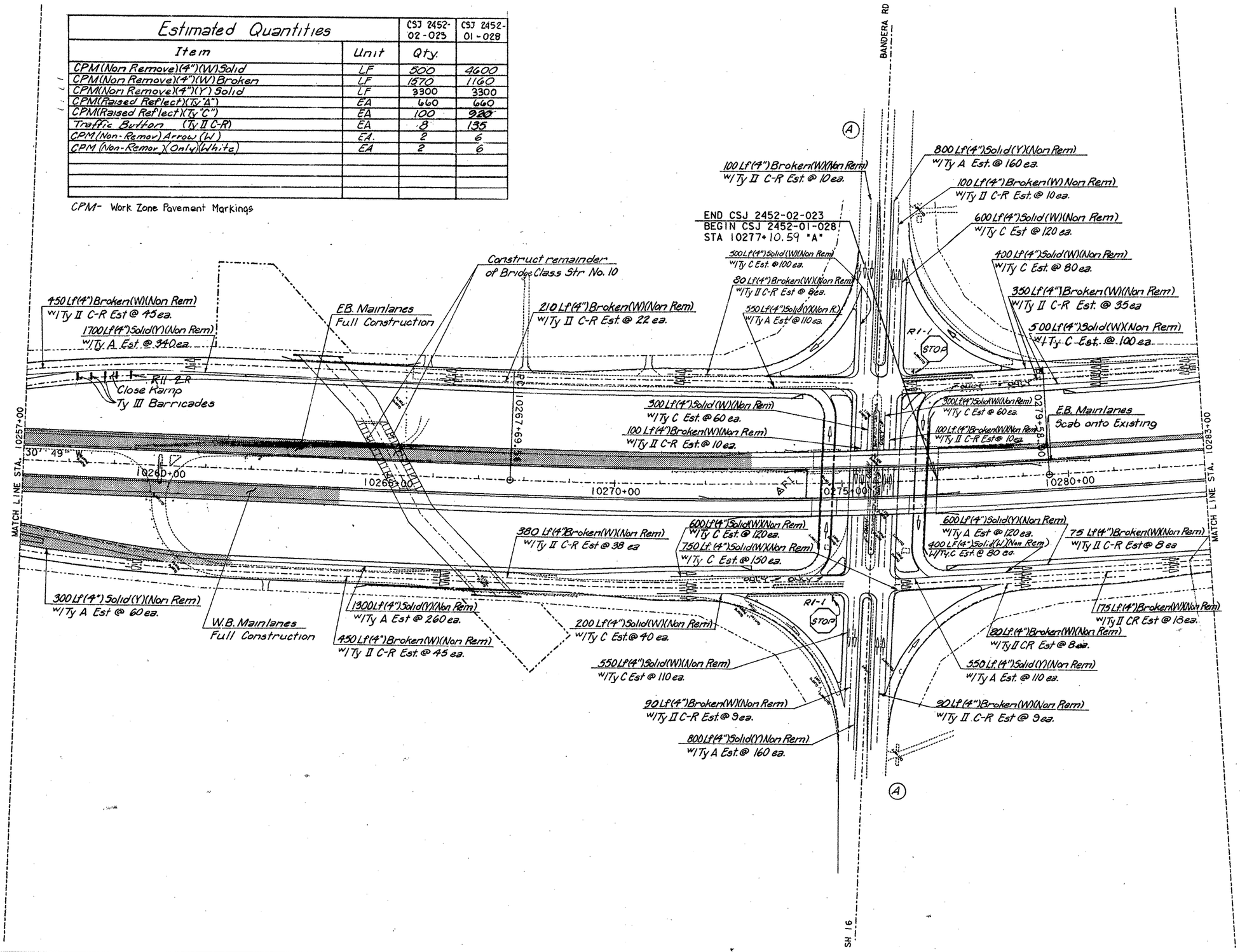
SHEET 5 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			20
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L005.DGN

Estimated Quantities		CSJ 2452-02-023	CSJ 2452-01-028
Item	Unit	Qty.	
CPM(Non Remove)(4")(W)Solid	LF	500	4600
CPM(Non Remove)(4")(W)Broken	LF	1570	1160
CPM(Non Remove)(4")(Y)Solid	LF	3300	3300
CPM(Raised Reflect)(Ty "A")	EA	660	660
CPM(Raised Reflect)(Ty "C")	EA	100	920
Traffic Button (Ty II C-R)	EA	8	135
CPM(Non-Remov) Arrow (W)	EA.	2	6
CPM (Non-Remov)(Only)(White)	EA	2	6

CPM- Work Zone Pavement Markings



SCALE: 1"=100'

STATE OF TEXAS
MAGEE
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. P.E 10-9-98

LP 1604
SEQUENCE OF WORK
PHASE II

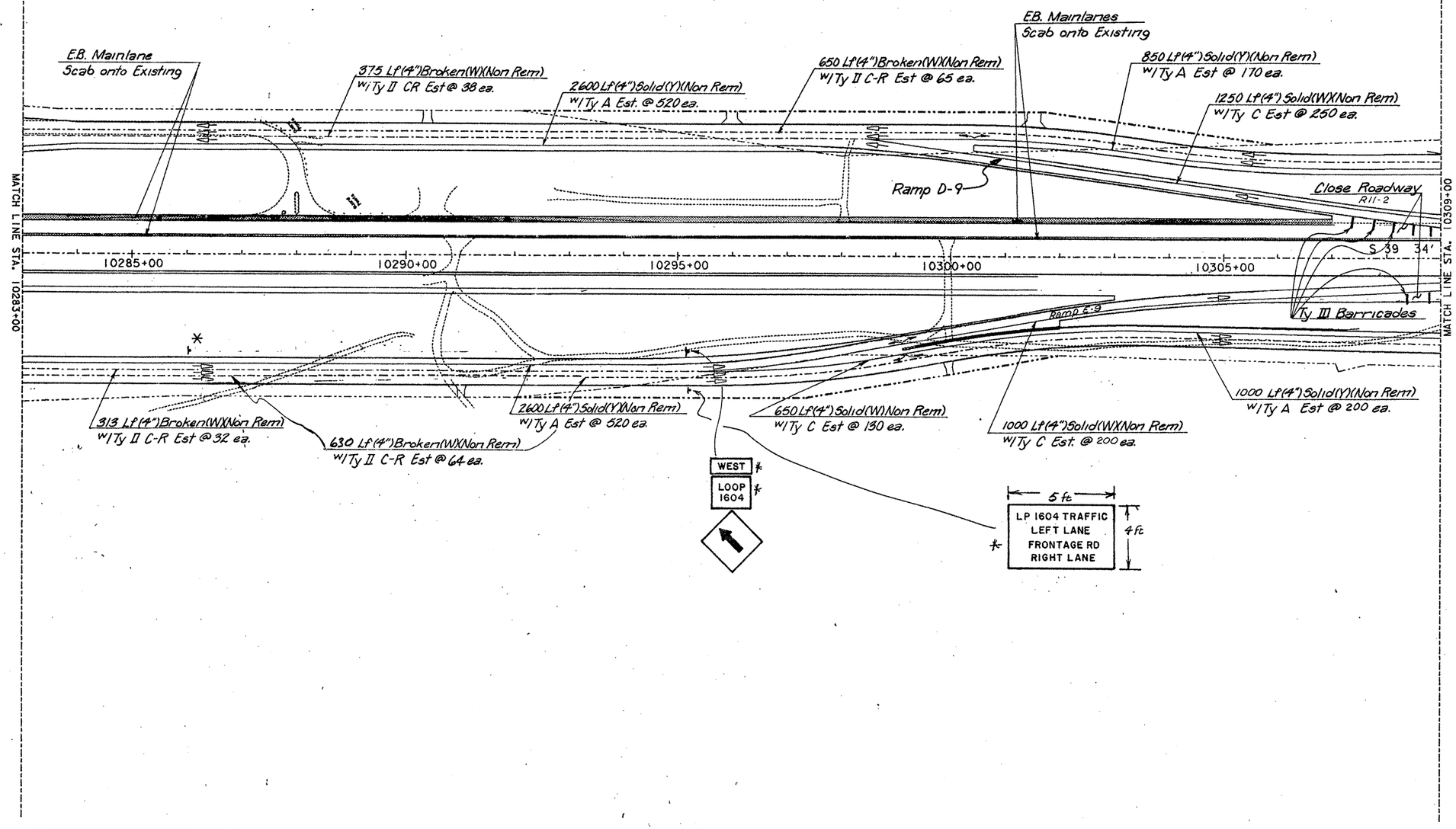
SHEET 6 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			21
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L006.DGN

Estimated Quantities		CSJ 2452-01-028
Items	Unit	Qty.
CPM(Non Remove)(4")(W)Solid	LF	2900
CPM(Non Remove)(4")(W)Broken	LF	1968
CPM(Non Remove)(4")(Y)Solid	LF	7050
CPM(Raised Reflect)(Ty "A")	EA	1410
CPM(Raised Reflect)(Ty "C")	EA	580
Traffic Button (Ty II C-R)	EA	199

CPM- Work Zone Pavement Markings



SCALE: 1"=100'

* Signs to be supplied by the State. See Sheet 32 for Note.

STATE OF TEXAS
ROBERT E. MAGERS
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 10-9-90
Robert E. M... Date

LP 1604
SEQUENCE OF WORK
PHASE 11

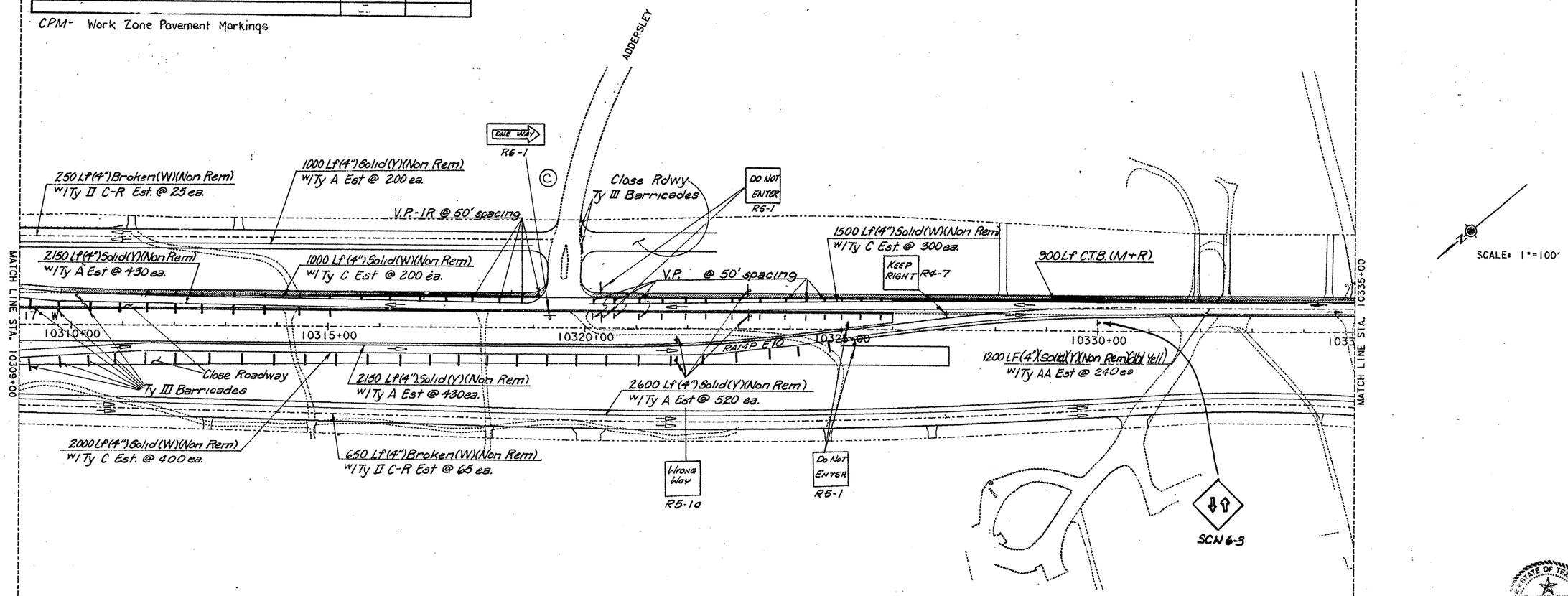
SHEET 7 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			22
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L007.DGN

Estimated Quantities		CSJ 2452-01-028
Item	Unit	Qty.
CPM (Non Remove)(4")(W) Solid	LF	4500
CPM (Non Remove)(4")(W) Broken	LF	900
CPM (Non Remove)(4")(Y) Solid	LF	9100
CPM (Raised Reflect)(Ty "A")	EA	1,580
CPM (Raised Reflect)(Ty "AA")	EA	240
CPM (Raised Reflect)(Ty "C")	EA	900
Traffic Button (Ty II C-R)	EA	90
Conc. Traffic Barrier (Move + Reset)	LF	900
CTB (Remove)	LF	900

CPM- Work Zone Pavement Markings



Robert E. Magers P.E. 10-9-90
Date

LP 1604
SEQUENCE OF WORK
PHASE II

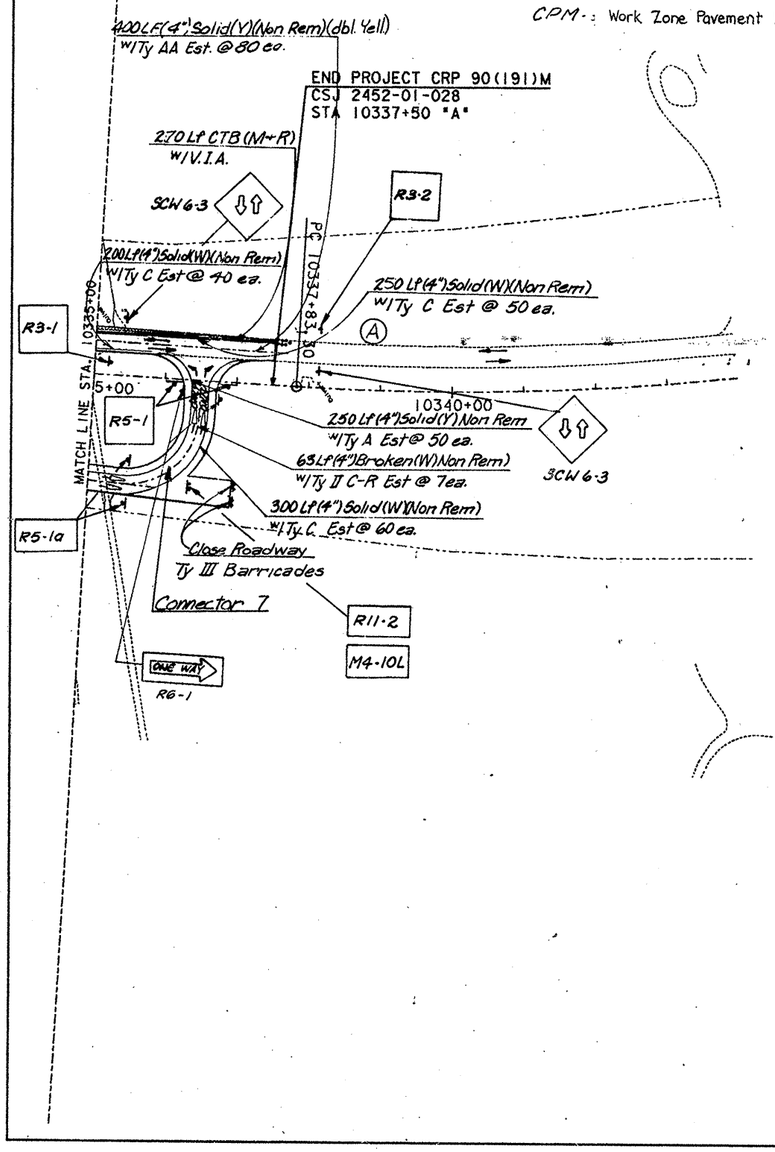
SHEET 8 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			23
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L008.DGN

Estimated Quantities		CSJ 2452-01-028
Item	Unit	Qty.
C.P.M.(Non Remove)(4")(W) Solid	LF	750
C.P.M.(Non Remove)(4")(W) Broken	LF	63
C.P.M.(Non Remove)(4")(Y) Solid	LF	650
Veh. Impact Attenuator Assem.(Remov)	EA	15
C.P.M.(Raised Reflect)(Ty "A")	EA	50
C.P.M.(Raised Reflect)(Ty "AA")	EA	80
C.P.M.(Raised Reflect)(Ty "C")	EA	130
Traffic Button (Ty II C-R)	EA	7
Conc. Traffic Barrier(Move + Reset)	LF	270
Vehicle Impact Attenuator Assem. (M & R)	EA	15
CTB (Remove)	LF	270
CPM (Non Remov)(Arrow)(W)	EA	2
CPM (Non Remov.)(Only) White	EA	2

CPM - : Work Zone Pavement Markings



SCALE: 1" = 100'

ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER STATE OF TEXAS

Robert E. Magers P.E. 10-9-90
Date

LP 1604
SEQUENCE OF WORK
PHASE II

SHEET 9 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			24
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC.	LP1604

1604L009.DGN

① Detour P.I. Sta. 12+00.00
48'Lt., Lp.1604 & Sta. 10141+00.00
Δ 5°56'15"
D 2°00'00"
T 148.57'
L 296.87'
R 2864.789'
P.C. Sta. 10+51.43
P.T. Sta. 13+48.30

② Detour P.I. Sta. 17+02.43
100'Lt., Lp.1604 & Sta. 10146+00.00
Δ 5°56'15"
D 2°00'00"
T 148.57'
L 296.87'
R 2864.789'
P.C. Sta. 15+53.86
P.T. Sta. 18+50.73

③ Detour P.I. Sta. 22+02.16
100'Lt., Lp.1604 & Sta. 10151+00.00
Δ 5°56'15"
D 2°00'00"
T 148.57'
L 296.87'
R 2864.789'
P.C. Sta. 20+53.60
P.T. Sta. 23+50.47

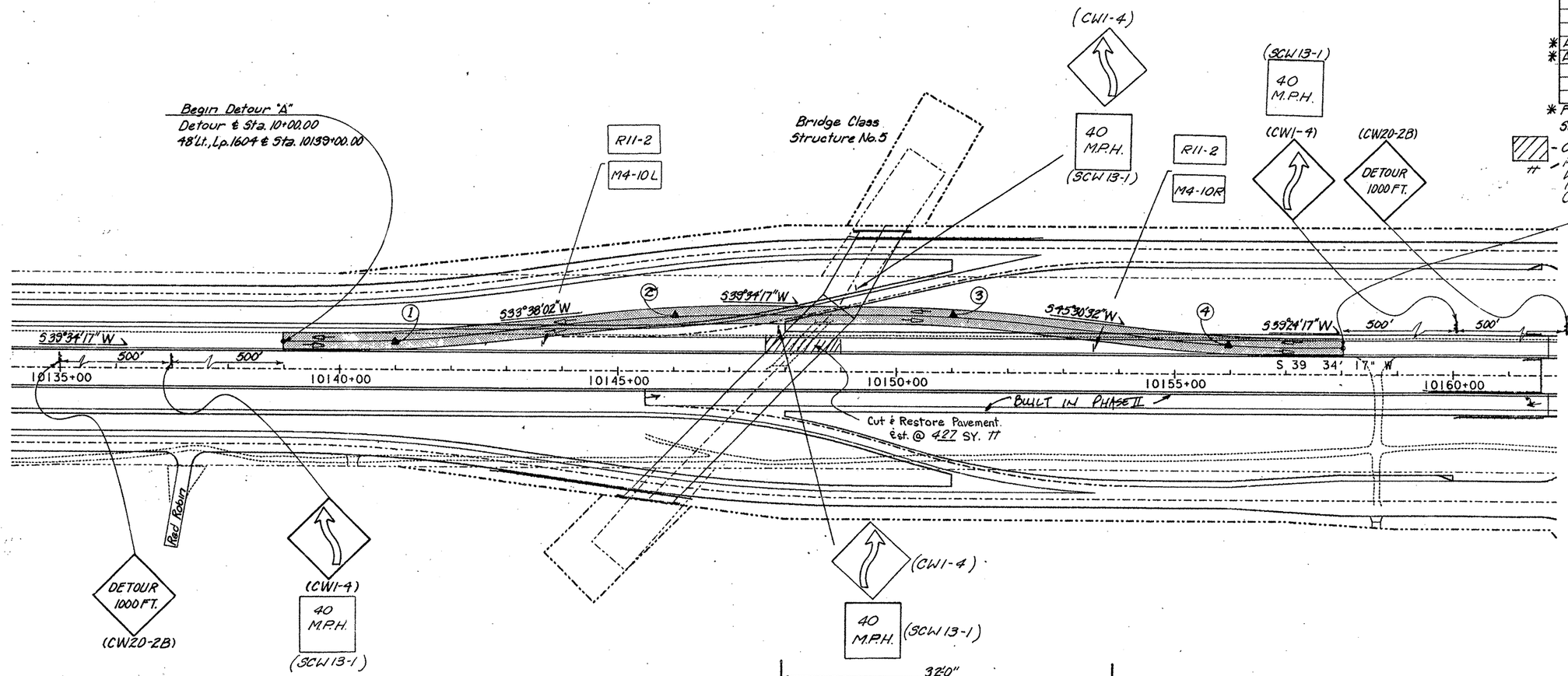
④ Detour P.I. Sta. 27+04.60
48'Lt., Lp.1604 & Sta. 10156+00.00
Δ 5°56'15"
D 2°00'00"
T 148.57'
L 296.87'
R 2864.789'
P.C. Sta. 25+56.02
P.T. Sta. 28+52.89

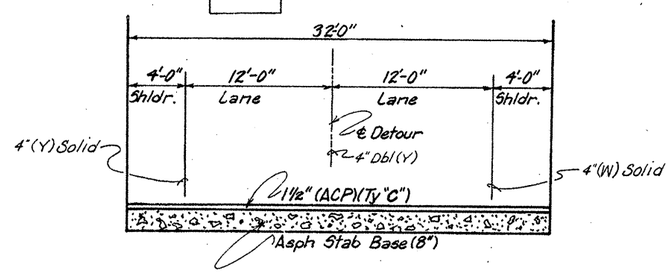
SCALE: 1" = 100'

ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
Constr. Det. (Cl. I) (0'-32')	Sta.	19
Constr. Pav. Mark (Solid) (Non Remove) (4")(Y)	LF	3810
Constr. Pav. Mark (Non Remove) (4")(W) Solid	LF	3810
Constr. Pav. Mark (Raised Reflect) (Ty "AA")	EA	764
Constr. Pav. Mark (Raised Reflect) (Ty "C")	EA	764
Cut & Restore Pav.	SY	427
* Asph Stab Base (8")	SY	4,090
* A.C.P. (Ty "C") (1 1/2")	SY	6756

* For Contractors information only. Subsidiary to item 508 (Constr. Det. Cl. I)





Typical Section
(Detour "A")

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 10-9-90
Date

(PHASE I)
LP 1604
DETOUR "A" LAYOUT

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			25
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604DET A.DGN

① Detour P.I. Sta. 12+00.00
48'Lt., Lp 1604 & Sta. 10141+00.00
Δ 5°56'15"
D 2°00'00"
T 148.57'
L 296.87'
R 2864.789'
P.C. Sta. 10+51.43
P.T. Sta. 13+48.30

② Detour P.I. Sta. 17+02.43
100'Lt., Lp 1604 & Sta. 10146+00.00
Δ 5°56'15"
D 2°00'00"
T 148.57'
L 296.87'
R 2864.789'
P.C. Sta. 15+53.86
P.T. Sta. 18+50.73

③ Detour P.I. Sta. 22+02.16
100'Lt., Lp 1604 & Sta. 10151+00.00
Δ 5°56'15"
D 2°00'00"
T 148.57'
L 296.87'
R 2864.789'
P.C. Sta. 20+53.60
P.T. Sta. 23+50.47

④ Detour P.I. Sta. 27+04.60
48'Lt., Lp 1604 & Sta. 10156+00.00
Δ 5°56'15"
D 2°00'00"
T 148.57'
L 296.87'
R 2864.789'
P.C. Sta. 25+56.02
P.T. Sta. 28+52.89

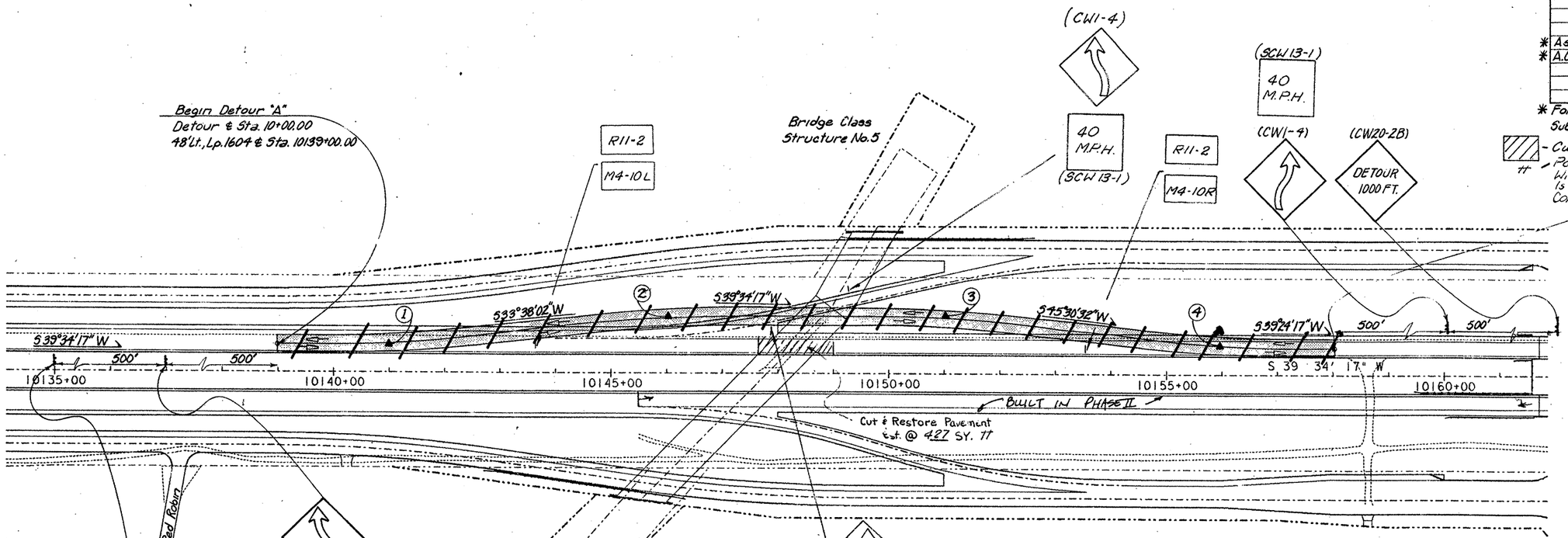
SCALE: 1" = 100'

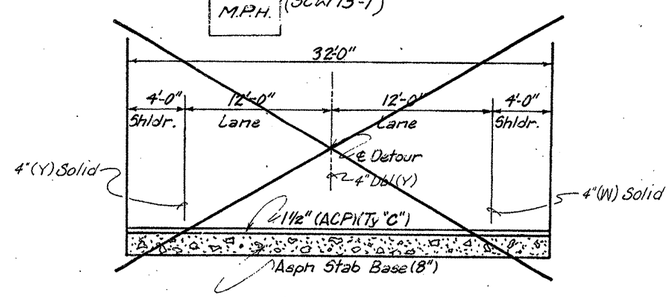
ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
Constr. Det. (Cl. I) (0'-32')	Sta.	19
Constr. Pav. Mark (Solid)		
(Non Remove) (4")(Y)	LF	3810
Constr. Pav. Mark		
(Non Remove)(4"XW) Solid	LF	3810
Constr. Pav. Mark		
(Raised Reflect)(Ty "AA")	EA	764
Constr. Pav. Mark		
(Raised Reflect)(Ty "C")	EA	764
Cut & Restore Pav.	SY	427
* Asph Stab Base (8")	SY	4,090
* A.C.P. (Ty "C")(1 1/2")	SY	6756

* For Contractors information only. Subsidiary to item 508 (Constr. Det. Cl. I)

Cut & Restore Pavement
Pavement Shall be Restored With 8" A.S.B. The Area of Pvmt. is Approx. 120' x 32'.
CONCRETE PAV. MARK = WORK ZONE PAV. MARK





Typical Section
(Detour "A")

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

10-9-90
Date

(PHASE I)
LP 1604
DETOUR "A" LAYOUT

SHEET 1 OF 1

CHANGE ORDER NO. 1
* Eliminate Detour "A"

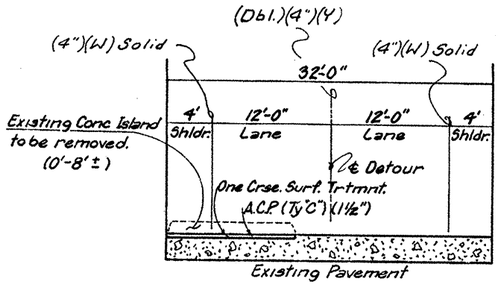
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	NH90(191)M	25A

STATE	DIST.	COUNTY
TEXAS	15	BEXAR

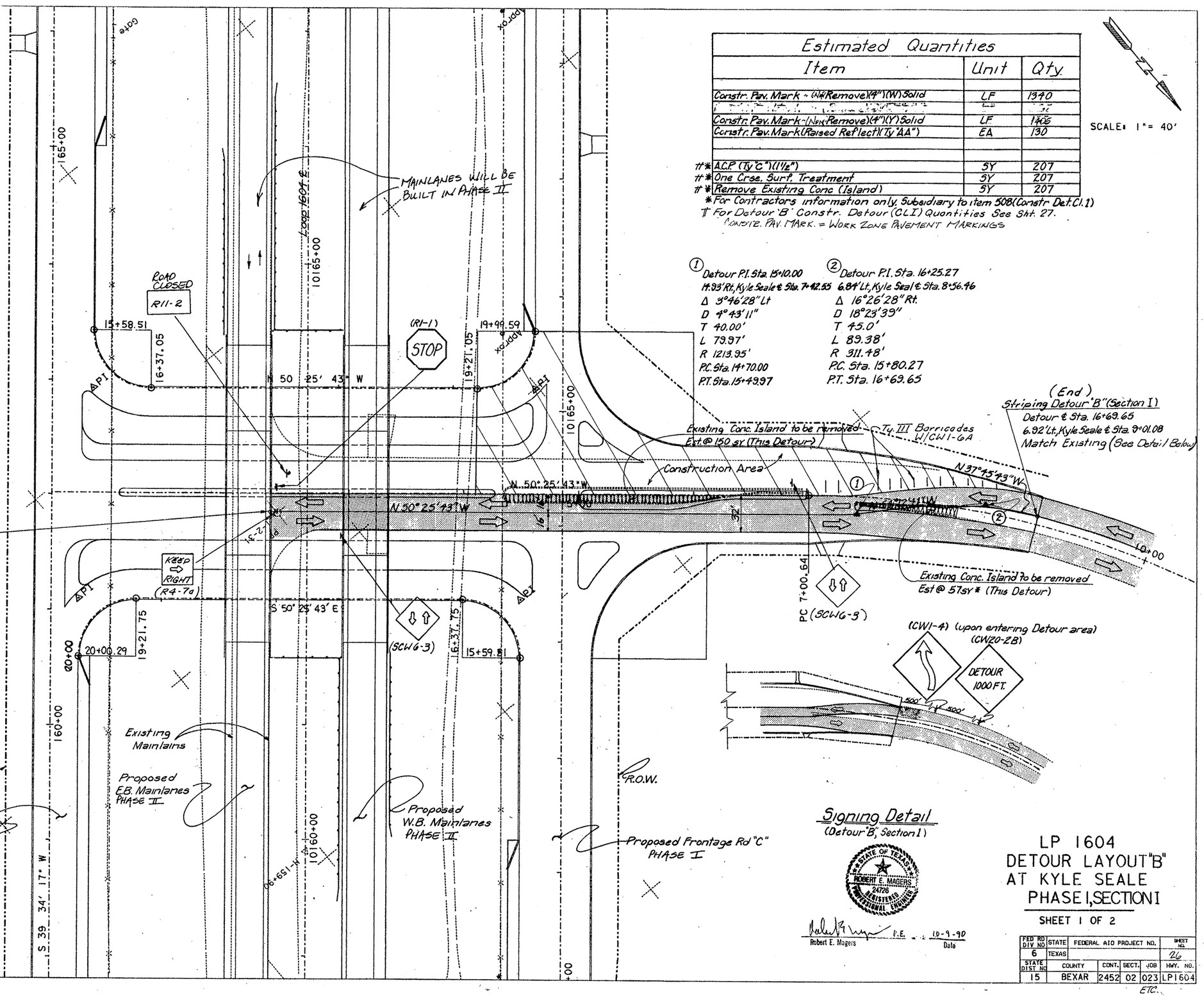
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604DET A.DGN

Note: Contractor shall seal with a one course "Surface Treatment" and level-up with A.C.P. (Ty."C")(1½") all base material exposed by removing existing Concrete Islands. No direct payment shall be made but shall be considered subsidiary to the item "Construct Detour (Cl. 1)."



Typical Section
(Detour "B", Section I) &
(Striping)



Estimated Quantities		
Item	Unit	Qty.
Constr. Pav. Mark ~ (Non Remove)(4")(W) Solid	LF	1340
[illegible]	[illegible]	[illegible]
Constr. Pav. Mark ~ (Non Remove)(4")(Y) Solid	LF	1405
Constr. Pav. Mark (Raised Reflect)(Ty "AA")	EA	130
‡* A.C.P. (Ty "C")(1½")	SY	207
‡* One Crse. Surf. Treatment	SY	207
‡* Remove Existing Conc (Island)	SY	207

* For Contractors information only. Subsidiary to item 508 (Constr Det. Cl. 1)
‡ For Detour "B" Constr. Detour (CL I) Quantities See Sht. 27.
CONSTR. PAV. MARK. = WORK ZONE PAVEMENT MARKINGS

SCALE: 1" = 40'

① Detour P.I. Sta. 15+10.00
14.93' Rt, Kyle Seale ℄ Sta. 7+42.55
Δ 3°46'28" Lt
D 4°43'11"
T 40.00'
L 79.97'
R 1213.95'
P.C. Sta. 14+70.00
P.T. Sta. 15+49.97

② Detour P.I. Sta. 16+25.27
6.84' Lt, Kyle Seal ℄ Sta. 8+56.46
Δ 16°26'28" Rt.
D 18°23'39"
T 45.0'
L 89.38'
R 311.48'
P.C. Sta. 15+80.27
P.T. Sta. 16+69.65

Signing Detail
(Detour "B", Section I)

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 10-9-90
Date

LP 1604
DETOUR LAYOUT "B" AT KYLE SEALE
PHASE I, SECTION I

SHEET 1 OF 2

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				26
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.
15	BEXAR	2452	02	023	LP1604

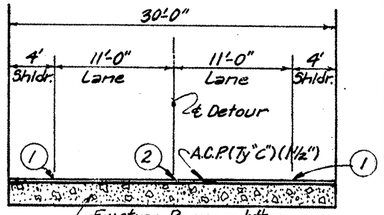
ETC.

UDA1:[317112]1604INT4D.DGN

NOTE: THE PURPOSE OF DET. 'B' SECTION I & II IS TO COMPLETE THE WBFR. THIS WILL ALLOW TRAFFIC TO BE SWITCHED FOR PHASE II. DET 'B' ONLY ALLOWS KYLE SEALE TO BE BUILT FROM Sta 4+00 +/- to Sta 10+00. GRADE DIFFERENCES PROHIBIT BUILDING KYLE SEALE FROM Sta 1+00 to Sta 4+00 DURING PHASE I.

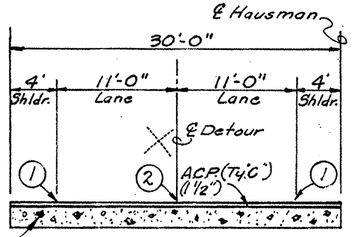
DET. 'K' IS BUILT TO ALLOW EBFR TRAFFIC ACCESS TO KYLE SEALE. DUE TO GRADE DIFFERENCES, IT IS REMOVED DURING PHASE II, THE INTERSECTION IS CLOSED, AND THE REMAINDER OF KYLE SEALE IS THEN BUILT.

EXIST. PVMNT REFERS TO RDWY THAT WAS CONSTRUCTED IN PHASE I, DET 'B', SECTION I OR THE EXIST. INTERSECTION PVMNT THAT WAS IN PLACE BEFORE CONSTRUCTION OF DET 'B' (Sta 2+00 +/- to Sta 4+00 +/-).



Typical Section
(Detour "B", Section II)
(Striping Only)

① 4" (W) Solid
② 4" DBL. (Y)



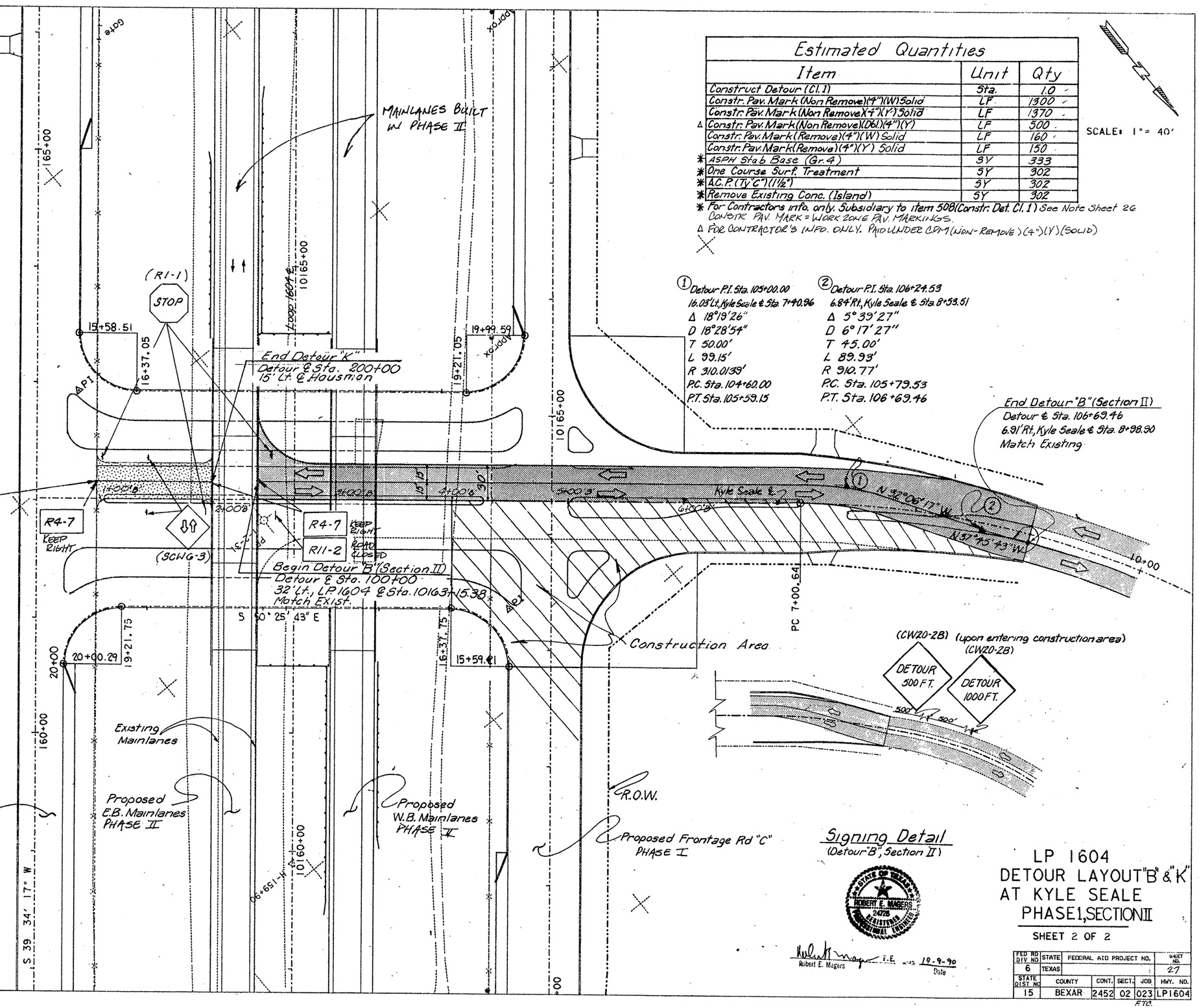
Typical Section
(Detour "K", Section II)
Sta. 100+00 to 200+00

Estimated Quantities

Item	Unit	Qty
Construct Detour (Cl. I)	Sta.	1.0
Constr. Pav. Mark (Non Remove)(4")(W) Solid	LF	1300
Constr. Pav. Mark (Non Remove)(4")(Y) Solid	LF	1370
Δ Constr. Pav. Mark (Non Remove)(DBL)(4")(Y)	LF	500
Constr. Pav. Mark (Remove)(4")(W) Solid	LF	160
Constr. Pav. Mark (Remove)(4")(Y) Solid	LF	150
* ASPH Stab Base (Gr. 4)	SY	333
* One Course Surf. Treatment	SY	302
* A.C.P. (Ty "C")(1½")	SY	302
* Remove Existing Conc. (Island)	SY	302

* For Contractors info. only. Subsidiary to Item 508 (Constr. Det. Cl. I) See Note Sheet 2G
CONSTR. PAV. MARK = WORK ZONE PAV. MARKINGS.
Δ FOR CONTRACTOR'S INFO. ONLY. PAID UNDER CPM (NON-REMOVE)(4")(Y)(SOLID)

SCALE: 1" = 40'



Signing Detail
(Detour "B", Section II)

STATE OF TEXAS
ROBERT E. MAGERS
24725
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 10-9-90
Robert E. Magers Date

LP 1604
DETOUR LAYOUT "B" & "K"
AT KYLE SEALE
PHASE 1, SECTION II

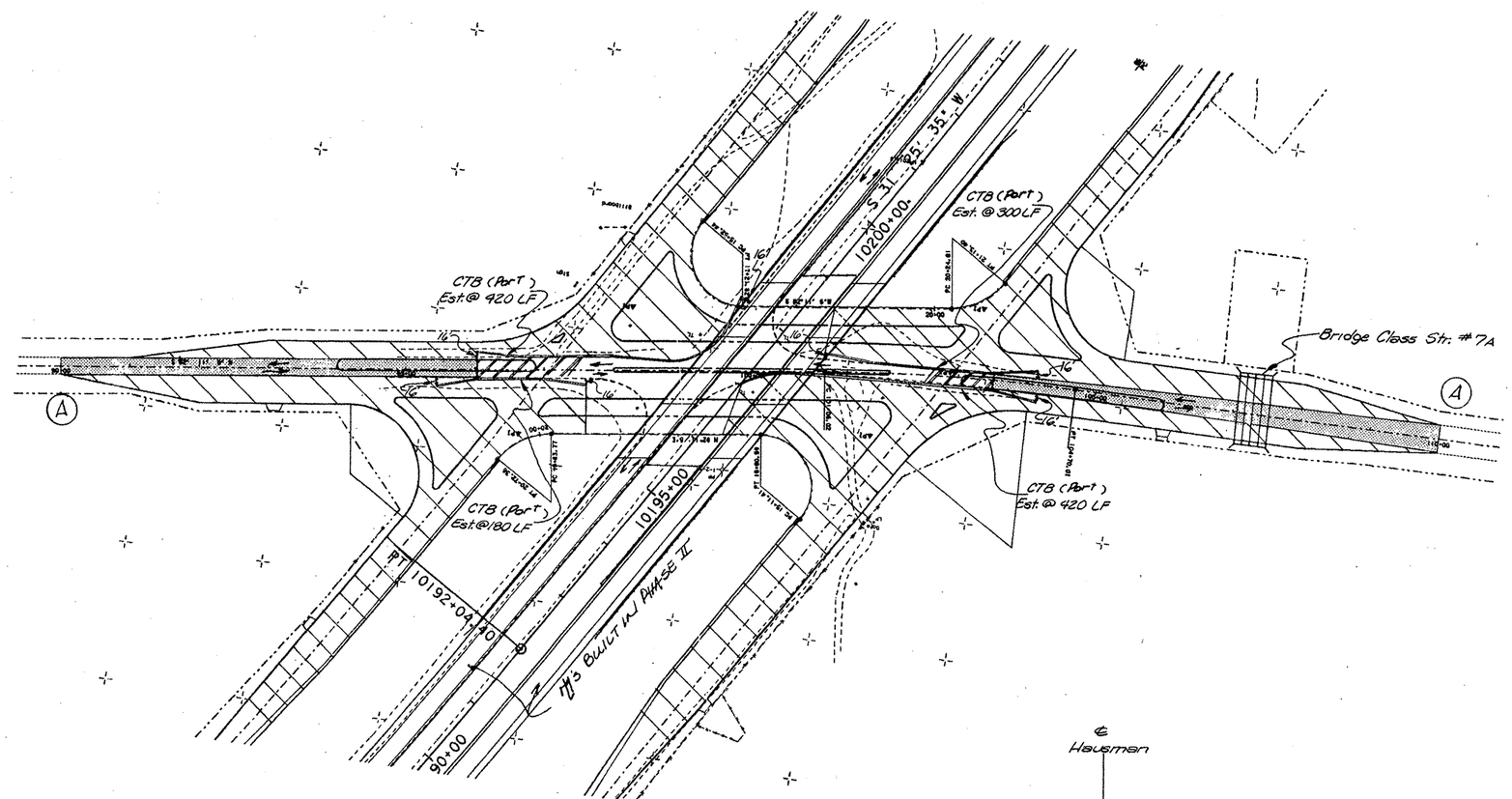
SHEET 2 OF 2

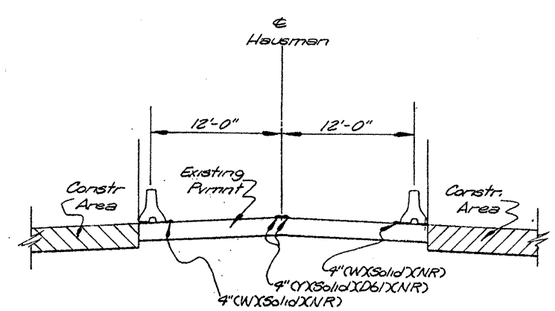
FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					27
STATE DIST NO	COUNTY	CONT.	SECT.	JOB		HWY. NO.
15	BEXAR	2452	02	023		LP1604

ETC.

UDA1:[3171123]1604INT4D.DGN

SCALE: 1" = 100'





TYPICAL SECTION
DETOUR "C"

ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
CTB (Part)	LF	1380
CPM 4" (Solid)(W)(Non Rem)	LF	3400
* CTB (Remove)	LF	1230
* CPM (Non Remove) 4" (Y) (Solid)	LF	3400

CPM = WORK ZONE PAV. MARKINGS

Note: Two-way traffic to be maintained during this phase.
⇄ DENOTES PLACEMENT OF TRAFFIC

These Quantities appear on the Barricade Summary, Rather than on the Detour Summary.

DETOUR 'C' Construction Area Phase I

DETOUR 'C' Construction Area Phase II

Existing Pavement to receive Overlay Only.

* Includes also 180 LF of Ty 5 CTB from Br. Class Str 7A to be removed

STATE OF TEXAS
CAROL GREINER LUSCHEN
60450
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

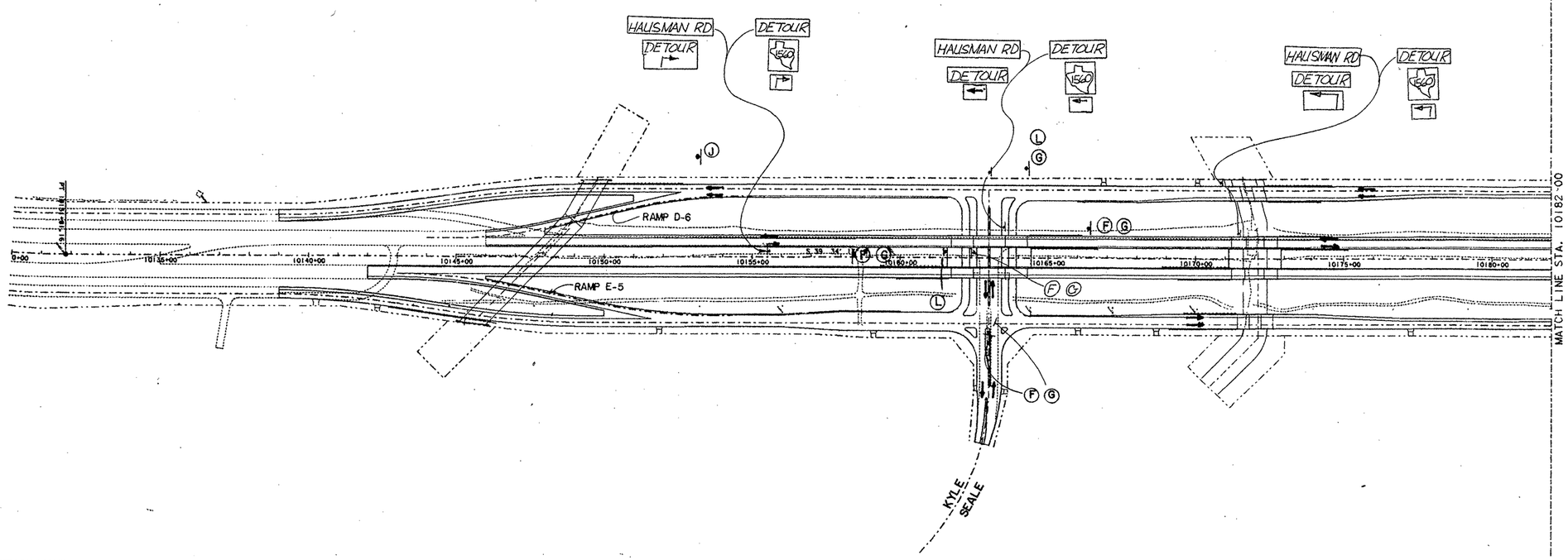
DETOUR LAYOUT "C"
HAUSMAN ROAD (FM 1560)
- PHASE I

SHEET 1 OF 1

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				28
STATE DIST. NO.	COUNTY	CONT. NO.	SEC. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

PL100

.ETC

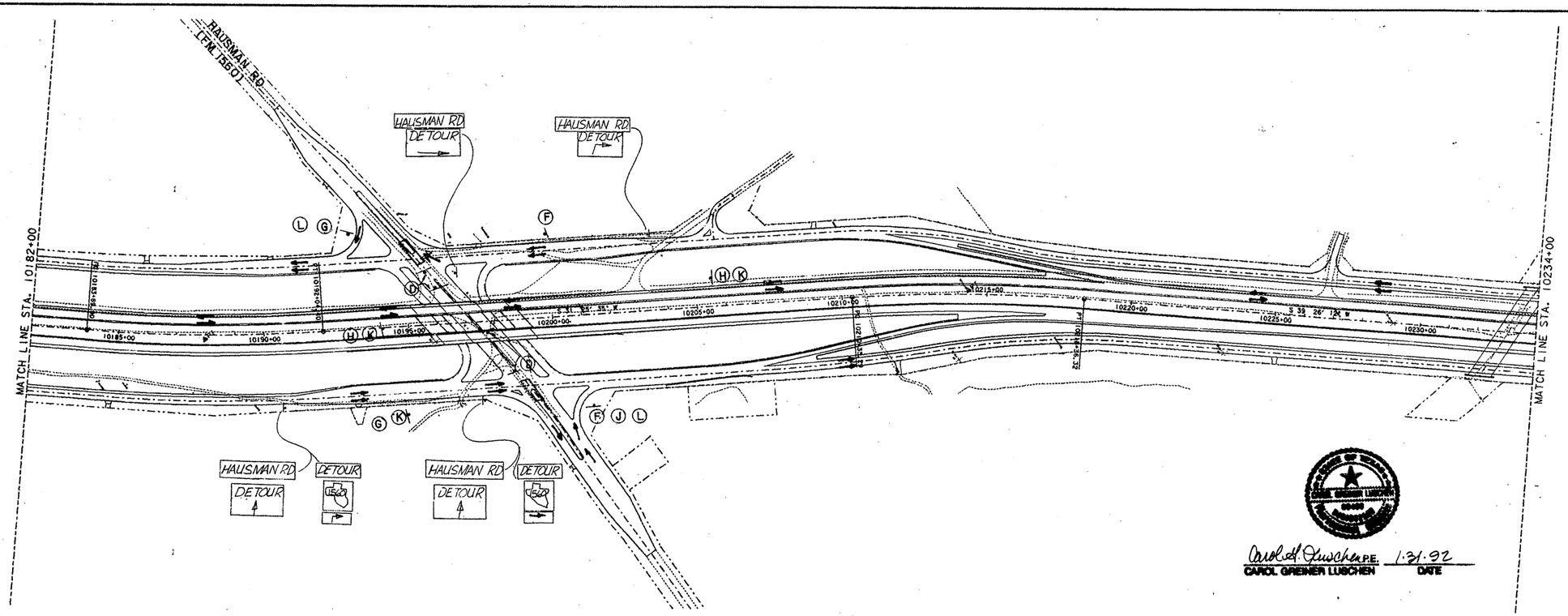


SEE SHT 17 FOR SCHEDULE OF BARRICADES

⇄ DENOTES NUMBER AND DIRECTION OF LANES OPEN TO TRAFFIC

RAMPS D-6, D-9, E-5, E-8, E-10, CONN. 7 & CONN. F ARE ALSO OPEN TO TRAFFIC

EXISTING EBD MAIN LANE WILL HAVE TWO WAY TRAFFIC. FRONTAGE ROADS WILL CARRY ONE WAY TRAFFIC.



Phase II Construction

NOTE: THIS WORK SHALL ONLY BE PERFORMED ON A SUNDAY

⇄ DENOTES NUMBER AND DIRECTION OF LANES OPEN TO TRAFFIC

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

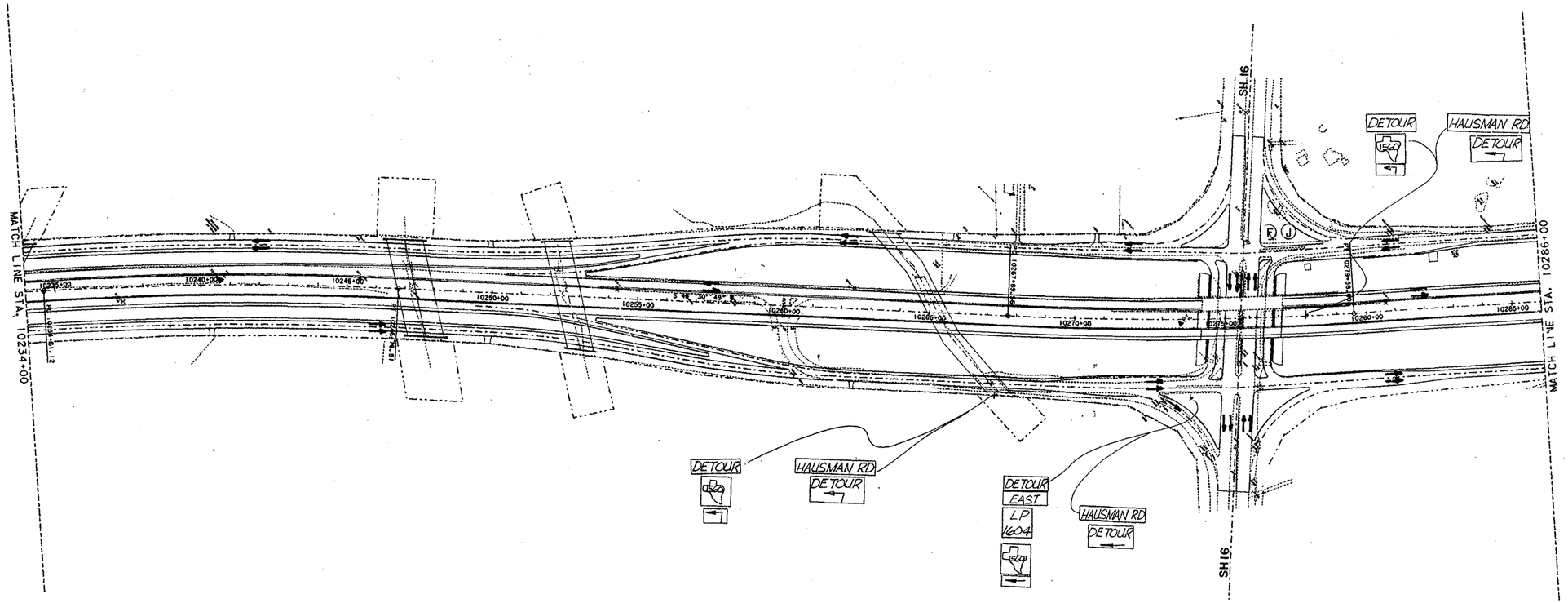
DETOUR LAYOUT "C"
HAUSMAN RD. (FM 1560)
PHASE II

SHEET 1 OF 2

FED. RD. DIV. NO.	STATE AID PROJECT NO.		SHEET NO.
6			29
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	1604

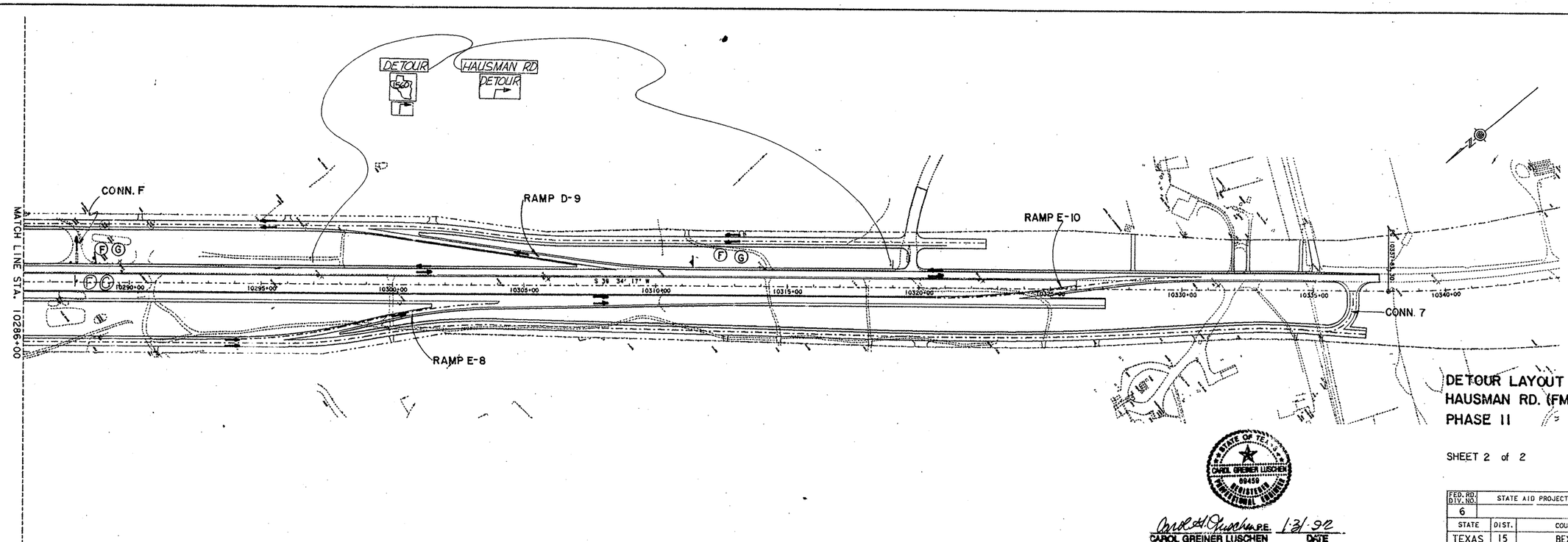
ETC.

1604sw001



SEE SHEET 17 FOR SCHEDULE OF BARRICADES

DENOTES NUMBER AND DIRECTION OF LANES OPEN TO TRAFFIC



DETOUR LAYOUT "C"
HAUSMAN RD. (FM1560)
PHASE II

SHEET 2 of 2

STATE OF TEXAS
CAROL GREINER LUSCHEN
80459
REGISTERED
PROFESSIONAL ENGINEER

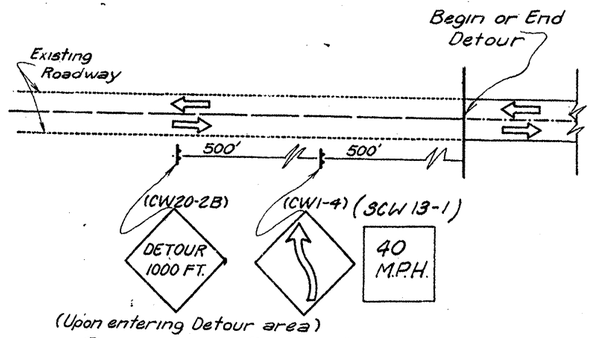
Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

FED. RD. DIV. NO.	STATE AID PROJECT NO.		SHEET NO.
6			29A
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	1604

ETC

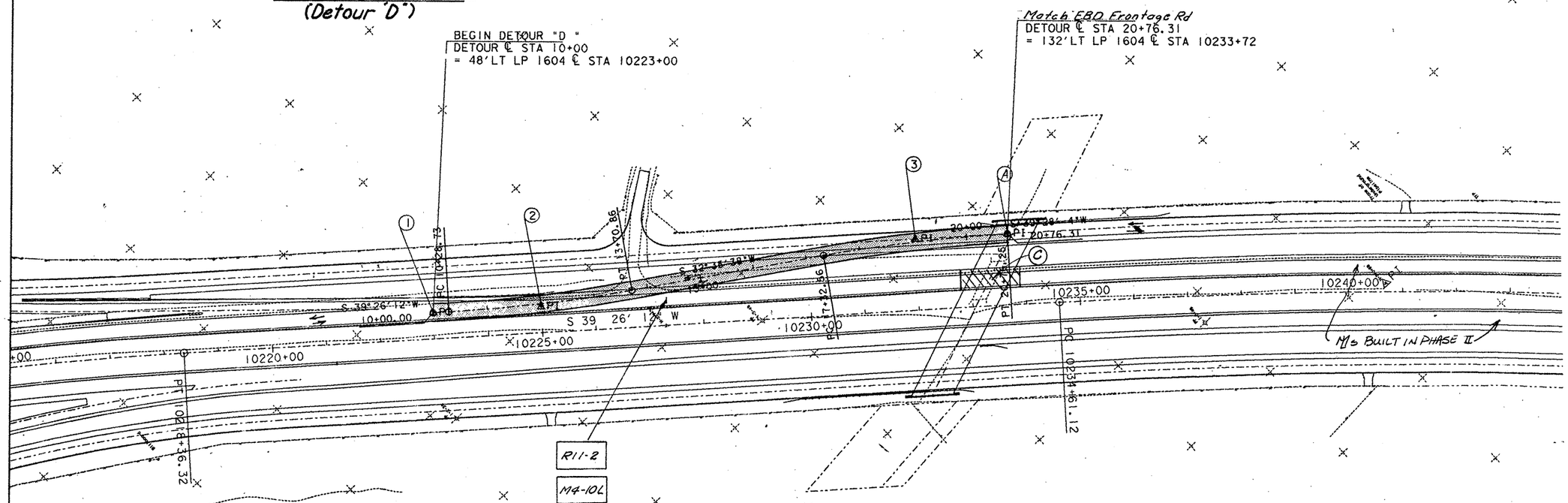
1604sw002

FOR QUANTITIES SEE SHEET 31



Signing Detail
(Detour "D")

SCALE: 1"=100'



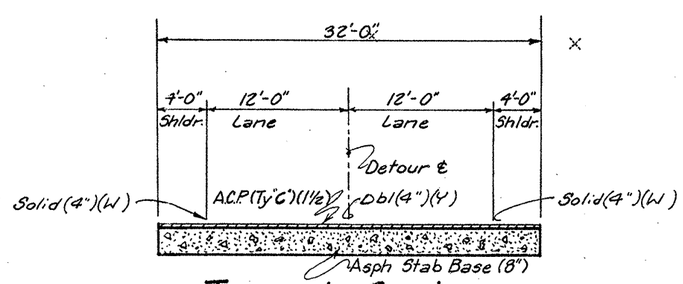
① DETOUR "D"
PI STA 10+00.00 "D1"
=48' Lt LP 1604 ℄ STA 10223+00
X = 51134.0275
Y = 150468.5584

② DETOUR "D"
PI STA 12+00.00 "D1"
=48' Lt LP 1604 ℄ STA 10225+00
X = 51006.9849
Y = 150314.0957
Δ = 6°50'33.74" LT.
D = 2°00'00.00"
T = 171.27'
L = 342.14'
R = 2864.79'
PC STA 10+28.73 "D1"
PT STA 13+70.86 "D1"

③ DETOUR "D"
PI STA 19+04.61 "D1"
=132' Lt LP 1604 ℄ STA 10232+00
X = 50627.2006
Y = 149720.1050
Δ = 6°52'25.79" RT.
D = 2°00'00.00"
T = 172.05'
L = 343.69'
R = 2864.79'
PC STA 17+32.56 "D1"
PT STA 20+76.25 "D1"

④ DETOUR "D"
PI STA 20+76.31 "D1"
=132' Lt LP 1604 ℄ STA 10233+72
X = 50517.7999
Y = 149587.2391

Cut & Restore Pavement
Pavement Shall be Restored With 8" A.S.B. The Area of Pvmt. is 100' X 32' See Sheet 31 For Quantity.



Typical Section
(Detour "D")

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

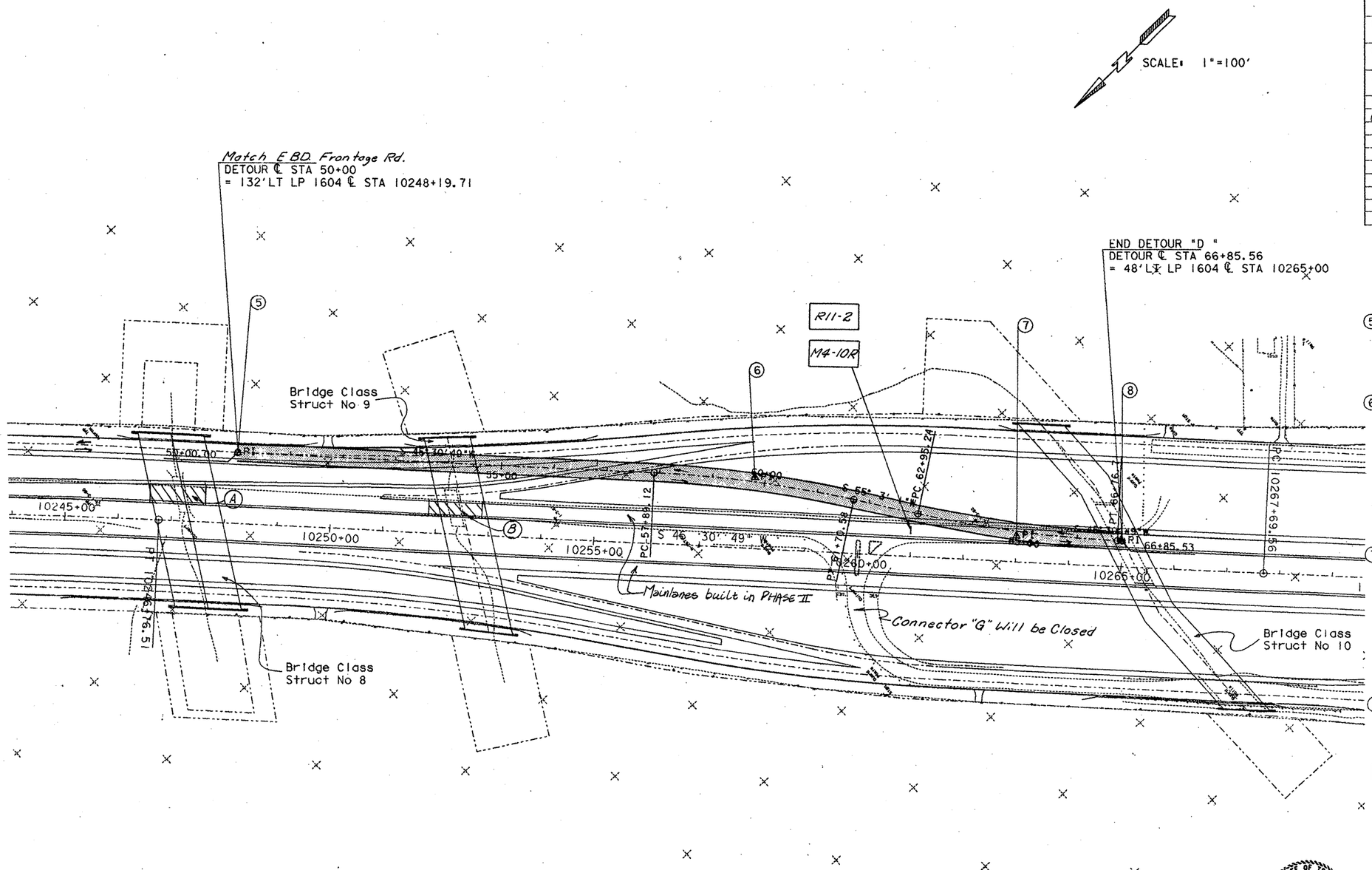
The seal appearing on this document was authorized by Robert E. Magers, P.E. 24726, on 10-9, 1990

PHASE I
LP 1604
DETOUR-"D"
LAYOUT

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			30
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604DETD.DGN



ESTIMATED QUANTITIES		
ITEM	UNIT	QTY.
CONST DETOUR (CL I)	STA	27.6
CONST PAV MARK (NON REMOV) SOLID (4") (W)	LF	8400
CONST PAV MARK (RAISED REFLECT) (TY AA)	EA	1680
CONST PAV MARK (RAISED REFLECT) (TY C)	EA	1680
CUT & RESTORE PAV	SY	1068
CPM (NON-REMOVE) 4" (Y) (SOLID)	LF	8400
*ASPH STAB BASE (8")	SY	9920
*ACP (TY C) (1½")	SY	9920

* FOR CONTRACTOR'S INFORMATION ONLY SUBSIDIARY TO ITEM 508 (CONSTR DET, CL I)
CONSTR. PAV. MARK. = WORK ZONE PAV. MARKING

(5) DETOUR "D"
PI STA 50+00.00 "D2"
=132'Lt LP 1604 ℄ STA 10248+19.71
X = 49529.3879
Y = 148511.7519

(6) DETOUR "D"
PI STA 59+80.29 "D2"
=132'Lt LP 1604 ℄ STA 10258+00
X = 48830.0326
Y = 147824.8237
Δ = 9°32'11.95" RT.
D = 2°30'00.00"
T = 191.17'
L = 381.47'
R = 2291.83'
PC STA 57+89.12 "D2"
PT STA 61+70.58 "D2"

(7) DETOUR "D"
PI STA 64+86.41 "D2"
=48'Lt LP 1604 ℄ STA 10263+00
X = 48414.4618
Y = 147534.3808
Δ = 9°32'11.95" LT.
D = 2°30'00.00"
T = 191.17'
L = 381.47'
R = 2291.83'
PC STA 62+95.24 "D2"
PT STA 66+76.71 "D2"

(8) DETOUR "D"
PI STA 66+85.53 "D2"
=48'Lt LP 1604 ℄ STA 10265+00
X = 48271.7784
Y = 147394.2328

Cut & Restore Pavement
Pavement Shall be Restored With 8" A.S.B. The Area of Pmt. is
(A) 356 SY. (100'x32')
(B) 356 SY. (100'x32')
(C) 356 SY. (100'x32') See Sheet 30

STATE OF TEXAS
ROBERT E. WAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

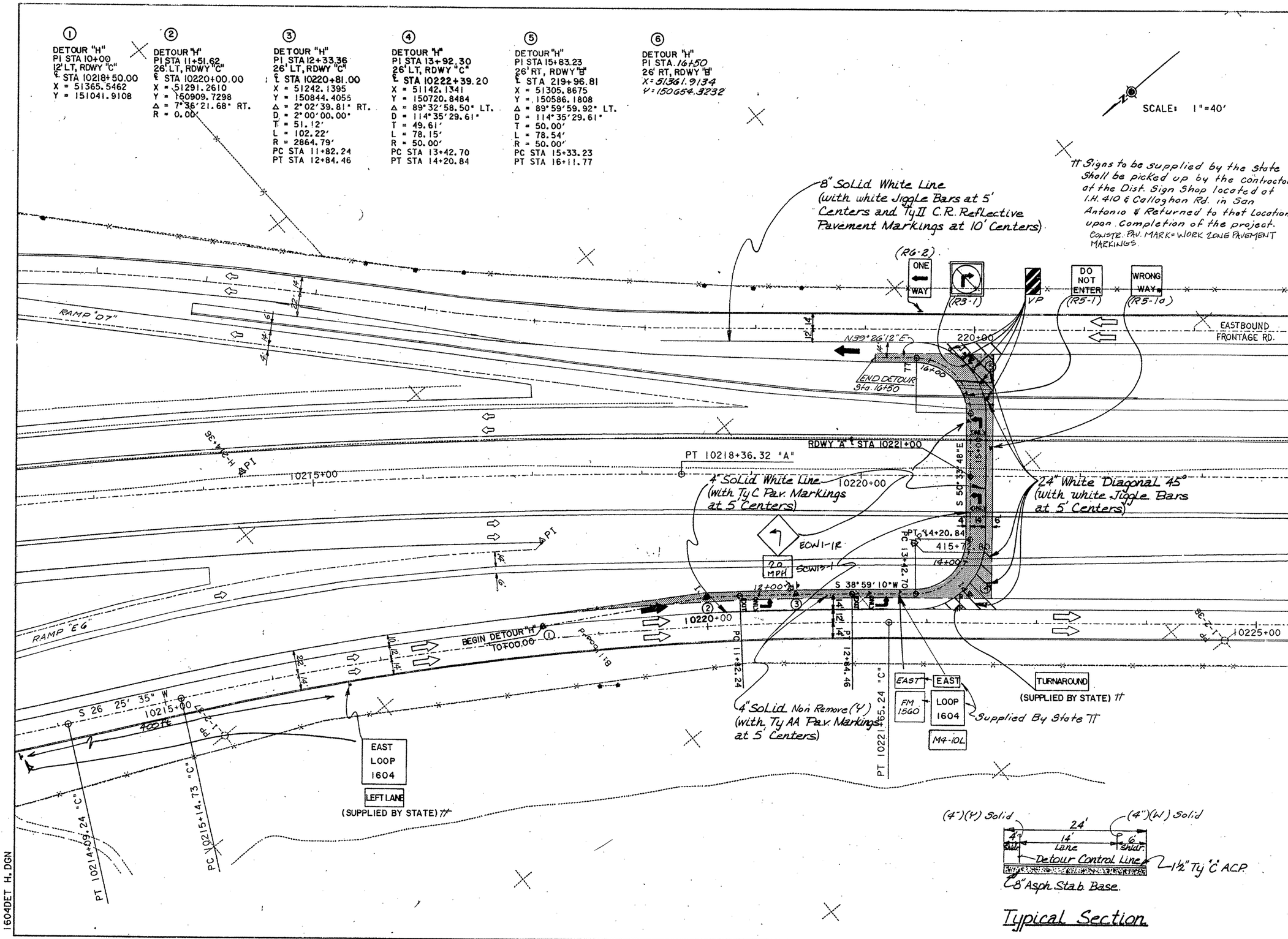
The seal appearing on this document was authorized by Robert E. Wagers, P.E. 24726, on 10-9, 1990

PHASE I
LP 1604
DETOUR "D"
LAYOUT

SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			31
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604DETD2.DGN



ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
Const Detour (C11)	Sta	6.5
Const Pav Mark (Non Remov)(4IN)(W)(Solid)	LF	430
Const Pav Mark (Remov) (4IN) (W)(Solid)	LF	500
Const Pav Mark (Remov)(24IN)(W)(Solid)	LF	310
Const Pav Mark (Remov)(8IN)(W)(Solid)	LF	320
Const Pav Mark (Remov) (Left Arrow)(W)	EA	2
Const Pav Mark (Remov)(Only)(White)	EA	2
Const Pav Mark (Remov) (Exit)(White)	EA	2
Const Pav Mark (Non Remov)(Left Arrow)(W)	EA	2
Const Pav Mark (Non Remov) (Only)(W)	EA	2
CPM (Raised Reflect)(Ty AA)	EA	180
CPM (Raised Reflect)(Ty C)	EA	97
Traffic Buttons (Ty II CR)	EA	34
Jiggle Bar Tile (Ty W)	EA	136
CPM (Non Remov)(4IN)(Y) Solid	LF	2380

⊤⊤ Signs to be supplied by the State Shall be picked up by the contractor at the Dist. Sign Shop located at I.H. 410 & Callaghan Rd. in San Antonio & Returned to that Location upon Completion of the project.
CONSTR. PAV. MARK = WORK ZONE PAVEMENT MARKINGS.

Robert E. Magers P.E.
10-9-90 Date

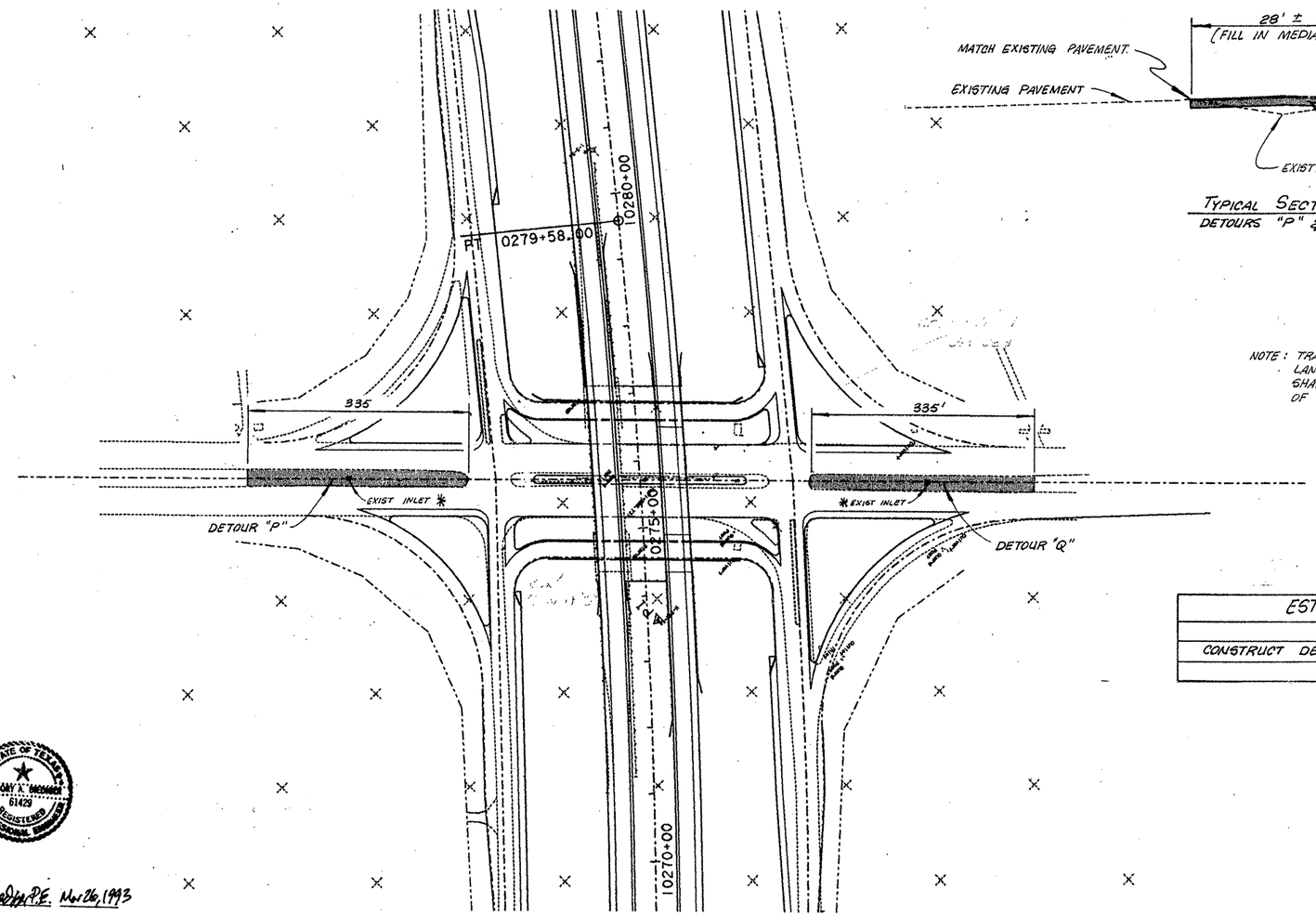
(PHASE II)
LP 1604
DETOUR "H" LAYOUT

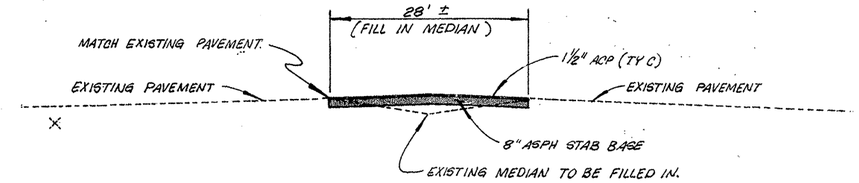
SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			32
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604DET H.DGN

SCALE: 1"=100'





TYPICAL SECTION
DETOURS "P" & "Q"

NOTE: TRAFFIC WILL BE HANDLED WITH CHANNELIZATION DEVICES. LANE CLOSURES DURING THE HOURS OF 9 am to 4 pm. SHALL BE ALLOWED. SEE SHTS 34 & 35 FOR DETAILS OF TRAFFIC CONTROL.

ESTIMATED QUANTITIES		
ITEM	UNIT	QTY
CONSTRUCT DETOUR (CL I)	STA	6.70

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED
PROFESSIONAL ENGINEER

◇ Gregory A. Biedigger P.E. Nov 26, 1993

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 10-9-90
Robert E. Magers Date

* IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE TEMPORARY DRAINAGE UNDER ALL DETOURS. ALL TEMPORARY DRAINAGE WILL BE SUBSIDIARY TO VARIOUS BID ITEMS & NO DIRECT PAYMENT WILL BE MADE.

◇ Revised Detour

LP 1604
DETOURS "P" & "Q"
SH 16 (BANDERA RD)
PHASE 1A

TYPICAL SECTION

SHEET 1 OF 3

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					33
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP1604	
					,ETC	

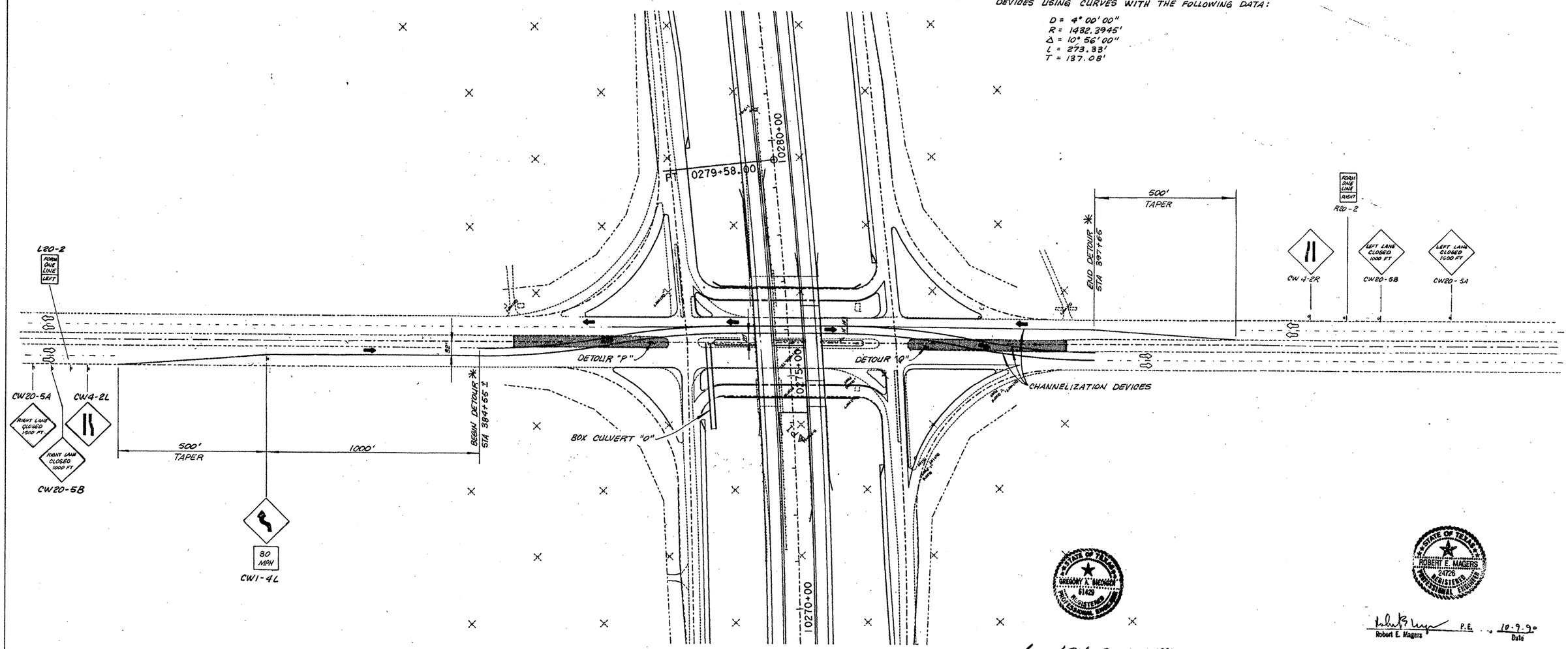
UDA1: [3171123]1604INT6D.DGN

SCALE: 1"=100'

* DETOURS SHALL BE LAID OUT AS SHOWN FOR CONSTRUCTION OF THE DOWNSTREAM END OF BOX CULVERT "O" AND SPANS 1 & 2 OF WBML. DETOUR SHALL BE USED ONLY BETWEEN THE HOURS OF 9:00 am & 4:00 pm. NO LANE CLOSURES SHALL BE ALLOWED OUTSIDE OF THESE HOURS UNLESS AUTHORIZED BY THE ENGINEER.

DETOURS SHALL CONSIST OF 14' LANES LAID OUT WITH CHANNELIZATION DEVICES USING CURVES WITH THE FOLLOWING DATA:

D = 4° 00' 00"
R = 1432.3945'
Δ = 10° 56' 00"
L = 273.33'
T = 137.08'



◇ Gregory A. Bledsoe P.E. Mar 26, 1993

◇ Revised Detour

Robert E. Magers P.E. 10-9-90
Date

LP 1604
DETOURS "P" & "Q"
SH 16 (BANDERA RD)
PHASE IA

LEFT DETOUR

SHEET 2 OF 3

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					34
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP1604	
					,ETC	

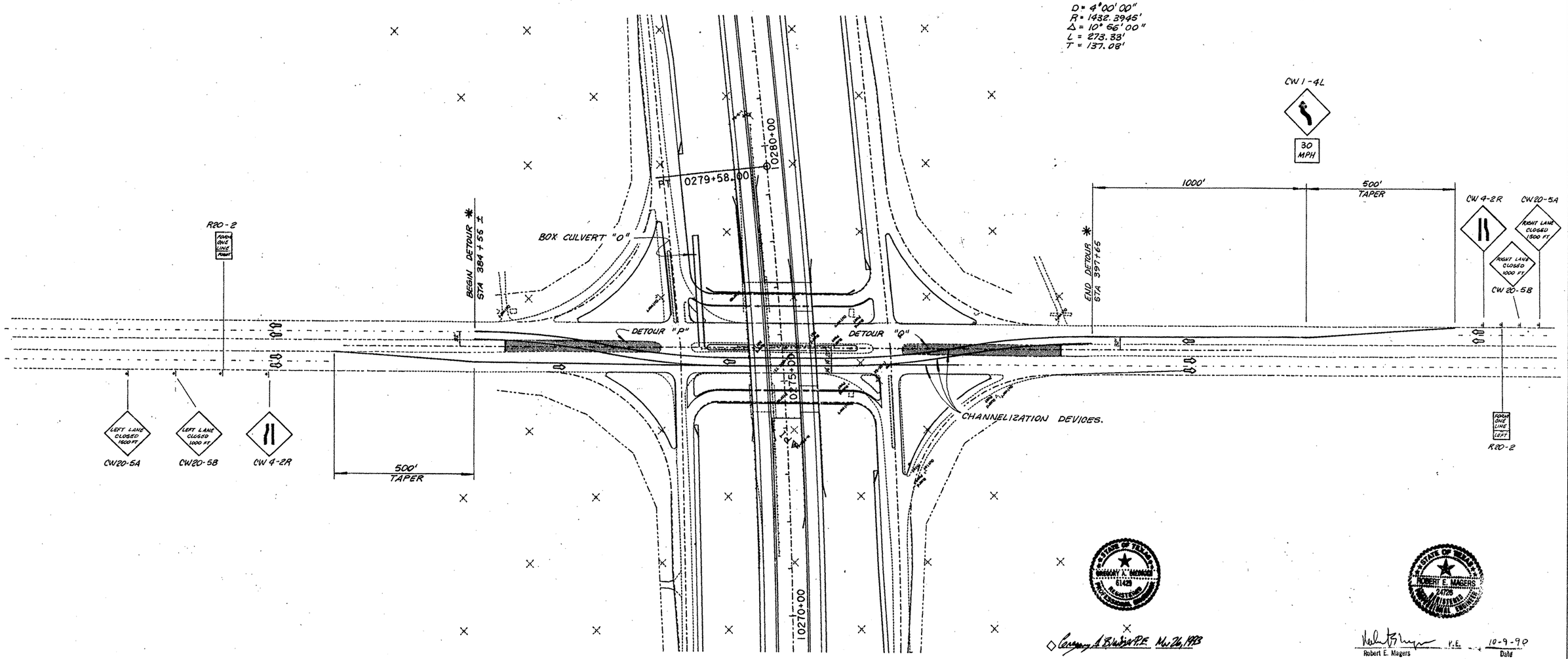
UDAI:[3171123]1604INT6D.DGN

SCALE: 1"=100'

* DETOURS SHALL BE LAID OUT AS SHOWN FOR CONSTRUCTION OF THE UPSTREAM END OF BOX CULVERT "O" AND SPANS 3 & 4 OF WBML. DETOUR SHALL BE USED ONLY BETWEEN THE HOURS OF 9:00 am & 4:00 pm. NO LANE CLOSURES SHALL BE ALLOWED OUTSIDE OF THESE HOURS UNLESS AUTHORIZED BY THE ENGINEER.

DETOURS SHALL CONSIST OF 14' LANES LAID OUT WITH CHANNELIZATION DEVICES USING CURVES WITH THE FOLLOWING DATA:

D = 4°00'00"
R = 1432.3945'
Δ = 10°56'00"
L = 273.38'
T = 137.08'



STATE OF TEXAS
GERALD A. BLASCHKE
61429
REGISTERED
PROFESSIONAL ENGINEER

◇ Gerald A. Blaschke P.E. Mar 26, 1993

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 10-9-90
Robert E. Magers Date

◇ Revised Detour

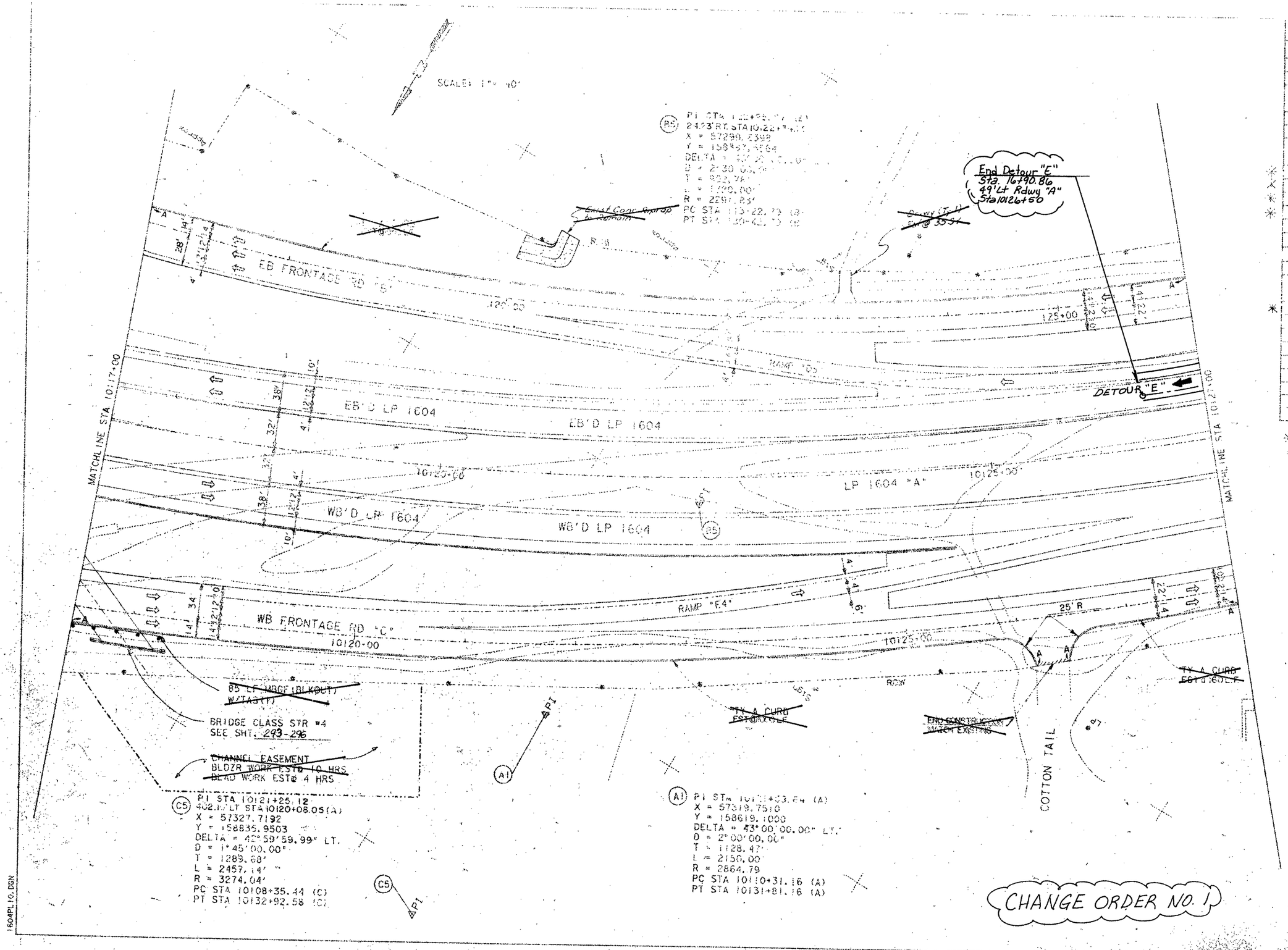
LP 1604
DETOURS "P" & "Q"
SH 16 (BANDERA RD)
PHASE IA

RIGHT DETOUR

SHEET 3 OF 3

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					35
STATE DIST NO	COUNTY	CONT.	SECT.	JOB		HWY. NO.
15	BEXAR	2452	02	023		LP1604
						, ETC

UDAI = [3171123]1604INT6D.DGN



CHANGE ORDER NO. 1

ESTIMATED QUANTITIES

ITEM	UNIT	QTY
BREP ROW	STA	10
BLAD (EROSN CONT)	HR	4
BLDZR WORK (ORD COMP) (EROSIN CONT)	HR	10
FURN & PLAC TPSL	SY	19,660
STR OR HAY MULCH SEED	SY	19,660
FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	2270
* ASPH STAB BS (GR 4) (4")	SY	13225
* ONE CRSE SURF TREAT	SY	22335
* ASPH CONC. (TY D)	SY	21720
* ASPH CONC. (TY D) (SURF)	SY	20935
CONC CURB (TY A)	LF	2,110
TERM ANCH SECT (12 GA)	EA	1
MBGF (BLKOUT) (12 GA) (TIM POST)	LF	85
* ASPH CONC (SURF) (8")	SY	91.0
DRVWY (TY 1)	SY	35
EXCAVATION	CY	33074
EMBANKMENT (ORD COMP) (TYB)	CY	2640

* FOR CONTRACTORS INFORMATION ONLY
‡ TRF FOUNDATION SHALL BE SUBSIDIARY TO CONC TRAFF BAR (TY S)

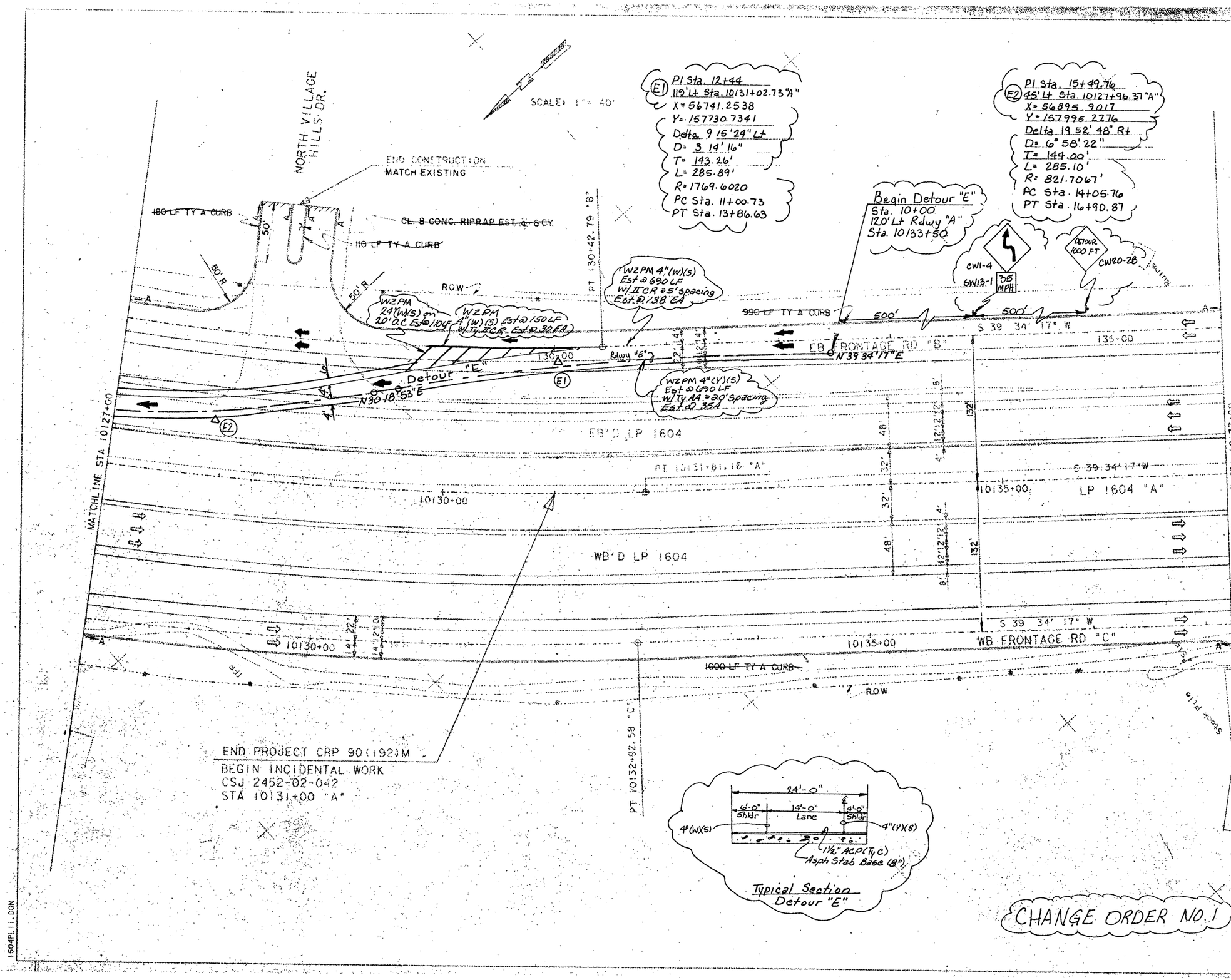
STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED PROFESSIONAL ENGINEER

Gregory A. Biediger
2-7-95

LP 1604
Detour "E" Layout
SHEET 10 OF 12

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.	
6	TEXAS	NH 90(191)M	354
STATE DIST NO	COUNTY	CONT. SECT. JOB	
15	BEXAR	2452 02 023	

1604PL10.DGN



CHANGE ORDER NO. 1

ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
PREP ROW	STA	10
FURN & PLAC TPSL	SY	13,825
STR OR HAY MULCH SEED	SY	13,825
FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	1520
* ASPH STAB. BS (GR 4) (4")	SY	8890
* ONE CRSE SURF TREAT	SY	18570
* ASPH CONC. (TY D)	SY	18115
* ASPH CONC. (TY D) (SURF)	SY	17480
CONC CURB (TY A)	LF	280
[illegible]	[illegible]	8
* [illegible] (STAB BASE (3x4x5")	CY	9580
Construct Detour (Cl 1)	Sta	6.9
Wrk Zn Pav Mrk (Remov) (4")(W)(S)	LF	840
Wrk Zn Pav Mrk Raised Refl (Ty AA)	EA	35
Pav Mark (Refl) (Ty IICR)	EA	168
Wrk Zn Pav Mrk (Remov) (4")(Y)(S)	LF	690
" " " " (24")(W)(S)	LF	110
~~EXCAVATION~~	~~CY~~	~~25369~~
~~EMBANKMENT (URB COMP)(TY B)~~	~~CY~~	~~584~~

* FOR CONTRACTORS INFORMATION ONLY.

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED PROFESSIONAL ENGINEER

Gregory A. Biediger
2-7-95

LP 1604
Detour "E" Layout
SHEET 11 OF 12
2 2

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS	NH 90(191)M	35B

STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY
15	BEXAR	2452	02	023	LP1604

1604PL11.DGN

SCALE: 1" = 40'

(B6) PI STA 139+96.03 (B)
=132' LT 10141+00(A)
X = 56117.2868
Y = 156956.8832
DELTA = 8°00'00.00" LT.
D = 2°00'00.00"
T = 200.33'
L = 400.00'
R = 2864.79'
PC STA 137+95.71 (B)
PT STA 141+95.71 (B)

BEGIN PROJECT CRP 90(191)M
END INCIDENTAL WORK
STA 10146+00(A)
CONTROL 2452-02-023
REF MARKER 518+0.491

PC 137+95.71 "B"
BEGIN FULL CONSTUCTION EB FRONTAGE RD (B)

PT 141+95.71 "B"

PC 144+41.73 "B"

~~TY A CURB EST @ 800 LF~~

PROP ROW

EB FRONTAGE RD "B"
S 31° 34' 17" W

145+00

140+00

S 39 34' 17"W

10°12'14"

(B6)

BEGIN FULL CONSTRUCTION (EBML)
STA 10146+00(A)

EXIST CONN "C"
~~SALV, HAUL & STKPL RECLM ASPH PAV (RAP) EST @ 2414 SY.~~

RAMP "D6"

SALVAGE, HAUL & STOCKPILE RECLAIMED ASPHALT PAVEMENT (RAP) EST. @ 136 SY

EB'D LP 1604

EXIST CONN "J"

~~BEGIN PREP ROW STA 10139+00(A)~~

LP 1604 "A"
S 39 34' 17"W

10140+00

EXIST CONN "P"
~~SALV, HAUL & STKPL RECLM ASPH. PAV (RAP) EST @ 1334 SY.~~

10145+00

MATCHLINE STA 10137+00

MATCHLINE STA 10147+00

Begin Detour "F"
Sta. 10+00
72' Rt Rdwy A
Sta. 10138+50

WZPM 4"(W)(S)
Est @ 696 LF
W/ II CR @ 5' Spacing
Est @ 138 EA

WB'D LP 1604

S 39 34' 17" W

DETOUR "F"

(F1)

RAMP "E5"

WZPM 4"(Y)(S)
Est @ 696 LF
W/ Ty II CR @ 20' spacing
Est @ 35 EA

Rdwy "E"

BEGIN FULL CONSTRUCTION (WBML)
10142+00(A)

End Detour "F"
Sta. 16+96.
= Rdwy C
Sta. 10146+59

S 39 34' 17"W

10140+00

S 57° 03' 32" W

10145+00

S 47° 34' 17" W

(F2)

RED ROBIN

PC 10140+22.11
BEGIN FULL CONSTUCTION WB FRONTAGE RD (C)

DRIVEWAY (TY I)
~~EST @ 50 SY~~

(C6)

WZPM 4"(Y)(S)
Est @ 487 LF

DRIVEWAY (TY I)
~~EST @ 50 SY~~

PT 10144+22.11

PROP ROW

WZPM 24"(W)(S)
20' O.C.
Est @ 110 LF

WZPM 4"(W)(S)
Est @ 150 LF
W/ Ty II CR @ 5
Est @ 30 EA

PC 10146+68.14

~~TY A CURB EST @ 800 LF~~

(F1) PI Sta. 12+40 "F"
72' Rt Sta 10140+90 "A"
X= 55966.4076
Y= 157094.5475
Δ 17°35'14.84" Rt
D= 3°46'
T= 235.31'
L= 466.92'
R= 1521.12'
PC Sta 10+04.68
PT Sta 14+71.61

(F2) PI Sta. 15+84.68 "F"
Sta. 10145+47.05 "C"
X= 55673.7036
Y= 156905.6150
Δ 9°35'14.86" Lt
D= 4°18'
T= 111.74'
L= 222.96'
R= 1332.96
PC Sta 14+72.93
PT Sta 16+95.90

(C6) PI STA 10142+22.44 (C)
=132' RT 101.41+00(A)
X = 55913.7873
Y = 157125.0615
DELTA = 8°00'00.00" RT.
D = 2°00'00.00"
T = 200.33'
L = 400.00'
R = 2864.79'
PC STA 10140+22.11 (C)
PT STA 10144+22.11 (C)

◇ Added Trees to Remain

24'-0"
6'-0" Shldr | 14'-0" Lane | 4'-0" Shldr
4"(W)(S) 4"(Y)(S)
1½" ACP(Ty C)
8" Flex Base

Typical Section
Detour "F"

CHANNEL EASEMENT
BLDZR WORK EST @ 8 HRS
BLAD WORK EST @ 4 HRS
SCRAPER WORK EST @ 8 HRS

CHANGE ORDER NO. 1
Revised 10-7-93

ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
PREP ROW	STA	8
FURN & PLAC TPSL	SY	6883
BRDCST SEED (BERMUDA)	SY	6883
FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	1887
ASPH STAB BS (GR 4) (4")	SY	1063
ONE CRSE SURF TREAT	SY	7130
ASPH CONC. (TY C)	SY	7379
ASPH CONC. (TY C) (SURF)	SY	7471
BLAD	HR	4
BLDZER WORK (ORD COMP)	HR	8
SCRAPER WORK	HR	8
MBGF (BLKOUT) (12 GA) (TIM POST)	LF	0
TERM ANCH SECT (12 GA)	EA	0
GUARDRAIL EXTRUDER TERM	EA	0
CONC CURB (TY A)	LF	1600
DRIVEWAY (TY I)	SY	100
SALV, HAUL AND STOCKPILE ASPHALTIC PAVEMENT (RAP)	SY	3884
Construct Detour (CT2)	Sta	6.96
Wrk Zn Pav Mk (Remov) (4") (W) (S)	LF	846
" " " (4") (Y) (S)	LF	1183
" " " (24") (W) (S)	LF	110
Pav Mk (Refl) (Ty II CR)	EA	168
" " " (Ty A1)	EA	35

✳ FOR CONTRACTORS INFORMATION ONLY

FOR RAMP D6 DETAIL
SEE SHEET 132

FOR RAMP E5 DETAIL
SEE SHEET 138

Trees to Remain

Tree No.	Station	Offset	Type	Dia.
2	10143+39 "C"	28' Rt.	Oak	9"
4	10143+85 "C"	32' Rt.	Oak	10"
6	10143+88 "C"	31' Rt.	Oak	9"

BRIDGE CLASS STRUCTURE # 5
SEE SHEET 237
8-8' X 4' MBC

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED PROFESSIONAL ENGINEER

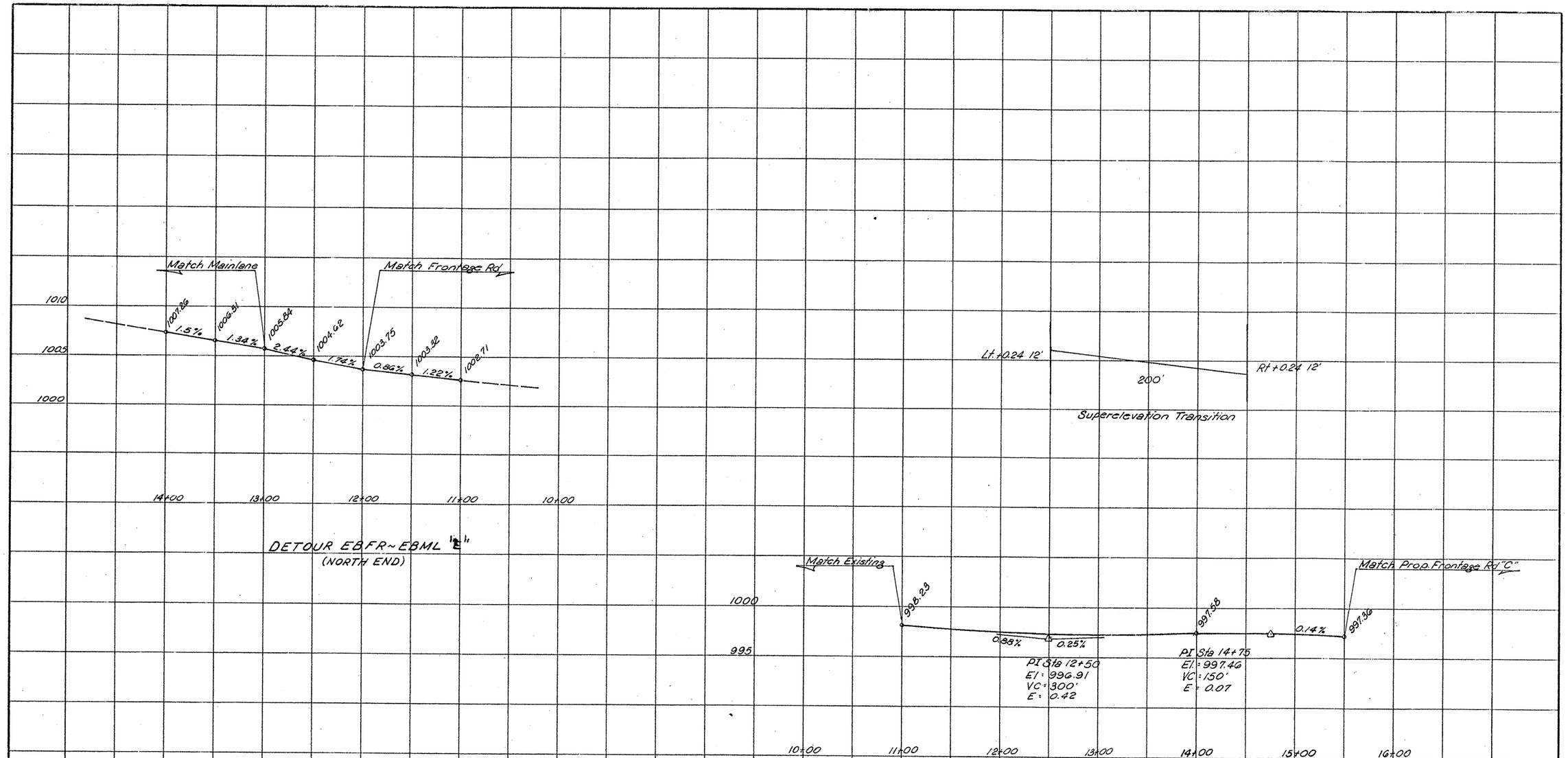
Gregory A. Biediger
2-7-95

LP 1604
Detour "F" Layout
SHEET 2 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS	NH 90(191)M				350
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP160	

ETC

1604PL12.DGN



STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED
PROFESSIONAL ENGINEER

Gregory A. Biediger
2-7-95

CHANGE ORDER NO. 1
Detour "E" & "F" Profiles

Sheet 1 of 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	NH 90(191)M		35D
STATE	DIST.	COUNTY	
TEXAS	15	Bexar	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

FILM DWT 134431 PAPER DWT 134432

General Notes - Barricades :

BARRICADES & BARRICADE SIGNS AT LOCATIONS A, B & C AS SHOWN ON EACH PHASE ARE TO REMAIN IN PLACE FOR THE ENTIRE DURATION OF THE PROJECT.

1. TO BE USED WHEN DETOURING MAINLANES AND MAINLANE CONNECTION TRAFFIC.
2. TO BE USED WHEN DETOURING ALL OTHER TRAFFIC.
3. TO BE USED FOR LANE CLOSURES ON MAINLANE AND MAINLANE CONNECTIONS.
4. TO BE USED FOR LANE CLOSURES ON ALL OTHER TYPE FACILITIES.
5. TO BE USED AS DIRECTED BY THE ENGINEER.
6. TO BE USED AS DIRECTED BY THE ENGINEER.

PHASE	LIMITS	CTB (M & R) LF	CTB (REMOVE) LF	VIA EA	VIA M & R EA	WORK ZONE PAVEMENT MARKINGS (NON-REMOVE) (4") (W) SOLID LF	(4") (Y) SOLID LF	(4") (W) BROKEN LF	(4") (Y) BROKEN LF	ARROW (W) EA	WORD (W) EA	RAISED REFLECTIVE TYIA EA	TY AA EA	TYIC EA	TY II CR EA	REMOV EXIST PAV MARK LF	CTB (Part) LF	VIA Remov EA
	CSJ 2452-02-023																	
1	10127+00 - 10153+00	300		30	30												300	
1	10153+00 - 10179+00																	
1	10179+00 - 10205+00		‡ 1230 ‡														‡1320	
1	10205+00 - 10231+00																	
1	10231+00 - 10257+00	300		60													810	60
1	10257+00 - 10274+35																	
TOTAL CSJ 2452-02-023		600	1230	90	30	0	0	0	0	0	0	0	0	0	0	0	2430	60
	CSJ 2452-01-028																	
1	10274+35 - 10283+00					1400	1400						294	280				
1	10283+00 - 10309+00					1325	1200						252	265				
1	10309+00 - 10335+00																	
1	10335+00 - 10344+00																	
TOTAL CSJ 2452-01-028		0	0	0	0	2725	2600	0	0	0	0	0	546	545	0	0	0	0
	CSJ 2452-02-023																	
2	10127+00 - 10153+00	210	210		15	1700	5200	850				1040		340	85	1950		15
2	10153+00 - 10179+00					700	5400	2525				1080		140	253			
2	10179+00 - 10205+00					2100	7300	2500				1460		460	250			
2	10205+00 - 10231+00						3800	1475				760			148			
2	10231+00 - 10257+00						5200	1300				1040			130			
2	10257+00 - 10274+35					500	3300	1570		2	2	660		100	8			
TOTAL CSJ 2452-02-023		210	210	0	15	5000	30200	10220	0	2	2	6040	0	1040	874	1950	0	15
	CSJ 2452-01-028																	
2	10274+35 - 10283+00					4600	3300	1160		6	6	660		920	135			
2	10283+00 - 10309+00					2900	7050	1968				1410		580	199			
2	10309+00 - 10333+00	900	900			4500	9100	900				1580	640	900	90			
2	10333+00 - 10344+00	270	270		15	750	650	63		2	2	50	20	150	7			15
TOTAL CSJ 2452-01-028		1170	1170	0	15	12750	20100	4091		8	8	3700	3[illegible]	2550	431	0	0	15
TOTAL CSJ 2452-02-023		810	1440	90	45	5000	30200	10220		2	2	6040	0	1040	874	1950		75
TOTAL CSJ 2452-01-028		1170	1170	0	15	15475	22700	4091		8	8	3700	866	3095	431	0		15
PROJECT TOTAL		1980	2610	90	60	20475	52900	14311		10	10	9740	866	4135	1305	1950	2430	90

* PAID FOR IN PHASE 1

‡ Existing Portable Ty 5 CTB @ STR # 7A, to be removed.
‡ See Detour "C" Sheet No. 28

General Notes For All Phases of Work :

The Contractor may, with the approval of and as directed by the Engineer, be required to vary the number and location of signs and barricades from that indicated on the Plans in order to maintain a safe and uninterrupted flow of traffic, particularly in those areas of immediate work.

Roadways carrying mainlane traffic shall be 2 lanes minimum(1 in each direction) unless previously approved by the Engineer.

All numbered detours shall be 2 lanes minimum unless otherwise shown on the Plans.

The number of lanes on all other roadways shall be as noted.

Culverts shall be constructed with the appropriate sequence of roadway shown in the Plans. The Contractor will need to provide for passage of water and pump any water from resulting sump holes where necessary.

Due to the sequence required in the construction of the drainage structures in the various phases of some work, the inlet ends of some new structures may need to be temporarily closed until the outfall ends are completed.

CTB (M & R) as shown on these phase of work sheets may be varied, as needed, when directed by the Engineer.

Vehicular Impact Attenuators (VIA's) shall be temporarily placed at the traffic approach of all CTB that is temporarily used when handling traffic and at other temporary locations shown on the Plans and as directed by the Engineer. Payment for reuse at other locations will not be paid for directly, but shall be considered subsidiary to the item "VEH IMPACT ATTEN ASSEM (TEMP)". Also see spec data notes for this item.

There is one electronic portable changeable message sign required for this project. This sign is for the handling of traffic through work areas. The Contractor shall be required to furnish one standby unit in good condition.

When an advance warning flashing arrow panel is specified by the Engineer for the closing of traffic lanes, the Contractor shall be required to furnish one standby unit in good condition at the job site ready for immediate use.

Vertical panels, traffic cones, etc. shall be required in addition to the scheduled signs and barricades in those areas of immediate work.

All sign placement and spacing shall be in accordance with the MUTCD.

The Barricades, Signs and Traffic Control Devices shall be maintained on a daily basis.

STATE OF TEXAS
GREGORY A. BIRKHOLZ
61429
REGISTERED PROFESSIONAL ENGINEER

◇ Gregory A. Birkholz P.E. Nov 26, 1995

◇ Added SSCB, Revised CTB Quantities.

SCHEDULE OF BARRICADES

LOCATION	BARRICADE TYPE	ROAD CONST NEXT 3 MI G20-1	END CONST G20-2	NAME AND ADDRESS G20-6	OBSV WARN SIGN R20-3	ROAD CONST 1500' CW20-1A	ROAD CONST 1000' CW20-1B	ROAD CONST 500' CW20-1C	ROAD CONST AHEAD CW20-1D	PASS WITH CARE R4-2	DETOUR 1000' CW20-2B	FLAGMAN AHEAD CW20-7D	CW1-4R/L	CW4-2L/R	RT/LT LANE CLOSED AHEAD CW20-5D	RT/LT LANE CLOSED 1000' CW20-5B	RT/LT LANE CLOSED 1500' CW20-5A	DO NOT ENTER R5-1	SCW 6-3	DO NOT PASS R4-1	XX MPH SCW 13-1	CW 1-6A	VERT PANEL L/R	SCW1-8	RAMP CLOSED R11-2R	KEEP RIGHT R4-7B	ROAD CLOSED R11-2	CW21-13L/R	FLASHING ARROW PANEL	MESSAGE ELECT MESSAGE SIGN	DETOUR M4-10R/L
A	III C	1	1	1	1	1	1	1																							
B	TY III PANEL (6")		1						1																						
C	SIGN POST		1						1																						
1	SIGN POST						1		1	1	1		1	1		1	1	1	1	1	1					1			1		
2	TY III PANEL																						1	1		1					
3	SIGN POST													1		1	1														
4	SIGN POST													1	1																
5	SIGN POST																			1	1	1									
6	TRAILER																											1	1		
5	TY III PANEL											1									1			1	1	1	1			1	

SIGNS SHOWN ON PLANS NOT SHOWN ON THIS SHEET

1. DETOUR 500 FT. - CW20-2B
2. DETOUR AHEAD - CW20-2D
3. RAMP CLOSED AHEAD - CW20RP-3D
4. ROAD CLOSED 1000 FT. - CW20-3B
5. ROAD CLOSED 500 FT. - CW20-3C
6. LANE ENDS MERGE LEFT - CW9-2L
7. CW4-1R
8. ONLY - R6-2
9. WRONG WAY - R5-1A
10. KEEP RIGHT - R4-7
11. KEEP RIGHT - R4-7A
12. FORM ONE LANE RIGHT - R20-2
13. R3-1
14. R3-2
15. STOP - R1-1
16. ECW1-1R

Note: Additional Signing for the Frontage Rds. to prevent Wrong Way movements shall be placed according to MUTCD or as directed by the engineer.

BARRICADES, CONSTRUCTION SIGNS AND PHASES OF WORK

SHEET 1 OF 1

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS		36

STATE DIST. NO.	COUNTY	CONT. NO.	SEC. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023, etc	LP1604

1604GR5.DGN

GRADING SUMMARY

SHEET NO.	CSJ 2452-02-023 STATION TO STATION	PREP R.O.W. STA EST.	BLAD HR EST.	SCRAP WORK (ORD COMP) HR EST.	BLDZR WORK (ORD COMP) HR EST.	FURN AND PLAC TPSL SY EST.	BRDCST SEED (BERMUDA) SY EST.	FLEX BASE (DEL) (DC) (TY A) (GR 1) (MOD) (CL 3) CY EST.	CEM STAB BASE (DC) (TY G) CY EST.	ASPH STAB BASE (GR 4) (4") SY * EST.	ASPH STAB BASE (GR 4) (8") SY * EST.	ONE COURSE SURF TREAT SY * EST.	ASPH CONC (TY C) SY * EST.	ASPH CONC (TY C) (SURF) SY * EST.	RIPRAP (CONC) (CL B) CY EST.	REMOVE OLD STR (LARGE) EA EST.	CONC CURB (TY A) LF EST.	PLANE ASPH SURF (0-2") SY EST.
53	10131+00 - 10137+00																	
53A	10137+00 - 10147+00	8	4	8	8	6883	6883	1887		1063		7130	7379	7471			1600	270
56	10147+00 - 10157+00	10	4	8	16	33,018	33,018	4842		12,076		22,305	21,575	20,932		1	2000	2670
59	10157+00 - 10167+00	10				27,519	27,519	4884		5831	8514	31,656	26,653	25,010	87		6455	2670
62	10167+00 - 10177+00	10	12	24	24	31,571	31,571	4001		7334		17,379	16,820	16,300		1	1640	2670
65	10177+00 - 10187+00	10				37,822	37,822	3944		6223		17,723	17,057	16,445			2000	2670
68	10187+00 - 10196+00	9				29,002	29,002	4315		6218	20,846	40,136	38,502	37,783	148.5		3592	2400
71	10196+00 - 10206+00	10	8	12	14	22,560	22,560	3487		6333		14,292	13,841	13,406	176.5		6975	2670
74	10206+00 - 10216+00	10				28,349	28,349	4853		13,356		23,207	18,993	21,318	62		2148	2670
77	10216+00 - 10226+00	10				14,373	14,373	4506		9498		20,212	18,885	18,247	44		2000	2670
80	10226+00 - 10236+00	10	8	16	16	17,784	17,784	3942		17,278		17,772	17,056	16,444	40		2040	2670
83	10236+00 - 10246+00	10				16,802	16,802	3962		8889		17,772	17,056	16,444	6		2000	2670
86	10246+00 - 10256+00	10	24	48	48	18,385	18,385	4541		12,307		21,140	20,363	19,641	75	2	2000	2670
89	10256+00 - 10266+00	10	4	8	8	34,542	34,542	4686		11,068		21,178	20,476	19,848	65		2000	2670
92	10266+00 - 10276+00	10	4	8	8	31,219	31,219	6297		5913		30,874	19,704	31,602	48	1	3105	2670
	TOTALS 2452-02-023	137.0	68	132	142	349,829	349,829	60,147	-	123,387	29,360	302,776	274,360	280,891	752	5	39,555	34,710

SHEET NO.	CSJ 2452-01-028 STATION TO STATION	PREP R.O.W. STA EST.	BLAD HR EST.	SCRAP WORK (ORD COMP) HR EST.	BLDZR WORK (ORD COMP) HR EST.	FURN AND PLAC TPSL SY EST.	BRDCST SEED (BERMUDA) SY EST.	FLEX BASE (DEL) (DC) (TY A) (GR 1) (MOD) (CL 3) CY EST.	CEM STAB BASE (DC) (TY G) CY EST.	ASPH STAB BASE (GR 4) (4") SY * EST.	ASPH STAB BASE (GR 4) (8") SY * EST.	ONE COURSE SURF TREAT SY * EST.	ASPH CONC (TY C) SY * EST.	ASPH CONC (TY C) (SURF) SY * EST.	RIPRAP (CONC) (CL B) CY EST.	REMOVE OLD STR (LARGE) EA EST.	CONC CURB (TY A) LF EST.	PLANE ASPH SURF (0-2") SY EST.
95	10276+00 - 10286+00	10				31,728	31,728	5028	457	5538		18,159	17,534	19,121	24		2820	911
98	10286+00 - 10295+00	9				31,879	31,879	3164	444	5600		13,550	12,950	14,800	15		1800	722
101	10295+00 - 10305+00	10				28,500	28,500	4408	494	8432		19,121	19,204	20,811			2030	1589
104	10305+00 - 10315+00	10				24,300	24,300	3696	494	7262		16,096	15,388	17,444	184		2000	2467
107	10315+00 - 10325+00	10				26,531	26,531	3221	494	6972		14,299	13,628	15,711	123		1670	2600
110	10325+00 - 10334+00	9				17,401	17,401	1792	444	3956		7948	7534	9563			900	667
113	10334+00 - 10337+50	3.5				7638	7638	624	102	1491		2841	2691	3625			295	
	TOTALS 2452-01-028	61.5	-	-	-	167,977	167,977	21,933	2929	39,251	-	92,014	88,929	101,875	346	-	11,515	8,956
	TOTALS 2452-02-023	137.0	68	132	142	349,829	349,829	60,147	-	123,387	29,360	302,776	274,360	280,891	752	5	39,555	34,710
	PROJECT TOTALS	198.50	68	132	142	517,806	517,806	82,080	2929	162,638	29,360	394,790	363,289	381,966	1098	5	51,070	43,666

* FOR CONTRACTOR'S INFORMATION ONLY

Revised 10-7-93
Revised 10-4-93

GRADING SUMMARY

SHEET 1 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			37
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

etc

151p2at1604grs.dgn

GRADING SUMMARY

SHEET NO.	CSJ 2452-02-023 STATION TO STATION	CONC DRVWY (6") SY	ROW MARK (TY II) EA	MBGF (12 GA) (TIM POST) LF	TERM ANCH SECT (12 GA) EA	MBGF (BLK OUT) (12 GA) (TIM POST) LF	REMOV MBGF LF	REMOV TERM ANCH SECT EA	CONDT (PVC) (SCH 80) (2") LF	GROUND BOX (RPM) (H20 LOAD) EA	WK ZN GDMRK (W) EA	WK ZN GDMRK (Y) EA	EXCAV CY	EMBANK (ORD COMP) (TY B) CY	SALV, HAUL & STKPL RECLM ASPH PAV (RAP) SY	MOWING HR	LITTER PICK-UP HR	MAILBOX (SINGLE) EA
		EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.
53	10131+00 - 10137+00												-	-	874			
53A	10137+00 - 10147+00												10444	1588	3884			
56	10147+00 - 10157+00		2										58028	16950				
59	10157+00 - 10167+00		10	728					4070	15			40129	88037				
62	10167+00 - 10177+00			1003		350							14706	75381				
65	10177+00 - 10187+00		2										46487	4249				
68	10187+00 - 10196+00		10	530	1				1575	6			24993	72684				1
71	10196+00 - 10206+00		9	705	3	175			4305	13			32546	135115				
74	10206+00 - 10216+00				1	50							19971	120775				
77	10216+00 - 10226+00			125									8555	18549				
80	10226+00 - 10236+00												4063	21215				
83	10236+00 - 10246+00												23446	1186				
86	10246+00 - 10256+00												4589	32087				
89	10256+00 - 10266+00						75	2					23624	24633				
92	10266+00 - 10276+00			365			1460	8	3815	11			9517	72835				
										1								
	TOTALS 2452-02-023	-	33	3456	5	575	1535	10	13,765	45	2780	2780	321098	685284	4758	479	685	1

SHEET NO.	CSJ 2452-01-028 STATION TO STATION	CONC DRVWY (6") SY	ROW MARK (TY II) EA	MBGF (12 GA) (TIM POST) LF	TERM ANCH SECT (12 GA) EA	MBGF (BLK OUT) (12 GA) (TIM POST) LF	REMOV MBGF LF	REMOV TERM ANCH SECT EA	CONDT (PVC) (SCH 80) (2") LF	GROUND BOX (RPM) (H20 LOAD) EA	WK ZN GDMRK (W) EA	WK ZN GDMRK (Y) EA	EXCAV CY	EMBANK (ORD COMP) (TY B) CY	SALV, HAUL & STKPL RECLM ASPH PAV (RAP) SY	MOWING HR	LITTER PICK-UP HR	MAILBOX (SINGLE) EA
		EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.
													-	-				
95	10276+00 - 10286+00		3	300			580	2	2295	12			42075	37552				
98	10286+00 - 10295+00		1										68955	253				
101	10295+00 - 10305+00	160	3										52756	1096				
104	10305+00 - 10315+00		6										27041	28014				
107	10315+00 - 10325+00	130	2										63451	5034	1623			1
110	10325+00 - 10334+00	150	5										51619	488				1
113	10334+00 - 10337+50		1										567	4260				2
	TOTALS 2452-01-028	440	21	300	-	-	580	2	2295	12	1230	1230	306464	76697	1623	246	549	4
	TOTALS 2452-02-023	-	33	3456	5	575	1535	10	13,765	45	2780	2780	321098	685284	4758	479	685	1
	PROJECT TOTALS	440	54	3756	5	575	2115	12	16,060	57	4010	4010	627562	761981	6381	725	1234	5

* FOR CONTRACTOR'S INFORMATION ONLY

GRADING SUMMARY

SHEET 2 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		38

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 160

etc

15ip2a1 1604grs. dgn

GRADING SUMMARY

SHEET NO.	CSJ 2452-02-023 STATION TO STATION	DRIVEWAY (TY 1) SY	GUARDRAIL EXTRUDER TERM EA	REMOVE EXIST ROADSIDE TRAF SIGNS EA	TEMP SIGN SUPPORT (4" X 4") LF	Traffic Signal Installation LS	CTB (Type 5) LF	VEH IMPACT ATTENUATOR EA										
		EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.
53	10131+00 - 10137+00																	
53A	10137+00 - 10147+00	100																
56	10147+00 - 10157+00	50																
59	10157+00 - 10167+00	150	4															
62	10167+00 - 10177+00	100	8															
65	10177+00 - 10187+00	150																
68	10187+00 - 10196+00	105	2			Hausman Rd.												
71	10196+00 - 10206+00	30	4			See Sheets												
74	10206+00 - 10216+00	160				374 - 378												
77	10216+00 - 10226+00	50	1															
80	10226+00 - 10236+00																	
83	10236+00 - 10246+00	105																
86	10246+00 - 10256+00	125																
89	10256+00 - 10266+00	95																
92	10266+00 - 10276+00	100	3				140	2										
	TOTALS 2452-02-023	1320	22	78	1300	1												

SHEET NO.	CSJ 2452-01-028 STATION TO STATION	DRIVEWAY (TY 1) SY	GUARDRAIL EXTRUDER TERM EA	REMOVE EXIST ROADSIDE TRAF SIGNS EA	TEMP SIGN SUPPORT (4" X 4") LF	Traffic Signal Installation LS	CTB (TYPE 5) LF	VEH IMPACT ATTENUATOR EA										
		EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.
95	10276+00 - 10286+00		3				140											
98	10286+00 - 10295+00	125																
101	10295+00 - 10305+00	55																
104	10305+00 - 10315+00	251																
107	10315+00 - 10325+00	90																
110	10325+00 - 10334+00	625																
113	10334+00 - 10337+50	800																
	TOTALS 2452-01-028	1946	3	44	800	-	140											
	TOTALS 2452-02-023	1320	22	78	1300	1	140	2										
	PROJECT TOTALS	3266	25	122	2100	1	280	30										

* FOR CONTRACTOR'S INFORMATION ONLY

GRADING SUMMARY

SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		38A

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

etc

151p2et 1604grs.dgn

CSJ 2452-02-023

EARTHWORK SUMMARY

SHEET NO	STATION	EXCAV CY	EMBANK CY
53	10131+00	0	0
	10132+00	0	0
	10133+00	0	0
	10134+00	0	0
	10135+00	0	0
	10136+00	0	0
	10137+00	0	0
SHEET TOTALS		0	0
53A	10138+00	0	0
	10139+00	0	0
	10140+00	361	46
	10141+00	582	14
	10142+00	1031	0
	10143+00	1474	0
	10144+00	1888	0
	10145+00	1884	28
	10146+00	1594	417
	10147+00	1630	1083
SHEET TOTALS		10444	1588
56	10148+00	2242	1224
	10149+00	2716	1063
	10150+00	2358	719
	10151+00	3041	247
	HMT #1	460	
	10152+00	5332	245
	10153+00	7794	701
	10154+00	8782	1534
	10155+00	8690	2602
	10156+00	8413	3706
	10157+00	8200	4909
SHEET TOTALS		58028	16950
59	10158+00	7989	5988
	10159+00	7039	7044
	10160+00	5588	8088
	10161+00	4006	9495
	KYLE SEALE	10596	5488
	10165+00	2899	17910
	10166+00	1033	17180
	10167+00	979	16844
SHEET TOTALS		40129	88037
62	10168+00	881	16255
	10169+00	840	15542
	10170+00	682	14617
	HMT #2	350	
	10171+00	398	14088
	10173+00	323	4709
	10174+00	2033	5442
	10175+00	3022	2875
	10176+00	3064	1411
	10177+00	3113	442
SHEET TOTALS		14706	75381

CSJ 2452-02-023

EARTHWORK SUMMARY

SHEET NO	STATION	EXCAV CY	EMBANK CY
65	10178+00	3355	65
	10179+00	3823	3
	10180+00	4278	0
	10181+00	4601	0
	10182+00	6058	0
	10183+00	6704	3
	10184+00	5400	145
	10185+00	4290	631
	10186+00	3776	1326
	10187+00	4202	2076
SHEET TOTALS		46487	4249
68	10188+00	4907	3092
	10189+00	4358	4557
	10190+00	3288	6309
	10191+00	2801	8204
	10192+00	2698	10293
	10193+00	2574	12396
	10194+00	2342	13922
	10195+00	2025	13911
SHEET TOTALS		24993	72684
71	HAUSMAN RD	17341	7526
	10199+00	1291	9576
	10200+00	1507	12718
	10201+00	1710	17358
	10202+00	2123	17680
	10203+00	2296	17330
	10204+00	2222	17465
	10205+00	1936	17779
	10206+00	2120	17683
SHEET TOTALS		32546	135115
74	10207+00	2589	17295
	10208+00	2681	16651
	10209+00	2595	15819
	10210+00	2307	14644
	10211+00	1992	13094
	10212+00	2003	11647
	10213+00	1930	10199
	10214+00	1637	8552
	10215+00	1275	7020
	10216+00	962	5854
SHEET TOTALS		19971	120775
77	10217+00	815	4811
	10218+00	618	3916
	10219+00	518	3003
	10220+00	590	2079
	10221+00	780	1255
	10222+00	973	667
	10223+00	1009	530
	10224+00	958	597
	10225+00	964	744
	10226+00	1330	947
SHEET TOTALS		8555	18549

CSJ 2452-02-023

EARTHWORK SUMMARY

SHEET NO	STATION	EXCAV CY	EMBANK CY
80	10227+00	1325	1141
	10228+00	851	1345
	10229+00	580	1573
	10230+00	287	1923
	10231+00	84	2543
	10232+00	14	3595
	HMT #5	285	
	10233+00	13	4065
	10234+00	120	2854
	10235+00	239	1302
	10236+00	265	874
SHEET TOTALS		4063	21215
83	10237+00	445	732
	10238+00	623	297
	10239+00	1017	56
	10240+00	1843	5
	10241+00	2841	0
	10242+00	3405	0
	10243+00	3175	0
	10244+00	2600	2
	10245+00	2618	4
	HMT #6	2369	
	10246+00	2510	90
SHEET TOTALS		23446	1186
86	10247+00	1435	1502
	10248+00	890	1834
	10249+00	750	1053
	10250+00	521	1060
	10251+00	303	1745
	10252+00	61	3814
	10253+00	5	5962
	10254+00	2	6697
	HMT #7	83	55
	10255+00	3	5365
	10256+00	536	3000
SHEET TOTALS		4589	32087
89	10257+00	1983	978
	10258+00	3189	284
	10259+00	3555	336
	10260+00	4476	274
	10261+00	4238	472
	10262+00	2630	1066
	10263+00	1551	2164
	10264+00	689	4485
	10265+00	562	6513
	10266+00	751	8061
SHEET TOTALS		23624	24633
92	10267+00	738	9317
	10268+00	909	9156
	10269+00	1091	9062
	10270+00	1017	9464
	10271+00	1051	9445
	10272+00	1291	9002
	10273+00	1538	8725
	10274+00	1882	8664
SHEET TOTALS		9517	72835

CSJ 2452-01-028

EARTHWORK SUMMARY

SHEET NO	STATION	EXCAV CY	EMBANK CY
95	SH 16	10486	3383
	10277+00	756	3067
	10278+00	2819	5521
	10279+00	3248	5675
	10280+00	3033	5305
	10281+00	2559	4961
	10282+00	1931	4417
	10283+00	1941	3202
	10284+00	3231	1609
	10285+00	5297	382
	10286+00	6774	30
SHEET TOTALS		42075	37552
98	10287+00	7620	14
	10288+00	7546	17
	10289+00	6977	26
	10290+00	6750	38
	10291+00	7217	55
	10292+00	8456	51
	10293+00	8967	30
	10294+00	8123	13
	10295+00	7299	9
SHEET TOTALS		68955	253
101	10296+00	6015	198
	10297+00	4032	324
	10298+00	3810	178
	10299+00	4092	133
	10300+00	3402	172
	10301+00	4686	88
	10302+00	6382	3
	10303+00	6658	0
	10304+00	6753	0
	10305+00	6926	0
SHEET TOTALS		52756	1096
104	10306+00	6877	0
	10307+00	5519	27
	10308+00	3284	189
	10309+00	1276	1601
	10310+00	245	5492
	10311+00	62	8380
	10312+00	53	7397
	10313+00	380	3994
	10314+00	2766	929
	10315+00	6579	5
SHEET TOTALS		27041	28014
107	10316+00	8220	0
	10317+00	6700	6
	10318+00	4395	396
	10319+00	3055	1014
	10320+00	2140	1310
	10321+00	1979	1475
	10322+00	4321	811
	10323+00	7987	22
	10324+00	11243	0
	10325+00	13411	0
SHEET TOTALS		63451	5034

CSJ 2452-01-028

EARTHWORK SUMMARY

SHEET NO	STATION	EXCAV CY	EMBANK CY
110	10326+00	13511	0
	10327+00	11758	0
	10328+00	9205	0
	10329+00	6665	5
	10330+00	4328	17
	10331+00	2820	12
	10332+00	1923	14
	10333+00	1010	118
	10334+00	399	322
SHEET TOTALS		51619	488
113	10335+00	219	537
	10336+00	127	1111
	10337+00	87	1556
	10338+00	134	766
	CONNECTOR	0	290
SHEET TOTALS		567	4260

EARTHWORK SUMMARY

CSJ	EXCAV CY	EMBANK CY
2452-02-023	321098	685284
2452-01-028	306464	76697
PROJECT TOTALS	627562	761981

EARTHWORK SUMMARY

SHEET 1 OF 1

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS	CRP 90(191)M			39
STATE DIST. NO.	COUNTY	CONT. NO.	SEC. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

FTC.

15bw.pm /usr/d1550@2/1604ews.dgn

LARGE STRUCTURE SUMMARY

DESCRIPTION			LP 1604 EB & WB OVERPASS AT KYLE SEALE	HUESTA CREEK BRIDGE EB & WB MAINLANES	HUESTA CREEK BRIDGE EB & WB FRONTAGE RD	LP 1604 EB & WB OVERPASS AT HAUSMAN	LP 1604 WB OVERPASS AT SH 16	LP 1604 EB OVERPASS AT SH 16**					PROJECT TOTAL (2452-02-023)
	CSJ		2452-02-023	2452-02-023	2452-02-023	2452-02-023	2452-02-028	2452-02-023					
	PERMANENT STRUCTURE NUMBER							15-015-0291-10-084					
	BEGIN BRIDGE STATION		161+71.35	171+21.00	171+00.96 (EB) 171+40.35 (WB)	195+65.18	274+35.59	274+35.59					
	END BRIDGE STATION		164+29.35	172+76.00	172+40.96 (EB) 172+60.35 (WB)	198+90.18	277+10.59	277+10.59					
	LENGTH (FEET)		258	155	*140 (EB) / 120 (WB)	325	275	275					
ITEM-CODE	LAYOUT SHEET NUMBER		149, 151	158, 160	166, 171	178-179, 181-182	190	—					
	ITEM	UNIT											
416-001	DRILL SHAFT (18")	L.F.	244	116		184	120						664
416-003	DRILL SHAFT (30")	L.F.	390	309	282	400	432						1813
416-004	DRILL SHAFT (36")	L.F.	204			144							348
421-010	CL "C" CONC. (BENT)	C.Y.	115.80	81.20	85.90	127.90	62.30						473.10
421-012	CL "C" CONC. (ABUT)	C.Y.	119.60	93.60	77.0	153.60	53.60						497.40
421-016	CL "C" CONC. (SHEAR KEY)	C.Y.			57.20								57.20
422-001	REINF CONC. SLAB	S.F.	20640	12400		26000	11000						70040
425-003	PRESTR CONC. BEAM (TY C)	L.F.		1540.52			1642.03						3182.55
425-005	PRESTR CONC. BEAM (TY 54)	L.F.	1792.00										1792.00
425-009	PRESTR CONC. BEAM (TY IV)	L.F.	1292.00			4137.36							5429.36
425-018	PRESTR CONC. BOX BEAM (5 E 20)	L.F.			513.88								513.88
425-019	PRESTR CONC. BOX BEAM (5 I 20)	L.F.			2055.49								2055.49
428-001	CONC. SURF TRMT	S.Y.	2130	1280		2684	1136						7230
432-008	RIPRAP (CONC) (CL B)	C.Y.	348	576	124	568	260						1876
450-003	RAIL (TY T202)	L.F.			566								566
450-036	RAIL (TY T501)	L.F.	1136	692		1416	602						3846
4006-002	SEALED EXP. JT. (3 IN.)	L.F.	150	152		192	75						569
8180	CL "B" FINISH FOR EXIST CONC	S.Y.						970					970
	BAT EXCLUDER JOINT SEALER	L.F.			2302.0								2314.0

*NO PROJECT LENGTH

**EXIST STRUCTURE
TY "C" PRESTR. CONC BEAM SPANS 55'-80'-80'-60'
WITH RAIL TYPE T-2
OVERALL LENGTH = 275', CLEAR RDWY = 44'-0"

LARGE STRUCTURE SUMMARY

SHEET 1 OF 1

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				40
STATE DIST. NO.	COUNTY	CONT. NO.	SEC. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

LSS

ETC

BRIDGE CLASS STRUCTURE SUMMARY

PLAN SHEET NO.	STRUCT LENGTH	STRUCT NO.	LOCATION	DESCRIPTION	STRUCT EXCAV (LARGE) CY	RIPRAP (CONC) (CL. B) CY	RAIL TY T-6 LF	CONC BOX CULVERT 8'x 4' (MC 8-3) LF	8'x 4' MBC (SPL) LF	7'X 4' (MC 7-3) LF	8'X 5' (MC 8-3) LF	7'X 3' (MC 7-3) LF	7'X 3' MBC (SPL) LF	9'X 5' MBC (MC 9-1) LF	CULVERT WINGWALL MCW P EA	MCW P 15° EA	MCW P 30° EA	MCW P 45° EA	"H"
237-238	96.87	5	10147+32.47 - 10148+29.34	8-8'X 4'X 637.74' MBC W/MCW-P-45° U.S. & MCW-P-30° D.S.	11877	13		2861.92	2240								2	2	4'
239	78.44	7	10232+65.96 - 10233+44.40	EXIST 3-7'X 4'X 77' MBC EXTENDED & ADD 6-7'X 4'X 365.54'	3031	14				3061.56							4		4'
240	*38.90	7A	107+20.79 - 107+59.69	EXIST 4-9'X 5'X 46' MBC EXTENDED U.S. & D.S. W/MCW-P	151	16	150							225.16	4				5'
241-242	125.00	8	10246+72.50 - 10247+97.50	14-8'X 5'X 329.56' MBC W/MCW-P-15° U.S. & D.S.	8120	40					4613.84					4			5'
243	88.52	9	10252+18.24 - 10253+06.76	10-8'X 4'X 369.38' MBC W/MCW-P-15°	3312	12		3693.80								4			4'
244-245	71.01	10	10264+93.55 - 10265+64.56	EXIST 4-7'X 3'X 142.42' MBC EXTENDED & ADD 4-7'X 3'X 663.32'	4608	17						2731.52	1917.44					4	3'
CSJ 2452-02-023			TOTAL		● 31099	112	150	6555.72	2240	3061.56	4613.84	2731.52	1917.44	225.16	4	8	6	6	

* NO PROJECT LENGTH

● For Contractors information Only

BRIDGE CLASS
STRUCTURE SUMMARY

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			41
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

FTP

CBS ESQUIVEL DISK: [15B=PN] 1604grs.dgn

RETAINING WALL NO.		RW 1				RW 3	RW 2											PROJECT TOTAL (2452-02-023)
ITEM	UNIT																	
TY T-501 RAIL	LF	720.0																720.0
PANEL AREA	SQ FT	5536.0				1838.0	2841.0											10215.0
LAYOUT SHEET		213 - 214				216	215											

2452-02-023

RETAINING WALL SUMMARY

SHEET 1 OF 1

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					42
STATE DIST. NO.	COUNTY		CONT. NO.	SEC. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR		2452	02	023	LP1604

ETC

RWSUM

CULVERT & STORM SEWER SUMMARY

LINE NO.	STORM DRAIN & UTILITY LAYOUT SHEET NO.	PROFILE SHEET NO.	FROM	TO	GRATE TY 2 ✳ EA	RING & COVER 18" ✳ EA	RING & COVER 24" ✳ EA	SEWER & STRUCT EXCAV ✳ CY	TRENCH EXCAV PROT LF	RIPRAP CONC CL B CY	RC PIPE CL III 18" LF	RC PIPE CL III 24" LF	RC PIPE CL III 30" LF	RC PIPE CL III 36" LF	RC PIPE CL III 48" LF	RC PIPE CL IV 24" LF	RC PIPE CL IV 30" LF	RC PIPE CL IV 36" LF	RC PIPE CL IV 48" LF	✳✳CGM PIPE 18" LF	✳✳CGM PIPE 30" LF	INLETS (COMPL) DROP TY 3 EA	INLETS (COMPL) DROP TY 6 EA	INLETS (COMPL) CURB TY 1 EA	INLETS (COMPL) CURB TY 3 EA	INLETS (COMPL) CURB TY C EA
A1	273	260A	A1	A2	4			154	73	3			146										1			
A2	|	260A	A2	A3	4			245	111	3				221									1			
A3	|	260A	A3	A4	4			625	217	3				433									1			
A4	273	260A	A4	OUTFALL	4			201		3													1			
B1	275	260B	B1	B3	4			220	159	3								159					1			
B2	275	260B	B2	B3	1					2										14		1				
B3	275	260B	B3	D8				190	109									137								
D1	274	260C	D1	D2			1	27			54													1		
D2	|	260C	D2	D3			1	57				84												1		
D3	|	260C	D3	D4			1	44	47			47												1		
D4	|	260C	D4	D6			1	100	102			32				70										
D5	|	260C	D5	D6	4			525	371	3			344				53						1			
D6	274	260C	D6	D7			1	619	295									295								
D7	275	260C	D7	D8			1	502	278					158				120								
D8	275	260B	D8	D9			1	21	8																	
D9	275	260B	D9	OUTFALL	4			179	30	4													1			
CSJ 2452-02-023 SUB-TOTAL					29		7	3709	1800	24	54	163	490	812		70	53	711		14		1	7	4		

LINE NO.	PLAN SHEET NO.	PROFILE SHEET NO.	FROM	TO	MANHOLE (COMPL) TY 1 EA	MANHOLE (COMPL) TY 3 EA	MANHOLE (COMPL) TY 4 EA	MANHOLE (COMPL) TY 5 EA	MANHOLE (COMPL) TY SPL ★ EA	⋈ CONC BOX CULV 5'X 2' LF	⋈ CONC BOX CULV 5'X 3' LF	⋈ CONC BOX CULV 7'X 3' LF	⋈ CONC BOX CULV 6'X 3' LF	WINGWALLS & HEADWALLS PW -N EA	WINGWALLS & HEADWALLS CH 11A EA	SAFETY END TRMT PD-SPR EA	42"RCP (CL IV) JACK OR BORE LF
A1	273	260A	A1	A2													
A2	|	260A	A2	A3													
A3	|	260A	A3	A4													
A4	273	260A	A4	OUTFALL								87					
B1	275	260B	B1	B3													
B2	275	260B	B2	B3													
B3	275	260B	B3	D8	1												
D1	274	260C	D1	D2													
D2	|	260C	D2	D3													
D3	|	260C	D3	D4													
D4	|	260C	D4	D6													
D5	|	260C	D5	D6													
D6	274	260C	D6	D7			1										
D7	275	260C	D7	D8	1												
D8	275	260B	D8	D9			1						8				
D9	275	260B	D9	OUTFALL									107				
CSJ 2452-02-023 SUB-TOTAL					2		2					87	115				

✳ FOR CONTRACTOR'S INFORMATION ONLY

✳✳ 14 GAUGE, 2 2/3 " X 1/2" CORRUGATIONS

⋈ FOR FILL HEIGHTS, SEE STORMSEWER SECTIONS

CULVERT & STORM SEWER SUMMARY

SHEET 1 OF 5 SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		43

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

ETC.

151p2or1604css.dgn ESQUIVEL

CULVERT & STORM SEWER SUMMARY

LINE NO.	STORM DRAIN & UTILITY LAYOUT SHEET NO.	PROFILE SHEET NO.	FROM	TO	GRATE TY 2	RING & COVER 18"	RING & COVER 24"	SEWER & STRUCT EXCAV	TRENCH EXCAV PROT	RIPRAP CONC CL B	RC PIPE CL III 18"	RC PIPE CL III 24"	RC PIPE CL III 30"	RC PIPE CL III 36"	RC PIPE CL III 48"	RC PIPE CL IV 24"	RC PIPE CL IV 30"	RC PIPE CL IV 36"	RC PIPE CL IV 48"	✳✳ CGM PIPE 18"	✳✳ CGM PIPE 30"	INLETS (COMPL) DROP TY 3	INLETS (COMPL) DROP TY 6	INLETS (COMPL) CURB TY 1	INLETS (COMPL) CURB TY 3	INLETS (COMPL) CURB TY C
					✳ EA	✳ EA	✳ EA	✳ CY	LF	CY	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA
E1	274	261	E1	E2			1	39			54														1	
E2	↓	261	E2	E3			1	250	147			260													1	
E3		261	E3	E4			1	54			83													1		
E4		261	E4	OUTFALL			1	277	198				198											1		
E6	274	261	E6	OUTFALL	4			416		3	1216												1			
F2	279	262	F2	F3	1			450	307	2		307										1				
F3	279	262	F3	F4			1	500	386			386														
F4	280	262	F4	F5	1			330	246	2			246									1				
F5	↓	262	F5	F6			1	270	247				247													
F6		262	F6	F7	1			245	247	2			247									1				
F7	280	262	F7	F8			1	210					246													
F8	281	262	F8	F9	1			320	250	2				250								1				
F9	281	262	F9	OUTFALL			1	580	190																	
F11	279	263	F11	F12	4			340	245	3			245										1			
F12	279	263	F12	F13			1	535	347				347													
F13	280	263	F13	F14			1	630	346				346													
F14	280	263	F14	F15			1	450	347				347													
F15	280	263	F15	F16	1			350	180	2				296								1				
F16	281	263	F16	LINE F9			1	285						297												
F21	281	262	F21	LINE F9	1			155	91	2		186										1				
F22	281	262	F22	LINE F9	1			105	80	2		133										1				
F23	281	262	F23	OUTFALL	4			45		3		71											1			
CSJ 2452-02-023 SUB-TOTAL					19		12	6836	3854	23	1353	1343	2469	843								7	3	2	2	

LINE NO.	PLAN SHEET NO.	PROFILE SHEET NO.	FROM	TO	MANHOLE (COMPL) TY 1	MANHOLE (COMPL) TY 3	MANHOLE (COMPL) TY 4	MANHOLE (COMPL) TY 5	MANHOLE (COMPL) TY SPL	⋈ CONC BOX CULV 5'X 2'	⋈ CONC BOX CULV 5'X 3'	⋈ CONC BOX CULV 7'X 3'	⋈ CONC BOX CULV 6'X 3'	WINGWALLS & HEADWALLS CH IIA	SAFETY END TRMT PD-SPR	42"RCP (CL IV) JACK OR BORE
					EA	EA	EA	EA	★ EA	LF	LF	LF	LF	EA	EA	LF
E1	274	261	E1	E2												
E2	↓	261	E2	E3												
E3		261	E3	E4												
E4		261	E4	OUTFALL												
E6	274	261	E6	OUTFALL												
F2	279	262	F2	F3												
F3	279	262	F3	F4	1											
F4	280	262	F4	F5												
F5	↓	262	F5	F6	1											
F6		262	F6	F7												
F7	280	262	F7	F8	1											
F8	281	262	F8	F9												
F9	281	262	F9	OUTFALL		1					375					
F11	279	263	F11	F12												
F12	279	263	F12	F13	1											
F13	280	263	F13	F14					1							
F14	280	263	F14	F15	1											
F15	280	263	F15	F16												
F16	281	263	F16	LINE F9	1											
F21	281	262	F21	LINE F9												
F22	281	262	F22	LINE F9												
F23	281	262	F23	OUTFALL												
CSJ 2452-02-023 SUB-TOTAL					6	1			1		375					

✳ FOR CONTRACTOR'S INFORMATION ONLY

✳✳ 14 GAUGE, 2 2/3 " X ½" CORRUGATIONS

★ FOR DIMENSIONS & DETAILS, SEE SHTS 263, 301

⋈ FOR FILL HEIGHTS, SEE STORMSEWER SECTIONS

CULVERT & STORM SEWER SUMMARY

SHEET 2 OF 5 SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		44

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

ETC.

151p2ar1604css.dgn ESQUIVEL

CULVERT & STORM SEWER SUMMARY

LINE NO.	STORM DRAIN & UTILITY LAYOUT SHEET NO.	PROFILE SHEET NO.	FROM	TO	GRATE TY 2	RING & COVER 18"	RING & COVER 24"	SEWER & STRUCT EXCAV	TRENCH EXCAV PROT	RIPRAP CONC CL B	RC PIPE CL III 18"	RC PIPE CL III 24"	RC PIPE CL III 30"	RC PIPE CL III 36"	RC PIPE CL III 48"	RC PIPE CL IV 24"	RC PIPE CL IV 30"	RC PIPE CL IV 36"	RC PIPE CL IV 48"	✳✳CGM PIPE 18"	✳✳CGM PIPE 30"	INLETS (COMPL) DROP TY 3	INLETS (COMPL) DROP TY 6	INLETS (COMPL) CURB TY 1	INLETS (COMPL) CURB TY 3	INLETS (COMPL) CURB TY C
					✳EA	✳EA	✳EA	✳CY	LF	CY	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA
G1	282	264	G1	G2	1			170		2	296											1				
G2	↓	264	G2	G3	1			220		2		348										1				
G3		264	G3	G4	4			125	98	3		196											1			
G4		264	G4	G5	4			205	95	3			190										1			
G5	282	264	G5	OUTFALL	4			115	60	3													1			
G10	282	264	G10	G11	1			120		2		171										1				
G11	↓	264	G11	G12			1	150	171			171														
G12		264	G12	G13			1	115				147														
G13	282	264	G13	G5	1			160		2		196										1				
H1	276	265	H1	OUTFALL	1			88	70	8			123									1				
H4	278	265	H4	OUTFALL	4		1	686	575	4				605									1			
H5	277-278	266	H5	H6				340	249					249												
H5A	↓	266	H5A	OUTFALL			1	640	466					466												
H6		266	H6	OUTFALL			1	275	200					218											1	
H7	↓	266	H7	H7A			1	60				48												1		
H7A	277-278	266	H7A	OUTFALL			1	315	130			296													1	
H8	278	266	H8	OUTFALL				1650	594						242				352							
H9	278	266	H9	H10				45	36					36												
H10	278	266	H10	OUTFALL			1	160	40					128												
CSJ 2452-02-023 SUB-TOTAL					21		8	5639	2784	29	296	1573	313	1702	242				352			5	4	1	2	

LINE NO.	PLAN SHEET NO.	PROFILE SHEET NO.	FROM	TO	MANHOLE (COMPL) TY 1	MANHOLE (COMPL) TY 3	MANHOLE (COMPL) TY 4	MANHOLE (COMPL) TY 5	MANHOLE (COMPL) TY SPL	⋈ CONC BOX CULV 5'X 2'	⋈ CONC BOX CULV 5'X 3'	⋈ CONC BOX CULV 7'X 3'	⋈ CONC BOX CULV 6'X 3'	WINGWALLS & HEADWALLS PW -N	WINGWALLS & HEADWALLS CH IIA	SAFETY END TRMT PD-SPR	42"RCP (CL IV) JACK OR BORE
					EA	EA	EA	EA	★ EA	LF	LF	LF	LF	EA	EA	EA	LF
G1	282	264	G1	G2													
G2	↓	264	G2	G3													
G3		264	G3	G4													
G4		264	G4	G5													
G5	282	264	G5	OUTFALL							70						
G10	282	264	G10	G11													
G11	↓	264	G11	G12					1								
G12		264	G12	G13					1								
G13	282	264	G13	G5													
H1	276	265	H1	OUTFALL													
H4	278	265	H4	OUTFALL		1											
H5	277-278	266	H5	H6													
H5A	↓	266	H5A	OUTFALL	1												
H6		266	H6	OUTFALL													
H7	↓	266	H7	H7A													
H7A	277-278	266	H7A	OUTFALL													
H8	278	266	H8	OUTFALL													
H9	278	266	H9	H10													
H10	278	266	H10	OUTFALL	1												
CSJ 2452-02-023 SUB-TOTAL					2	1			2		70						

✳ FOR CONTRACTOR'S INFORMATION ONLY

✳✳ 14 GAUGE, 2 2/3 " X ½" CORRUGATIONS

★ FOR DIMENSIONS & DETAILS, SEE SHTS 264, 301

⋈ FOR FILL HEIGHTS, SEE STORMSEWER SECTIONS

CULVERT & STORM SEWER SUMMARY

SHEET 3 OF 5 SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		45

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

ETC.

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CULVERT & STORM SEWER SUMMARY

LINE NO.	STORM DRAIN UTILITY LAYOUT SHEET NO.	PROFILE SHEET NO.	FROM	TO	GRATE TY 2 ✳EA	RING & COVER 18" ✳EA	RING & COVER 24" ✳EA	SEWER & STRUCT EXCAV ✳CY	TRENCH EXCAV PROT LF	RIPRAP CONC CL B CY	RC PIPE CL III 18" LF	RC PIPE CL III 24" LF	RC PIPE CL III 30" LF	RC PIPE CL III 36" LF	RC PIPE CL III 48" LF			RC PIPE CL IV 24" LF	RC PIPE CL IV 30" LF	RC PIPE CL IV 36" LF	RC PIPE CL IV 48" LF		✳✳CGM PIPE 18" LF	✳✳CGM PIPE 30" LF	INLETS (COMPL) DROP TY 3 EA	INLETS (COMPL) DROP TY 6 EA	INLETS (COMPL) CURB TY 1 EA	INLETS (COMPL) CURB TY 3 EA	INLETS (COMPL) CURB TY C EA	
I1	283	267	I1	I2	4			275	202	3			202													1				
I2	283	267	I2	I3	4			350	170	3				300												1				
I3	283	267	I3	OUTFALL			1	15						21																
M1	284	267A	M1	OUTFALL				195																						
M2	285	267A	M2	OUTFALL	8			90				172														2				
CSJ 2452-02-023 SUB-TOTAL					16		1	925	372	6		172	202	321												4				
N1	286	268	N1	LINE O		1		96	65		165																		1	
N2	286	268	N2	LINE O	1			70	37	5	105														1					
N3	285	268	N3	LINE O	1			55	25	3	85														1					
N4	285	268	N4	LINE O		1		66			201																		1	
O	285-286	268	O	OUTFALL				935	200																					
P1	286	269	P1	P2	4			97	83	3		83														1				
P2	285	269	P2	P3			1	127	109				109														1			
P3	285	269	P3	OUTFALL			1	174	40	4			214														1			
Q	285	269	Q1	OUTFALL	1			15		6	42														1					
R1	286	269	R1	R2	1			50		2	68														1					
R2	286	269	R2	OUTFALL				15		3																				
S1	286	269	S1	S2				425	120	5									314											
S2	286	269	S2	OUTFALL	4			510	140	3										346						1				
CSJ 2452-01-028 SUB-TOTAL					12	2	2	2635	819	34	666	83	323						314	346					4	2	2		2	

LINE NO.	PLAN SHEET NO.	PROFILE SHEET NO.	FROM	TO	MANHOLE (COMPL) TY 1 EA	MANHOLE (COMPL) TY 3 EA	MANHOLE (COMPL) TY 4 EA	MANHOLE (COMPL) TY 5 EA	MANHOLE (COMPL) TY SPL ★ EA	⋈ CONC BOX CULV 5'X 2' LF	⋈ CONC BOX CULV 5'X 3' LF	⋈ CONC BOX CULV 7'X 3' LF	⋈ CONC BOX CULV 6'X 3' LF	WINGWALLS & HEADWALLS PW -N EA	WINGWALLS & HEADWALLS CH IIA EA	SAFETY END TRMT PD-SPR EA		42"RCP (CL IV) JACK OR BORE LF					
I1	283	267	I1	I2																			
I2	283	267	I2	I3																			
I3	283	267	I3	OUTFALL	1																		
M1	284	267A	M1	OUTFALL								147				1							
M2	285	267A	M2	OUTFALL																			
CSJ 2452-02-023 SUB-TOTAL					1							147				1							
N1	286	268	N1	LINE O																			
N2	286	268	N2	LINE O																			
N3	285	268	N3	LINE O																			
N4	285	268	N4	LINE O																			
O	285-286	268	O	OUTFALL								400				2							
P1	286	269	P1	P2																			
P2	285	269	P2	P3																			
P3	285	269	P3	OUTFALL																			
Q	285	269																					
R1	286	269	R1	R2																			
R2	286	269	R2	OUTFALL						30				2									
S1	286	269	S1	S2																			
S2	286	269	S2	OUTFALL																			
CSJ 2452-01-028 SUB-TOTAL										30		400		2		2							

✳ FOR CONTRACTOR'S INFORMATION ONLY

✳✳ 14 GAUGE, 2 2/3 " X ½" CORRUGATIONS

⋈ FOR FILL HEIGHTS, SEE STORMSEWER SECTIONS

CULVERT & STORM SEWER SUMMARY

SHEET 4 OF 5 SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		46

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

ETC.

151p2a: 1604oss.dgn ESQUIVEL

CULVERT & STORM SEWER SUMMARY

LINE NO.	STORM DRAIN & UTILITY LAYOUT SHEET NO.	PROFILE SHEET NO.	FROM	TO	GRATE TY 2 ✳EA	RING & COVER 18" ✳EA	RING & COVER 24" ✳EA	SEWER & STRUCT EXCAV ✳CY	TRENCH EXCAV PROT LF	RIPRAP CONC CL B CY	RC PIPE CL III 18" LF	RC PIPE CL III 24" LF	RC PIPE CL III 30" LF	RC PIPE CL III 36" LF	RC PIPE CL III 48" LF	RC PIPE CL IV 24" LF	RC PIPE CL IV 30" LF	RC PIPE CL IV 36" LF	RC PIPE CL IV 48" LF	RC PIPE CL IV 42" LF	✳✳CGM PIPE 18" LF	✳✳CGM PIPE 30" LF	INLETS (COMPL) DROP TY 3 EA	INLETS (COMPL) DROP TY 6 EA	INLETS (COMPL) CURB TY 1 EA	INLETS (COMPL) CURB TY 3 EA	INLETS (COMPL) CURB TY C EA
U1	288	270	U1	OUTFALL	4			740	125	9		1194												1			
V1	289	270	V1	V2									90														
V2	↓	270	V2	V3	4			70		3			94														
V3	↓	270	V3	V4	1			615	30	2														1			
V4	289	270	V4	OUTFALL	4			20		3					64					39	7		1				
W1	290-291	270	INLET	OUTFALL				65		10														1			
X1	292	270	INLET	OUTFALL						10											250						
Y1	290	270	INLET	OUTFALL				30		10												140					
																					50						
CSJ 2452-01-028 SUB-TOTAL					13			1540	155	47		1194	184		64					39	307	140	1	3			
CSJ 2452-02-023 TOTAL					85	0	28	17109	8810	82	1703	3251	3474	3678	242			70	53	711	352	0	14	0	13	18	7	4	0
CSJ 2452-01-028 TOTAL					25	2	2	4175	974	81	666	1277	507	0	64			0	314	346	0	129	307	140	5	5	2	0	2
PROJECT TOTALS					110	2	30	21284	9784	163	2369	4528	3981	3678	306			70	367	1057	352	129	321	140	18	23	9	4	2

LINE NO.	PLAN SHEET NO.	PROFILE SHEET NO.	FROM	TO	MANHOLE (COMPL) TY 1 EA	MANHOLE (COMPL) TY 3 EA	MANHOLE (COMPL) TY 4 EA	MANHOLE (COMPL) TY 5 EA	MANHOLE (COMPL) TY SPL ★ EA	⋈ CONC BOX CULV 5'X 2' LF	⋈ CONC BOX CULV 5'X 3' LF	⋈ CONC BOX CULV 7'X 3' LF	⋈ CONC BOX CULV 6'X 3' LF	WINGWALLS & HEADWALLS PW -N EA	WINGWALLS & HEADWALLS CH IIA EA	SAFETY END TRMT PD-SPR EA	42"RCP (CL IV) JACK OR BORE LF
U1	288	270	U1	OUTFALL													
V1	289	270	V1	V2													
V2	↓	270	V2	V3											1		
V3	↓	270	V3	V4				1									
V4	289	270	V4	OUTFALL													90
W1	290-291	270	INLET	OUTFALL											1		
X1	292	270	INLET	OUTFALL													
Y1	290	270	INLET	OUTFALL													
CSJ 2452-01-028 SUB-TOTAL								1							2		90
CSJ 2452-02-023 TOTAL					11	2	2	0	3	0	445	234	115	0	0	1	0
CSJ 2452-01-028 TOTAL					0	0	0	1	0	30	0	400	0	2	2	2	90
PROJECT TOTALS					11	2	2	1	3	30	445	634	115	2	2	3	90

✳ FOR CONTRACTOR'S INFORMATION ONLY
✳✳ 14 GAUGE, 2 2/3" X 1/2" CORRUGATIONS

⋈ FOR FILL HEIGHTS, SEE STORMSEWER SECTIONS

CULVERT & STORM SEWER SUMMARY

SHEET 5 OF 5 SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		46A

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

ETC

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SERVICE POLE SUMMARY

Service Pole No.	Sheet No.	Service Pole Description (See ED (3)-92)	Service Conduit Size	Service Conductors No. / Size	Safety Switch Amps	Main Disconnect: Switch Amp/Fuse	Main Disconnect: Ckt. Bkr. Pole / Amp	Two-Pole Contactor Amps	Panelbd./ Loadcenter Amp Rating (min)	Circuit No.	Branch Ckt. Bkr. Pole / Amps	KVA Load
1	327	Serv Pole Ty S (240 / 480) 060 (NS) GS (T) TP (0)	1½"	3 / #6	N/A		N/A	4P/30A	N/A	207	2P/30	7
2	328	Serv Pole Ty S (240 / 480) 060 (NS) GS (T) TP (0)	1½"	3 / #6	N/A		N/A	4P/30A	N/A	208	2P/30	7.2
3	330	Serv Pole Ty S (240 / 480) 060 (NS) GS (T) TP (0)	1½"	3 / #6	N/A		N/A	4P/30A	N/A	209	2P/30	7
4	332	Serv Pole Ty S (240 / 480) 060 (NS) GS (T) TP (0)	1½"	3 / #6	N/A		N/A	4P/30A	N/A	210	2P/30	7

NOTE: Service poles for traffic signals will not be paid for directly but shall be considered subsidiary to Item 632, "Installation of Highway Traffic Signals".

ELECTRICAL LAYOUT SUMMARY

ITEM	DESC CODE	DESCRIPTION	UNIT	CSJ 2452-02-023 SHEET NUMBER 1	2	3	4	5	CSJ 2452-01-028 SHEET NUMBER 5	6	7	CSJ 2452-02-023 EST QUANTITY	CSJ 2452-01-028 EST QUANTITY	FINAL QUANTITY
610	196	RDWY ILLUM ASSEM (TY SA40T-8) (0.25 KW) S	EA	2	4	4		2	4	2	7	12	13	25
610	198	RDWY ILLUM ASSEM (TY SA50T-8) (0.40 KW) S	EA			2						2		2
610	200	RDWY ILLUM ASSEM (TY SA40T-8-8)(0.25 KW) S	EA	4		1	5	2		1	4	12	5	17
610	164	RDWY ILLUM ASSEM U/P (SPL-CO)(0.15 KW) S (TY-1)	EA		8	8			8			16	8	24
616	001	RDWY ILLUM ASSEM FND. (TY A)	EA	6	4	7	5	4	4	3	11	26	18	44
618	002	CONDT (RM)(1")	LF						40				40	40
618	045	CONDT (PVC)(SCH 80)(2")	LF	528		547		510		500	310	1585	810	2395
618	055	CONDT (RM)(2")(PUSHED OR BORED)	LF								60		60	60
618	056	CONDT (PVC)(SCH 40)(1")	LF		80	80			40			160	40	200
618	059	CONDT (PVC)(SCH 40)(1¼")	LF	1974	566	1943	854	2189	220	1073	2529	7526	3822	11348
618	075	CONDT (PVC)(SCH 80)(1¼")	LF	230	846	1441		500	986		522	3017	1508	4525
620	001	ELECT. CONDR.(NO 8 BAR)	LF	2765	1210	3702	854	3247	974	1594	3451	11778	6019	17797
620	013	ELECT. CONDR.(NO 12 BAR)	LF		336	396			366			732	366	1098
620	031	ELECT. CONDR.(NO 8)(TY XHHW)	LF	5530	2420	7404	1708	6494	1948	3188	6902	23556	12038	35594
620	034	ELECT. CONDR.(NO 12)(TY XHHW)	LF		672	792			732			1464	732	2196
624	022	GROUND BOX (RPM)(TY A)(122311) APRON	EA	5	5	10		7	4	3	5	27	12	39
628		SERVICE POLE TY S (240/480) 060 (NS) GS (T) TP (0)	EA		1	1		1			1	3	1	4

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
LICENSED PROFESSIONAL ENGINEER

Gregory A. Biediger P.E.
4-13-1993

TEXAS DEPARTMENT OF TRANSPORTATION

ELECTRICAL / SERVICE POLE SUMMARY

ORIGINAL DRAWING DATE: 01-92	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
REVISIONS	15	6		47

COUNTY	CONTROL	SECTION	JOB	HIGHWAY
BEXAR	2452	02	023	1604

Maintenance and Operations Division (D-18) ZFA3:(122,1861 ELSUM.DGN ETC

[D15B PN] ELSUM.DGN - ESQUIVEL

	PLAN SHEET NO.	SHEET NO.	SILT FENCE (TY. 2)	SILT FENCE (TY. 2) (REM. & REPL.)	SILT FENCE (TY. 2) (REM.)	SOIL RETENTION BLANKET (CL. 1) (TY. A)	SOIL RETENTION BLANKET (CL. 2) (TY. E)	SOIL RETENTION BLANKET (CL. 2) (TY. H)	EXCAVATOR WORK (EROSION CONTROL)	FRT. END LDR. WORK (EROSION CONTROL)	ROCK FILTER DAM (TY. 1)	ROCK FILTER DAM (TY. 1) (REM. & REPL)	ROCK FILTER DAM (TY. 1) (REM.)	ROCK FILTER DAM (TY. 2)	ROCK FILTER DAM (TY. 2) (REM.)	ROCK FILTER DAM (TY. 3)	ROCK FILTER DAM (TY. 3) (REM.)	CONSTRUCTION EXIT (TY. 1)	CONSTRUCTION EXIT (TY. 1) (REM. & REPL.)	CONSTRUCTION EXIT (TY. 1) (REM.)	BLOCK SOD (PRARIE BUFFALO)	PLASTER/ CELLULOSE FIB. MULCH SEEDING
			LF	LF	LF	SY	SY	SY	HR	HR	LF	LF	LF	LF	LF	LF	LF	SY	SY	SY	SY	SY
CSJ 2452-02-023	1	272	91	91	91		430		10	5								504	504	504		
	2	273	232	232	232		1841		4	2						90	90					
	3	274	60	60	60	270	1490		6	3												7160
	4	275	174	174	174		1425		10	5						100	100					12025
	5	276	134	134	134		240		24	12	120		120									
	6	277				763	2010		28	14				76	76							
	7	278	545		545	1970															185	
	8	279	152	152	152		395		12	6												
	9	280	40	40	40		380		8	4	50	50	50									
	10	281					1678	200	42	21	40	40	40			88	88					
	11	282					1965		36	18												
	12	283	20	20	20		306	450	4	2						246	246					
	13	284					600		21	11	45	45	45			90	90					
	14	285	10	10	10		860		10	5	36	36	36									
CSJ 2452-01-028	15	286	20	20	20		2355		54	27												
	16	287							32	16	34	34	34									
	17	288					525		14	7	35	35	35									
	18	289					970		28	14	57	57	57									
	19	290	28	28	28		400		6	3												
	20	291					200		18	9												
	21	292					1343		32	16												
CSJ: 2452-02-023			1458	913	1458	3003	13620	650	215	108	291	171	291	76	76	614	614	504	504	504	185	19185
CSJ: 2452-01-028			48	48	48		5793		184	92	126	126	126									
TOTAL			1506	961	1506	3003	19413	650	399	200	417	297	417	76	76	614	614	504	504	504	185	19185

SW3P SUMMARY

DESIGN:	PED. NO. DIV. NO.	FEDERAL AID PROJECT NO.			SHEET NO.
RDA	6				48
GRAPHICS:	STATE	STATE DIST. NO.	COUNTY		
JH	TEXAS	15	BEXAR		
CHECK:	CONT.	SECT.	JOB	HIGHWAY NO.	
NDS	2452	02	023 ETC	LP 1604	

HMT. DGN

HAZARDOUS MATERIAL TRAP SUMMARY

SHEET NO.	HAZARDOUS MATERIAL TRAP NO.	FURNISH & PLACE TPSL (12") SY	FURNISH & PLACE TPSL (6") SY	BLOCK SOD (PRARIE BUFFALO) SY	RIPRAP CL"B" CONC (5") CY	INLET (COMPL) (TY I SAFETY) ✳ EA	DRAIN LINE (CPVC 4 IN) (SCH 80) LF	GROUND BOX (RPM) (TY X) (122330) EA	GROUND BOX (RPM) (TY Y) (122342) EA	EXCAVATION CY	EMBANKMENT (ORD COMP) (TY B) CY	EMBANKMENT (ORD COMP) (TY C) CY
		EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.
	1		400	400	75	1	18.75	1		✳✳ 460		
	2		282	282	76	1	17.75		1	✳✳ 350		
	3				288	1	22.25	1		★		
	4				234	1	22.25	1		★		
	5		611	611	89	1	43.33	1		✳✳ 285		
	6				102	1	17.75	1		✳✳ 2369		
	7		51	51	103	1	17.75	1		✳✳ 83	✳✳ 55	
	8	540		540	15	1	22.25	1		★		180
	9	452		452	18	1	14.25	1		★		151
	CSJ: 2453-02-023 TOTALS	992	1344	2336	1000	9	196.33	8	1	✳✳ 3547	✳✳ 55	331

✳ TY I SAFETY ~ 4:1 SLOPE H = 2'-0"

✳✳ EARTHWORK QUANTITIES SHOWN FOR CONTRACTORS INFORMATION ONLY. QUANTITIES HAVE BEEN ADDED TO THE APPROPRIATE PLAN SHEET.

★ INCLUDED WITH RDWY EXCAVATION QUANTITIES. (COMPUTER GENERATED)

HAZARDOUS MATERIAL TRAP SUMMARY

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			49
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

etc

DISK: [15bxpnl] 1604grs.dgn

CONSTRUCTING DETOURS (CL I)

SHEET NO.	DETOUR	PHASE	CONSTR DETOUR (CL I) STA			WORK ZONE PAV MARK (NON REMOV) (4") (W) SOLID LF	WORK ZONE PAV MARK (REMOV) (4") (W) SOLID LF	WORK ZONE PAV MARK RAISED REFL (TY AA) EA	WORK ZONE PAV MARK RAISED REFL (TY 1C) EA	WORK ZONE PAV MARK (REMOV) (24") (W) SOLID LF	WORK ZONE PAV MARK (REMOV) (8") (W) SOLID LF	PAV MARK (REFLECT) (TY II CR) EA	JIGGLE BAR TILE (TY W) EA	WORK ZONE PAV MARK (REMOV) L ARROW (W) EA	WORK ZONE PAV MARK (REMOV) WORD (W) EA		WORK ZONE PAV MARK (NON REMOV) L ARROW (W) EA	WORK ZONE PAV MARK (NON REMOV) WORD (W) EA	WORK ZONE PAV MARK (NON REMOV) (4") (Y) SOLID LF
			EST.			EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.		EST.	EST.	EST.
25	A	I	19			3810		764	764										3810
26	B	I, SECT I				1340		130											1405
27	B & K	I, SECT 2	1.0			1300	160												1370
28	C	I				3400													3400
29	C	II																	
29A	C	II																	
30-31	D	I	27.6			8400		1680	1680										8400
32	H	2	6.5			430	500	180	97	310	320	34	136	2	4 Δ		2	2 ΔΔ	2380
33-35	SH 16 **	IA	6.7																
	† TOTALS		60.8			18,680	660	2754	2541	310	320	34	136	2	4 Δ		2	2 ΔΔ	20,765

SHEET NO.	DETOUR	PHASE	WORK ZONE PAV MARK (REMOV) (4") (Y) SOLID LF	ASPH * STAB BASE (8") SY	ACP * (TY C) (1½") SY	ONE * COURSE SURF TREAT SY	REMOV * OLD CONC (ISLAND) SY	CUT & RESTOR PAV SY	LF	LF									
			EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.
25	A	I		4090	6756			427											
26	B	I, SECT I			207	207	207												
27	B & K	I, SECT 2	150	333	302	302	302												
28	C	I																	
29	C	II																	
29A	C	II																	
30-31	D	I		9,920	9,920			1068											
240																			
32	H	2																	
33-35	SH 16 **	IA																	
	† TOTALS		150	14343	17,185	509	509	1495											

* FOR CONTRACTOR'S INFORMATION ONLY.
SUBSIDIARY TO ITEM 508, "CONSTRUCTING DETOURS".

** SH 16 DETOURS REQUIRE NO NEW PAVEMENT MARKINGS.
TRAFFIC WILL BE HANDLED THROUGH CHANNELIZATION DEVICES & DURING DAYTIME ONLY.

† DETOURS A, B, C, D & H ARE ON CSJ 2452-02-023. TOTALS ARE FOR THIS CSJ ONLY.

Δ FOR CONTRACTOR'S INFO. ONLY. 'WORD' WILL INVOLVE 2-(ONLY) AND 2-(EXIT).

ΔΔ FOR CONTRACTOR'S INFO. ONLY. 'WORD' WILL INVOLVE 2-(ONLY).

DETOUR SUMMARY

SHEET 1 OF 1

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				50
STATE DIST. NO.	COUNTY	CONT. NO.	SEC. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

ETC

1604GRS.DGN

CONSTRUCTING DETOURS (CL 1)

SHEET NO.	DETOUR	PHASE	CONSTR DETOUR (CL 1) STA	Constr Detour (Cl. 2) Sta		WORK ZONE PAV MARK (NON REMOV) (4") (W) SOLID LF	WORK ZONE PAV MARK (REMOV) (4") (W) SOLID LF	WORK ZONE PAV MARK RAISED REFL (TY AA) EA	WORK ZONE PAV MARK RAISED REFL (TY1C) EA	WORK ZONE PAV MARK (REMOV) (24") (W) SOLID LF	WORK ZONE PAV MARK (REMOV) (8") (W) SOLID LF	PAV MARK (REFLECT) (TY II CR) EA	JIGGLE BAR TILE (TY W) EA	WORK ZONE PAV MARK (REMOV) L ARROW (W) EA	WORK ZONE PAV MARK (REMOV) WORD (W) EA		WORK ZONE PAV MARK (NON REMOV) L ARROW (W) EA	WORK ZONE PAV MARK (NON REMOV) WORD (W) EA	WORK ZONE PAV MARK (NON REMOV) (4") (Y) SOLID LF
			EST.	Est		EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.		EST.	EST.	EST.
																			~~3810~~
26	B	1, SECT 1				1340		130											1405
27	B & K	1, SECT 2	1.0			1300	160												1370
28	C	I				3400													3400
29	C	II																	
29A	C	II																	
30-31	D	1	27.6			8400		1680	1680										8400
32	H	2	6.5			430	500	180	97	310	320	34	136	2	4 Δ		2	2 ΔΔ	2380
33-35	SH 16 **	1A	6.7																
35 C				6.96			846	35		110		168							1183
35 B			6.9				840	35		110		168							690
	† TOTALS		48.7	6.96		14,870	2346	2060	1777	530	320	370	136	2	4 Δ		2	2 ΔΔ	16955

SHEET NO.	DETOUR	PHASE	WORK ZONE PAV MARK (REMOV) (4") (Y) SOLID LF	ASPH * STAB BASE (8") SY	ACP * (TY C) (1½) SY	ONE * COURSE SURF TREAT SY	REMOV * OLD CONC (ISLAND) SY	CUT & RESTOR PAV SY	LF	LF									
			EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.	EST.
26	B	1, SECT 1			207	207	207												
27	B & K	1, SECT 2	150	333	302	302	302												
28	C	I																	
29	C	II																	
29A	C	II																	
30-31	D	1		9,920	9,920			1068											
240																			
32	H	2																	
33-35	SH 16 **	1A																	
35C			1,183																
35B			690																
	† TOTALS		2023	10253	10,429	509	509	1068											

* FOR CONTRACTOR'S INFORMATION ONLY.
SUBSIDIARY TO ITEM 508, "CONSTRUCTING DETOURS".

** SH 16 DETOURS REQUIRE NO NEW PAVEMENT MARKINGS.
TRAFFIC WILL BE HANDLED THROUGH CHANNELIZATION DEVICES & DURING DAYTIME ONLY.

† DETOURS A, B, C, D & H ARE ON CSJ 2452-02-023. TOTALS ARE FOR THIS CSJ ONLY.

Δ FOR CONTRACTOR'S INFO. ONLY. 'WORD' WILL INVOLVE 2-(ONLY) AND 2(EXIT).

ΔΔ FOR CONTRACTOR'S INFO. ONLY. 'WORD' WILL INVOLVE 2-(ONLY).

CHANGE ORDER NO. 1

DETOUR SUMMARY

SHEET 1 OF 1

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS	NH90(191) M				50A
STATE DIST. NO.	COUNTY		CONT. NO.	SEC. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR		2452	02	023	LP1604

1604GRS. DGN

ETC.

GENERAL NOTES AND SPECIFICATION DATA--

GRADING REQUIREMENTS FOR ITEM 249 FLEX BASE (TY A GR 1 MOD)

GRADING REQUIREMENTS FOR ITEM 292 ASPH STAB BASE (GR 4)

ITEM	PERCENT RETAINED ON EACH SIEVE 1 3/4"	1 1/4"	7/8"	3/8"	#4	#40	SOIL CONSTANTS LL MAX	PI MAX	PI MIN	WET BALL MILL MAX
249	0		10-35	35-55	45-75	70-85	35	10	4	* 40
292	0	0-10	10-30	25-50	45-65	65-80	45	15		* 55

* THE MAXIMUM INCREASE IN MATERIAL PASSING THE NO. 40 SIEVE SHALL NOT EXCEED 20.

= = = = = = = = = = = = = BASIS OF ESTIMATE = = = = = = = = = = = = =

ITEM	DESCRIPTION	RATE	QUANT	UNIT
168	SPRINK (SEED)	40 GAL/SY	21,480	MG
168	SPRINK (SOD)	40 GAL/SY	100	MG
292	ASPH STAB BASE(4")	440 LB/SY	35,780	TON
292	ASPH STAB BASE(8")	880 LB/SY	12,919	TON
310	MC-30 OR AE-P	0.20 GAL/SY	78,957	GAL
5008	MOWING(30 MO)	2 HR/AC-3/YR	725	HR
5031	LITTER PKUP(30 MO)	4 HR/MI-26/YR	1234	HR
	THE FOLLOWING FOR CONTRACTOR'S INFORMATION ONLY- NON PAY			
166	FERT(16-8-8)	0.10 LB/SY		
204	SPRINK(EMB)	40 GAL/CY		
211	ROLL(EMB)	1 HR/300 CY		
212	ROLL(EMB)	1 HR/300 CY		
213	ROLL(MED-B)(SUBGR)	1 HR/1000 SY		
213	ROLL(MED-B)(TOPSOIL)	1 HR/10,000 SY		
213	ROLL(MED-B)(SURF TRMT)	1 HR/2000 SY		

= = = = = = = = = = = ASPHALTIC CONCRETE PAVEMENT = = = = = = = = = = =

TYPE	LOCATION	DEPTH	RATE	AREA-SY	QUANT-CY
ACP-C-SURF	MAIN LN, FRONT RDS & INTERSECTIONS	1-1/2"	.0417 CY/SY	381,966	15,928
ACP(TY C)	MAIN LN, FRONT RDS & INTERSECTIONS	1-1/2"	.0417 CY/SY	363,289	15,149

= = = = = = = = = = = = COMPACTION REQUIREMENTS = = = = = = = = = = = =

ITEM	MATERIAL	COURSE	DENSITY

SPECIFICATION DATA

SHEET A

F.R. DIV.6 | TEXAS | NH 90(191)M ,ETC | SHEET 51
BEXAR COUNTY | HWY LP 1604 | CONT 2452-2-23,ETC

GENERAL NOTES AND SPECIFICATION DATA--

249	FLEX BSE(TY A GR 1 MOD)	ALL	98 % MIN

= = = = = = = = = = ONE COURSE SURFACE TREATMENT DATA = = = = = = = = = =

DESCRIPTION
AREA 394,790 SY
ASPH--TYPE ----------SEE GEN NOTES----------
ASPH--RATE(GAL/SY) 0.30 = 118,437 GAL
AGGR--TYPE/GR PB/GR 4
AGGR--RATE(CY/SY) 1:100 = 3948 CY

JOB TRAINEES ARE REQUIRED FOR THIS CONTRACT. REFER TO THE FORMULA IN SPECIAL PROVISION, "JOB TRAINING", FOR DETERMINATION OF THE NUMBER OF JOB TRAINEES FOR THIS CONTRACT.

THE FOLLOWING STANDARD DETAIL SHEETS HAVE BEEN MODIFIED: GPC, GPB-3, VIA(SFPM) & T202.

ALL PAVEMENT MARKINGS SHALL BE IN ACCORDANCE WITH THE TEXAS MUTCD.

THE PERMANENT STRIPING WILL BE DONE BY STATE FORCES.

IN THOSE INSTANCES WHERE FIXED FEATURES REQUIRE, THE GOVERNING SLOPES INDICATED HEREIN MAY BE VARIED FROM BETWEEN THE LIMITS AND TO THE EXTENT DETERMINED BY THE ENGINEER.

THE LOCATION OF UTILITIES, EITHER UNDERGROUND OR OVERHEAD, SHOWN WITHIN THE RIGHT OF WAY ARE APPROXIMATE AND SHALL BE VERIFIED BY THE CONTRACTOR BEFORE BEGINNING CONSTRUCTION OPERATIONS.

THE FOLLOWING IS A LIST OF THE TELEPHONE NUMBERS OF THE UTILITY LOCATORS FOR THE VARIOUS UTILITIES THAT MAY BE ENCOUNTERED.

CITY PUBLIC SERVICE (GAS & ELECTRIC)	978-9500
S.W. BELL TELEPHONE	954-4102
PARAGON CABLE SYSTEM	222-9961
SAN ANTONIO WATER SYSTEM	225-7461 (EXT 388)
GREY FOREST(NATURAL GAS CO.)	695-8781
AT & T	1-800-252-1133
CITY OF S.A. WASTEWATER	533-6192

THE CONTRACTOR SHALL NOTIFY THE UTILITY OWNERS PRIOR TO ANY BLASTING WITHIN 75 FEET OF ANY UTILITY FACILITY.

THE CONTRACTOR IS RESPONSIBILE FOR MAINTAINING AND PROTECTING THE INTEGRITY OF THE POWER POLES DURING CONSTRUCTION.

SPECIFICATION DATA

SHEET B

F.R. DIV.6 | TEXAS | NH 90(191)M ,ETC | SHEET 51
BEXAR COUNTY | HWY LP 1604 | CONT 2452-2-23,ETC

GENERAL NOTES AND SPECIFICATION DATA--

DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181, CITY PUBLIC SERVICE MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES THAT ARE IN THE PROJECT AREA.

ALL EXISTING RAISED PAVEMENT MARKINGS SHALL BE REMOVED BY THE CONTRACTOR DAILY, AS THE WORK PROGRESSES AND AS APPROVED BY THE ENGINEER. THIS WORK WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS. MATERIAL REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR.

IF WASTE AREAS OR MATERIAL SOURCES ARE REQUIRED FOR THE COMPLETION OF THIS PROJECT, SUCH AREAS SHALL NOT BE VISIBLE FROM ANY HIGHWAY ON THE TEXAS HIGHWAY SYSTEM UNLESS APPROVED IN WRITING BY THE ENGINEER.

MATERIALS LARGER THAN 4 INCHES IN SIZE WITHIN THE LIMITS OF THE RIGHT OF WAY AND NOT INCORPORATED IN THE FINISHED ROADWAY SECTION SHALL BE REMOVED FROM THE RIGHT OF WAY OR DISPOSED OF IN A MANNER SUITABLE TO THE ENGINEER AT THE ENTIRE EXPENSE OF THE CONTRACTOR.

A PROJECT COVERING SIGNING AND DELINEATION WILL BE LET PRIOR TO THE COMPLETION OF THIS PROJECT. THE CONTRACTOR WILL BE REQUIRED TO CORRELATE HIS WORK WITH THAT OF THE SIGNING AND DELINEATION CONTRACTOR. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR ANY HINDRANCE OR DELAYS IN CONSTRUCTION OPERATIONS THAT MAY BE ATTRIBUTED TO OBSERVANCE OF THE REQUIREMENTS HEREIN OUTLINED.

THE CONTRACTOR SHALL MAINTAIN THE RIGHT OF WAY IN A SATISFACTORY APPEARANCE AS DETERMINED BY THE ENGINEER. HE WILL BE REQUIRED TO MOW THE RIGHT OF WAY AND PICK UP LITTER IN ACCORDANCE WITH THE ITEMS "MOWING" AND "LITTER PICKUP".

---ITEM 8---
THE PARTICULAR ATTENTION OF THE BIDDER IS DIRECTED TO THE FIRST PARAGRAPH OF ARTICLE 2.3 OF THE STANDARD SPECIFICATIONS. IN VIEW OF THE COMPLEX NATURE OF THE WORK, THE NEED FOR CLOSE COORDINATION WITH THE VARIOUS UTILITIES, TRAFFIC CONTROL CONSIDERATIONS, AND OTHER FACTORS INFLUENCING THE PROSECUTION OF THE WORK, IT IS STRONGLY RECOMMENDED THAT PROSPECTIVE BIDDERS EXAMINE THE SITE OF THE WORK IN COMPANY WITH THE ENGINEER.

SPECIFICATION DATA

SHEET C

F.R. DIV.6 | TEXAS | NH 90(191)M ,ETC | SHEET 51
BEXAR COUNTY | HWY LP 1604 | CONT 2452-2-23,ETC

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 5---
THE CONTRACTOR SHALL ESTABLISH AND BE RESPONSIBLE FOR THE CORRECTNESS OF ALIGNMENT, ELEVATION AND POSITION OF ALL CONSTRUCTION REQUIRED BY THE CONTRACT IN ACCORDANCE WITH THE REQUIREMENTS OF SPECIAL PROVISION TO ITEM 5 (005---023).

---ITEM 7---
ANY OPERATIONS BY THE CONTRACTOR WHICH ARE LOCATED NEAR ANY ELECTRICAL POWER LINES SHALL BE ACCOMPLISHED USING ESTABLISHED INDUSTRY AND UTILITY SAFETY PRACTICES. THE CONTRACTOR SHALL CONSULT WITH THE APPROPRIATE UTILITY COMPANY PRIOR TO BEGINNING SUCH WORK. ALL ASSOCIATED COSTS WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.

---ITEM 100---
THE CONTRACTOR SHALL NOT BEGIN ANY CLEARING OPERATIONS BEFORE THE RESIDENT ENGINEER HAS ESTABLISHED AND DEFINED THE TREES AND AREAS OF VEGETATION THAT SHALL NOT BE REMOVED OR DISTRUBED BY CONSTRUCTION ACTIVITIES.

INCLUDED ALONG WITH OTHER WORK UNDER THIS ITEM SHALL BE THE FOLLOWING: REMOVAL OF CURBS, RIPRAP, SIDEWALKS, DIRECTIONAL ISLANDS, MISCELLANEOUS ROADWAY SIGNS, FENCES AND STORM SEWER PIPE. REMOVAL OF OLD CONCRETE SHALL BE IN ACCORDANCE WITH ITEM 104, EXCEPT FOR MEASUREMENT AND PAYMENT.

---ITEM 150 & 156---
WHERE CHANNEL EXCAVATION EXTENDS BEYOND THE RIGHT OF WAY FENCE THE CONTRACTOR SHALL REMOVE AND REPLACE THE FENCE AT HIS OWN EXPENSE, TO A CONDITION COMPARABLE TO THAT AT REMOVAL. ROCK MAY BE ENCOUNTERED DURING EXCAVATION.

---ITEMS 162, 164 & 166---
ALL AREAS THAT RECEIVE TOPSOIL SHALL BE SODDED OR SEEDED AND FERTILIZED.

PLANTING DATES	SEED & RATE *
OCTOBER THRU FEBRUARY	BERMUDA GRASS @ 6 LB/AC OATS @ 21 LB/AC RED WINTER WHEAT @ 30 LB/AC TALL FESQUE @ 4 LB/AC

SPECIFICATION DATA

SHEET D

F.R. DIV.6 | TEXAS | NH 90(191)M ,ETC | SHEET 51
BEXAR COUNTY | HWY LP 1604 | CONT 2452-2-23,ETC

GENERAL NOTES AND SPECIFICATION DATA--

---ITEMS 162, 164 & 166---, CONT'D
MARCH THRU SEPTEMBER BERMUDA GRASS @ 25 LB/AC

* NOTE: RATE IS PURE LIVE SEED (PLS) PER ACRE.

THE SEEDED AREA SHALL BE WATERED AND MAINTAINED FOR A PERIOD OF NOT LESS THAN 60 CALENDAR DAYS FOLLOWING PLANTING OR AS DIRECTED BY THE ENGINEER.

---ITEM 249---
FLEXIBLE BASE MATERIAL SHALL NOT BE HAULED DIRECTLY ON THE ROAD, BUT SHALL BE STOCKPILED. THIS STOCKPILE SHALL BE TESTED BEFORE DELIVERY ON THE ROAD. THE STOCKPILE SHALL BE BUILT IN LIFTS NOT TO EXCEED 2 FEET AND IN A MANNER AS TO OBTAIN A MINIMUM WORKING FACE OF NOT LESS THAN 12 FEET AND A MAXIMUM WORKING FACE OF NOT MORE THAN 20 FEET. FINAL ACCEPTANCE OF FLEXIBLE BASE MATERIAL WILL BE FROM TESTS MADE FROM WINDROW SAMPLES AND/OR THE STOCKPILE.

TOLERANCES, AS OUTLINED IN THE STANDARD SPECIFICATIONS, ARE PERMITTED.

THE REQUIREMENTS OF FLEXIBLE BASE (TY A, GR 1) ARE MODIFIED IN RESPECT TO GRADATION AND MINIMUM PI.

---ITEM 274---
CEMENT STABILIZED BASE (TYPE G) SHALL CONSIST OF CONCRETE AGGREGATE AND TWO SACKS OF CEMENT PER CUBIC YARD OF MATERIALS AS DIRECTED BY THE ENGINEER. FOR THIS ITEM, DENSITY REQUIREMENTS ARE WAIVED.

---ITEM 292---
RECLAIMED ASPHALTIC MATERIAL (RAP) IN THE FORM OF MILLINGS RESULTING FROM ASPHALT PLANING (ITEMS 508, 3821 & 3822) SHALL BE USED IN THE PRODUCTION OF ASPHALT STABILIZED BASE (GR 4).

THERE ARE 4 SOURCES OF RAP ON THIS PROJECT.

SOURCE 1 IS ESTIMATED AT APPROXIMATELY 373 CY AND CONSISTS OF MILLINGS SALVAGED FROM ALL PLANING OPERATIONS OF THE EXISTING EASTBOUND MAINLANES, SOUTH OF SH 16.
SOURCE 2 IS ESTIMATED AT APPROXIMATELY 1685 CY AND CONSISTS OF RAP MILLINGS REMOVED UNDER THE ITEM "SALVAGING, HAULING AND STOCKPILING RECLAIMABLE ASPHALTIC PAVEMENT".

SPECIFICATION DATA

Rev. 10/07

SHEET E

F.R. DIV.6 | TEXAS | NH 90(191)M ,ETC | SHEET 51
BEXAR COUNTY | HWY LP 1604 | CONT 2452-2-23,ETC

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 292---, CONT'D
SOURCE 3 IS ESTIMATED AT APPROXIMATELY 1490 CY AND CONSISTS OF MILLINGS SALVAGED FROM ALL PLANING OPERATIONS ON THE EXISTING MAINLANES BETWEEN STATION 10147+00 AND 10276+00.
SOURCE 4 IS ESTIMATED AT APPROXIMATELY 4495 CY AND CONSISTS OF RAP MILLINGS REMOVED FROM DETOURS "A", "D" & "K" THAT WILL BE BUILT AND REMOVED ON THIS PROJECT.

RAP PROPERTIES

SOURCE 1 & 3: RANDOM CORE SAMPLES SHOW THE RAP MATERIAL TO HAVE THE FOLLOWING PROPERTIES:

APPROXIMATE GRADING

SIEVE SIZE	% RETAINED
5/8"	0
1/2"	8
3/8"	30
NO. 4	23
NO. 10-40	13
NO. 40-80	14
NO. 80-200	5
PASSING 200	7

AVG. ASPH. CONTENT	5.5%
PENETRATION	= 27
VISCOSITY	= 14,635
DUCTILITY	= 130

THE APPROXIMATE GRADATION SHOWN ABOVE MAY BE SIGNIFICANTLY CHANGED BY THE MILLING OPERATIONS.

SOURCE 2: COMPOSED OF 16% ACP TY D AND 84% ASPH STAB BASE GR 4 AS PLACED UNDER PROJECT CRP 90(192)M.

SOURCE 4: COMPOSED OF MATERIAL PLACED UNDER APPROPRIATE ITEMS FOR ACP (TY C) AND ASB (GR 4).

RAW BASE MATERIAL SHALL BE STOCKPILED, TESTED AND APPROVED BEFORE USE. THE STOCKPILE SHALL BE BUILT IN LIFTS NOT TO EXCEED 2 FEET AND IN SUCH A MANNER AS TO OBTAIN A MINIMUM WORKING FACE OF NOT LESS THAN 12 FEET AND A MAXIMUM WORKING FACE OF NOT MORE THAN 20 FEET. IF THE ASPHALT STABILIZED BASE IS PRODUCED FROM AN APPROVED FLEXIBLE BASE STOCKPILE, UP TO 15 PERCENT OF FIELD SAND, AS DIRECTED BY THE ENGINEER, MAY BE REQUIRED TO BE ADDED TO THE MATERIAL THROUGH THE COLD FEED SYSTEM.

NO ASPHALT MIXTURE SHALL BE PLACED WHEN THE AIR TEMPERATURE IS BELOW 50 DEGREES F DURING THE PRECEDING 24 HOUR PERIOD, EXCEPT THAT A SINGLE THICK MAT (2 1/2" COMPACTED, OR GREATER) MAY BE PLACED WHEN THE AIR TEMPERATURE IS 40 DEGREES F AND RISING.

SPECIFICATION DATA

Rev. 10/07

SHEET F

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 292---, CONT'D
THE ASPHALT STABILIZED BASE MIXTURE SHALL BE PLACED WITH A SPREADING AND FINISHING MACHINE EQUIPPED WITH AUTOMATIC SCREED CONTROL DEVICES UNLESS OTHERWISE AUTHORIZED BY THE ENGINEER.

THE DESIGN SHALL BE IN ACCORDANCE WITH TEST METHOD TEX-126-E.

THE IN PLACE DENSITY IS REQUIRED AND SHALL BE MEASURED WITH THE NUCLEAR GAUGE, HOWEVER, THE CONTRACTOR WILL BE REQUIRED TO REMOVE THREE (3) EACH, 4 INCH DIAMETER UNDISTURBED CORES FOR THE FULL DEPTH OF THE PREVIOUS DAY'S PLACEMENT, AT A POINT DIRECTED BY THE ENGINEER, FOR CORRELATION. THIS REQUIREMENT FOR UNDISTURBED CORES MAY BE LATER WAIVED, IF CORRELATIONS PROVE SATISFACTORY. THE MATERIALS SHALL BE COMPACTED TO THE PERCENT DENSITY SHOWN IN TEST METHOD TEXT-126-E.

IF THE MATERIALS FURNISHED ARE FOUND TO HAVE STRIPPING CHARACTERISTICS, THE ENGINEER MAY REQUIRE THE ADDITION OF AN APPROVED ANTISTRIPPING AGENT CONFORMING TO THE REQUIREMENTS OF ITEM 3817, "ASPHALT ANTISTRIPPING AGENT (LIME)" OR ITEM 3818, "ASPHALT ANTISTRIPPING AGENT (LIQUID)". THE USE OF TEST METHOD TEX-531-C SHALL NOT BE REQUIRED TO EVALUATE THE MIX. THE COST OF THE ANTISTRIPPING ADDITIVES WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS. A TEST SECTION WITHOUT THE ANTISTRIPPING AGENT WILL NOT BE REQUIRED.

THE ASPHALT PLANT SHALL BE EQUIPPED WITH TRUCK SCALES AS DEFINED IN ITEM 520, ARTICLE 520.3(1) OF THE STANDARD SPECIFICATIONS. THREE WEIGHT TICKETS BEARING THE DATE, THE TRUCK NUMBER AND THE GROSS, NET AND TARE WEIGHTS SHALL BE GIVEN THE TRUCK DRIVER BY THE CONTRACTOR'S PERSONNEL, AND THEN GIVEN TO THE STATE INSPECTOR AT THE SPREADING AND FINISHING MACHINE. THE CONTRACTOR MAY BE REQUIRED TO WEIGH LOADS OF ASPHALTIC CONCRETE ON PUBLIC SCALES OR PORTABLE PLATFORM SCALES TO INSURE THE PROPER WEIGHT OF MATERIAL.

---ITEM 304---
PREVIOUSLY TESTED AGGREGATES DELIVERED TO THE PROJECT, WHICH ARE FOUND TO CONTAIN EXCESSIVE QUANTITIES OF DUST (MORE THAN 0.5 PERCENT PASSING THE NO. 40 SIEVE) DUE TO DEGRADATION DURING PRECOATING, STOCKPILING OR HAULING OPERATIONS MAY BE REJECTED BY THE ENGINEER.

---ITEM 320---
BETWEEN SEPTEMBER 1 AND MAY 1 NO ASPHALT MATERIAL SHALL BE APPLIED UNLESS, DUE TO UNUSUAL SITUATIONS, IT IS SPECIFICALLY AUTHORIZED OTHERWISE IN WRITING BY THE ENGINEER.

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 320---, CONT'D

IT IS THE INTENT TO USE (AC-5, AC-10 OR MC 2400) LATEX, HFRS-2P OR CRS-2P. THE GRADE OF AC WITH 2% BY WEIGHT OF LATEX ADDITIVE (SOLID BASIS) WILL BE APPROVED BY THE ENGINEER PRIOR TO USE. MATERIAL RATES SHOWN ARE BASED ON AC (LATEX) AND MAY BE ADJUSTED BY THE ENGINEER DEPENDING ON THE MATERIAL USED. IN THE EVENT EMULSIONS ARE USED, A CURING PERIOD APPROVED BY THE ENGINEER SHALL ELAPSE BEFORE PLACING ANY SUBSEQUENT ASPHALT COURSES. WHEN USING LATEX ASPHALT, THE CONTRACTOR SHALL USE PRECAUTIONARY MEASURES TO AVOID DRIFTING OF ASPHALT INTO TRAFFIC AND ADJACENT PROPERTY.

NO ASPHALT SHALL BE APPLIED WHEN THE AIR TEMPERATURE, AT ANY TIME, HAS BEEN BELOW 60 DEGREES F DURING THE PRECEDING 24 HOUR PERIOD UNLESS AUTHORIZED BY THE ENGINEER. THE CONTRACTOR'S ATTENTION IS CALLED TO THE STANDARD SPECIFICATION ITEM 320.1, LAST SENTENCE, "ASPHALTIC MATERIAL SHALL NOT BE PLACED WHEN GENERAL WEATHER CONDITIONS, IN THE OPINION OF THE ENGINEER, ARE NOT SUITABLE".

ALL PAVEMENT SHALL BE SURFACED IN LANE WIDTHS OR AS DIRECTED BY THE ENGINEER.

THE CONTRACTOR WILL BE REQUIRED TO SET A STRING LINE FOR ALL SURFACE TREATMENT OPERATIONS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

ASPHALT AND AGGREGATE RATES ARE FOR ESTIMATING PURPOSES ONLY AND MAY BE VARIED BY THE ENGINEER. AGGREGATE RATES SHALL BE KEPT TO A MINIMUM AS DIRECTED BY THE ENGINEER.

THE LOCATION OF AGGREGATE STOCKPILES SHALL BE APPROVED BY THE ENGINEER. THE AGGREGATE SHALL BE FREE OF EXCESS SURFACE MOISTURE, AS DETERMINED BY THE ENGINEER, BEFORE APPLICATION.

PRECOATED AGGREGATES, OTHER THAN LRA MAY BE PRECOATED WITH AC-10, AC-20, MS-1, CSS-1 OR PRECOAT OIL, EXCEPT THAT WHEN EMULSIONS ARE TO BE PLACED, AC-10 OR AC-20 SHALL NOT BE USED AS THE PRECOAT MATERIAL. FLUX OIL OR EMULSIONS MAY BE USED FOR PRECOATING LRA. WHEN AC-10 OR AC-20 IS USED AS THE PRECOAT MATERIAL, THE AMOUNT USED SHALL NOT EXCEED 1.0 PERCENT BY WEIGHT. THE TYPE AND AMOUNT OF PRECOAT MATERIAL WILL BE APPROVED BY THE ENGINEER PRIOR TO PRODUCTION. WHEN EMULSIONS ARE USED AS THE PRECOAT MATERIAL, THE PRECOATED AGGREGATE SHALL BE ADEQUATELY DRIED TO THE SATISFACTION OF THE ENGINEER. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR/PRODUCER TO PROVIDE ADEQUATE DRYING AND CURING PERIODS BEFORE DELIVERY OF THE AGGREGATES. THE ENGINEER RESERVES THE RIGHT TO REJECT ANY PRECOATED AGGREGATE WHICH IS IMPROPERLY COATED OR OTHERWISE UNSATISFACTORY FOR USE.

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 320---, CONT'D

IF THE AGGREGATES TO BE PRECOATED ARE FOUND TO HAVE STRIPPING CHARACTERISTICS, THE ENGINEER MAY REQUIRE THE ADDITION OF A LIME SLURRY. LIME MEETING THE REQUIREMENTS OF ITEM 264 SHALL BE ADDED TO THE AGGREGATE AT THE RATE OF 1% HYDRATED LIME BY WEIGHT OF AGGREGATE. THE LIME SHALL BE ADDED TO THE AGGREGATE IN SLURRY FORM AT THE COLD FEED. THE COST OF THE LIME SHALL BE CONSIDERED SUBSIDIARY TO THIS ITEM AND WILL NOT BE PAID FOR DIRECTLY. IF APPROVED BY THE ENGINEER, THE LIME SLURRY MAY BE ADDED AT THE STOCKPILE BUT NOT MORE THAN 24 HOURS IN ADVANCE OF USE.

WARNING TO CONTRACTORS: STOCKPILES OF AGGREGATE PRECOATED WITH AC MAY GENERATE EXCESSIVE HEAT BUILD-UP RESULTING IN DAMAGE TO THE ASPHALT AND/OR AGGREGATES IF ADEQUATE COOLING HAS NOT BEEN INITIALLY PROVIDED. STOCKPILES SHOWING EVIDENCE OF EXCESSIVE HEAT BUILD-UP WILL BE REJECTED.

---ITEM 416---
THE CONTRACTOR'S PARTICULAR ATTENTION IS DIRECTED TO THE FACT THAT SMALL CAVERNS WERE ENCOUNTERED WHILE DRILLING TEST HOLES. IF CAVERNS ARE ENCOUNTERED DURING CONSTRUCTION, THE CONTRACTOR WILL BE REQUIRED TO ADJUST THE BOTTOM ELEVATION OF THE SHAFT, SUCH THAT IT IS EMBEDDED A MINIMUM OF TWO DIAMETERS INTO SATISFACTORY MATERIAL AS DETERMINED BY THE ENGINEER. THE CONTRACTOR WILL BE REQUIRED TO USE CASING IF SMALL VOIDS OR SMALL CAVERNS ARE ENCOUNTERED. CASING LEFT IN PLACE WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 416.

THE CONTRACTOR SHALL BE REQUIRED TO MAKE SOUNDINGS OR TAKE CORES TO A MINIMUM DEPTH OF FIVE FEET BELOW THE PROPOSED FOUNDATION GRADE IN ORDER TO DETERMINE THE CHARACTER OF THE SUPPORTING MATERIAL.

PAYMENT FOR THIS WORK SHALL BE IN ACCORDANCE WITH THE PROVISIONS OF ITEM 416.

---ITEM 420---
THE RETAINING WALLS SHALL RECEIVE A STRIATED FINISH AS SHOWN IN THE PLANS.

ALL CONCRETE STRUCTURES SHALL RECEIVE A GRADE I, CLASS B(TY I) FINISH. ALL CONCRETE STRUCTURES AND RETAINING WALLS SHALL RECEIVE A "MAPLE SUGAR" TINT.

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 420---, CONT'D
THE CONTRACTOR SHALL BE REQUIRED TO PAINT A TEST SECTION FOR APPROVAL BY THE ENGINEER PRIOR TO USE.

---ITEM 421---
BENT CONCRETE WILL BE MEASURED FOR PAYMENT AS PLAN QUANTITY.

THE ENGINEER WILL SAMPLE ALL CONCRETE AND MAKE AND TEST ALL TEST BEAMS AND CYLINDERS IN ACCORDANCE WITH TEST METHODS TEX-418-A AND TEX-420-A.

THE CONTRACTOR SHALL FURNISH AND PROPERLY MAINTAIN ALL TEST MOLDS. THE TEST MOLDS SHALL MEET THE REQUIREMENTS OF TEST METHODS TEX-418-A AND TEX-420-A AND, IN THE OPINION OF THE ENGINEER, MUST BE SATISFACTORY FOR USE AT THE TIME OF USE. IN ADDITION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING PERSONNEL TO REMOVE THE TEST SPECIMENS FROM THE MOLDS AND TO TRANSPORT THEM TO THE PROPER CURING LOCATION AT THE SCHEDULE DESIGNATED BY THE ENGINEER AND IN ACCORDANCE WITH THE GOVERNING SPECIFICATION. FOR ALL CONCRETE ITEMS THE CONTRACTOR SHALL HAVE A WHEELBARROW, OR OTHER CONTAINER ACCEPTABLE TO THE ENGINEER, AVAILABLE TO USE IN THE SAMPLING OF THE CONCRETE.

ALL LABOR AND EQUIPMENT FURNISHED BY THE CONTRACTOR WILL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS AND WILL NOT BE PAID FOR DIRECTLY.

---ITEM 423 & 8570---
THE QUANTITY SHOWN IN THE PROPOSAL IS BASED AS FOLLOWS:

THE QUANTITIES FOR WALL 1 ARE BASED ON MECHANICALLY STABILIZED EARTH WALLS, WHILE THOSE FOR WALLS 2 & 3 ARE BASED ON CAST-IN-PLACE CONSTRUCTION. THE CONTRACTOR SHALL HAVE THE OPTION OF CONSTRUCTING CAST-IN-PLACE, RETAINED EARTH, STRENGTHENED EARTH, OR REINFORCED EARTH WALLS, EXCEPT FOR WALLS 2 AND 3, WHICH MUST BE CAST-IN-PLACE.

THE FOLLOWING MECHANICALLY STABILIZED EARTH (MSE) WALL SYSTEMS ARE APPROVED FOR THIS CONTRACT:

REINFORCED EARTH WALLS
THE REINFORCED EARTH COMPANY
1905 CENTRAL DR. SUITE 100
BEDFORD, TEXAS 76021
(817) 282-5503

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 423 & 8570---, CONT'D
RETAINED EARTH WALLS
THE VSL CORPORATION
1414 POST AND PADDOCK
GRAND PRAIRIE, TEXAS 75050
(214) 647-0200

STRENGTHENED EARTH WALLS
GIFFORD-HILL AND COMPANY
CONCRETE PRODUCTS DIVISION
2515 MCKINNEY AVE.
DALLAS, TEXAS 75201
(214) 754-5500

REINFORCED SOIL EMBANKMENT WALLS
THE HILFIKER RETAINING WALL COMPANY
621 N. HURST BLVD.
HURST, TEXAS 76053
(817) 268-1044

IF THE HILFIKER WALL IS CHOSEN, THE FLAT FACE RETAINING WALL PANEL SHALL BE PROVIDED.

THE RETAINING WALLS SHALL RECEIVE A STRIATED FINISH, USING A SCOTT COMPANY PATTERN NUMBER 109 OR EQUAL FORM LINER.

IF OPTIONAL PRECAST WALL SYSTEMS ARE USED, FILTER FABRIC SHALL BE PLACED BEHIND ALL HORIZONTAL JOINTS UNLESS A FULL WIDTH BEARING PAD IS USED.

PRECAST COPING MAY BE PERMITTED BY THE ENGINEER ON PRECAST WALLS AFTER THE CONTRACTOR HAS DEMONSTRATED CAPABILITY OF SATISFACTORY WORK ON PREVIOUS PROJECTS OR A TEST SECTION. WHERE T-501 RAIL IS REQUIRED, THE CONTRACTOR MAY ALSO PRECAST THE RAIL IN COMBINATION WITH THE COPING, TOP PANEL OR MODULE, THE DETAILS OF WHICH MUST BE SUBMITTED TO AND APPROVED BY THE ENGINEER. PAYMENT FOR THE COMBINATION PIECES WILL BE ACCORDING TO THE APPLICABLE BID ITEMS.

THE MATERIAL USED AS BACKFILL FOR PRECAST RETAINING WALLS SHALL BE STOCKPILED AND APPROVED BY THE ENGINEER BEFORE PLACEMENT UNLESS OTHERWISE AUTHORIZED BY THE ENGINEER. THE STOCKPILE SHALL BE BUILT IN LIFTS NOT TO EXCEED 2 FEET AND IN A MANNER SO AS TO OBTAIN A MINIMUM WORKING FACE OF NOT LESS THAN 12 FEET AND A MAXIMUM WORKING FACE OF NOT MORE THAN 20 FEET.

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 423 & 8570---, CONT'D
FOR ALL PRECAST RETAINING WALLS, THE CONTRACTOR WILL PROVIDE A MINIMUM OF TWO FEET OF CLEARANCE BELOW PROPOSED FINISHED GRADE TO THE TOP OF LEVELING PAD.

---ITEM 427---
A GRADE I CLASS B, (TYPE 1)(PAINT TYPE) MATERIAL SHALL BE USED FOR CONCRETE FINISHING. THE CONTRACTOR WILL BE REQUIRED TO DEMONSTRATE THE ADEQUACY OF THE PRODUCT TO BE USED. A TEST SURFACE SHALL BE APPLIED TO AT LEAST FOUR FULL LENGTHS OF CONCRETE TRAFFIC BARRIER THAT IS BEING USED IN THE TRAFFIC CONTROL PLAN AND WHICH IS PLACED IN A LOCATION EXPOSED TO WEATHER AND TRAFFIC. THE ENGINEER WILL APPROVE THE COATING MATERIAL ONLY AFTER IT HAS SATISFACTORILY DEMONSTRATED IT'S ABILITY TO RESIST PEELING AND DISCOLORATION (BLACKENING) FOR A PERIOD OF NOT LESS THAN 12 MONTHS.

TO INSURE THAT THE CLASS B (PAINT TYPE) CONCRETE FINISH MEETS ALL SPECIFIED REQUIREMENTS, RANDOM TEST SAMPLES WILL BE TAKEN DURING ACTUAL APPLICATION AND FORWARDED TO TXDOT FILE D-9 FOR TEST CONFIRMATION.

---ITEM 427 & 429---
CURING COMPOUND WILL NOT BE PERMITTED ON RETAINING WALL AND BRIDGE RAIL THAT ARE TO RECEIVE A PAINT TYPE FINISH. POLYETHYLENE SHEETING, BURLAP, POLYETHYLENE MATS OR LAMINATED MATS TO PREVENT OUTSIDE AIR FROM ENTERING WILL BE PERMITTED FOR CURING.

---ITEM 432---
IN ALL RIPRAP SLOPES, 3 INCH DIAMETER WEEP HOLES SHALL BE PROVIDED AT 10 FOOT MAXIMUM SPACING AND BACKED WITH LOOSE GRADED GRAVEL OR CRUSHED STONE AND GALVANIZED HARDWARE CLOTH AS DIRECTED BY THE ENGINEER.

IN AREAS WHERE GUARD FENCE POSTS ARE TO BE PLACED IN RIPRAP, THE RIPRAP SHALL HAVE A BLOCKED OUT AREA AT LEAST 12 INCHES LARGER THAN THE POST.

---ITEM 446---
PAINTS PURCHASED FROM THE DEPARTMENT WILL BE CHARGED AS FOLLOWS:

PROTECTION SYSTEM II PRIME COAT (EPOXY) $73.10 PER 3 GALLONS

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 460---
ALL METAL PIPES WITH RIPRAP SLOPED HEADWALLS SHALL HAVE 5/8" X 6" GALVANIZED BOLTS WITH 2 HEX NUTS AT NOT OVER 24 INCH CENTERS FOR ANCHORS TO HEADWALLS. THIS WORK WILL BE SUBSIDIARY TO THIS ITEM.

BACKFILL FOR CORRUGATED METAL PIPE SHALL MEET THE FOLLOWING CRITERIA:
1. THE RESISTIVITY SHALL BE 1,500 OHMS-CM OR GREATER AS DETERMINED BY TEST METHOD TEX-128-E.
2. THE PH RANGE SHALL BE FROM 6.5 TO 9.0 AS DETERMINED BY TEST METHOD TEX-128-E.

---ITEM 462---
IF PRECAST UNITS ARE USED, THE CEMENT STABILIZED BACKFILL BETWEEN THE BARRELS SHALL CONSIST OF CONCRETE AGGREGATE AND TWO SACKS OF PORTLAND CEMENT PER CUBIC YARD.

THE PRECAST CULVERT END UNITS SHALL BE TIED IN TO THE CAST-IN-PLACE WINGS IN A MANNER ACCEPTABLE TO THE ENGINEER.

BOX CULVERTS, LINE "O" AND LINE "R-2" SHALL BE PRECAST.

ALL BREAKBACK LINES ON CULVERTS SHALL BE SAW CUT IN ACCORDANCE WITH ITEM 430.

---ITEM 465---
THE USE OF THE COLD APPLIED, PLASTIC ASPHALT SEWER JOINT COMPOUND WILL BE PERMITTED.

THE CONTRACTOR SHALL USE CLASS C BEDDING OR AS DIRECTED BY THE ENGINEER.

---ITEM 470---
ALTERNATE DESIGN DRAWINGS BEARING THE SEAL OF A REGISTERED PROFESSIONAL ENGINEER WILL BE ACCEPTABLE FOR PRECAST CONSTRUCTION OF INLETS, MANHOLES AND JUNCTION BOXES. SHOP DRAWINGS WILL NOT BE REQUIRED.

---ITEM 502---
WHEN AN ADVANCED WARNING FLASHING ARROW PANEL IS SPECIFIED FOR THE CLOSING OF TRAFFIC LANES, THE CONTRACTOR SHALL BE REQUIRED TO FURNISH ONE STANDBY UNIT IN GOOD CONDITION AT THE JOB SITE READY FOR IMMEDIATE USE.

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 502---, CONT'D

CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT VERTICAL PANELS ON FLEXIBLE SUPPORTS SHALL BE USED TO SEPARATE TRAFFIC AND CHEVRONS ON FLEXIBLE SUPPORTS SHALL BE USED TO DELINEATE TRAFFIC THROUGH DETOURS AS SHOWN ON THE TRAFFIC CONTROL SHEET AND AS DIRECTED BY THE ENGINEER. THESE DEVICES ARE TO REPLACE BARRELS AND BARREL MOUNTED CHEVRONS AND SHALL NOT BE PAID FOR DIRECTLY BUT SHALL BE CONSIDERED SUBSIDIARY TO THIS ITEM.

IN LIEU OF VERTICAL PANELS(VP), PLASTIC DRUMS AND THE CHEVRON SIGN (CWI-8) AS SHOWN ON BC(9)-89 AND BC(4)-89, THE CONTRACTOR MAY BE PERMITTED TO USE THE IMPACT RECOVERY SYSTEM (IRS) DELINEATOR OR EQUAL. THIS IS A PATENTED PRODUCT AND MAY BE OBTAINED FROM FLASHER EQUIPMENT COMPANY, INC., 246 WEST JOSEPHINE STREET, SAN ANTONIO, TEXAS 78212, (512) 736-4251.

THERE ARE TWO ELECTRONIC PORTABLE CHANGEABLE MESSAGE SIGNS REQUIRED FOR THIS PROJECT. THESE SIGNS ARE FOR THE HANDLING OF TRAFFIC THROUGH THE WORK AREAS. THEY SHALL BE OF THE PROGRAMMABLE TYPE.

THERE ARE EXISTING TRAFFIC SIGNALS PRESENTLY IN OPERATION AT THE HAUSMAN ROAD INTERSECTION. THE EXISTING TRAFFIC SIGNALS SHALL REMAIN IN OPERATION AT ALL TIMES EXCEPT DURING SIGNAL MODIFICATION. AT THIS TIME, THE CONTRACTOR SHALL HIRE OFF-DUTY POLICE OFFICERS TO CONTROL THE TRAFFIC UNTIL THE SIGNALS ARE BACK IN SATISFACTORY OPERATION.

THE CONTRACTOR IS RESPONSIBLE FOR MAINTENANCE OF EXISTING TRAFFIC SIGNALS. THE CONTRACTOR SHALL ENSURE THAT ALL ELEMENTS OF THE TRAFFIC SIGNAL, EXTERNAL OF THE CONTROLLER CABINET, REMAIN IN OPERATION AT HIS EXPENSE. WHEN IT BECOMES NECESSARY TO MODIFY SEQUENCES, TIMING OR PHASING OF TRAFFIC SIGNAL, THE CONTRACTOR SHALL CONTACT MR. HARVEY BEIERLE AT 615-5975. THE CONTRACTOR SHALL COMPLETE REPAIRS OF THE EXISTING TRAFFIC SIGNAL WITHIN 4 HOURS AFTER NOTIFICATION. THE STATE SHALL RETAIN THE RESPONSIBLITY OF THE OPERATION OF THE EXISTING TRAFFIC SIGNAL.

THE CONTRACTOR IS FULLY RESPONSIBLE FOR THE TRAFFIC CONTROL AND WILL BE RESPONSIBLE FOR FURNISHING ALL NECESSARY SIGNS, CONES, BARRICADES AND FLAGMEN. THE CONSTRUCTION METHODS SHALL BE CONDUCTED TO PROVIDE THE LEAST POSSIBLE INTERFERENCE TO TRAFFIC SO AS TO PERMIT THE CONTINUOUS MOVEMENT OF TRAFFIC IN ALL ALLOWABLE DIRECTIONS AT ALL TIMES. THE CONTRACTOR SHALL SCHEDULE HIS WORK SO THAT ALL TRAFFIC LANES ARE OPEN TO TRAFFIC AT NIGHT. THE CONTRACTOR SHALL CLEAN UP AND REMOVE FROM THE WORK AREA ALL LOOSE MATERIAL RESULTING FROM CONTRACT OPERATIONS AT THE END OF EACH WORK DAY. WHEN PLACING DETECTORS ACROSS THE ROADWAY AT

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 502---, CONT'D
LEAST ONE LANE SHALL REMAIN OPEN AT ALL TIMES.

---ITEM 504---
THE CONTRACTOR WILL BE REQUIRED TO FURNISH ONE FIELD OFFICE TYPE D. THE TYPE D FIELD OFFICE AND LABORATORY SHALL BE 750 SQUARE FEET IN SIZE AND SHALL BE PARTITIONED INTO 5 WORKROOMS. THE FIELD OFFICE AND LABORATORY MAY BE FURNISHED SEPARATELY WITH THE FIELD OFFICE CONTAINING A MINIMUM OF 600 SQUARE FEET PARTITIONED INTO 4 WORKROOMS. THE FIELD OFFICE SHALL HAVE ADEQUATE WINDOWS AND DOORS, SHALL BE PROVIDED WITH THE NECESSARY PLAN TABLES, SHELVES, AND LOCKERS REQUIRED AND CONSTRUCTED AS DIRECTED BY THE ENGINEER, AND SHALL CONTAIN THE FACILITIES OF A TOILET AND LAVATORY. THE LABORATORY BUILDINGS SHALL BE SERVICED WITH ADEQUATE SINK AND DRAINAGE CONNECTIONS AND SHALL BE PROVIDED WITH NECESSARY WORK TABLES, SHELVES, WEIGHT TABLES AND LOCKERS REQUIRED AND CONSTRUCTED AS DIRECTED BY THE ENGINEER.

THE CONTRACTOR SHALL ALSO PROVIDE THE NECESSARY OFFICE FURNITURE CONSISTING OF DESKS, CHAIRS AND FILING CABINETS AS DIRECTED BY THE ENGINEER.

IF AN ASPHALT MIX PLANT IS LOCATED AT THE PROJECT SITE, THE CONTRACTOR SHALL ALSO BE REQUIRED TO PROVIDE A TYPE E STRUCTURE MEETING THE DIMENSIONAL REQUIREMENTS OF A TYPE A STRUCTURE TO RUN THE ASPHALT MIX QUALITY CONTROL TESTS. HOWEVER, AN ASPHALT MIX PLANT SHALL NOT BE SITED WITHIN THE EDWARDS AQUIFER RECHARGE ZONE.

---ITEM 508--
WORK UNDER THIS ITEM SHALL INCLUDE THE REMOVAL OF 8 INCHES OF ASPHALT STABILIZED BASE (GR 4) AND 1 1/2 INCHES OF ASPHALTIC CONCRETE PAVEMENT (TY C) FROM DETOURS "A", "D", AND "K".

THE ASPHALT STABILIZED BASE AND ASPHALTIC CONCRETE PAVEMENT MATERIAL FROM THESE DETOURS SHALL BE REMOVED IN ACCORDANCE WITH THE REQUIREMENTS OF SPECIAL SPECIFICATION ITEM 3822 "PLANING AND/OR TEXTURING PAVEMENT" EXCEPT FOR MEASUREMENT AND PAYMENT. PAYMENT FOR PLANING (MILLING) THIS MATERIAL SHALL BE CONSIDERED SUBSIDIARY TO ITEM 508.

THE RAP MATERIAL SALVAGED FROM THESE DETOURS SHALL BE USED IN THE PRODUCTION OF ASPHALT STABILIZED BASE (GR 4). REMAINING MILLINGS NOT USED IN THE PRODUCTION OF THE ASPHALT STABILIZED BASE WILL REMAIN THE PROPERTY OF THE STATE AND SHALL BE HAULED AND STOCKPILED AT THE INTERSECTION OF LOOP 1604 AND SHAENFIELD ROAD AS DIRECTED BY THE ENGINEER.

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 508--, CONT'D

---ITEM 512---
THE CONCRETE TRAFFIC BARRIER (PORT) SHALL BE TYPE 2 SINGLE SLOPE (H= 42 IN). WHEN THE BARRIER IS NO LONGER NEEDED ON THE PROJECT, THE CONTRACTOR SHALL HAUL THE BARRIER AND REBAR CONNECTORS TO THE STORAGE SITE LOCATED AT LOOP 1604 AND QUINTANA RD.

COMMERCIALLY PRODUCED REFLECTOR TABS APPROVED BY THE ENGINEER SHALL BE PLACED ON TOP OF THE CTB'S AT 40 FOOT INTERVALS. COST IS TO BE CONSIDERED SUBSIDIARY TO THIS ITEM.

---ITEM 530---
CONCRETE TEST BEAMS WILL NOT BE REQUIRED FOR CURB CONSTRUCTION.

---ITEM 540---
TIMBER POSTS SHALL HAVE BEVELED TOPS AND SHALL NOT BE PAINTED.

AFTER THE GUARD FENCE IS INSTALLED, THE BLOCKED OUT RIPRAP AREA AROUND THE POST SHALL BE BACKFILLED FOR A DEPTH OF 4 INCHES WITH AN ASPHALTIC MIXTURE OR CONCRETE RIPRAP APPROVED BY THE ENGINEER.

EXISTING METAL BEAM RAIL ELEMENTS ATTACHED TO THE BRIDGE RAIL AT THE LP 1604 EASTBOUND OVERPASS AT SH 16 SHALL BE RELAPPED FOR ONE-WAY TRAFFIC. THERE SHALL BE NO DIRECT PAY FOR THIS, BUT IT SHALL BE CONSIDERED TO BE SUBSIDIARY TO THE VARIOUS BID ITEMS.

---ITEM 542---
THE RAIL ELEMENTS FROM THE EXISTING METAL BEAM GUARD FENCE REMOVED BY THE CONTRACTOR SHALL REMAIN THE PROPERTY OF THE STATE. ALL RAIL ELEMENTS REMOVED SHALL BE PLACED ALONG THE RIGHT OF WAY FOR REMOVAL BY MAINTENANCE AS DIRECTED BY THE ENGINEER.

---ITEM 618---
ALL ELECTRICAL MATERIAL FURNISHED AND/OR INSTALLED SHALL BE IN COMPLIANCE WITH THE NATIONAL ELECTRICAL CODE SPECIFICATIONS.

---ITEM 632---
GENERAL:

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 632---, CONT'D
THIS PROJECT SHALL CONSIST OF FURNISHING AND INSTALLING ALL REQUIRED MATERIALS AND EQUIPMENT NECESSARY FOR THE COMPLETE AND OPERATING TRAFFIC SIGNAL INSTALLATION AT THE FOLLOWING INTERSECTIONS:

LOOP 1604 AT F.M. 1560 (HAUSMAN RD.) AND AT S.H. 16

GROUND BOX(PULL BOX) MEETING THE FOLLOWING REQUIREMENTS SHALL BE USED: (A) IT SHALL BE MANUFACTURED FROM REINFORCED PLASTIC MORTAR (RPM) COMPOSED OF BOROSILICATE GLASS FIBER, A CATALYZED POLYESTER RESIN AND AN AGGREGATE. (B) MINIMUM INSIDE DIMENSIONS (LXWXH) SHALL BE 21"LX13"WX11"H. (C) THE GROUND BOX(PULL BOX) AND LID SHALL BE DESIGNED FOR H-20 LOADING. (D) THE COVER SHALL BE STEEL AND SHALL BE BOLT-DOWN WITH "TRAFFIC SIGNAL" INCISED IN 1 INCH LETTERS.

UTILITIES:
THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE FACT THAT BOTH OVERHEAD AND UNDERGROUND UTILITY INSTALLATIONS EXIST IN THE VICINITY OF THIS CONSTRUCTION. THE EXACT LOCATION OF UNDERGROUND UTILITIES IS NOT CERTAIN. THE CONTRACTOR SHALL CONTACT THE AREA UTILITY COMPANIES FOR EXACT LOCATION OF UTILITIES AT LEAST 48 HOURS PRIOR TO DRILLING FOR FOUNDATIONS OR COMMENCING ANY WORK THAT MIGHT AFFECT PRESENT UTILITIES. THE LOCATIONS SHOWN ON THE PLANS FOR SIGNAL POLE FOUNDATIONS, CONTROLLER FOUNDATIONS, CONDUIT AND OTHER ITEMS MAY BE VARIED TO MEET LOCAL CONDITIONS, SUBJECT TO PRIOR APPROVAL BY THE ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTMENTS IN PROJECT CONSTRUCTION WHICH MAY BE NECESSARY BECAUSE OF CONFLICTS WITH UTILITIES.

FOR THIS PROJECT, THE COMPLETE CONTROLLER ASSEMBLY WILL BE PROVIDED BY THE STATE. THE CONTRACTOR SHALL INSTALL ALL OTHER EQUIPMENT, FOUNDATIONS, AND PROPERLY LABELED FIELD WIRING IN ACCORDANCE WITH THE PLANS. THE FOUNDATION FOR THE CONTROLLER ASSEMBLY SHALL ALSO BE PROVIDED BY THE CONTRACTOR USING THE ANCHOR BOLTS AND TEMPLATE SUPPLIED BY THE STATE. THE CONTRACTOR SHALL DEMONSTRATE TO THE ENGINEER'S SATISFACTION THAT THE FIELD WIRING IS PROPERLY INSTALLED AND THE STATE SHALL THEN INSTALL THE CONTROLLER ASSEMBLY ON THE COMPLETED FOUNDATION. THE STATE WILL CONNECT THE FIELD WIRING TO THE CONTROLLER ASSEMBLY, SET UP, AND TURN ON THE CONTROLLER.

ALL MAST ARM POLES, PEDESTAL POLES AND STEEL STRAIN POLES FURNISHED BY THE CONTRACTOR SHALL BE BY THE SAME MANUFACTURER.

SIGNAL HEADS:
ALL TRAFFIC SIGNAL HEADS SHALL BE HIGHWAY YELLOW IN COLOR AND SHALL BE MADE OF POLYCARBONATE RESIN AND SHALL BE BY THE SAME MANUFACTURER. THE CONTRACTOR SHALL SUPPLY "OPTION B" BRACKET ASSEMBLY FOR THIS PROJECT,

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 632---, CONT'D
SEE STANDARD SHEET SMA-80 FOR DETAILS. OPTION A BRACKET ASSEMBLY IS OMITTED FROM THIS PROJECT.

ALL PROPOSED TRAFFIC SIGNAL HEADS SHALL BE COVERED SO THAT SIGNAL FACES CANNOT BE SEEN FROM TIME OF INSTALLATION UNTIL PLACED IN OPERATION.

ALL PEDESTRIAN SIGNAL HEADS SHALL BE SINGLE OR TWO SECTION INCANDESCENT TYPE. DIE CAST POLYCARBONATE WILL BE AN ACCEPTABLE MATERIAL IN LIEU OF DIE CAST ALUMINUM. ALL MOUNTING ATTACHMENTS SHALL BE CONSTRUCTED OF STEEL PIPE AND SHALL BE MOUNTED AS SHOWN ON THE PLANS. THE PEDESTRIAN SIGNAL SHALL DISPLAY THE SYMBOLIZED MESSAGE AS SHOWN ON THE PLANS.

THE CONTRACTOR SHALL FURNISH ALL LAMPS REQUIRED FOR EACH INSTALLATION.

CONDUCTOR:
FOR EACH CONDUCTOR TERMINATING IN THE CONTROLLER CABINET, AN EXTRA 10 FOOT LENGTH SHALL BE PROVIDED. ALL CONDUCTORS ARE TO BE CONTINUOUS WITHOUT SPLICES FROM TERMINAL POINT TO TERMINAL POINT OR AS DIRECTED BY THE ENGINEER. ALL PROPOSED SIGNAL CABLE SHALL BE #12 A.W.G. STRANDED COPPER. THE NUMBER OF CONDUCTORS REQUIRED SHALL BE AS SHOWN ON THE PLANS.

ELECTRICAL:
EACH SIGNAL INSTALLATION WILL REQUIRE 120/240 VOLT ELECTRIC POWER SERVICE.

CONDUIT:
POLYVINYL CHLORIDE CONDUIT (P.V.C.) SHALL BE SCHEDULE 80.

ALL FEES AND COST FOR PERMITS, POWER SERVICE CONNECTION AND FOR WORK DONE BY THE UTILITY COMPANIES OR THE CONTRACTOR FOR ANY UTILITY ADJUSTMENTS THAT MAY BE NECESSARY WILL BE CONSIDERED SUBSIDIARY TO THE BID ITEM 632, "INSTALLATION OF HIGHWAY TRAFFIC SIGNALS" AND WILL NOT BE PAID DIRECTLY.

EXISTING SIGNAL EQUIPMENT WHICH IS REMOVED ON THIS PROJECT SHALL REMAIN THE PROPERTY OF THE PRESENT OWNER. ALL SIGNAL EQUIPMENT REMOVED ON THIS PROJECT SHALL BE PLACED WITHIN THE PROJECT RIGHT OF WAY, AS DIRECTED BY THE ENGINEER, AND WILL BE PICKED UP BY THE PRESENT OWNER.

---ITEMS 1146 & 1147---
PRIOR TO CONTRACT LETTING, REPRODUCIBLE EARTHWORK CROSS SECTIONS WILL BE AVAILABLE AT THE AREA ENGINEER'S OFFICE FOR BORROWING BY

GENERAL NOTES AND SPECIFICATION DATA--

---ITEMS 1146 & 1147---, CONT'D
COPYING-SERVICE COMPANIES FOR THE PURPOSE OF MAKING COPIES FOR THE PROSPECTIVE BIDDERS, AT THE PROSPECTIVE BIDDER'S EXPENSE.

---ITEM 1147---
SPRINKLING AND ROLLING WILL NOT BE PAID FOR DIRECTLY BUT SHALL BE CONSIDERED SUBSIDIARY. WATER USED FOR SPRINKLING SHALL CONFORM TO ITEM 204, EXCEPT FOR MEASUREMENT AND PAYMENT.

EMBANKMENT (TY C) WILL BE USED IN THE CONSTRUCTION OF NON-RIPRAPPED HAZARDOUS MATERIAL TRAPS AND SHALL BE CLAY MEETING THE FOLLOWING SPECIFICATIONS:

PROPERTY	TEST METHOD	UNIT	SPECIFICATION
PERMEABILITY	TEX-129-E	CM/SEC	.000001
PLASTICITY INDEX	TEX-106-E	%	NOT LESS THAN 15
LIQUID LIMIT	TEX-104-E	%	NOT LESS THAN 30
PARTICLES PASSING 200 SIEVE	TEX-110-E (PART II)	%	NOT LESS THAN 30
COMPACTION	AS DIRECTED BY THE ENGINEER		

---ITEM 3821---
WORK UNDER THIS ITEM SHALL INCLUDE THE REMOVAL OF THE EXISTING 8 INCHES OF ASPHALT STABILIZED BASE (GR 4) AND 1 1/2 INCHES OF ASPHALTIC CONCRETE PAVEMENT (TY C) FROM EXISTING CONNECTIONS "J", "C" AND "P" AS SHOWN ON PLAN SHEETS 53 AND 53A.

THE RAP MATERIAL SHALL BE REMOVED IN ACCORDANCE WITH THE REQUIREMENTS OF SPECIAL SPECIFICATION ITEM 3822 "PLANING AND/OR TEXTURING PAVEMENT" EXCEPT FOR MEASUREMENT AND PAYMENT. PAYMENT FOR PLANING (MILLING) THIS MATERIAL SHALL BE CONSIDERED SUBSIDIARY TO ITEM 3821.

THE RAP MATERIAL SALVAGED FROM THESE EXISTING CONNECTORS SHALL BE USED IN THE PRODUCTION OF ASPHALT STABILIZED BASE (GR 4). REMAINING MILLINGS NOT USED IN THE PRODUCTION OF THE ASPHALT STABILIZED BASE WILL REMAIN THE PROPERTY OF THE STATE AND SHALL BE HAULED AND STOCKPILED AT THE INTERSECTION OF LOOP 1604 AND SHAENFIELD ROAD AS DIRECTED BY THE ENGINEER.

---ITEM 3822---
ALL MILLINGS SHALL REMAIN THE PROPERTY OF THE STATE AND SHALL BE USED IN THE PRODUCTION OF ASPHALT STABILIZED BASE (GR 4).

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 3822---, CONT'D

REMAINING MILLINGS NOT USED IN THE PRODUCTION OF THE ASPHALT STABILIZED BASE SHALL BE HAULED AND STOCKPILED AT THE INTERSECTION OF LOOP 1604 AND SHAENFIELD ROAD AS DIRECTED BY THE ENGINEER.

NOTE: TEST SECTIONS OF SULPHLEX PAVEMENT WERE PLACED ON THE EXISTING PAVEMENT AT THE FOLLOWING LOCATIONS:
STATION 10154+00 TO 10220+00 WESTBOUND MAINLANE
STATION 10114+00 TO 10151+00 EASTBOUND MAINLANE
STATION 10194+00 TO 10220+00 EASTBOUND MAINLANE

THE CONTRACTOR SHALL PLANE THESE SECTIONS AND TRANSPORT THE MATERIAL TO A STOCKPILE LOCATED AT LOOP 1604 AND SHAENFIELD ROAD. THE CONTRACTOR SHALL ENSURE THAT THE SULPHLEX MATERIAL IS REMOVED AND STOCKPILED SEPARATELY FROM THE ASPHALTIC MATERIAL THAT IS CONSIDERED TO BE R.A.P.

---ITEM 3834---
BETWEEN NOVEMBER 1 AND MARCH 1, NO ASPHALTIC CONCRETE PAVEMENT SHALL BE PLACED UNLESS, DUE TO UNUSUAL SITUATIONS, IT IS SPECIFICALLY AUTHORIZED BY THE ENGINEER IN WRITING.

ASPHALT CONCRETE PAVEMENT SHALL BE PLACED WITH A SPREADING AND FINISHING MACHINE EQUIPPED WITH AUTOMATIC SCREED CONTROL DEVICES UNLESS OTHERWISE AUTHORIZED BY THE ENGINEER.

ASPHALT LAYING MACHINE SHALL NOT BE SERVED BY MORE THAN ONE PLANT AT A TIME.

THE ACP LAYDOWN MACHINE, USED IN THE PLACEMENT OF THE FINAL MAT OF ACP, WILL BE LIMITED TO A MAXIMUM WIDTH OF 16 FEET (12' ROADWAY PLUS 4' SHOULDER) UNLESS THE CONTRACTOR CAN DEMONSTRATE THAT THEY CAN SATISFACTORILY PLACE AN ASPHALTIC MAT IN EXCESS OF 16 FEET THAT WILL PRODUCE A RIDING SURFACE ACCEPTABLE TO THE ENGINEER.

VEHICLES OF THE HIGH DUMP SEMI-TRAILER TYPE WILL NOT BE ALLOWED TO DUMP DIRECTLY INTO THE FINISHING MACHINE UNLESS SPECIFICALLY AUTHORIZED BY THE ENGINEER.

THE USE OF A SINGLE DRUM VIBRATORY ROLLER FOR BREAKDOWN ROLLING WILL NOT BE ALLOWED.

FOR ASPHALTIC MATERIAL WITHOUT RECLAIMABLE ASPHALTIC PAVEMENT (RAP) MATERIAL, ONLY AC-20 SHALL BE USED. FOR ASPHALTIC MATERIAL WITH A (RAP) MIXTURE, THE ASPHALT SHALL BE AS DESCRIBED UNDER THE ASPHALTIC

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 3834---, CONT'D
MATERIAL ARTICLE FOR THIS ITEM.

THE COARSE AGGREGATE MAY BE SAMPLED DURING DELIVERY TO THE PLANT, FROM THE STOCKPILE, FROM THE COLD BINS, OR FROM THE HOT BINS AS DIRECTED BY THE ENGINEER.

THE USE OF TEST METHOD TEX-531-C SHALL NOT BE REQUIRED TO EVALUATE THE MIX. IF AN ANTISTRIPPING AGENT IS USED, A TEST SECTION WITHOUT THE ANTISTRIPPING AGENT WILL NOT BE REQUIRED.

THE COARSE AGGREGATE USED IN THE MAT DESIGNATED ACP (SURF) SHALL HAVE A MINIMUM POLISH VALUE OF 32. IF TRAPROCK OR FLINTROCK IS USED THE POLISH VALUE WILL BE WAIVED, PROVIDING THE FOLLOWING CRITERIA IS MET: THAT PORTION OF THE TRAPROCK RETAINED ON THE NO. 10 SIEVE SHALL COMPRISE OF AT LEAST 30% BY VOLUME OF THE TOTAL AGGREGATE. IN ADDITION, IF NATURALLY BLENDED OR MECHANICALLY BLENDED AGGREGATES ARE USED, THE BLENDED AGGREGATES SHALL CONTAIN AT LEAST 50 % TRAPROCK OR FLINTROCK RETAINED ON THE NO. 4 SIEVE.

CRUSHED GRAVEL SCREENINGS MAY BE USED WITH, OR IN LIEU OF STONE SCREENINGS.

CRUSHED LIMESTONE OR CRUSHED DOLOMITE MAY NOT BE USED AS THE POLISH VALUE AGGREGATE.

THE LONGITUDINAL JOINTS IN ONE LAYER SHALL OFFSET THAT IN THE OTHER LAYER IMMEDIATELY BELOW BY APPROXIMATELY 3 INCHES OR MORE; HOWEVER, THE JOINTS IN THE TOP LAYER SHALL BE AT THE LANE LINES OR AS DIRECTED BY THE ENGINEER.

THE ASPHALT PLANT SHALL BE EQUIPPED WITH TRUCK SCALES AS DEFINED IN ITEM 520, ARTICLE 520.3(1) OF THE STANDARD SPECIFICATIONS. THREE WEIGHT TICKETS BEARING THE DATE, THE TRUCK NUMBER AND THE GROSS, NET AND TARE WEIGHTS SHALL BE GIVEN TO THE TRUCK DRIVER BY THE CONTRACTOR'S PERSONNEL, AND THEN GIVEN TO THE STATE INSPECTOR AT THE SPREADING AND FINISHING MACHINE. THE CONTRACTOR MAY BE REQUIRED TO WEIGH LOADS OF ASPHALTIC CONCRETE ON PUBLIC SCALES OR PORTABLE PLATFORM SCALES TO INSURE THE PROPER WEIGHT OF MATERIAL.

---ITEM 4006---
ALL SEALED EXPANSION JOINTS SHALL RECEIVE PROTECTION II IN ACCORDANCE WITH ITEM 446.

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 5008---
THE MOWING HEIGHT SHALL BE SIX (6) INCHES.

---ITEM 5583---
THE MAXIMUM INTERRUPTION FOR TIE-INS FOR THE 24" AND 30" WATER MAINS SHALL NOT EXCEED 24 HOURS. NO INTERRUPTION WILL BE ALLOWED BETWEEN APRIL 1 AND SEPTEMBER 30. THE 24" AND 30" WATER MAINS SHALL NOT BE INTERRUPTED UNTIL THE CONTRACTOR HAS COMPLETED THE NEW WATER MAIN CONSTRUCTION ADJACENT TO THE EXISTING WATER MAIN AND HAS ALL REQUIRED MATERIALS TO COMPLETE THE TIE-IN ON SITE.

---ITEM 5641---
"MATERIALS ON HAND" PAYMENTS WILL NOT BE CONSIDERED IN DETERMINING PERCENTAGES USED TO COMPUTE PAYMENT FOR THE ITEM "MOBILIZATION".

---ITEM 5878---
AT THE END OF CONSTRUCTION, ALL VIA BARRELS IN ACCEPTABLE CONDITION SHALL BECOME THE PROPERTY OF THE STATE AND THOSE NOT ACCEPTABLE SHALL BECOME THE PROPERTY OF THE CONTRACTOR, AS DETERMINED BY THE ENGINEER. VIA BARRELS BECOMING THE PROPERTY OF THE STATE SHALL BE EMPTIED AND DELIVERED BY THE CONTRACTOR TO THE TXDOT MAINTENANCE YARD LOCATED AT 4615 NW LP 1604 IN SAN ANTONIO.

THE CONTRACTOR SHALL USE STANDARD OBJECT MARKER OB-3A SHOWN WITHIN STATE STANDARD D & OM(3). ALL MATERIAL AND LABOR SHALL BE CONSIDERED SUBSIDIARY TO ITEM 585S AND NO DIRECT PAYMENT SHALL BE MADE.

---ITEM 5915---
PRIOR TO COMMENCING ANY OPERATIONS WITHIN TWENTY(20) FEET OF ANY EXISTING SANITARY SEWER LINE, THE CONTRACTOR SHALL DETERMINE THE EXISTING CONDITION OF THE SEWER LINE WITH CLOSED CIRCUIT TELEVISION EQUIPMENT.

THE TELEVISION CAMERA USED FOR THE INSPECTION SHALL BE ONE SPECIFICALLY DESIGNED AND CONSTRUCTED FOR SUCH INSPECTION. LIGHTING FOR THE CAMERA SHALL BE SUITABLE TO ALLOW A CLEAR PICTURE OF THE ENTIRE PERIPHERY OF THE PIPE. THE CAMERA SHALL PRODUCE A COLOR PICTURE QUALITY WITH A MINIMUM OF 300 LINES OF RESOLUTION. THE CAMERA SHALL BE MOVED THROUGH THE SEWER LINE AT A SPEED NOT TO EXCEED 30 FEET PER MINUTE.

PRIOR TO COMMENCING OPERATIONS FOR TELEVISION INSPECTION, IT SHALL BECOME THE CONTRACTOR'S RESPONSIBLITY TO CLEAN THE LINE OF ANY EXTRANEOUS MATERIALS THAT MIGHT PREVENT PROPER OPERATION OF TELEVISION

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 5915---, CONT'D
INSPECTION OR OTHER INTERNAL SEWER LINE OPERATIONS.

A VIDEO RECORDING SHALL BE MADE SHOWING THE EXISTING CONDITION OF THE SEWER LINE. THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER OF ANY EXISTING DAMAGE OF THE SEWER LINE. AFTER THE CONTRACTOR HAS COMPLETED THE BLASTING OPERATIONS AND CONSTRUCTION IN THE AREA, A SECOND TELEVISION INSPECTION RECORDING SHALL BE MADE OF THE SEWER LINE. THE VIDEO RECORDING SHALL SHOW THE TIME AND DATE ON THE RECORDINGS. IF THERE IS ANY DAMAGE TO THE SEWER LINE AS DETERMINED BETWEEN THE TWO RECORDINGS, THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REPAIR OF THE SEWER LINE AT HIS EXPENSE.

IF AN EXISTING SEWER LINE IS DAMAGED BY THE CONTRACTOR'S OPERATIONS, THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER AND THE TEXAS WATER COMMISSION WITHIN TWO HOURS FROM THE TIME DAMAGE HAS OCCURED. IN THE EVENT THE CONTRACTOR DAMAGES A SANITARY SEWER LINE, ALL CONSTRUCTION OPERATIONS IN THE AREA OF THE DAMAGED SEWER LINE SHALL CEASE AND IMMEDIATE REPAIRS SHALL BE INITIATED.

ANY REQUIRED TELEVISION INSPECTION OF SANITARY SEWER LINES WILL BE HANDLED AS CONTRACTOR FORCE ACCOUNT OR AGREED UNIT PRICE WORK UNDER THIS ITEM.

ALONG WITH OTHER WORK UNDER THIS ITEM, THE FOLLOWING POLLUTION ABATEMENT PROCEDURES SHALL BE INCLUDED IN ORDER TO PROTECT THE EDWARDS AQUIFER RECHARGE ZONE:

THE CONTRACTOR WIL BE REQUIRED TO KEEP ON-SITE COPIES OF THE WATER POLLUTION ABATEMENT PLAN AND ITS APPROVAL LETTER.

FACILITIES FOR ABOVEGROUND OR UNDERGROUND STORAGE OF STATIC HYDROCARBONS SHALL NOT BE SITED WITHIN THE BOUNDS OF THE EDWARDS AQUIFER RECHARGE ZONE. TEMPORARY STOCKPILES OF MATERIAL SHALL BE PERMITTED ON THOSE PARTS OF THE PROJECT NOT WITHIN THE RECHARGE ZONE, PROVIDED THAT APPROPRIATE EROSION AND WATER POLLUTION CONTROL MEASURES ARE APPLIED TO THE STOCKPILE AREA TO TREAT DRAINAGE OFF THE STOCKPILE SITE. DRAINAGE ONTO THE STOCKPILE SITE SHALL BE DIVERTED AROUND.

FACILITIES USED FOR THE ABOVEGROUND STORAGE OF STATIC HYDROCARBONS SHALL BE CONSTRUCTED WITHIN CONTROLLED DRAINAGE AREAS THAT ARE SIZED TO CAPTURE ONE AND ONE-HALF (1 1/2) TIMES THE STORAGE CAPACITY OF THE FACILITY AND THAT DIRECT ANY SPILLAGE TO A POINT CONVENIENT FOR THE COLLECTION AND RECOVERY OF THE SPILLAGE. THE CONTROLLED DRAINAGE AREA SHALL BE CONSTRUCTED OF OR IN A MATERIAL

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 5915---, CONT'D
SUITABLY IMPERVIOUS TO THE MATERIAL BEING STORED. ANY SPILLAGE FROM SUCH STORAGE FACILITIES SHALL BE REMOVED FROM THE CONTROLLED DRAINAGE AREA FOR DISPOSAL WITHIN TWENTY-FOUR (24) HOURS OF SPILLAGE. THIS WORK SHALL BE AT THE CONTRACTOR'S EXPENSE.

ROUTINE VEHICLE MAINTENANCE SHALL NOT BE PERFORMED ON THE PROJECT SITE EXCEPT FOR LARGE TYPE EQUIPMENT THAT MUST BE DISASSEMBLED TO BE TRANSPORTED ON PUBLIC ROADWAYS; ROUTINE MAINTENANCE MAY BE PERFORMED ON THE PROJECT SITE, BUT NOT OVER THE RECHARGE ZONE. FOR THIS EQUIPMENT PROVIDED THAT ALL NECESSARY PRECAUTIONS ARE TAKEN TO INSURE THAT NO FLUIDS SPILL ONTO THE SOIL. ALL COLLECTED WASTE FLUIDS MUST BE TRANSPORTED OFF THE PROJECT WITHIN 24 HOURS TO BE DISPOSED OF IN ACCORDANCE WITH STANDARD REQUIREMENTS.

IF ANY SIGNIFICANT RECHARGE FEATURES, SUCH AS SOLUTION OPENINGS (CAVES) OR SINKHOLES, ARE DISCOVERED DURING CONSTRUCTION, ALL REGULATED ACTIVITIES NEAR THE SIGNIFICANT RECHARGE FEATURE MUST BE IMMEDIATELY SUSPENDED AND MAY NOT PROCEED UNTIL THE EXECUTIVE DIRECTOR OF THE TEXAS WATER COMMISSION (TWC) HAS REVIEWED AND APPROVED THE METHODS TO PROTECT THE AQUIFER FROM ANY POTENTIAL ADVERSE IMPACTS.

DURING CONSTRUCTION, WASTEWATER GENERATED ON SITE WILL BE COLLECTED BY CHEMICAL TOILETS AND SHALL BE TRANSPORTED OFF THE RECHARGE ZONE.

ALL BID ITEMS USED FOR EROSION CONTROL (I.E. BALED HAY, BLADING, SCRAPER WORK, BULLDOZER WORK, BACKHOE WORK, AND SOIL RETENTION BLANKET) SHALL BE USED AS DIRECTED BY THE ENGINEER.

---ITEM 5920---
THE TOP OF TEMPORARY SEDIMENT CONTROL FENCE FABRIC SHALL BE NO HIGHER THAN THREE INCHES BELOW THE EDGE OF THE LOWEST ADJACENT ROADWAY. TEMPORARY SEDIMENT CONTROL FENCE FABRIC MAY BE FOLDED AT THE BOTTOM PRIOR TO PLACEMENT IN THE TRENCH IF NEEDED.

ALL REFERENCES IN THE PLANS TO SILT FENCE ARE FOR SPECIAL SPECIFICATION ITEM 5920, "TEMPORARY SEDIMENT CONTROL FENCE".

---ITEM 6057---
ALL EXISTING ROADSIDE TRAFFIC SIGNS REMOVED BY THE CONTRACTOR SHALL REMAIN THE PROPERTY OF THE STATE. ALL SIGNS REMOVED SHALL BE PLACED ALONG THE RIGHT OF WAY FOR REMOVAL BY MAINTENANCE AS DIRECTED BY THE ENGINEER.

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 6063---
IN PREPARING HOLES FOR TEMPORARY SIGN SUPPORTS, CARE SHOULD BE TAKEN SO AS NOT TO RUPTURE EXISTING DRAINAGE STRUCTURES, ELECTRICAL CONDUITS AND PUBLIC UTILTIES.

ANY SIGN PANELS THAT HAVE BEEN REMOVED SHALL BE REPLACED ON TEMPORARY SIGN SUPPORT POLES IN THE SAME WORKDAY OR AS DIRECTED BY THE ENGINEER.

SMALL SIGNS ON RAMPS AND FRONTAGE ROADS THAT HAVE BEEN REMOVED SHALL BE REPLACED ON 4"X4" POSTS AT A LATERAL CLEARANCE OF 8 TO 12 FEET FROM THE EDGE OF PAVEMENT OR AS DIRECTED BY THE ENGINEER.

---ITEM 6912---
RAISED PAVEMENT MARKERS SHALL NOT BE PLACED UNTIL THE ASPHALT CONCRETE PAVEMENT SURFACE HAS CURED A MINIMUM OF 48 HOURS.

---ITEM 6924---
PAINT SHALL BE PURCHASED AT THE DEPARTMENT'S DISTRICT WAREHOUSE LOCATED IN SAN ANTONIO, TEXAS. PAINTS PURCHASED FROM THE DEPARTMENT WILL BE CHARGED AS FOLLOWS:

PAINT (TRAFFIC) WHITE ACRYLIC WATER BASE $ 26.80 PER 5 GAL BKT
OR $279.20 PER 55 GAL DRUM
PAINT (TRAFFIC) YELLOW ACRYLIC WATER BASE $ 24.00 PER 5 GAL BKT
OR $294.80 PER 55 GAL DRUM

WORK ZONE MARKER TABS OR GUIDEMARKS PLACED PRIOR TO THE FINAL COURSE OF ASPHALTIC CONCRETE PAVEMENT SHALL BE REMOVED DAILY BY THE CONTRACTOR AS THE ACP OPERATIONS PROGRESS. THIS REMOVAL SHALL BE CONSIDERED SUBSIDIARY TO THIS ITEM.

THE CONTRACTOR WILL BE REQUIRED TO FURNISH CONSTRUCTION PAVEMENT MARKINGS OF BOTH THE REMOVABLE (TAPE) AND NON-REMOVABLE TYPE AS INDICATED ON THE SEQUENCE OF WORK AND DETOUR LAYOUT SHEETS.

FOIL-BACKED PAVEMENT MARKINGS WILL NOT BE PERMITTED AS REMOVABLE MARKINGS. THE REMOVABLE (TAPE) PAVEMENT MARKINGS SHALL BE HIGHLY DURABLE, RETROREFLECTIVE AND SKID RESISTANT AND COMPLETELY REMOVABLE WITHOUT USE OF HEAT OR OTHER TYPICAL REMOVAL METHODS. REMOVABLE PAVEMENT MARKINGS (TAPE) SHALL BE A 3M BRAND FOR WHITE(5710) AND FOR YELLOW(5711) OR EQUAL. EXISTING PAINT STRIPES THAT ARE IN PLACE WHEN THE PROJECT BEGINS AND NEED TO BE REMOVED FOR TRAFFIC DETOUR PURPOSES SHALL BE REMOVED UNDER THE ITEM 6913, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS".

SPECIFICATION DATA

GENERAL NOTES AND SPECIFICATION DATA--

---ITEM 6924---, CONT'D
AFTER STANDARD PAVEMENT MARKINGS HAVE BEEN PLACED, THE CONTRACTOR SHALL REMOVE ALL SHORT TERM PAVEMENT MARKINGS WHOSE LOCATION DOES NOT COINCIDE WITH THAT OF THE STANDARD MARKINGS.

---ITEM 8102---
THE CLASS OF FINISH APPLIED TO THE EXISTING SH 16 EB MAINLANE BRIDGE CONCRETE SURFACE SHALL BE THE SAME AS THAT APPLIED TO THE ADJOINING NEW CONCRETE SURFACE. THIS EXISTING STRUCTURE HAS PRESTRESSED CONCRETE BEAMS TYPE 'C' SPANS OF 55'-80'-80'-60' WITH A CONCRETE TYPE T-2 RAIL. THE ABUTMENTS, BENTS (CAPS & COLUMNS), OUTSIDE BEAMS AND SLAB OVERHANG, AND INSIDE AND OUTSIDE OF RAIL SHALL BE PAINTED. IF IT IS NECESSARY FOR THE CONTRACTOR TO REMOVE THE RAIL ELEMENT ON THE TYPE T-2 RAIL, THERE WILL BE NO DIRECT PAYMENT FOR THIS WORK.

SPECIFICATION DATA

ESTIMATE SUMMARY

				BEXAR COUNTY		BEXAR COUNTY		BEXAR COUNTY								
				NH 90(191)M, ETC.		NH 90(191)M, ETC.		NH 90(191)M, ETC.								
				2452-2-23, ETC. BRIDGE		2452-2-23, ETC. SAN ANTONIO WTR SYS		2452-2-23, ETC. ROADWAY								
EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	ALT.	ITEM-CODE ITEM NO	DESC CODE	SP NO	DESCRIPTION	UNIT	TOTAL EST.	TOTAL FINAL
								198.500			100	002	009	PREP R O W	STA	198.500	
								68.000			150	001		BLAD	HR	68.000	
								132.000			154	002	001	SCRAP WORK (ORD COMP)	HR	132.000	
								142.000			156	002	001	BLDZR WORK (ORD COMP)	HR	142.000	
								519150.000			160	005	001	FURN AND PLAC TPSL (6 IN)	SY	519150.000	
								992.000			160	011	001	FURN AND PLAC TPSL (12 IN)	SY	992.000	
								2521.000			162	016	009	BLOCK SOD (PRAIRIE BUFFALO)	SY	2521.000	
								517806.000			164	016	035	BRDCST SEED (BERMUDA)	SY	517806.000	
								19185.000			164	099	035	PLASTER/CELL FIB MULCH SEED (BERMUDA)	SY	19185.000	
								21580.000			168	001		SPRINK IRRIG	MG	21580.000	
								82080.000			249	049		FLEX BASE(DEL)(DC)(TY A GR1 MOD CL 3)	CY	82080.000	
								2929.000			274	202		CEM STAB BASE (DC)(TY G)(10 IN)	CY	2929.000	
								48699.000			292	010	020	ASPH STAB BS (GR 4)	TON	48699.000	
								78957.000			310	008	006	ASPH MATL (MC-30 OR AE-P)	GAL	78957.000	
								3948.000			320	015	001	AGGR (TY PB, GR 4)	CY	3948.000	
								118437.000			320	169	001	ASPH (AC OR MC-2400)LTX,HFRS-2P,CRS-2P	GAL	118437.000	
								1495.000			400	008	052	CUT AND RESTORE PAV	SY	1495.000	
				664.000							416	001	002	DRILL SHAFT (18 IN)	LF	664.000	
				1843.000							416	003	002	DRILL SHAFT (30 IN)	LF	1843.000	
				348.000							416	004	002	DRILL SHAFT (36 IN)	LF	348.000	
				473.100							421	010	047	CL C CONC (BENT)	CY	473.100	
				497.400							421	012	047	CL C CONC (ABUT)	CY	497.400	
				57.200							421	016	047	CL C CONC (SHEAR KEY)	CY	57.200	
				70040.000							422	001	001	REINF CONC SLAB	SF	70040.000	
								10215.000			423	001	054	RETAINING WALL	SF	10215.000	
				3182.550							425	003	007	PRESTR CONC BEAM (TY C)	LF	3182.550	
				1792.000							425	005	007	PRESTR CONC BEAM (TY 54)	LF	1792.000	
				5429.360							425	009	007	PRESTR CONC BEAM (TY IV)	LF	5429.360	
				513.880							425	018	007	PRESTR CONC BOX BEAM (5 E 20)	LF	513.880	
				2055.490							425	019	007	PRESTR CONC BOX BEAM (5 I 20)	LF	2055.490	
				7230.000							428	001	001	CONC SURF TREAT	SY	7230.000	
				1988.000				2213.000			432	008		RIPRAP (CONC)(CL B)	CY	4201.000	
				566.000							450	003	002	RAIL (TY T 202)	LF	566.000	
				150.000							450	008	002	RAIL (TY T 6)	LF	150.000	
				3846.000				768.000			450	036	002	RAIL (TY T 501)	LF	4614.000	
								321.000			460	042	005	CMP (18 IN)	LF	321.000	
								140.000			460	043	005	CMP (30 IN)	LF	140.000	
								30.000			462	006	006	CONC BOX CULV (5 FT X 2 FT)	LF	30.000	
								445.000			462	007	006	CONC BOX CULV (5 FT X 3 FT)	LF	445.000	
								115.000			462	013	006	CONC BOX CULV (6 FT X 3 FT)	LF	115.000	
				2731.520				634.000			462	017	006	CONC BOX CULV (7 FT X 3 FT)	LF	3365.520	
				3061.560							462	018	006	CONC BOX CULV (7 FT X 4 FT)	LF	3061.560	
				6555.720							462	022	006	CONC BOX CULV (8 FT X 4 FT)	LF	6555.720	
				4613.840							462	023	006	CONC BOX CULV (8 FT X 5 FT)	LF	4613.840	
				225.160							462	027	006	CONC BOX CULV (9 FT X 5 FT)	LF	225.160	
				2240.000							462	119	006	CONC BOX CULV (8FT X 4FT)(SPL)	LF	2240.000	
				1917.440							462	168	006	CONC BOX CULV (7FT X 3FT)(SPL)	LF	1917.440	
								2369.000			465	061		RCP SEW (18 IN)(CL III)	LF	2369.000	
								4528.000			465	062		RCP SEW (24 IN)(CL III)	LF	4528.000	
								3981.000			465	063		RCP SEW (30 IN)(CL III)	LF	3981.000	

ESTIMATE & QUANTITY SHEET

Revised 10-4-93

STATE DIST. NO.	COUNTY	PROJECT NO.	SHEET NO.
15	BEXAR	NH 90(191)M, ETC.	52

ESTIMATE SUMMARY

				BEXAR COUNTY		BEXAR COUNTY		BEXAR COUNTY		ALT	ITEM-CODE			DESCRIPTION	UNIT	TOTAL	
				NH 90(191)M, ETC.		NH 90(191)M, ETC.		NH 90(191)M, ETC.									
				2452-2-23, ETC. BRIDGE		2452-2-23, ETC. SAN ANTONIO WTR SYS		2452-2-23, ETC. ROADWAY									
EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL		ITEM NO	DESC CODE	SP NO			EST.	FINAL
								3678.000			465	064		RCP SEW (36 IN)(CL III)	LF	3678.000	
								306.000			465	066		RCP SEW (48 IN)(CL III)	LF	306.000	
								352.000			465	069		RCP SEW (48 IN)(CL IV)	LF	352.000	
								1057.000			465	070		RCP SEW (36 IN)(CL IV)	LF	1057.000	
								70.000			465	084		RCP SEW (24 IN)(CL IV)	LF	70.000	
								39.000			465	099		RCP SEW (42 IN)(CL IV)	LF	39.000	
								367.000			465	209		RCP SEW (30 IN)(CL IV)	LF	367.000	
								9.000			470	131	002	INLET (COMPL)(TY I SAFETY)	EA	9.000	
								3.000			470	145	002	MANH (COMPL)(SPL)	EA	3.000	
								11.000			470	230	002	MANH (COMPL)(TY 1)	EA	11.000	
								18.000			470	247	002	INLET (COMPL)(DROP)(TY 3)	EA	18.000	
								2.000			470	336	002	INLET (COMPL)(CURB)(TY C)	EA	2.000	
								2.000			470	369	002	MANH (COMPL)(TY 3)	EA	2.000	
								1.000			470	370	002	MANH (COMPL)(TY 5)	EA	1.000	
								23.000			470	381	002	INLET (COMPL)(DROP TY 6)	EA	23.000	
								9.000			470	391	002	INLET (COMPL)(TY 1)(CURB)(10 FT)	EA	9.000	
								2.000			470	430	002	MANH (COMPL)(TY 4)	EA	2.000	
								4.000			470	457	002	INLET (COMPL)(TY 3)(CURB)	EA	4.000	
								2.000			475	012		CULV HDWL (CH 11A)	EA	2.000	
								2.000			475	015		CULV WINGWALL (PW-N)	EA	2.000	
				6.000							475	167		CULV WINGWALL (MCW-P-30 DEG)(H=4FT)	EA	6.000	
				2.000							475	251		CULV WINGWALL (MCW-P-45 DEG)(H=4FT)	EA	2.000	
				4.000							475	313		CULV WINGWALL (MCW-P)(H=5FT)	EA	4.000	
				4.000							475	314		CULV WINGWALL (MCW-P-15 DEG)(H=5FT)	EA	4.000	
				4.000							475	439		CULV WINGWALL (MCW-P-45)(H=3FT)	EA	4.000	
				4.000							475	579		CULV WINGWALL (MCW-P-15)(H=4FT)	EA	4.000	
								90.000			476	014		JACK OR BOR PIPE (42 IN)(RC)(CL IV)	LF	90.000	
								3.000			477	397	002	SAFE END TREAT (TY P)(7FT X 3FT)(6:1)	EA	3.000	
								5.000			496	001		REMOV OLD STR (LARGE)	EA	5.000	
								30.000			502	001	022	BARCD,SIGN AND TRAF HANDLING	MO	30.000	
								60.800			508	001	007	CONSTRUCTING DETOURS (CL 1)	STA	60.800	
								2430.000			512	001	004	CONC TRAF BAR (PORT)	LF	2430.000	
								3150.000			512	002	004	CONC TRAF BAR (MOVE AND RESET)	LF	3150.000	
								3780.000			512	003	004	CONC TRAF BAR (REMOVE)	LF	3780.000	
								280.000			514	005	007	CONC TRAF BAR (TY 5)	LF	280.000	
								51070.000			530	015	011	CONC CURB (TY A)	LF	51070.000	
								440.000			530	019	011	CONC DRVWY (6 IN)	SY	440.000	
								54.000			538	002		R O W MARK (TY II)	EA	54.000	
								3756.000			540	010		METAL BEAM GD FENCE (12 GA)(TIM POST)	LF	3756.000	
								5.000			540	011		TERM-ANCH SECT (12 GA)	EA	5.000	
								575.000			540	015		MET BM GD FE (BLK OUT)(12 GA)(TIM POST)	LF	575.000	
								2115.000			542	001	001	REMOV METAL BEAM GD FENCE	LF	2115.000	
								12.000			542	003	001	REMOV TERM-ANCH SECT	EA	12.000	
								196.330			582	030	002	DRAIN LINE (CPVC 4IN)(SCH 80)	LF	196.330	
								24.000			610	164		RDWY ILL ASM (U/P TY 1)(.15KW)S(SPL CO)	EA	24.000	
								25.000			610	196		RDWY ILL ASSEM (TY SA 40T-8)(.25 KW)S	EA	25.000	
								2.000			610	198		RDWY ILL ASSEM (TY SA 50T-8)(.4 KW)S	EA	2.000	
								17.000			610	200		RDWY ILL ASSEM (TY SA 40T-8-8)(.25 KW)S	EA	17.000	
								44.000			616	001		RDWY ILL ASSEM FND (TY A)	EA	44.000	
								40.000			618	002		CONDT (RM)(1 IN)	LF	40.000	

ESTIMATE & QUANTITY SHEET

STATE DIST. NO.	COUNTY	PROJECT NO.	SHEET NO.
15	BEXAR	NH 90(191)M, ETC.	52A

ESTIMATE SUMMARY

				BEXAR COUNTY		BEXAR COUNTY		BEXAR COUNTY		ALT.	ITEM-CODE			DESCRIPTION	UNIT	TOTAL	
				NH 90(191)M, ETC.		NH 90(191)M, ETC.		NH 90(191)M, ETC.									
				2452-2-23, ETC. BRIDGE		2452-2-23, ETC. SAN ANTONIO WTR SYS		2452-2-23, ETC. ROADWAY									
EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL		ITEM NO	DESC CODE	SP NO			EST.	FINAL
								18455.000			618	045		CONDT (PVC)(SCH 80)(2 IN)	LF	18455.000	
								60.000			618	055		CONDT (RM)(2 IN)(PUSHED OR BORED)	LF	60.000	
								200.000			618	056		CONDT (PVC)(SCH 40)(1 IN)	LF	200.000	
								11348.000			618	059		CONDT (PVC)(SCH 40)(1 1/4 IN)	LF	11348.000	
								4525.000			618	075		CONDT (PVC)(SCH 80)(1 1/4IN)	LF	4525.000	
								17797.000			620	001		ELEC CONDR (NO. 8 BAR)	LF	17797.000	
								1098.000			620	013		ELEC CONDR (NO. 12 BAR)	LF	1098.000	
								35594.000			620	031		ELEC CONDR (NO. 8)(TY XHHW)	LF	35594.000	
								2196.000			620	034		ELEC CONDR (NO. 12)(TY XHHW)	LF	2196.000	
								57.000			624	006		GROUND BOX (RPM)(H 20 LOADING)	EA	57.000	
								39.000			624	022		GROUND BOX (RPM)(TY A)(122311) APRON	EA	39.000	
								8.000			624	044		GROUND BOX (RPM)(TY X)(122330)	EA	8.000	
								1.000			624	050		GROUND BOX (RPM)(TY Y)(122342)	EA	1.000	
								4.000			628	075		SERV POLE TYS(240/480)060(NS)GS(T)TP(O)	EA	4.000	
								1.000			632	001	033	INSTALLATION OF HIGHWAY TRAFFIC SIGNALS	LS	1.000	
								627562.000			1146	001		EXCAV	CY	627562.000	
								761981.000			1147	004		EMBANK (OC)(TY B)	CY	761981.000	
								331.000			1147	006		EMBANK (OC)(TY C)	CY	331.000	
								3003.000			1225	001		SOIL RET BLNKT (CL 1)(TY A)	SY	3003.000	
								19413.000			1225	012		SOIL RET BLNKT (CL 2)(TY E)	SY	19413.000	
								650.000			1225	015		SOIL RET BLNKT (CL 2)(TY H)	SY	650.000	
								6381.000			3821	002		SALV HAUL & STKPL RECLM ASPH PAV	SY	6381.000	
								43,666.000			3822	014		PLANE ASPH CONC PAV (0 TO 2 IN)	SY	43,666.000	
								15928.000			3834	003		ASPH CONC (TY C)(SURF)	CY	15928.000	
								15149.000			3834	005		ASPH CONC (TY C)	CY	15149.000	
				569.000							4006	002		SEALED EXPANSION JOINTS (3 IN)	LF	569.000	
								725.000			5008	001		MOWING	HR	725.000	
								1234.000			5031	001		LITTER PICK-UP	HR	1234.000	
						87.000					5040	001		SAN SEWER (CONC ENCASEMENT)	CY	87.000	
						120.000					5040	009		SAN SEWER (DI)(12 IN)	LF	120.000	
						2.000					5040	010		SAN SEWER (ADJUST MANH)	EA	2.000	
						3.000					5040	011		SAN SEWER (ABAND MANH)	EA	3.000	
						4.000					5040	013		SAN SEWER (CONC CRADLE)	CY	4.000	
						515.000					5040	038		SAN SEWER (8 IN)(PVC)	LF	515.000	
						184.000					5040	040		SAN SEWER (SELECT BEDDING)(CLEAN GRAV)	CY	184.000	
						8.000					5040	045		SAN SEWER (MANH RING ENCASEMENT)	EA	8.000	
						8.000					5040	047		SAN SEWER (MANH)(COMPL)(0'-6')	EA	8.000	
						982.000					5040	049		SAN SEWER (12 IN)	LF	982.000	
						37.000					5040	051		SAN SEWER (MANH)(EXTRA DEPTH)	LF	37.000	
						708.000					5040	102		SAN SEWER (DI PRES PIPE)10IN FORCE MAIN	LF	708.000	
						4.000					5040	103		SAN SEWER (10IN BEND)(MECH JOINT)	EA	4.000	
						70.000					5040	104		SAN SEWER (12 IN)(JACK OR BORE)	LF	70.000	
								5.000			5049	001		MAILBOX INSTALL (SINGLE)	EA	5.000	
								3266.000			5267	003		DRIVEWAY (TY I)	SY	3266.000	
						1.000					5583	015	004	PERM BLOW-OFF (4 IN)(COMPL)	EA	1.000	
						2.000					5583	016	004	TEMP BLOW-OFF (2 IN)(COMPL)	EA	2.000	
						1.000					5583	017	004	AUTO AIR RELEASE VALVE (1 IN)(COMPL)	EA	1.000	
						10.000					5583	019	004	FIRE HYDRANT W/6 IN VALVE & BOX	EA	10.000	
						9.270					5583	020	004	CAST IRON FITTINGS	TON	9.270	
						6.000					5583	022	004	HYDROSTATIC PRESSURE TEST	EA	6.000	

ESTIMATE & QUANTITY SHEET

Revised 10-7-93

STATE DIST. NO.	COUNTY	PROJECT NO.	SHEET NO.
15	BEXAR	NH 90(191)M, ETC.	52B

ESTIMATE SUMMARY

				BEXAR COUNTY		BEXAR COUNTY		BEXAR COUNTY		ALT	ITEM-CODE			DESCRIPTION	UNIT	TOTAL	
				NH 90(191)M, ETC.		NH 90(191)M, ETC.		NH 90(191)M, ETC.									
				2452-2-23, ETC. BRIDGE		2452-2-23, ETC. SAN ANTONIO WTR SYS		2452-2-23, ETC. ROADWAY									
EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL		ITEM NO	DESC CODE	SP NO			EST.	FINAL
						11217.000					5583	023	004	TRENCH EXCAV PROTECTION	LF	11217.000	
						610.000					5583	025	004	CUT & REPL ASPH PAV W/6 IN ASPH TRT BS	SF	610.000	
						5.000					5583	037	004	PIPE WTR MAIN (6 IN)(DI)	LF	5.000	
						5015.000					5583	039	004	PIPE WTR MAIN (24 IN)(CSC)	LF	5015.000	
						284.000					5583	040	004	PIPE WTR MAIN (24 IN)(CSC)(CONDUIT)	LF	284.000	
						1.000					5583	045	004	MAIN TIE-IN (COMPL)(6 IN)	EA	1.000	
						4.000					5583	048	004	TEMP BLOW-OFF (COMPL)(4 IN)	EA	4.000	
						6.000					5583	051	004	MAIN TIE-IN (COMPL)(24 IN)	EA	6.000	
						7.000					5583	052	004	BUTTERFLY VALVE (COMPL W/BOX)(24 IN)	EA	7.000	
						755.000					5583	058	004	PIPE WTR MAIN (16 IN)(DI)	LF	755.000	
						110.000					5583	060	004	PIPE WTR MAIN (24 IN)(DI)	LF	110.000	
						284.000					5583	063	004	CONDUIT (42IN ID)	LF	284.000	
						11.000					5583	065	004	AUTO AIR RELEASE VALVE (2 IN)(COMPL)	EA	11.000	
						3.000					5583	066	004	MAIN TIE-IN (16 IN)(COMPL)	EA	3.000	
						1.000					5583	067	004	GATE VALVE (COMPL W/BOX)(16 IN)	EA	1.000	
						10.000					5583	100	004	PIPE WTR MAIN (16 IN)(AC)	LF	10.000	
						410.000					5583	108	004	CONC CAP OVER MAIN	SF	410.000	
						1.000					5583	116	004	MAIN TIE-IN (COMPL)(30 IN)	EA	1.000	
						3.000					5583	117	004	BUTTERFLY VALVE (COMPL W/BOX)(30 IN)	EA	3.000	
						1.000					5583	118	004	TAP SLEV/VAL (30IN X 16IN)(COMPL W/BOX)	EA	1.000	
						1010.000					5583	119	004	PIPE WTR MAIN (30 IN)(CSC)	LF	1010.000	
						285.000					5583	120	004	PIPE WTR MN (24 ")(CSC)(JK,BOR OR TUN)	LF	285.000	
						506.000					5583	121	004	PIPE WTR MAIN (30 IN)(CSC)(IN CONDUIT)	LF	506.000	
						428.000					5583	122	004	CONDUIT (48 IN)	LF	428.000	
						78.000					5583	123	004	CONDUIT (48 IN)(JK,BOR OR TUN)	LF	78.000	
						280.000					5583	124	004	PIPE WTR MN (36")(CSC)(JK,BOR OR TUN)	LF	280.000	
						3523.000					5583	143	004	PIPE WTR MAIN (36 IN)(CSC)	LF	3523.000	
						4.000					5583	126	004	BUTTERFLY VALVE (COMPL W/BOX)(36 IN)	EA	4.000	
						1.000					5583	127	004	MAIN TIE-IN (COMPL)(36 IN)	EA	1.000	
						0.092		0.908			5641	001		MOBILIZATION	LS	1.000	
								25.000			5694	001		GUARDRAIL EXTRUDER TERMINALS	EA	25.000	
								120.000			5878	001		VEH IMPACT ATTEN ASSEM BRLS	EA	120.000	
								60.000			5878	002		VEH IMPCT ATEN ASEM BRLS (MOVE & RESET)	EA	60.000	
								90.000			5878	003		VEH IMPACT ATTEN ASSEM BRLS (REMOV)	EA	90.000	
								76.000			5916	004		ROCK FILTER DAMS (TY 2)	LF	76.000	
								417.000			5916	005		ROCK FILTER DAMS (TY 1)	LF	417.000	
								76.000			5916	007		ROCK FILTER DAMS (REMOV)(TY 2)	LF	76.000	
								297.000			5916	008		ROCK FILTER DAMS (REMOV & REPLAC)(TY 1)	LF	297.000	
								417.000			5916	009		ROCK FILTER DAMS (REMOV)(TY 1)	LF	417.000	
								614.000			5916	010		ROCK FILTER DAMS (TY 3)	LF	614.000	
								614.000			5916	012		ROCK FILTER DAMS (REMOV)(TY 3)	LF	614.000	
								1506.000			5920	001		TEMP SEDMT CONT FENCE	LF	1506.000	
								961.000			5920	002		TEMP SEDMT CONT FENCE (REMOV & REPLAC)	LF	961.000	
								1506.000			5920	003		TEMP SEDMT CONT FENCE (REMOV)	LF	1506.000	
								504.000			5921	004		CONSTRUCT EXIT (TY 1)	SY	504.000	
								504.000			5921	005		CONSTRUCT EXIT (REMOV)(TY 1)	SY	504.000	
								504.000			5921	009		CONSTRUCT EXIT (REMOV & REPLAC)(TY 1)	SY	504.000	
								399.000			5932	009		EXCAV WORK (EROSN CONT)(CL 1)	HR	399.000	
								200.000			5932	010		FRONT END LOADER WORK (ERSN CONT)(CL 1)	HR	200.000	
								122.000			6057	001		REMOVING EXISTING ROADSIDE TRAF SIGNS	EA	122.000	

ESTIMATE & QUANTITY SHEET

Rev. 10-9-93

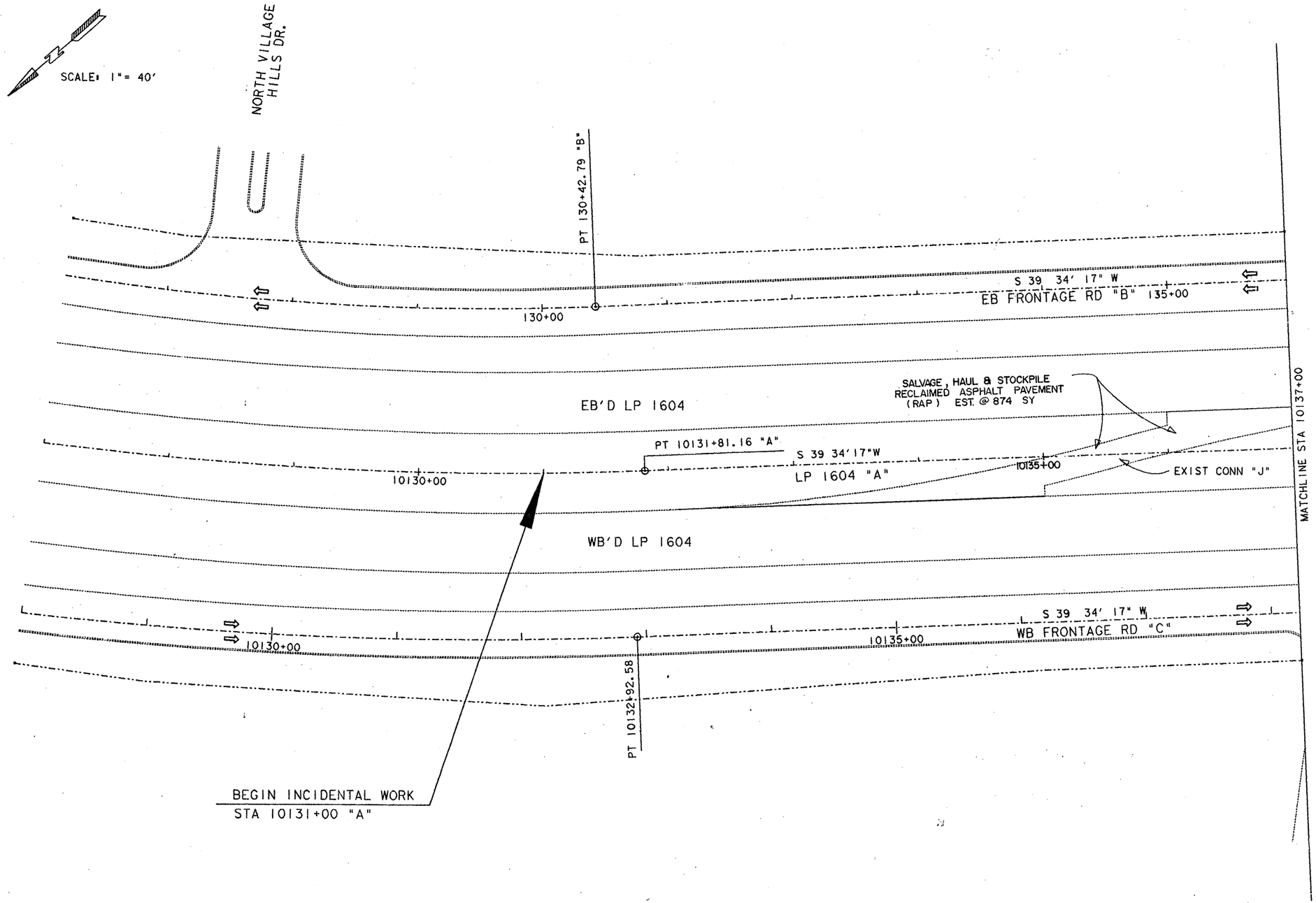
STATE DIST. NO.	COUNTY	PROJECT NO.	SHEET NO.
15	BEXAR	NH 90(191)M, ETC.	52C

ESTIMATE SUMMARY

				BEXAR COUNTY		BEXAR COUNTY		BEXAR COUNTY		ALT	ITEM-CODE			DESCRIPTION	UNIT	TOTAL	
				NH 90(191)M, ETC.		NH 90(191)M, ETC.		NH 90(191)M, ETC.									
				2452-2-23, ETC. BRIDGE		2452-2-23, ETC. SAN ANTONIO WTR SYS		2452-2-23, ETC. ROADWAY									
EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL		ITEM NO	DESC CODE	SP NO			EST.	FINAL
								2100.000			6063	002		TEMP SIGN SUPPT (4IN X 4IN)	LF	2100.000	
								136.000			6912	004		RAIS PAV MRK CL A (JIGGLE) TY W	EA	136.000	
								1950.000			6913	001		ELIM EXT PAV MRK & MRKERS (4")	LF	1950.000	
								660.000			6924	001		WRK ZN PAV MRK REMOV (W)(4")(SLD)	LF	660.000	
								320.000			6924	005		WRK ZN PAV MRK REMOV (W)(8")(SLD)	LF	320.000	
								310.000			6924	009		WRK ZN PAV MRK REMOV (W)(24")(SLD)	LF	310.000	
								2.000			6924	010		WRK ZN PAV MRK REMOV (W)(ARROW)	EA	2.000	
								4.000			6924	014		WRK ZN PAV MRK REMOV (W)(WORD)	EA	4.000	
								150.000			6924	020		WRK ZN PAV MRK REMOV (Y)(4")(SLD)	LF	150.000	
								39155.000			6924	029		WRK ZN PAV MRK NON-REMOV (W)(4")(SLD)	LF	39155.000	
								14311.000			6924	030		WRK ZN PAV MRK NON-REMOV (W)(4")(BRK)	LF	14311.000	
								12.000			6924	038		WRK ZN PAV MRK NON-REMOV (W)(ARROW)	EA	12.000	
								12.000			6924	042		WRK ZN PAV MRK NON-REMOV (W)(WORD)	EA	12.000	
								73665.000			6924	048		WRK ZN PAV MRK NON-REMOV (Y)(4")(SLD)	LF	73665.000	
								4010.000			6924	057		WRK ZN PAV MRK GDMRK (W)	EA	4010.000	
								4010.000			6924	058		WRK ZN PAV MRK GDMRK (Y)	EA	4010.000	
								9740.000			6924	075		WK ZN PAV MRK REMOV (CL B) TY I-A	EA	9740.000	
								6676.000			6924	076		WK ZN PAV MRK REMOV (CL B) TY I-C	EA	6676.000	
								3620.000			6924	077		WK ZN PAV MRK REMOV (CL B) TY II-A-A	EA	3620.000	
								1339.000			6924	078		WK ZN PAV MRK REMOV (CL B) TY II-C-R	EA	1339.000	
						2323.000		9784.000			8012	001		TRENCH EXCAVATION PROTECTION	LF	12107.000	
				970.000							8182	003		CL B FINISH FOR EXIST CONC	SY	970.000	
				2302.000							8564	001		BAT EXCLUDER JT SEALS	LF	2302.000	
														STATE FORCE ACCOUNT WORK (PART)			
														01 PERM PAV MARK (PAINT)	LS	1.000	
														02 FURN & INSTALL CONTROLLER	LS	1.000	
														03 TEMP SIGN TRAILERS	LS	1.000	
														04 TEMP SIGNS	LS	1.000	
														05 MAINTENANCE OF SW3P	LS	1.000	
														01 PERM PAV MARK (PAINT)	LS	1.000	
														03 TEMP SIGN TRAILERS	LS	1.000	
														04 TEMP SIGNS	LS	1.000	
														05 MAINTENANCE OF SW3P	LS	1.000	

ESTIMATE & QUANTITY SHEET

STATE DIST. NO.	COUNTY	PROJECT NO.	SHEET NO.
15	BEXAR	NH 90(191)M, ETC.	52D



ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
SALVAGE, HAUL & STOCKPILE RECLAIMED ASPH PVMT (RAP)	SY	874

Carol G. Luschen P.E. 1-31-96
CAROL GREINER LUSCHEN DATE

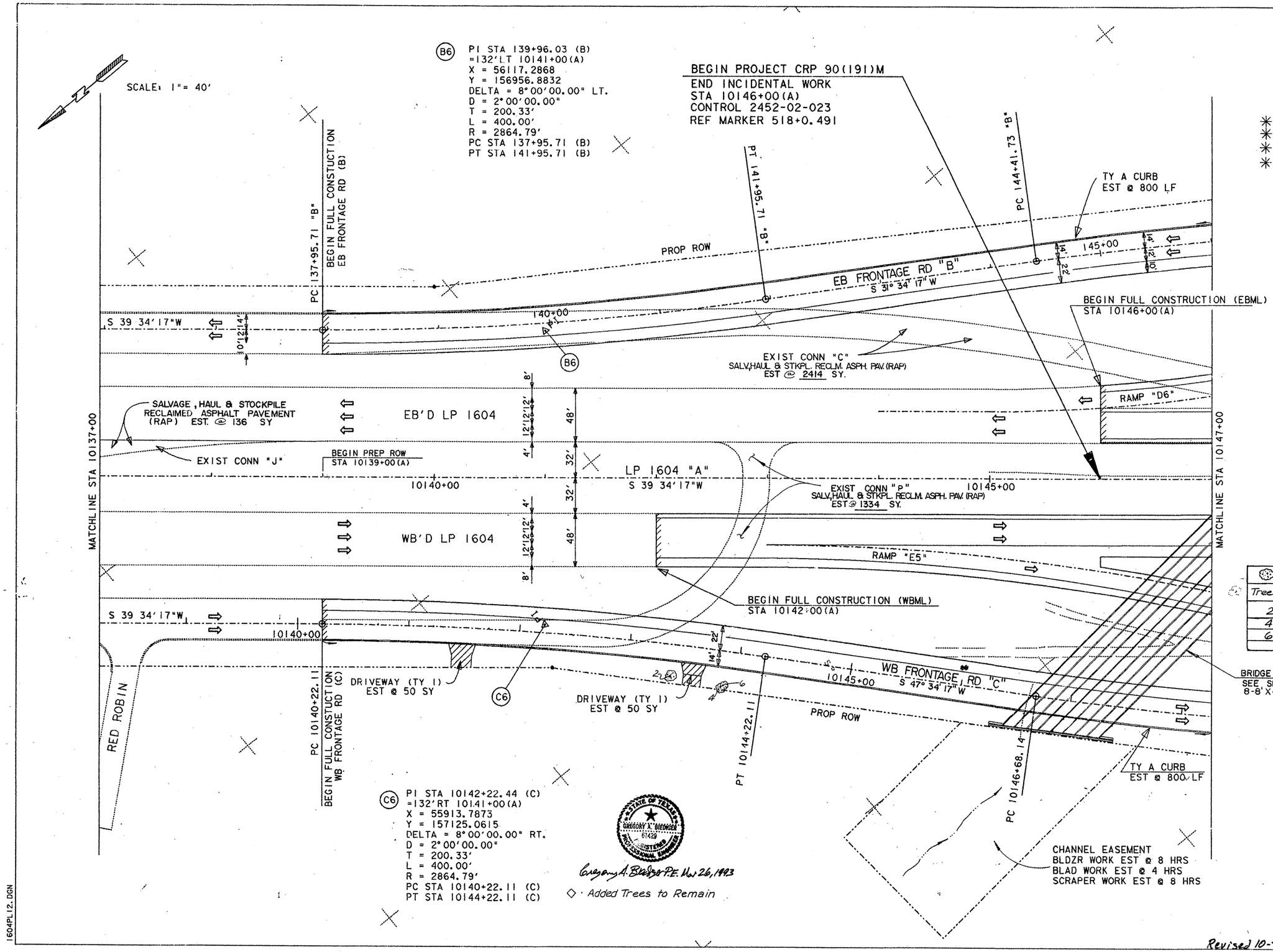
LP 1604
PLAN SHEET

SHEET 1 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					53
STATE DIST NO	COUNTY	CONT.	SECT.	JOB		HWY. NO.
15	BEXAR	7452	02	023		LP1604

ETC.

1604PL11.DGN



ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
PREP ROW	STA	8
FURN & PLAC TPSL	SY	6883
BRDCST SEED (BERMUDA)	SY	6883
FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	1887
✳ ASPH STAB BS (GR 4) (4")	SY	1063
✳ ONE CRSE SURF TREAT	SY	7130
✳ ASPH CONC. (TY C)	SY	7379
✳ ASPH CONC. (TY C) (SURF)	SY	7471
BLAD	HR	4
BLDZER WORK (ORD COMP)	HR	8
SCRAPER WORK	HR	8
MBGF (BLKOUT) (12 GA) (TIM POST)	LF	0
TERM ANCH SECT (12 GA)	EA	0
GUARDRAIL EXTRUDER TERM	EA	0
CONC CURB (TY A)	LF	1600
DRIVEWAY (TY 1)	SY	100
SALV., HAUL AND STOCKPILE ASPHALTIC PAVEMENT (RAP)	SY	3884
PLANING ASPHALTIC SURFACE	SY	270
EXCAVATION	CY	10444
EMBANKMENT (ORD COMP) (TY B)	CY	1588

✳ FOR CONTRACTORS INFORMATION ONLY

FOR RAMP D6 DETAIL
SEE SHEET 132

FOR RAMP E5 DETAIL
SEE SHEET 138

Trees to Remain

Tree No.	Station	Offset	Type	Dia.
2	10143+39 "C"	28' Rt.	Oak	9"
4	10143+85 "C"	32' Rt.	Oak	10"
6	10143+88 "C"	31' Rt.	Oak	9"

BRIDGE CLASS STRUCTURE # 5
SEE SHEET 237
8-8' X 4' MBC

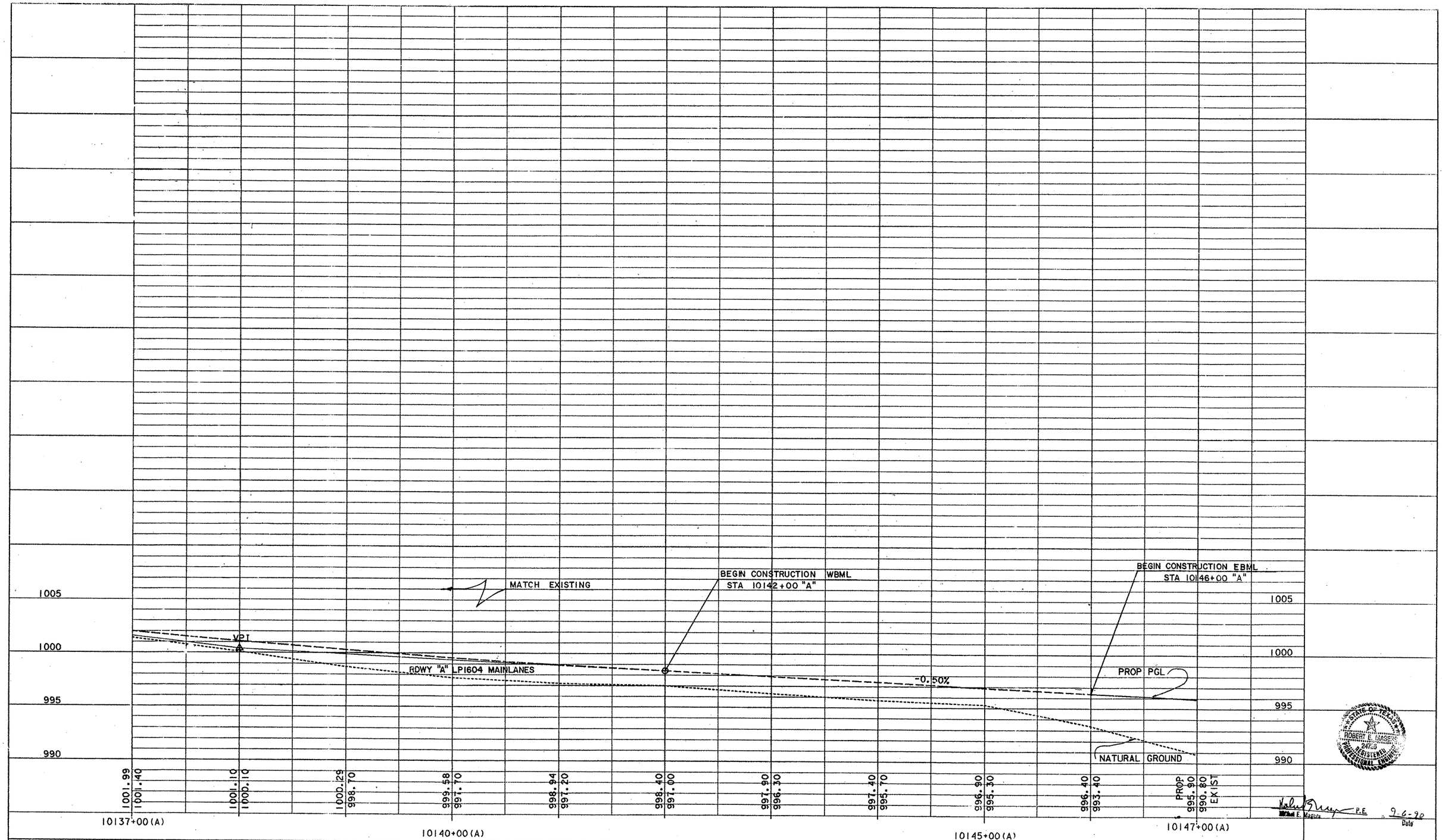
LP 1604
PLAN SHEET

SHEET 2 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					53 A
STATE DIST NO	COUNTY	CONT.	SECT.	JOB		HWY. NO.
15	BEXAR	2452	02	023		LP1604

1604PL12.DGN

, ETC



SCALE: 1"= 40' HORIZ.
1"= 4' VERT.

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			54
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

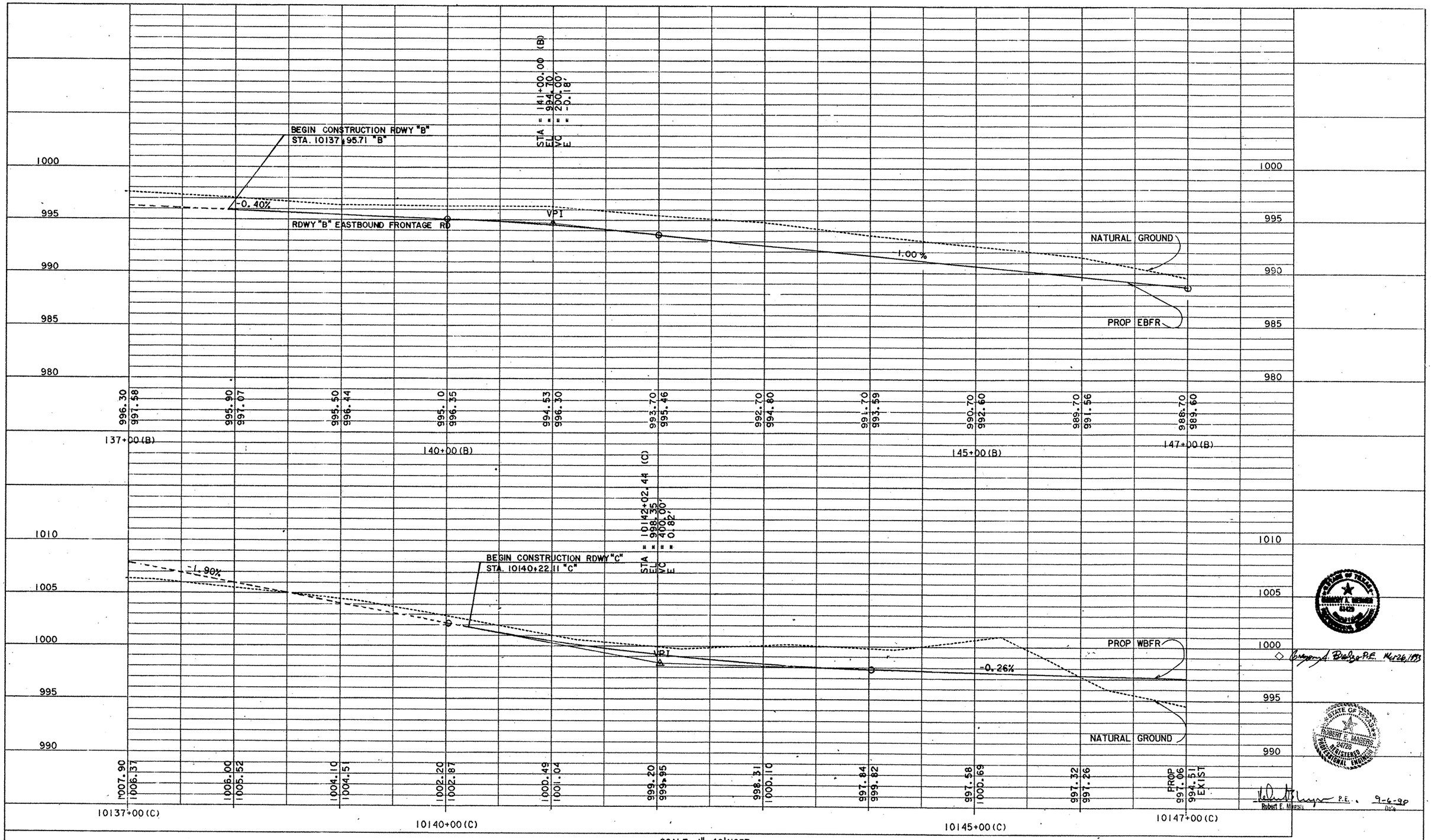
ETC.

STATE OF TEXAS
ROBERT E. MAGERS
24728
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90
Date

1604PRA12.DGN

PROF1



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

◇ · Profile Revised

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		55

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

Robert E. Magers P.E. 9-6-90
Date

1604PRB12.DGN

PROF1

SCALE: 1" = 40'

(B7) PI STA 146+42.06 "B"
=222' LT 10147+40.38 "A"
X = 55778.7124
Y = 156405.9221
DELTA = 8°00'00.00" RT.
D = 2°00'00.00"
T = 200.33'
L = 400.00'
R = 2864.79'
PC STA 144+41.73 "B"
PT STA 148+41.73 "B"

PT 146+41.73 "B"

CHANNEL EASEMENT
BLDZR WORK EST @ 16 HRS
BLAD WORK EST @ 4 HRS
SCRAPER WORK EST @ 8 HRS

BRIDGE CLASS STRUCTURE #5
SEE SHT. 237
8 - 8' X 4' MBC

HAZARDOUS MATERIALS TRAP NO. 1
SEE SHT. 292 F

1000 LF TY A CURB

R.O.W.

S 39 34' 17"W
EB FRONTAGE RD "B"

150+00

155+00

RAMP "D6"

REMOVE OLD STRUCT (LARGE)
3 - 6' X 3' X 108' MC 6-2 (MOD)

EB LP 1604

S 39 34' 17"W
LP 1604 "A"

10150+00

10155+00

WB'D LP 1604

MATCHLINE STA 10147+00

MATCHLINE STA 10157+00

RAMP "E5"

S 39 34' 17"W
WB FRONTAGE RD "C"

10150+00

10155+00

1000 LF TY A CURB

R.O.W.

DRIVEWAY (TY 1)
EST @ 50 SY

PT 10150+68.14

BEGIN TAPER
STA 10156+00 "A" =
STA 10157+27.43 "C"

(C7) PI STA 10148+68.46 "C"
=222' RT 10147+40.38 "A"
X = 55436.4633
Y = 156688.7675
DELTA = 8°00'00.00" LT.
D = 2°00'00.00"
T = 200.33'
L = 400.00'
R = 2864.79'
PC STA 10146+68.14 "C"
PT STA 10150+68.14 "C"

◇ ·Added HMT # 1
·Added Drainage Revisions
·Added Trees to Remain

◇ Gregory A. Biedriger P.E. Mar 26, 1993

Revised 10-7-93

1604PL13.DGN

TREES TO REMAIN

NO.	LOCATION	TYPE	DIA.
10	33.9' RT "C" STA 10148+42.03	CEDAR	11"
12	36.72' RT "C" STA 10148+86.50	CEDAR	16"
14	36.96' RT "C" STA 10149+20.23	CEDAR	12"
16	33.43' RT "C" STA 10149+20.00	OAK	13"
22	22.95' RT "C" STA 10149+62.95	CEDAR	13"
26	27.41' RT "C" STA 10149+96.12	CEDAR	18"
28	36.23' RT "C" STA 10150+03.94	CEDAR	11"
32	23.69' RT "C" STA 10150+35.30	CEDAR	24"
40	36.00' RT "C" STA 10151+28.13	CEDAR	12"
44	22.30' RT "C" STA 10152+04.93	ELM	12"
48	23.0' RT "C" STA 10152+60.33	MESQUITE	10"
62	36.0' RT "C" STA 10154+73.24	CEDAR	10"
72	30.6' RT "C" STA 10156+17.85	CEDAR	10"
76	23.3' RT "C" STA 10156+45.34	CEDAR	16"

ESTIMATED QUANTITIES

	ITEM	UNIT	QTY.
	PREP ROW	STA	10
	BLAD	HR	4
	BLDZR WORK (ORD COMP)	HR	16
	SCRAPER WORK	HR	8
	FURN & PLAC TPSL	SY	33018
	BRDCST SEED (BERMUDA)	SY	33018
	FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	4842
✳	ASPH STAB BS (GR 4) (4")	SY	12076
✳	ONE CRSE SURF TREAT	SY	22305
✳	ASPH CONC (TY C)	SY	21575
✳	ASPH CONC (TY C) (SURF)	SY	20932
	CONC CURB (TY A)	LF	2000
⊛	ROW MARK (TY 11)	EA	2
	MBGF (BLKOUT) (12 GA) (TIM POST)	LF	0
	TERM ANCH SECT (12 GA)	EA	0
	GUARDRAIL EXTRUDER TERM	EA	0
	DRIVEWAY (TY 1)	SY	50
	REMOVE OLD STR (LARGE)	EA	1
	PLANING ASPHALTIC SURFACE	SY	2670
	EXCAVATION	CY	58028
	EMBANKMENT (ORD COMP) (TY B)	CY	16950

✳ FOR CONTRACTORS INFORMATION ONLY

FOR RAMP D6 LAYOUT
SEE SHEET 132

FOR RAMP E5 LAYOUT
SEE SHEET 138

⊛ ROW MARKERS (TY 11)

1	260' LT STA 10148+00 (A)
2	260' RT STA 10148+00 (A)

STATE OF TEXAS
CAROL GREINER LUSCHER
80459
REGISTERED
PROFESSIONAL ENGINEER

Carol H. Luschen P.E. 1-31-92
CAROL GREINER LUSCHER DATE

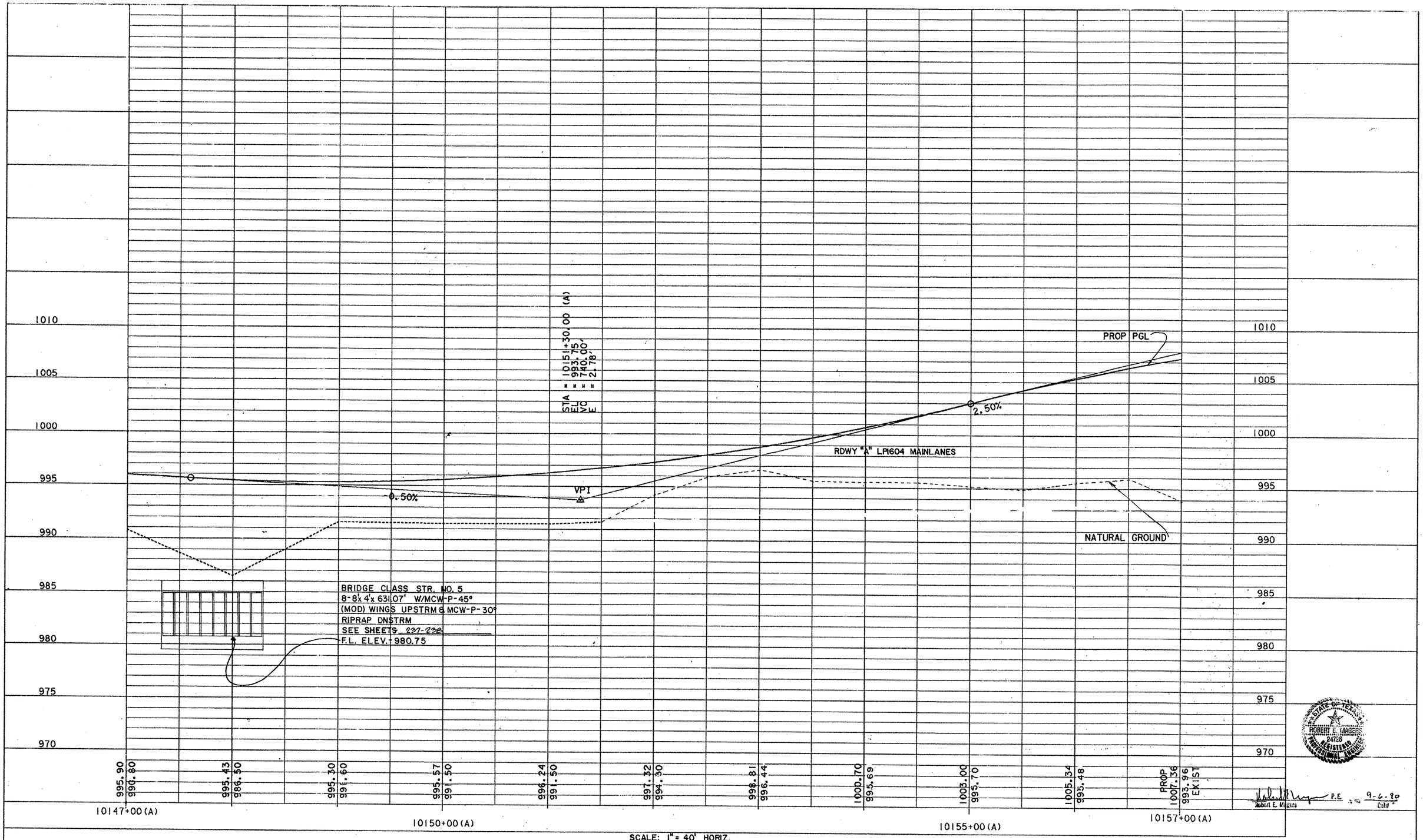
STATE OF TEXAS
GREGORY A. BIEDRIGER
61429
REGISTERED
PROFESSIONAL ENGINEER

LP 1604
PLAN SHEET

SHEET 3 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					56
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY.	
15	BEXAR	2452	02	023	LP1	

ETC



SCALE: 1" = 40' HORIZ.
1" = 4' VERT.

STATE OF TEXAS
ROBERT E. MAGERS
24728
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90
Date

PROFILE SHEET

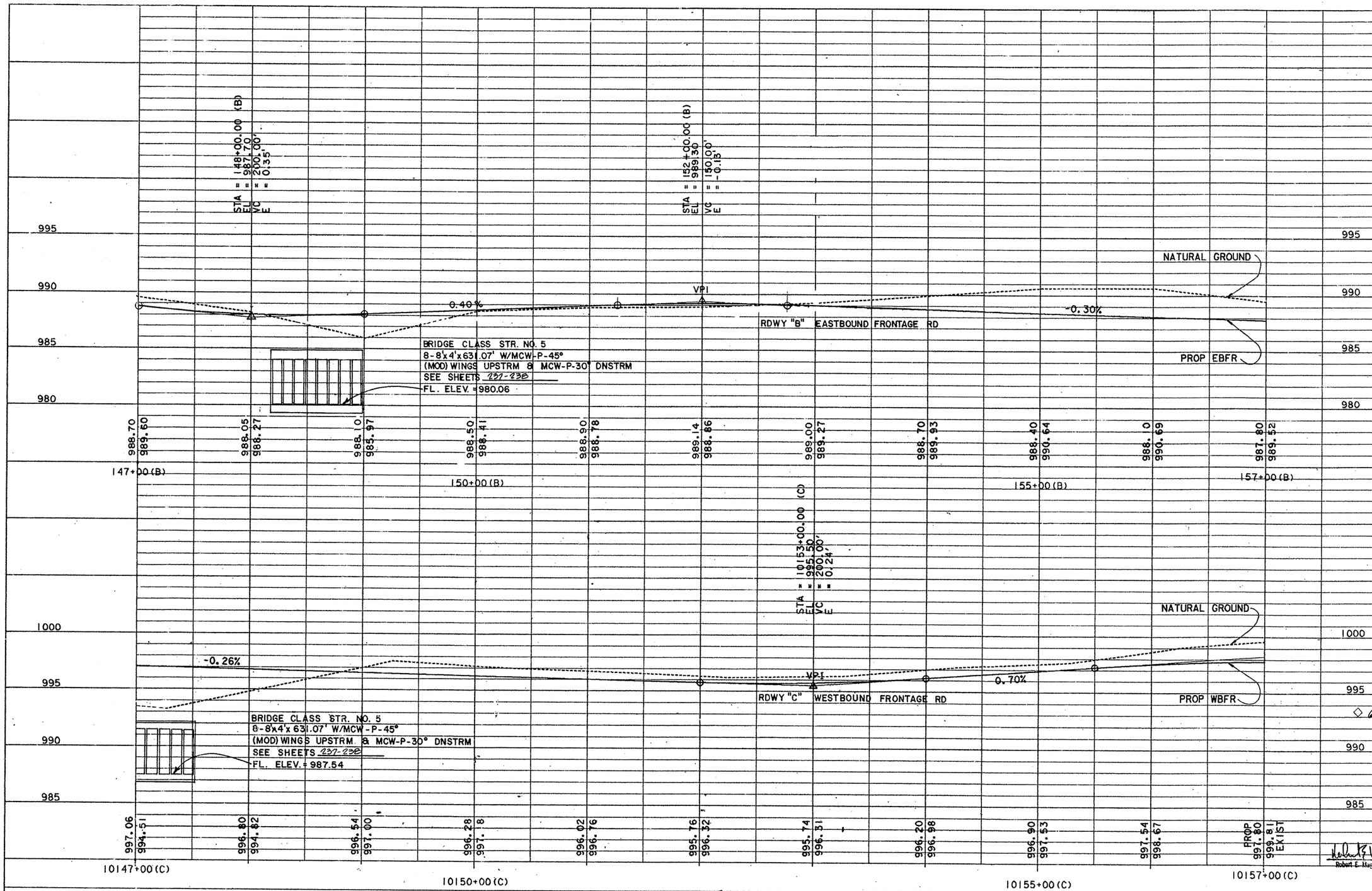
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		57

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA13.DGN

PROF I



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

◇ Profile Revised

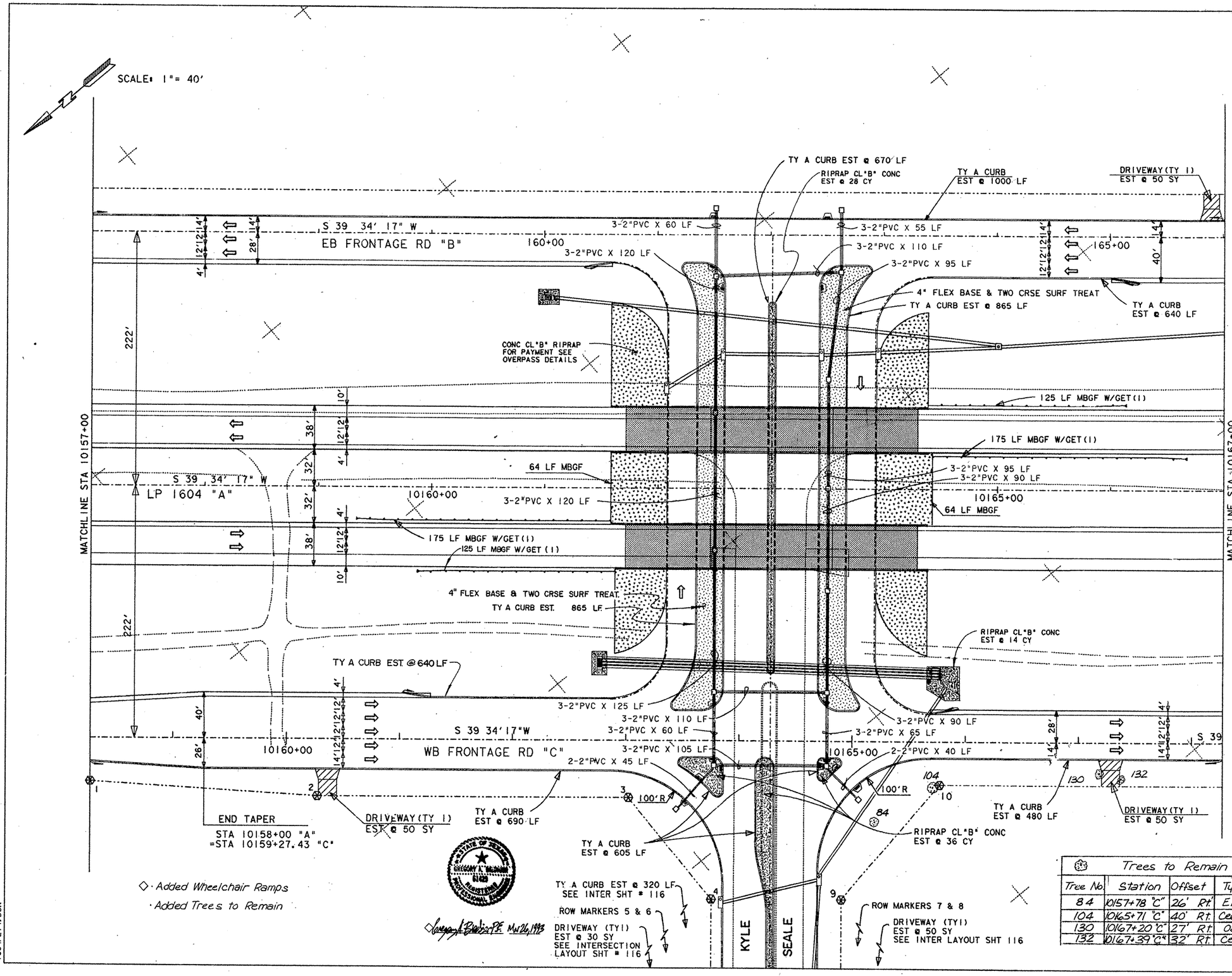
PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			58
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

◇ Gregory A. Bieber P.E. Nov 26, 1993

Robert E. Magers P.E. 9-6-90

1604PRB13.DGN



◇ · Added Wheelchair Ramps

· Added Trees to Remain

ESTIMATED QUANTITIES

	ITEM	UNIT	QTY.
	PREP ROW	STA	10
	FURN & PLAC TPSL	SY	27519
	BRDCST SEED (BERMUDA)	SY	27519
#	FLEX BASE (DEL)(DC) (TY A GR 1 MOD)(CL 3)	CY	4884
✳	ASPH STAB BS(GR 4)(4")	SY	5831
✳	ASPH STAB BS(GR 4)(8")	SY	8514
#✳	ONE CRSE SURF TREAT	SY	31656
✳	ASPH CONC (TY C)	SY	26653
✳	ASPH CONC (TY C)(SURF)	SY	25010
	CONC CURB (TY A)	LF	6455
⊗	ROW MARK (TY11)	EA	10
	MBGF (12 GA)(TIM POST)	LF	728
	GUARDRAIL EXTRUDER TERM	EA	4
	DRIVEWAY (TY 1)	SY	150
	RIPRAP CL"B" CONC	CY	87
	2" PVC (SCH 80)	LF	4070
	PULL BOX	EA	15
	PLANING ASPHALTIC SURFACE	SY	2670
	EXCAVATION	CY	40129
	EMBANKMENT (ORD COMP)(TY B)	CY	88037

✳ FOR CONTRACTORS INFORMATION ONLY

INCLUDES QUANTITIES FOR TRAFFIC ISLANDS W/ FLEX BASE & TWO CRSE SURF TREAT

KYLE SEALE INTERSECTION & TURNAROUND LAYOUT SEE SHEET 116

KYLE SEALE OVERPASS DETAILS SEE SHEETS 149 & 151

□ DENOTES PULL BOX

WHEELCHAIR RAMP; EST. @ .5 CY EA. RIPRAP (CONC)(CL B) FOR DETAILS, SEE SHT # 147

⊗ ROW MARKERS (TY 11)

1	260' RT STA 10157+00.00(A)
2	272' RT STA 10159+00.00(A)
3	272' RT STA 10161+75.00(A)
4	51.85'RT STA 4+23.75(KYLE SEALE)
5	51.50'RT STA 5+25.34(KYLE SEALE)
6	43.00'RT STA 7+00.00(KYLE SEALE)
7	43.00'LT STA 6+96.54(KYLE SEALE)
8	63.55'LT STA 5+25.12(KYLE SEALE)
9	63.15'LT STA 4+23.75(KYLE SEALE)
10	149.65'LT STA 3+23.75(KYLE SEALE)

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

Trees to Remain

Tree No.	Station	Offset	Type	Dia
84	10157+78 "C"	26' Rt	Elm	10"
104	10165+71 "C"	40' Rt	Cedar	12"
130	10167+20 "C"	27' Rt	Oak	9"
132	10167+39 "C"	32' Rt	Cedar	10"

STATE OF TEXAS
GREGORY A. McADAMS
61423
REGISTERED
PROFESSIONAL ENGINEER

Gregory A. McAdams P.E. Mar 26, 1993

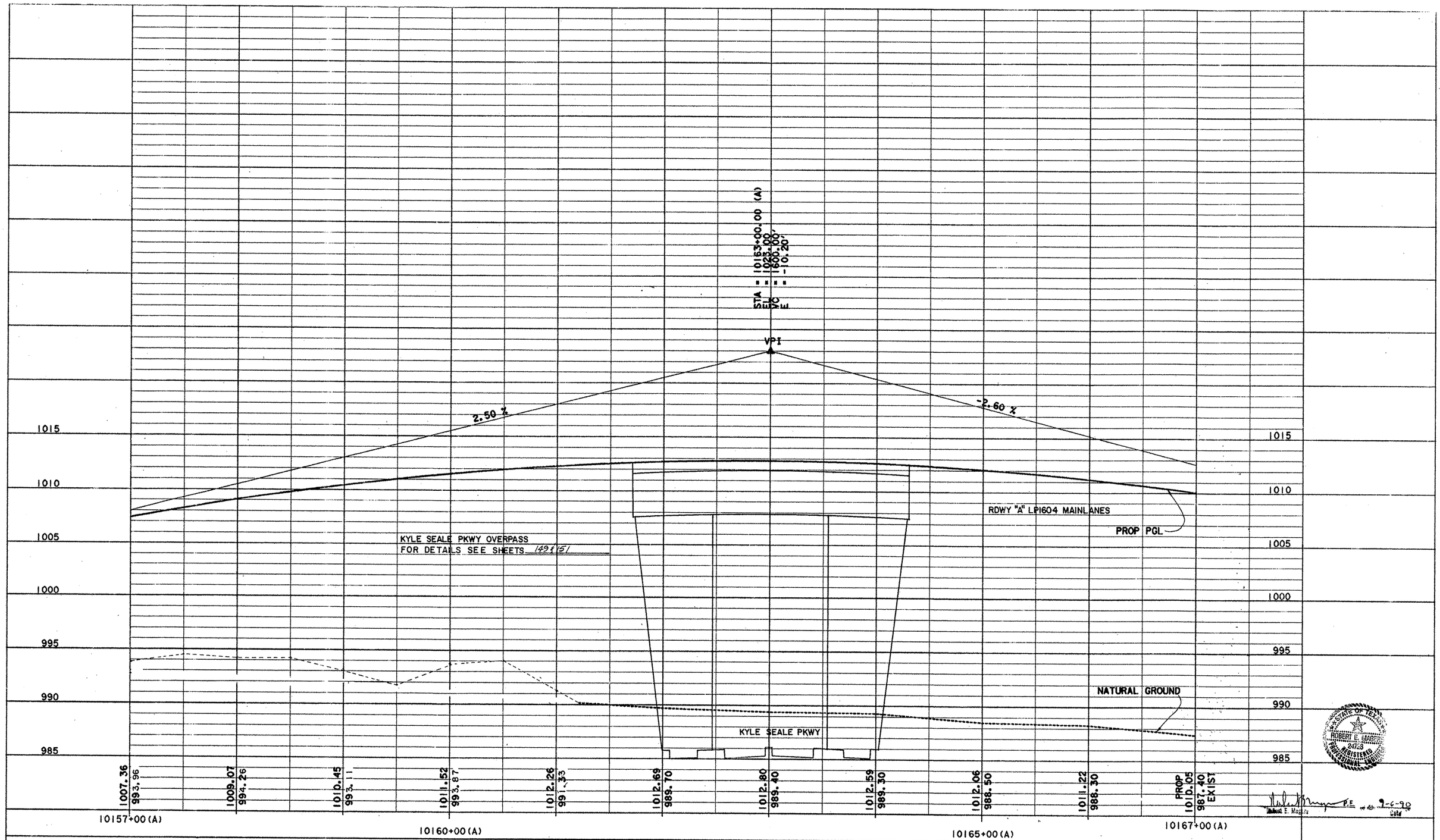
LP 1604
PLAN SHEET

SHEET 4 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					59
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY.	
15	BEXAR	2452	02	023	LP1604	

Revised 10-7-93

1604PL14.DGN



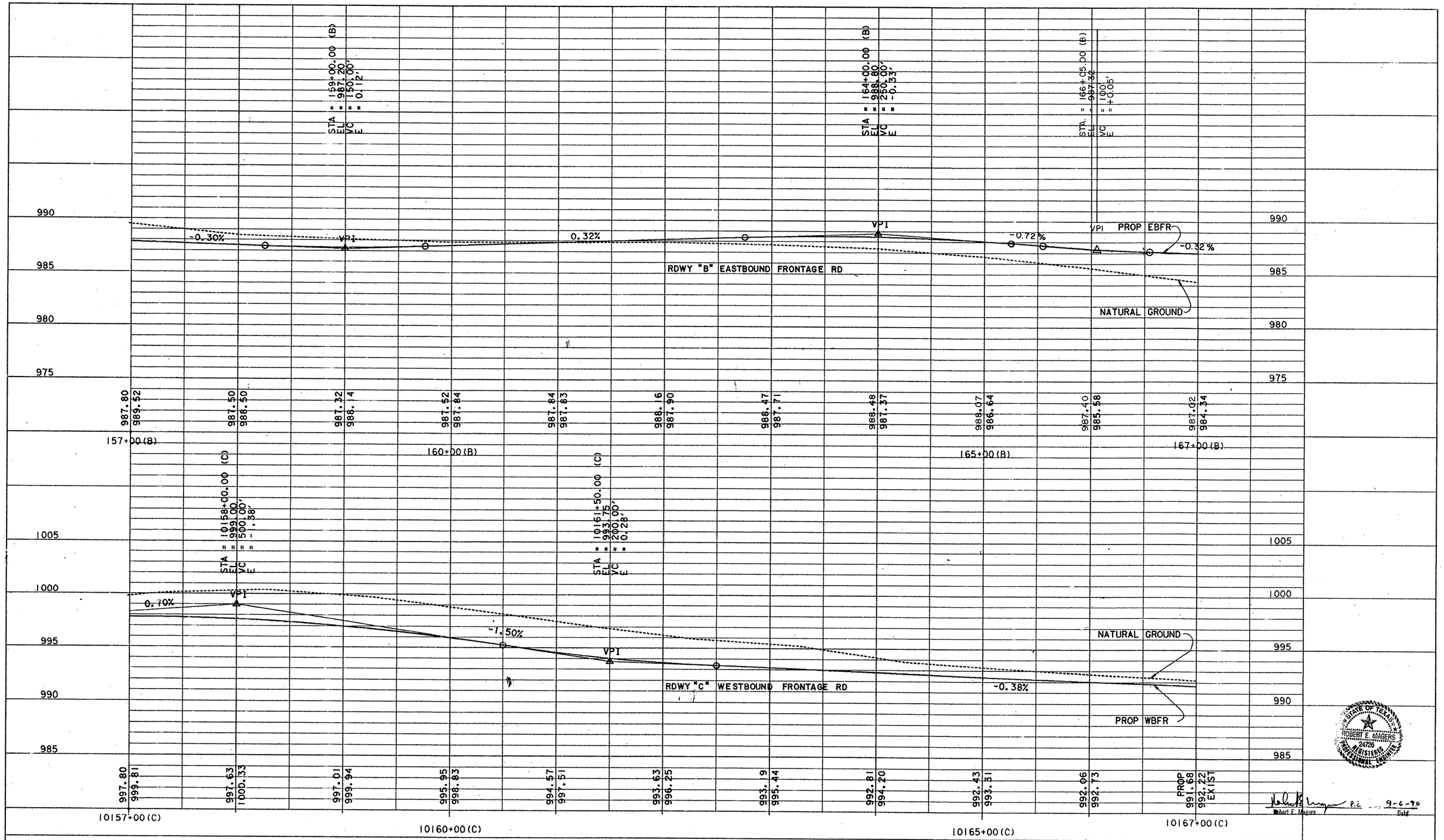
SCALE: 1" = 40' HORIZ.
1" = 4' VERT.

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			60
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA14.DGN

PROF I



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

PROFILE SHEET

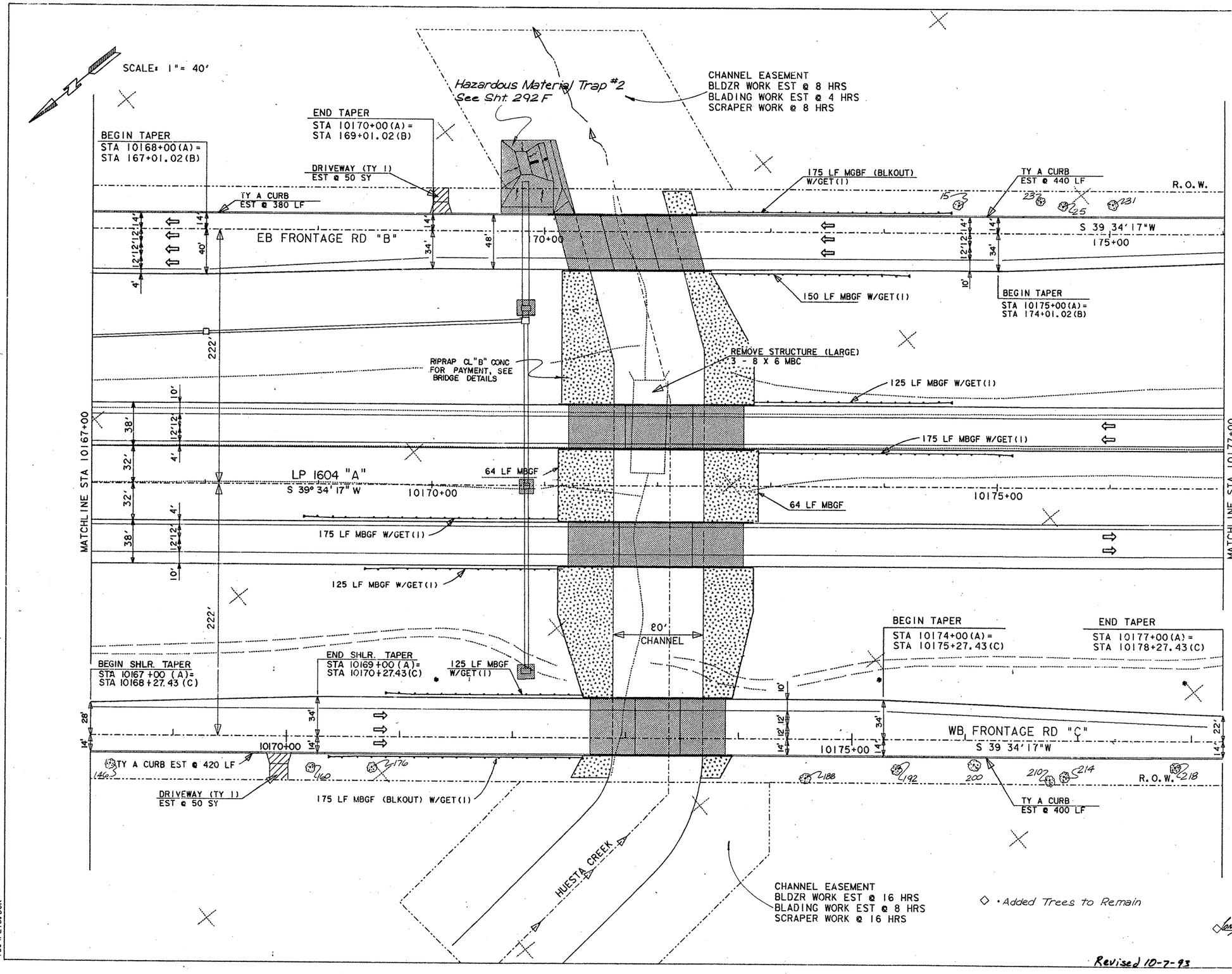
STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90
Robert E. Magers Date

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		61

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRB14.DGN



ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
PREP ROW	STA	10
BLAD	HR	12
BLDZR WORK (ORD COMP)	HR	24
SCRAPER WORK	HR	24
FURN & PLAC TPSL	SY	31571
BRDCST SEED (BERMUDA)	SY	31571
FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	4001
✳ ASPH STAB BS (GR 4) (4")	SY	7334
✳ ONE CRSE SURF TREAT	SY	17379
✳ ASPH CONC (TY C)	SY	16820
✳ ASPH CONC (TY C) (SURF)	SY	16300
CONC CURB (TY A)	LF	1640
MBGF (12 GA) (TIM POST)	LF	1003
MBGF (BLKOUT) (12 GA) (TIM POST)	LF	350
PLANING ASPHALTIC SURFACE	SY	2670
GUARDRAIL EXTRUDER TERM	EA	8
DRIVEWAY (TY 1)	SY	100
REMOVE OLD STR (LARGE)	EA	1
EXCAVATION	CY	14706
EMBANKMENT (ORD COMP) (TY B)	CY	75381

✳ FOR CONTRACTORS INFORMATION ONLY

HUESTA CREEK MAINLANE BRIDGE
DETAILS SEE SHEETS 158 & 160

HUESTA CREEK EB FRONTAGE RD
BRIDGE DETAILS SEE SHEETS 166

HUESTA CREEK WB FRONTAGE RD
BRIDGE DETAILS SEE SHEETS 171

◇ Trees to Remain

Tree No.	Station	Offset	Type	Dia.
146	10168+45 "C"	24' Rt.	Cedar	12"
160	10170+21 "C"	27' Rt.	Cedar	10"
176	10170+75 "C"	26' Rt.	Cedar	11"
188	10174+60 "C"	34' Rt.	Oak	10"
192	10175+39 "C"	26' Rt.	Oak	9"
200	10176+09 "C"	21' Rt.	Cedar	18"
210	10176+22 "C"	34' Rt.	Cedar	14"
214	10176+88 "C"	31' Rt.	Oak	10"
218	10177+86 "C"	23' Rt.	Elm	12"
15	173+66 "B"	24' Lt.	Cedar	12"
23	174+38 "B"	28' Lt.	Oak	10"
25	174+57 "B"	24' Lt.	Oak	9"
31	175+02 "B"	25' Lt.	Mesquite	10"

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
PROFESSIONAL ENGINEER

Carol H. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

STATE OF TEXAS
GREGORY A. MEYNEN
81421

Gregory A. Meynen P.E. Mar 26, 1993

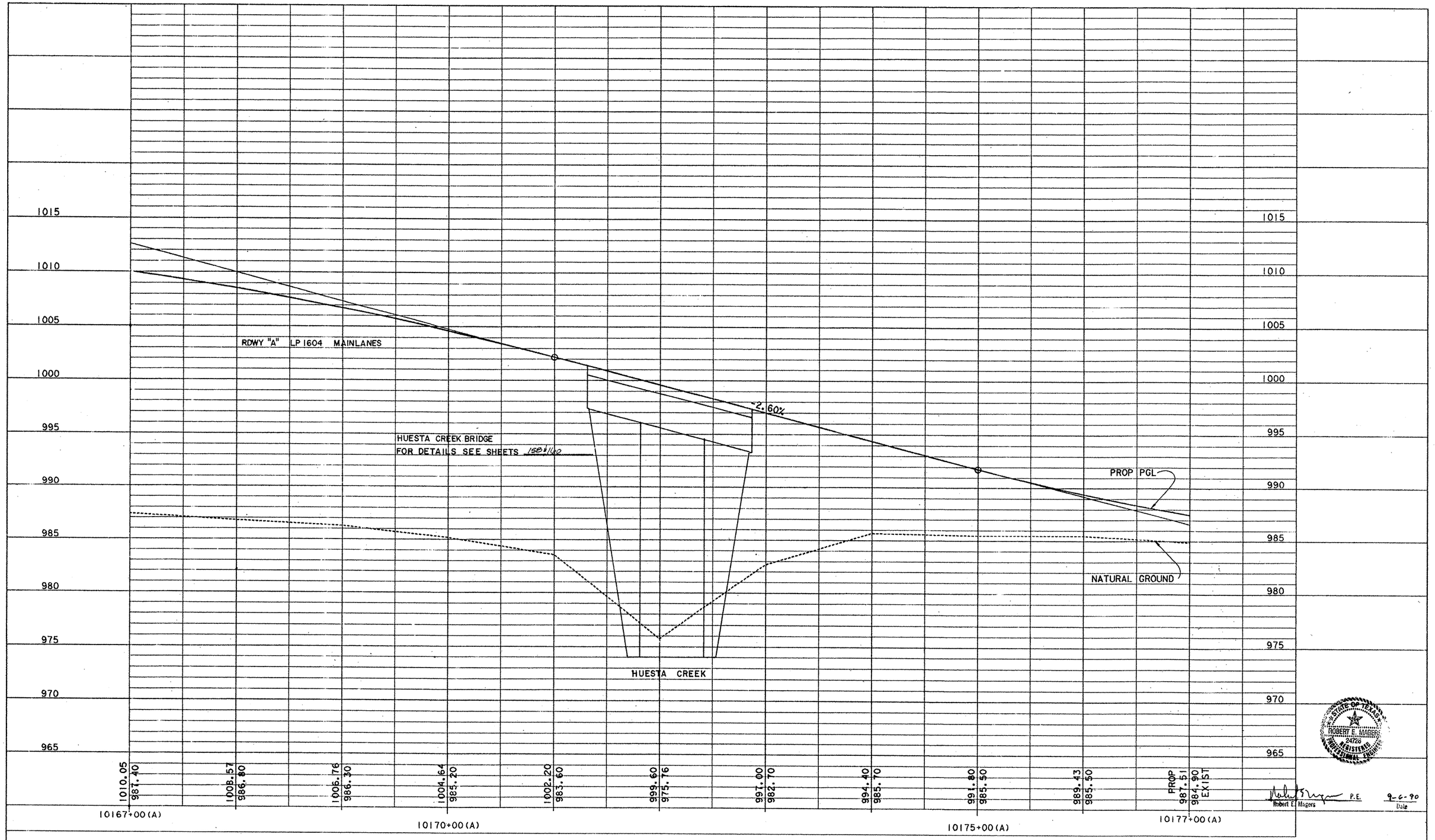
LP 1604
PLAN SHEET
SHEET 5 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					62
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP1604	

Revised 10-7-93

1604PL15.DGN

, ETC



STATE OF TEXAS
ROBERT E. MAGERS
24720
REGISTERED
PROFESSIONAL ENGINEER

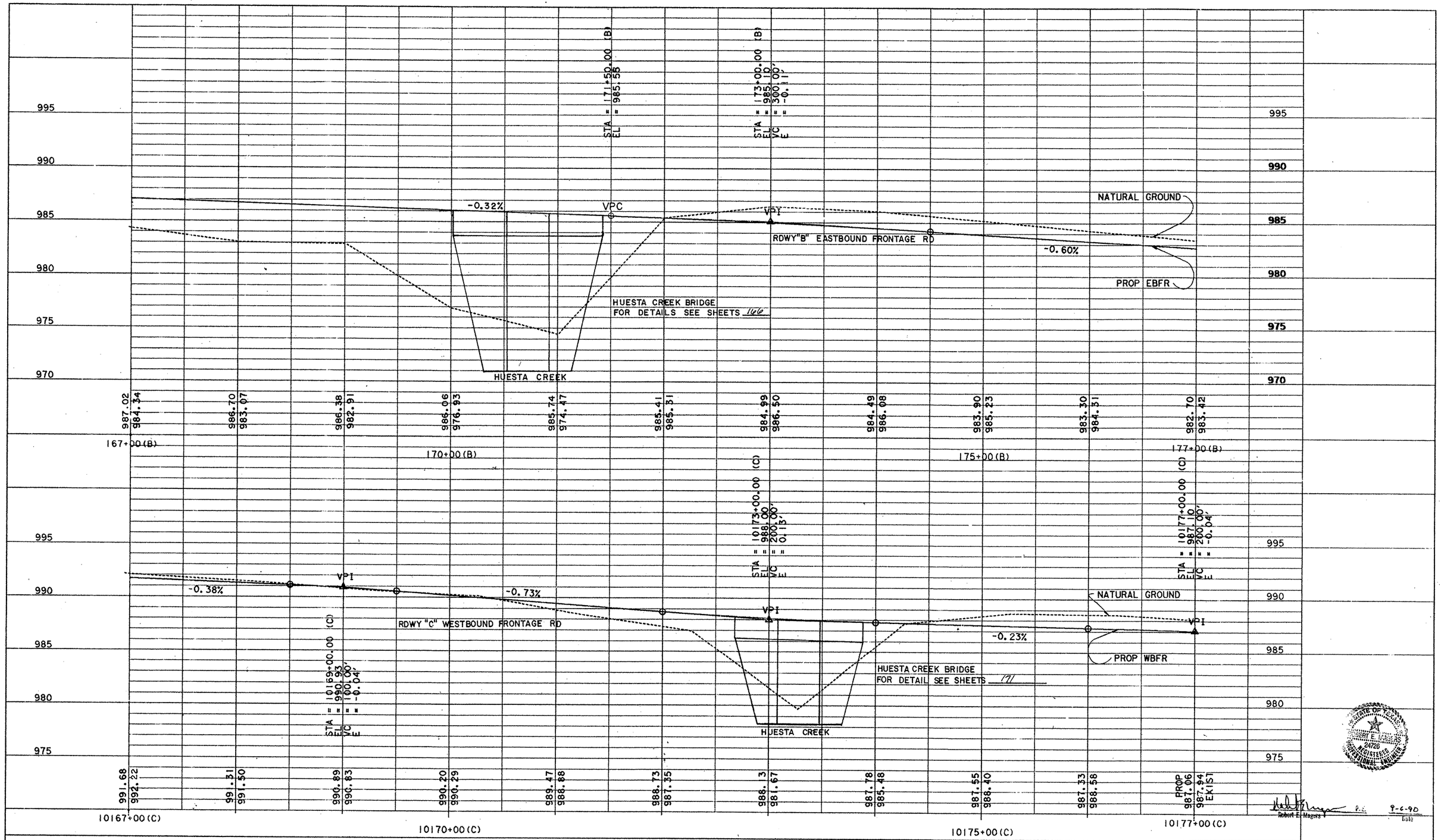
Robert E. Magers P.E. 9-6-90
Robert E. Magers Date

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			63
STATE	STATE DIST. NO.	COUNTY	
TEXAS	13	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA15.DGN

PROF1



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

Robert E. Magers 9-6-90
Date

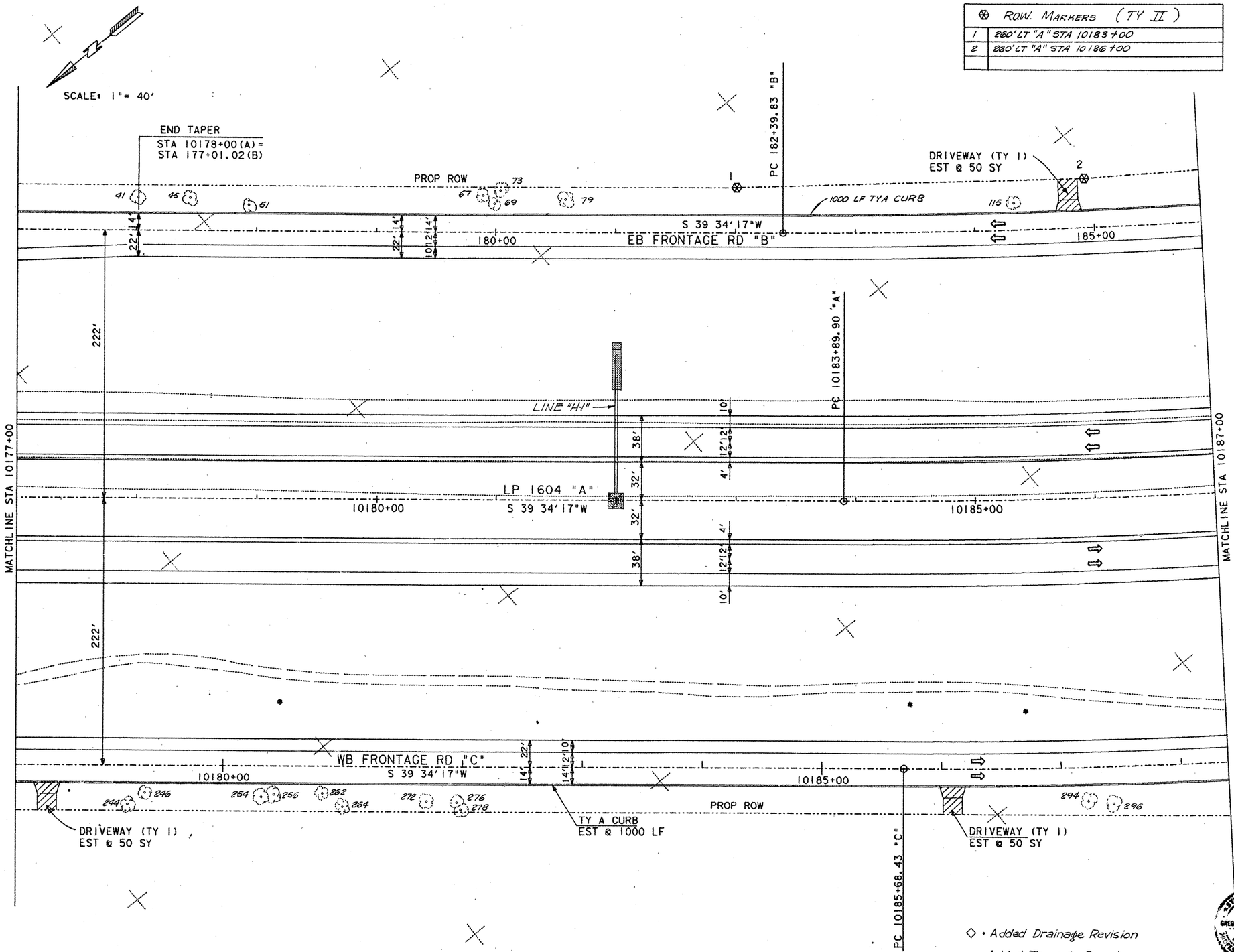
PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		G4

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRB15.DGN



⊛ ROW MARKERS (TY II)	
1	260' LT "A" STA 10183+00
2	260' LT "A" STA 10186+00

ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
PREP ROW	STA	10
FURN & PLAC TPSL	SY	37822
BRDCST SEED (BERMUDA)	SY	37822
FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	3944
✳ ASPH STAB BS (GR 4) (4")	SY	6223
✳ ONE CRSE SURF TREAT	SY	17723
✳ ASPH CONC (TY C)	SY	17057
✳ ASPH CONC (TY C) (SURF)	SY	16445
CONC CURB (TY A)	LF	2000
⊛ ROW MARK (TY II)	EA	2
DRIVEWAY (TY I)	SY	150
PLANING ASPHALTIC SURF	SY	2670
EXCAVATION	CY	46487
EMBANKMENT (ORD COMP) (TY B)	CY	4249

✳ FOR CONTRACTORS INFORMATION ONLY

TREES TO REMAIN

NO.	LOCATION	TYPE	DIA.
41	27.4' LT "B" STA 177+00.39	ELM	9"
45	27.5' LT "B" STA 177+44.19	OAK	9"
51	21.0' LT "B" STA 177+93.09	OAK	5-14"
67	31.0' LT "B" STA 179+88.30	OAK	9"
69	24.0' LT "B" STA 179+97.80	OAK	10"
73	35.0' LT "B" STA 180+02.99	OAK	9"
79	28.0' LT "B" STA 180+56.69	MESQUITE	10"
115	23.2' LT "B" STA 184+31.81	CEDAR	12"
244	33.0' RT "C" STA 10179+21.26	CEDAR	11"
246	23.0' RT "C" STA 10179+35.56	MESQUITE	10"
254	26.0' RT "C" STA 10180+32.17	CEDAR	12"
256	24.0' RT "C" STA 10180+42.82	OAK	9"
262	23.0' RT "C" STA 10180+83.32	OAK	9"
264	34.5' RT "C" STA 10181+00.02	OAK	14"
272	29.0' RT "C" STA 10181+70.42	CEDAR	10"
276	30.0' RT "C" STA 10181+95.95	OAK	16"
278	36.0' RT "C" STA 10181+99.32	OAK	14"
294	28.09' RT "C" STA 10187+22.98	OAK	13"
296	30.71' RT "C" STA 10187+44.24	OAK	12"

◇ • Added Drainage Revision
• Added Trees to Remain

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

Gregory A. Bledsoe P.E. Mar 26, 1993

Revised 10-7-93

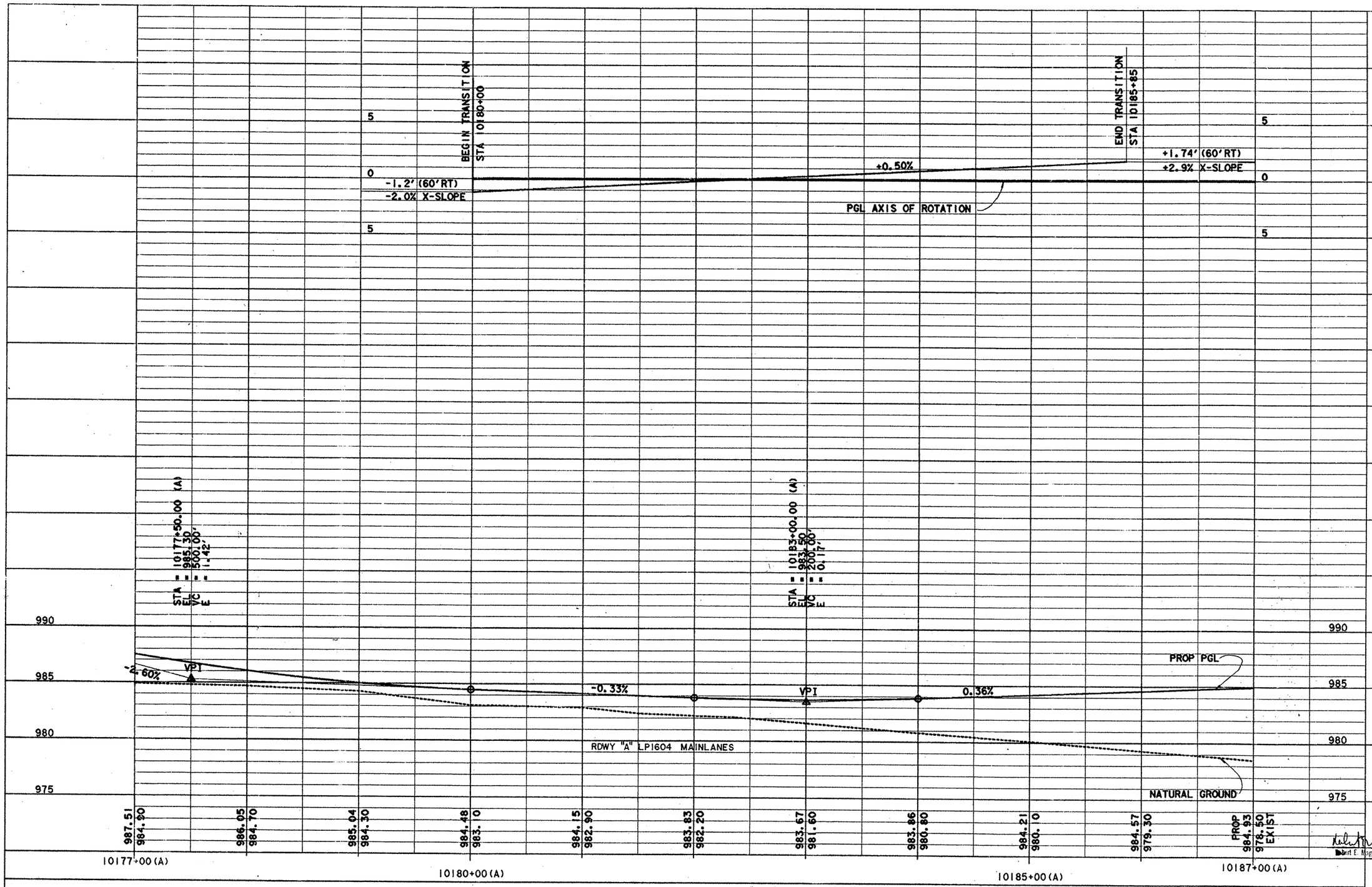
LP 1604
PLAN SHEET

SHEET 6 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					65
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY.	
15	BEXAR	2452	02	023	LP16	

, ETC

1604PL16.DGN



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

PROFILE SHEET

STATE OF TEXAS
ROBERT E. MAGERS
24720
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90
Date

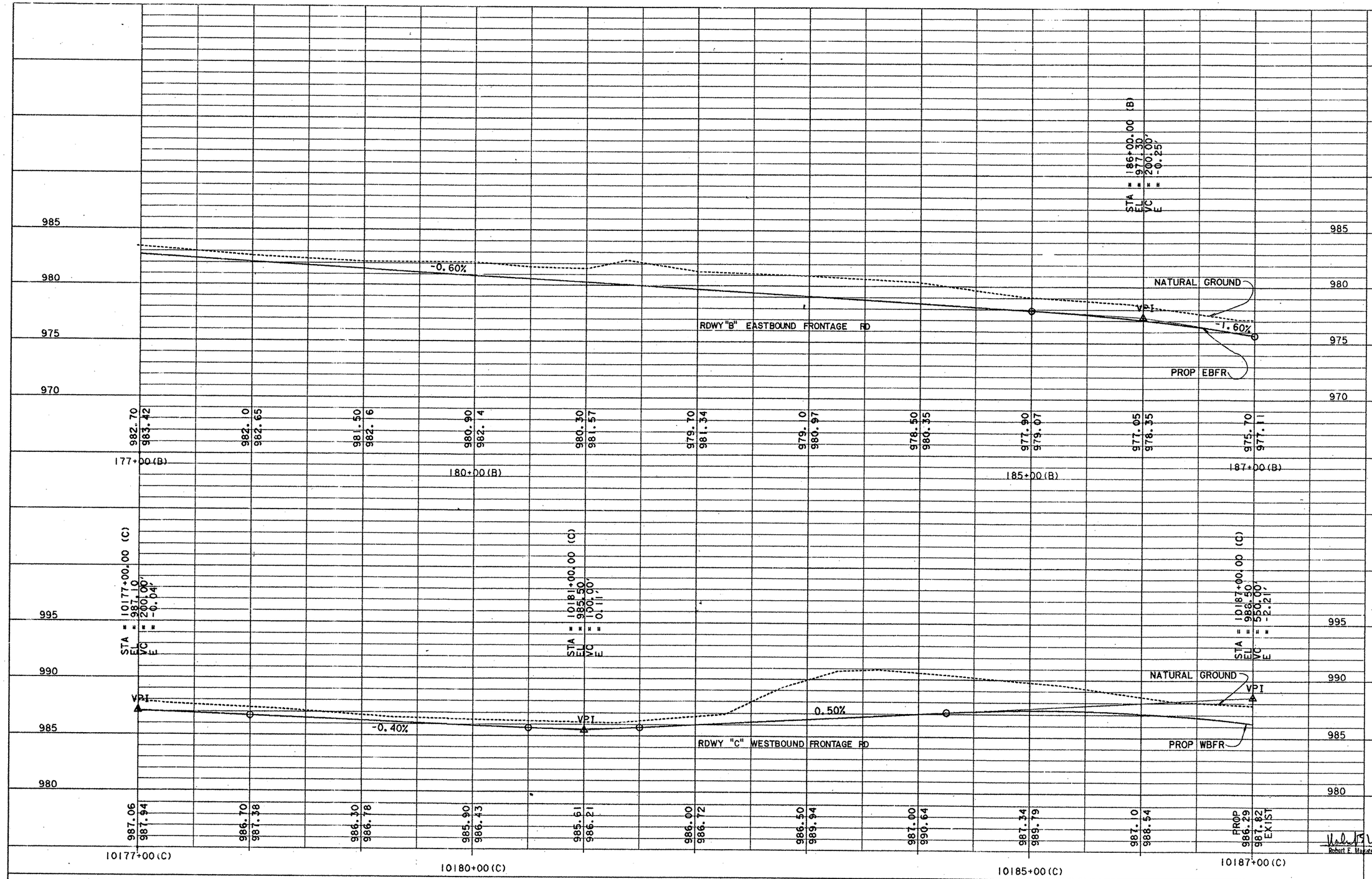
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		66

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA16. DGN

PROF I



STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers 9-6-90
Date

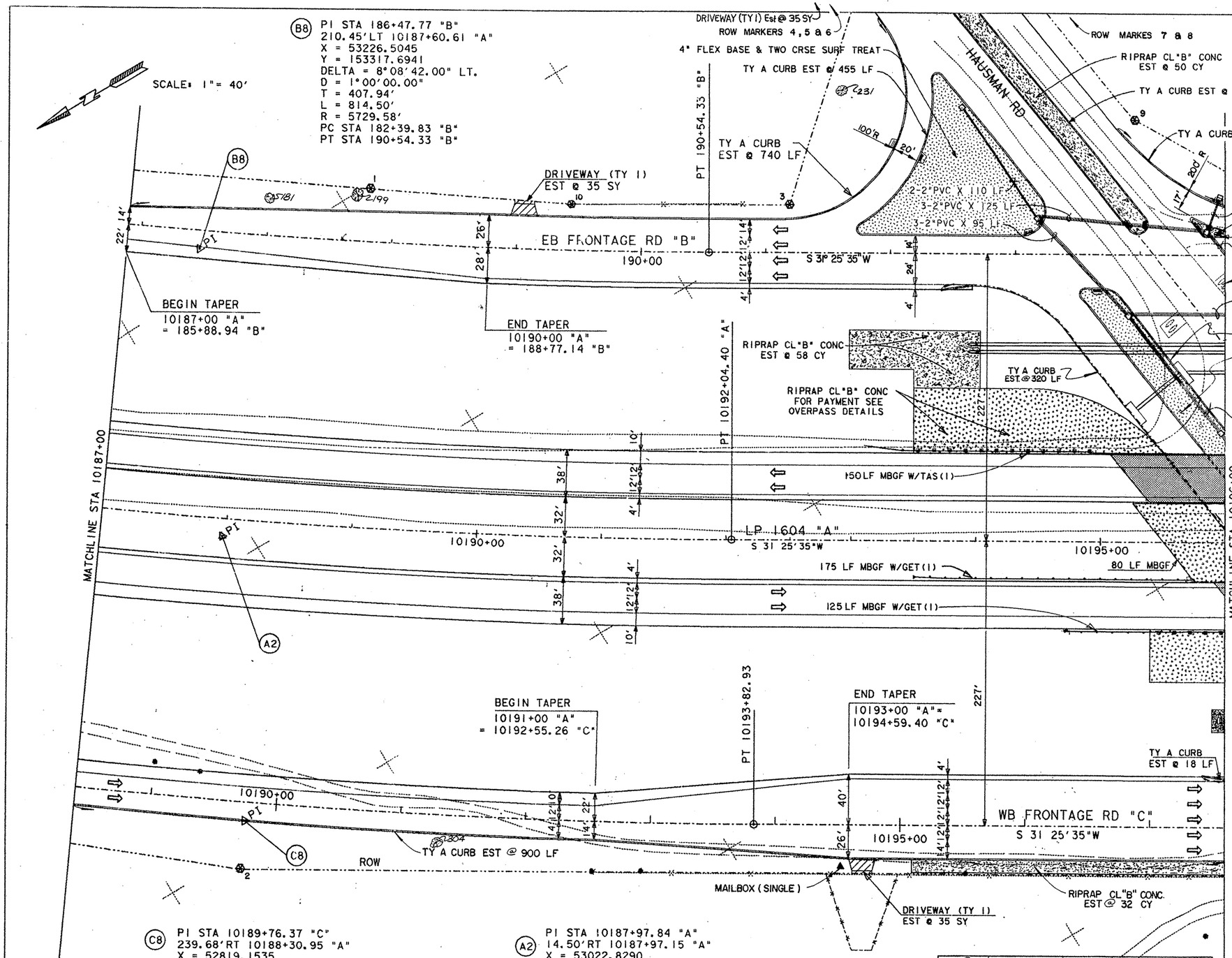
SCALE: 1" = 40' HORZ.
1" = 4' VERT.

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		67

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRB16.DGN



ESTIMATED QUANTITIES

	ITEM	UNIT	QTY.
	PREP ROW	STA	9
	FURN & PLAC TPSL	SY	29002
	BRDCST SEED (BERMUDA)	SY	29002
#	FLEX BASE (DEL)(DC) (TY A GR 1 MOD)(CL 3)	CY	4315
✳	ASPH STAB BS(GR 4)(4")	SY	6218
# ✳	ONE CRSE SURF TREAT	SY	40136
✳	ASPH CONC(TY C)	SY	38502
✳	ASPH CONC(TY C)(SURF)	SY	37783
	CONC CURB (TY A)	LF	3592
⊛	ROW MARK (TY II)	EA	10
	MBGF (12 GA)(TIM POST)	LF	530
	TERM ANCH SECT (12 GA)	EA	1
	GUARDRAIL EXTRUDER TERM	EA	2
	DRIVEWAY (TY I)	SY	105
	RIPRAP CL"B" CONC	CY	148.5
	ASPH STAB BS (GR 4)(8")	SY	20846
	PULL BOX	EA	6
	2" PVC (SCH 80)	LF	1575
	MAILBOX (SINGLE)	EA	1
	PLANING ASPHALTIC SURF	SY	2400
	EXCAVATION	CY	24993
	EMBANKMENT (ORD COMP)(TY B)	CY	72684

✳ FOR CONTRACTORS INFORMATION ONLY

INCLUDES QUANTITIES FOR TRAFFIC ISLANDS W/4" FLEX BASE & TWO CRSE SURF TREAT

** SUBSIDIARY TO VARIOUS BID ITEMS

NOTE: HAUSMAN RD INTERSECTION & TURNAROUNDS LAYOUT SEE SHEETS 118-119

HAUSMAN RD OVERPASS DETAILS SEE SHEETS 178-179 & 181-182

□ DENOTES PULL BOXES

WHEELCHAIR RAMP EST. .5 CY EA. RIPRAP (CONC)(CL B) FOR DETAILS, SEE SHT #147

⊛ ROW MARKERS (TY II)

1	268'LT STA 10189+00(A)
2	277.77'RT STA 10188+30.72(A)
3	265'LT STA 10192+50(A)
4	62.84'RT STA 94+00.85(HAUSMAN)
5	62.77'RT STA 92+00.00(HAUSMAN)
6	39.24'RT STA 91+00.00(HAUSMAN)
7	40.07'LT STA 91+46.14(HAUSMAN)
8	55.00'LT STA 93+00.00(HAUSMAN)
9	55.00'LT STA 96+12.26(HAUSMAN)
10	263.45' Lt. Sta. 10190+68.12 (A)

Trees to Remain

Tree No.	Station	Offset	Type	Dia.
304	10191+29 "C"	21' Rt.	Oak	28"
181	187+01 "B"	29' Lt.	Oak	3-10"
199	187+71 "B"	36' Lt.	Oak	10"
231	191+61 "B"	130' Lt.	Mesquite	11"

◇ Added Trees to Remain

STATE OF TEXAS GREGORY K. BUSHNELL 61429 REGISTERED PROFESSIONAL ENGINEER

Gregory K. Bushnell P.E. Mar 26, 1993

STATE OF TEXAS CAROL GREINER LUSCHEN 68459 REGISTERED PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

LP 1604
PLAN SHEET

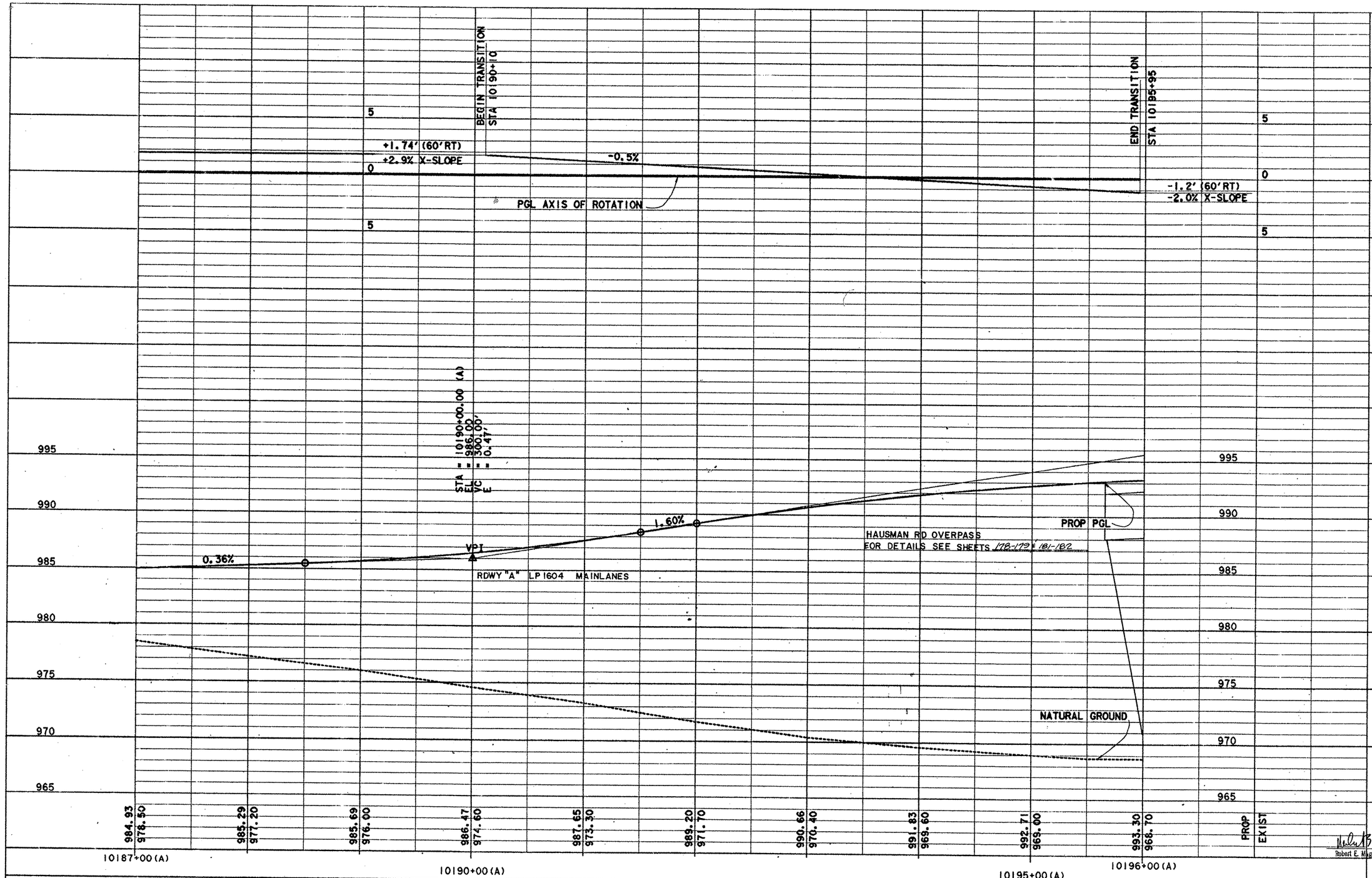
SHEET 7 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					68
STATE DIST NO	COUNTY	CONT.	SECT.	JOB		HWY. NO
15	BEXAR	2452	02	023		LP160

ETC.

Revised 10-7-93

1604PL17.DGN



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers T.L.
Robert E. Magers

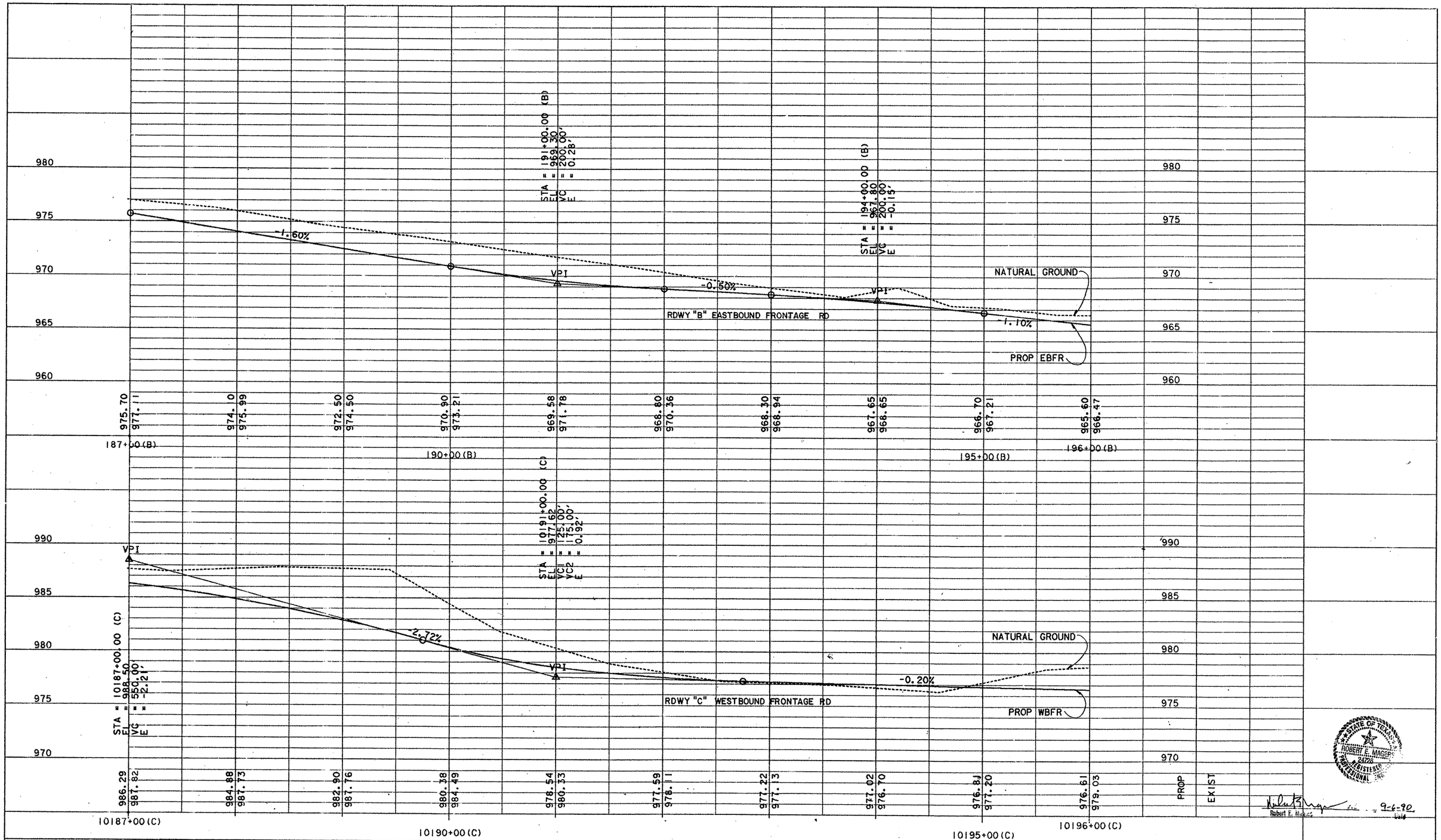
9-6-90
Date

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			69
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA17.DGN

PROFI



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

PROFILE SHEET

STATE OF TEXAS
ROBERT E. MAGEE
24720
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magee 9-6-90
Date

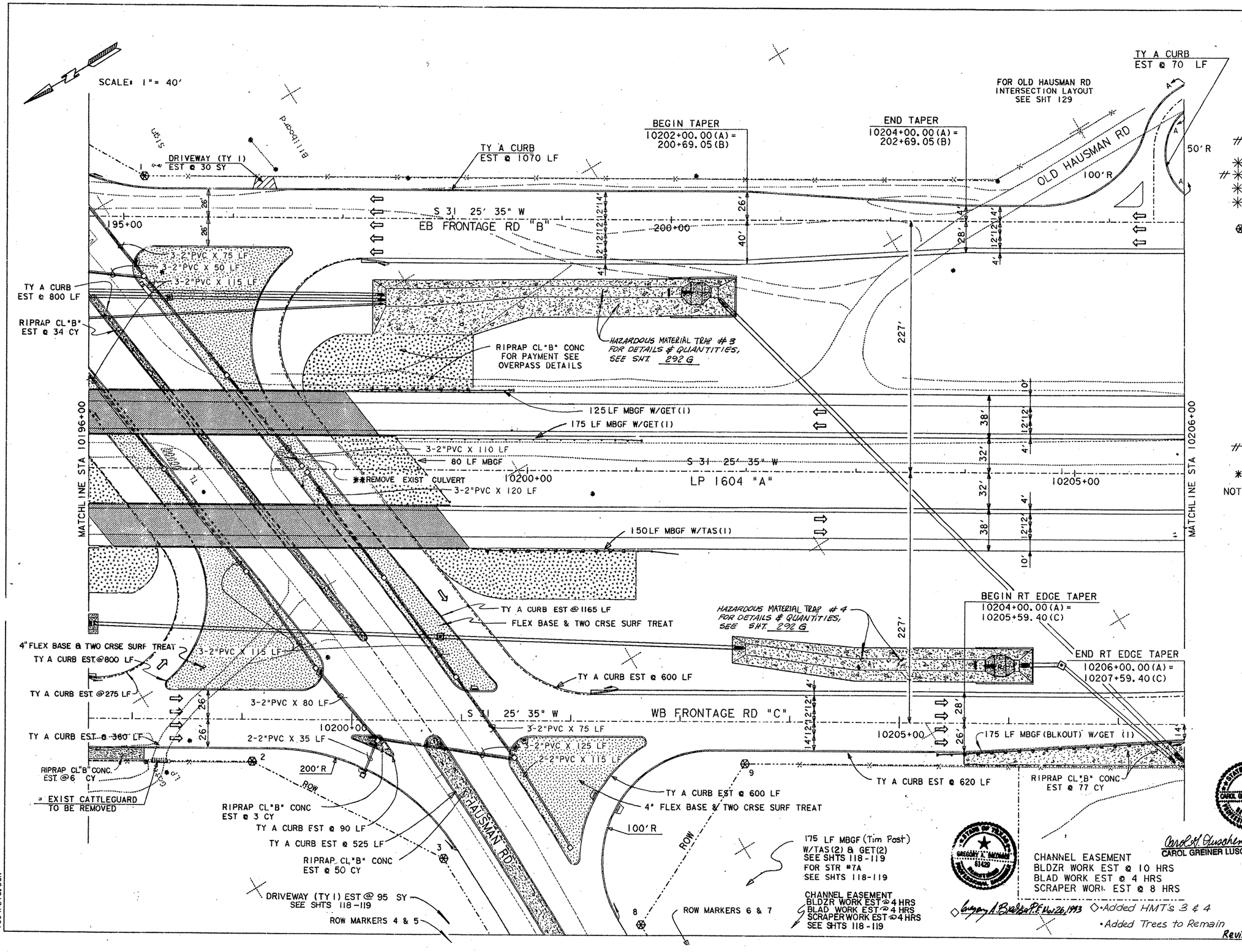
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		70

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRB17.DGN

PROF1



ESTIMATED QUANTITIES

	ITEM	UNIT	QTY.
	PREP ROW	STA	10
	BLAD	HR	8
	BLDZR WORK (ORD COMP)	HR	14
	SCRAPER WORK	HR	12
	FURN & PLAC TPSL	SY	22560
	BRDCST SEED (BERMUDA)	SY	22560
#	FLEX BASE (DEL)(DC) (TY A GR 1 MOD)(CL 3)	CY	3487
✳	ASPH STAB BS(GR 4)(4")	SY	6333
#✳	ONE CRSE SURF TREAT	SY	14292
✳	ASPH CONC(TY C)	SY	13841
✳	ASPH CONC(TY C)(SURF)	SY	13406
	CONC CURB (TY A)	LF	6975
⊗	ROW MARK (TY II)	EA	9
	MBGF (12 GA)(TIM POST)	LF	705
	TERM ANCH SECT (12 GA)	EA	3
	GUARDRAIL EXTRUDER TERM	EA	4
	MBGF (BLKOUT) (12 GA)(TIM POST)	LF	175
	DRIVEWAY (TY 1)	SY	30
	RIPRAP CL"B" CONC	CY	176.5
	PLANING ASPHALTIC SURFACE	SY	2670
	PULL BOX	EA	13
	2" PVC (SCH 80)	LF	4305
	EXCAVATION	CY	32546
	EMBANKMENT (ORD COMP)(TY B)	CY	135115

✳ FOR CONTRACTORS INFORMATION ONLY

INCLUDES QUANTITES FOR TRAFFIC ISLANDS W/FLEX BASE & TWO CRSE SURF TREAT

✳✳SUBSIDIARY TO VARIOUS BID ITEMS

NOTE: PAVEMENT QUANTITIES ABOVE INCLUDE HAUSMAN RD INTERSECTION

HAUSMAN RD INTERSECTION & TURNAROUND LAYOUT SEE SHEETS 118-119

HAUSMAN RD OVERPASS DETAILS SEE SHEETS 178-179 & 181-182

□ DENOTES PULL BOX

WHEELCHAIR RAMP EST @ .5 CY EA. RIPRAP (CONC)(CL B) FOR DETAILS, SEE SHT # 147

⊗ ROW MARKERS (TY II)

1	265' LT STA 10196+50 (A)
2	265' RT STA 10197+50 (A)
3	54.23' RT STA 104+02.91 (HAUSMAN)
4	55.00' RT STA 108+00.00 (HAUSMAN)
5	50.19' RT STA 109+00.00 (HAUSMAN)
6	39.82' LT STA 110+00.00 (HAUSMAN)
7	67.00' LT STA 108+00.00 (HAUSMAN)
8	67.00' LT STA 105+50.00 (HAUSMAN)
9	265.00' RT STA 10202+00.00 (A)

STATE OF TEXAS CAROL GREINER LUSCHEN 60459 REGISTERED PROFESSIONAL ENGINEER

STATE OF TEXAS GREGORY A. BUTLER 61429 REGISTERED PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

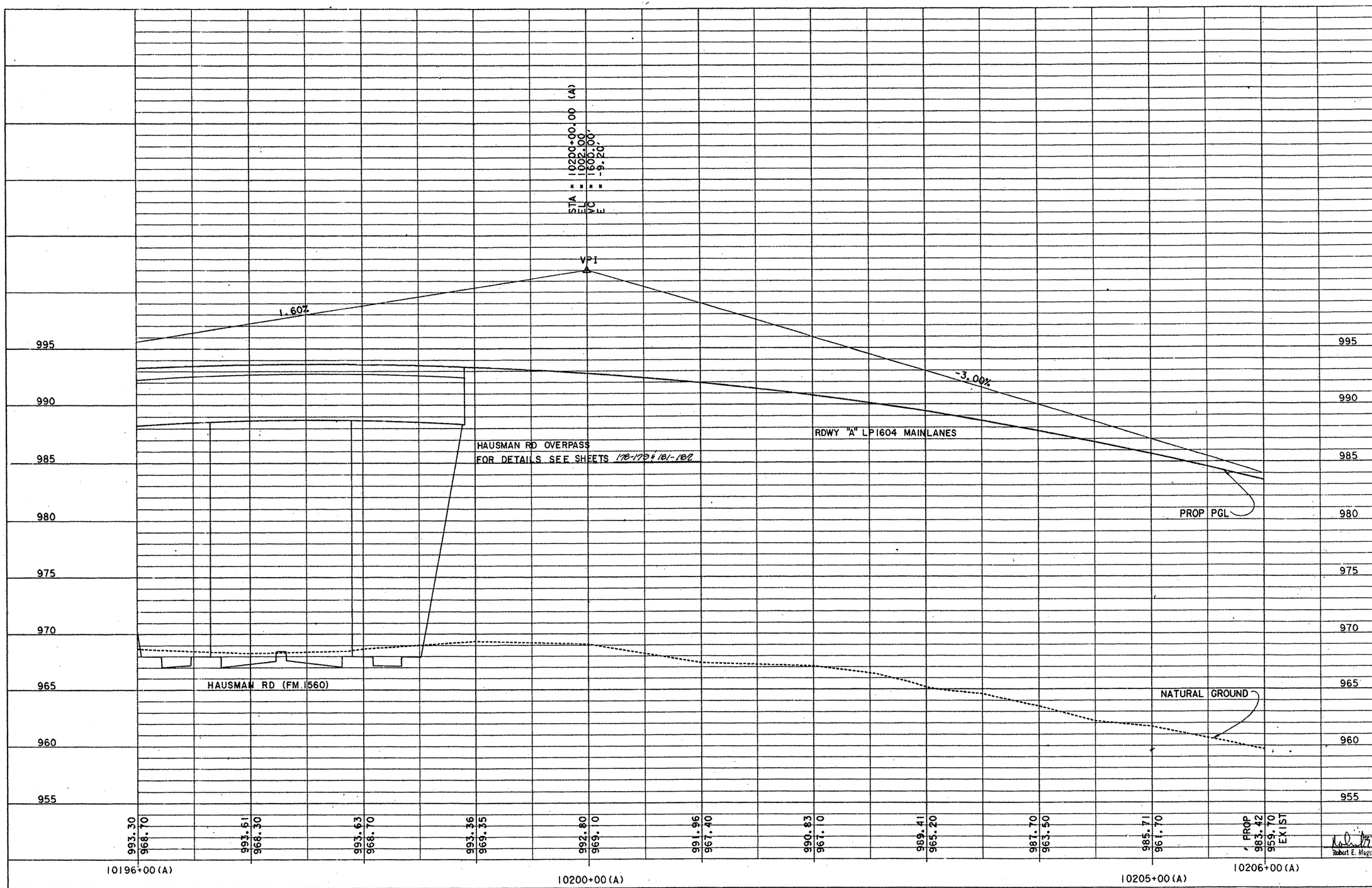
Gregory A. Butler P.E. Nov 26, 1993

LP 1604
PLAN SHEET

SHEET 8 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					71
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO	
15	BEXAR	2452	02	023	LP1	

ETC



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

STATE OF TEXAS
ROBERT E. MIGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Migers P.E. 9-6-90

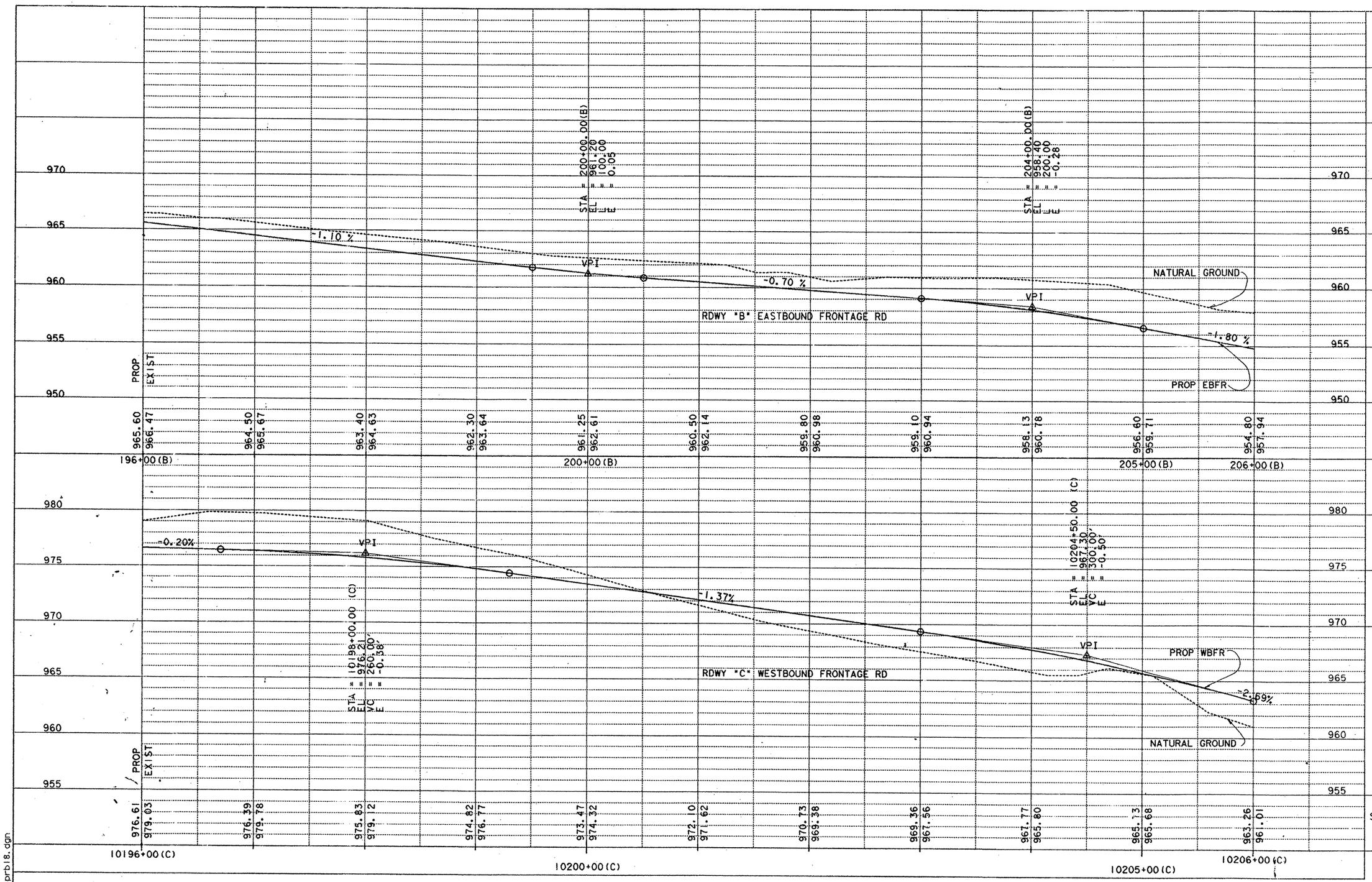
PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		72

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA18.DGN



STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on 12-19-1991

Carol G. Luschen

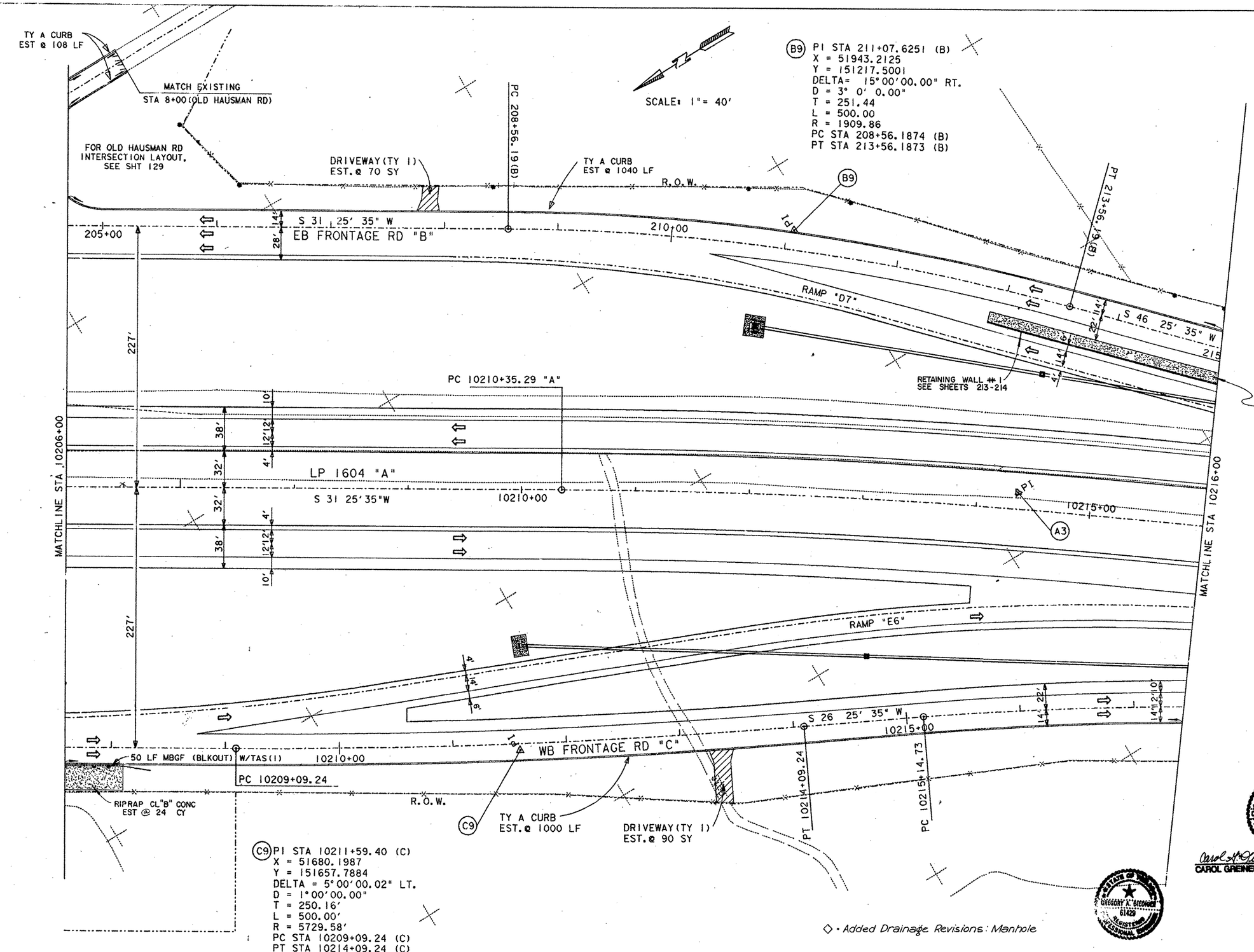
SCALE: 1" = 40' HORIZ
1" = 4' VERT

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			73
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

15bpn:1604prb18.dgn

PROF1



ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
PREP ROW	STA	10
FURN & PLAC TPSL	SY	28349
BRDCST SEED (BERMUDA)	SY	28349
FLEX BASE (DEL)(DC) (TY A GR 1 MOD)(CL 3)	CY	4853
✳ ASPH STAB BS(GR 4)(4")	SY	13356
✳ ONE CRSE SURF TREAT	SY	23207
✳ ASPH CONC. (TY C)	SY	18993
✳ ASPH CON. (TY C)(SURF)	SY	21318
DRVWY (TY 1)	SY	160
CONC CURB(TY A)	LF	2148
TERM ANCH SECT (12 GA)	EA	1
RIPRAP CL"B" CONC	CY	62
MBGF (BLKOUT)(12 GA) (TIM POST)	LF	50
PLANING ASPHALTIC SURFACE	SY	2670
EXCAVATION	CY	19971
EMBANKMENT (ORD COMP)(TY B)	CY	~~120775~~

✳ FOR CONTRACTORS INFORMATION ONLY

STATE OF TEXAS
CAROL GREINER LUSCHEN
80450
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED
PROFESSIONAL ENGINEER

Gregory A. Biediger P.E. Nov 26, 1993

Revised 10-7-93

LP 1604
PLAN SHEET

SHEET 9 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS	•				74
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	1023	LP1604	

ETC

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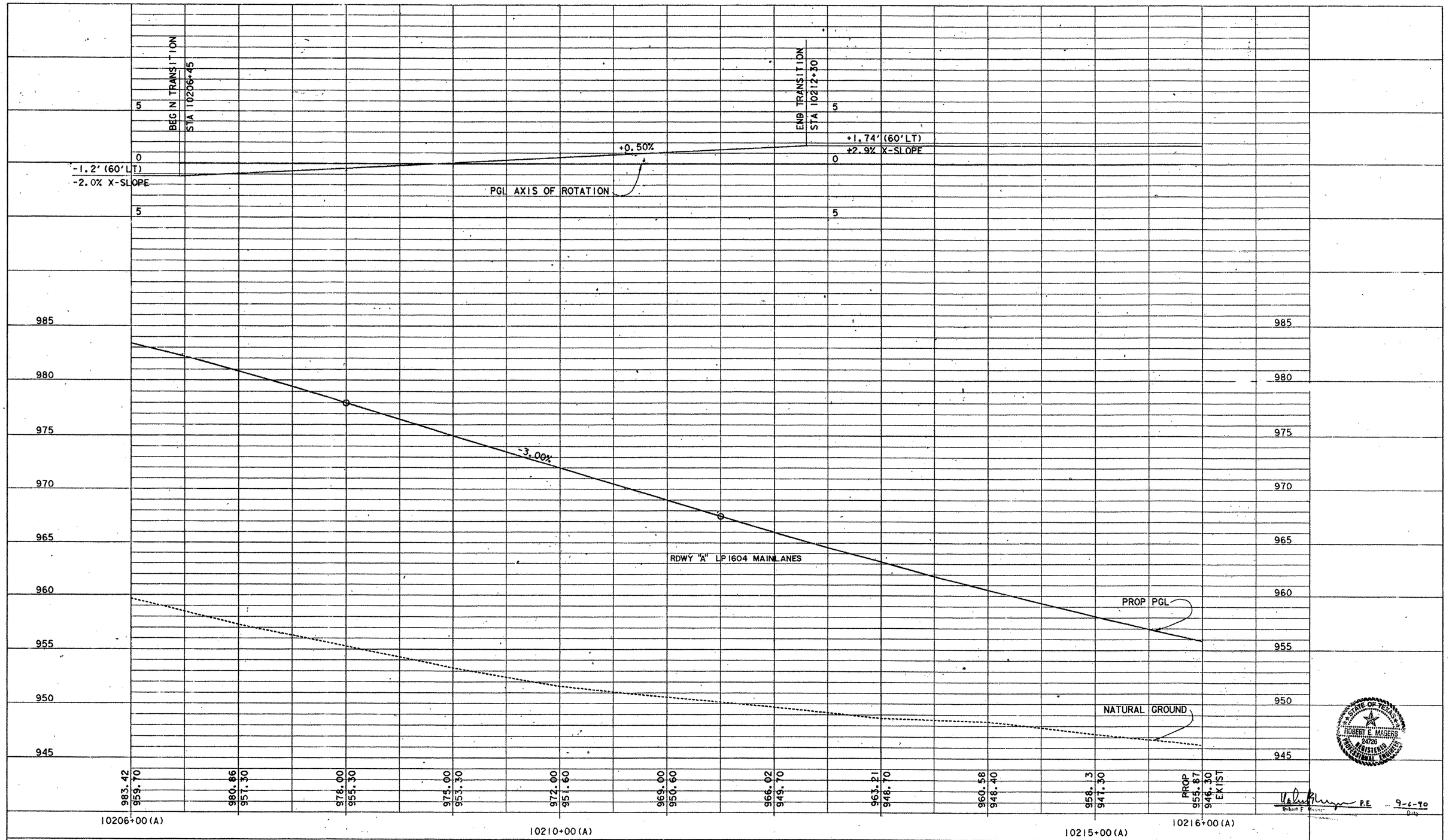


SCALE: 1" = 40' HORZ.
1" = 4' VERT.

PROFILE SHEET

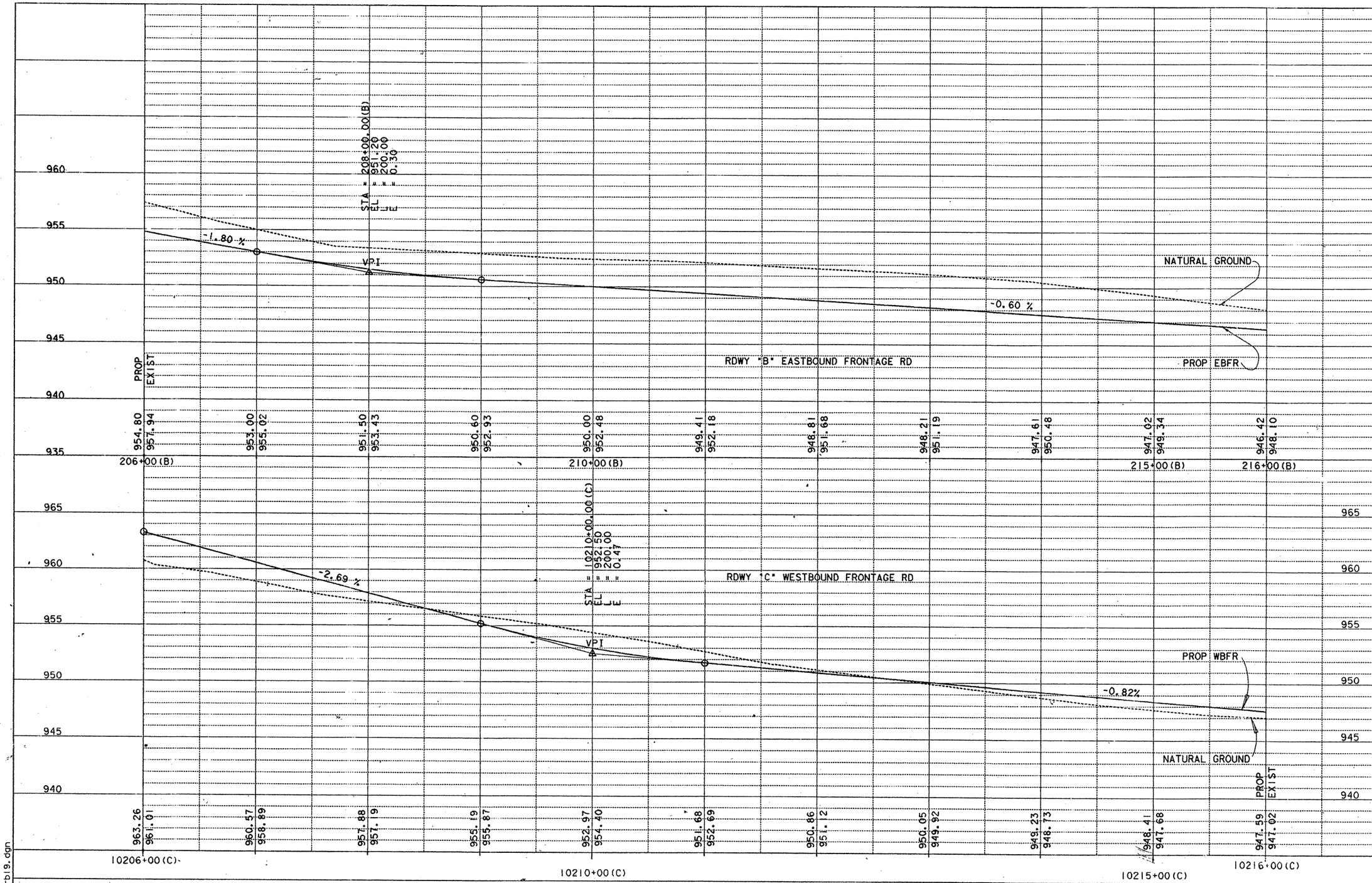
STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90
Date

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		75

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA19.DGN



STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec 19, 1991

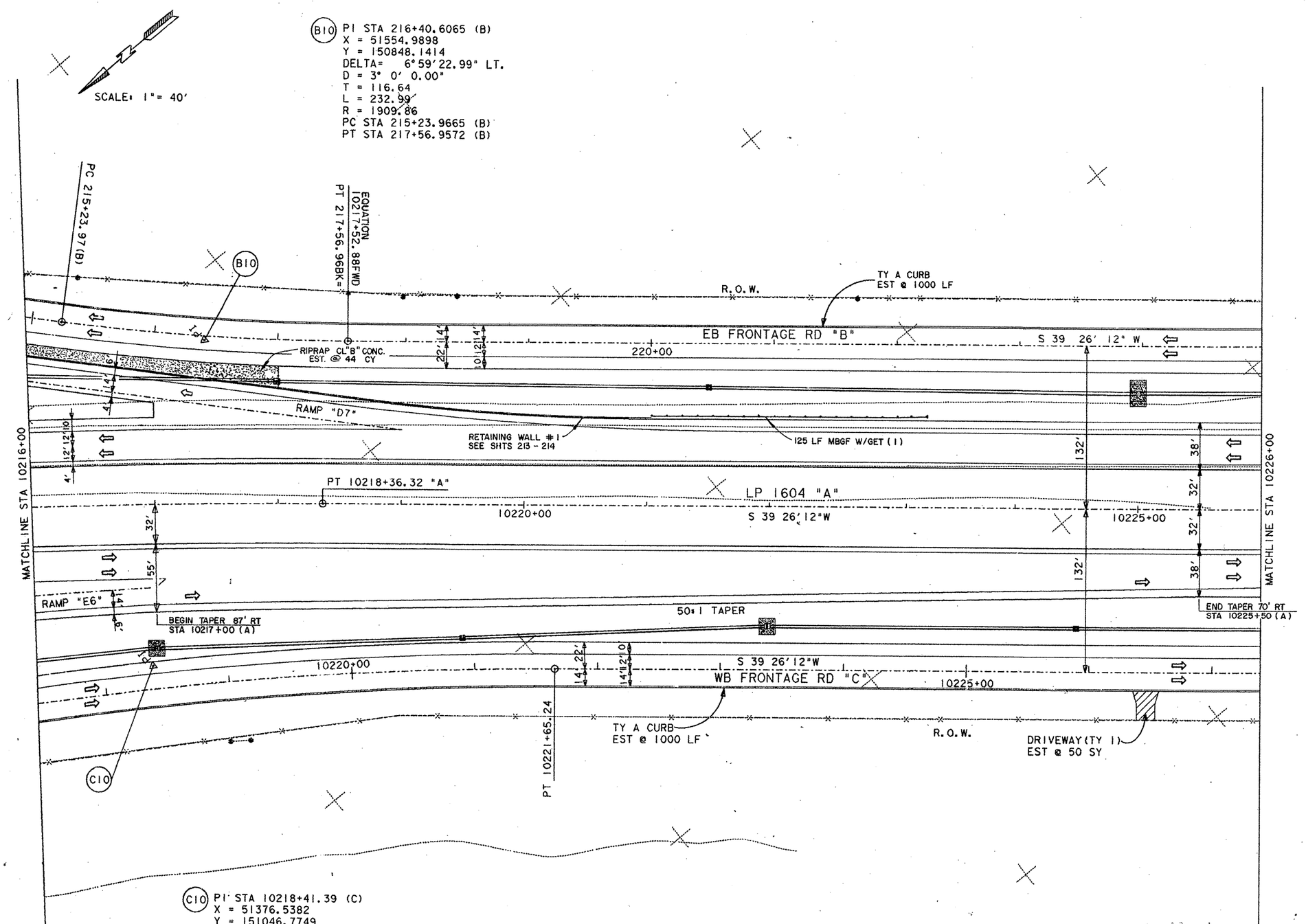
Carol G. Luschen

SCALE: 1" = 40' HORIZ
1" = 4' VERT

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			76
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

15bc pnt 1604prb19.dgn



C10 PI STA 10218+41.39 (C)
X = 51376.5382
Y = 151046.7749
DELTA = 13°00'37.03" RT.
D = 2°00'00.00"
T = 326.66'
L = 650.51'
R = 2864.79'
PC STA 10215+14.73 (C)
PT STA 10221+65.24 (C)

◇ · Added Drainage Revisions: Manhole

ESTIMATED QUANTITIES

	ITEM	UNIT	QTY.
	PREP ROW	STA	10
	FURN & PLAC TPSL	SY	14373
	BRDCST SEED (BERMUDA)	SY	14373
	FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	4506
✳	ASPH STAB BS (GR 4) (4")	SY	9498
✳	ONE CRSE SURF TREAT	SY	20212
✳	ASPH CONC (TY C)	SY	18885
✳	ASPH CONC (TY C) (SURF)	SY	18247
	CONC CURB (TY A)	LF	2000
	MBGF (12 GA) (TIM POST)	LF	125
	GUARDRAIL EXTRUDER TERM	EA	1
	DRIVEWAY (TY 1)	SY	50
	RIPRAP CL"B" CONC	CY	44
	PLANING ASPHALTIC SURFACE	SY	2670
	EXCAVATION	CY	8555
	EMBANKMENT (ORD COMP) (TY B)	CY	18549

✳ FOR CONTRACTORS INFORMATION ONLY

FOR RAMP D7 LAYOUT
SEE SHEET 133-134

FOR RAMP E6 LAYOUT
SEE SHEET 139-140

STATE OF TEXAS
CAROL GREINER LUSCHEN
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-90
CAROL GREINER LUSCHEN DATE

STATE OF TEXAS
GREGORY A. BIEBER
61429
REGISTERED
PROFESSIONAL ENGINEER

Gregory A. Bieber P.E. 10-26-93

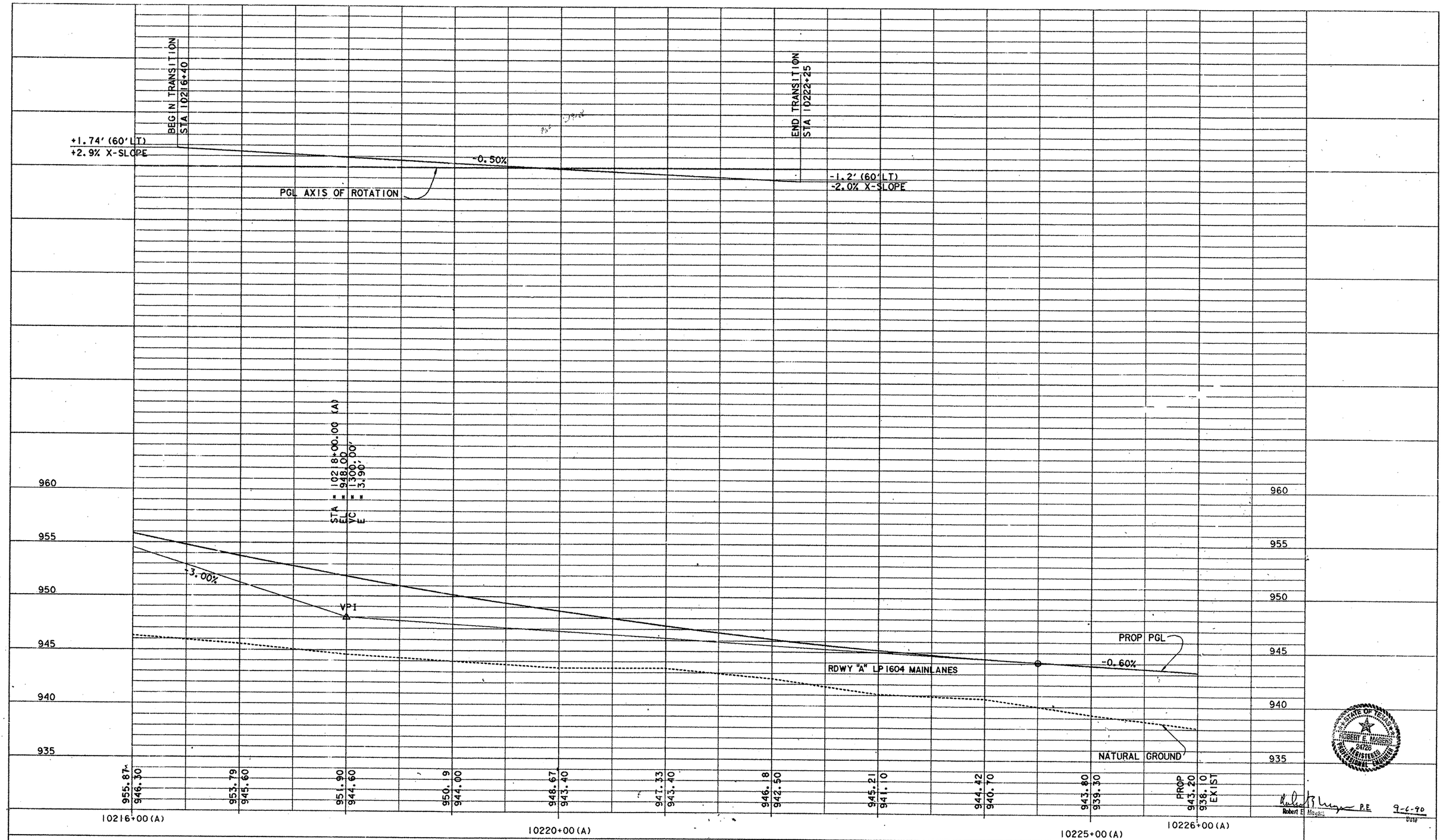
LP 1604
PLAN SHEET
SHEET 10 OF 22

Revised 10-7-93

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					77
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB		WY. NO.
15	BEXAR	2452	02	023		

ETC

1604PL20.DGN



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

PROFILE SHEET

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90
Date

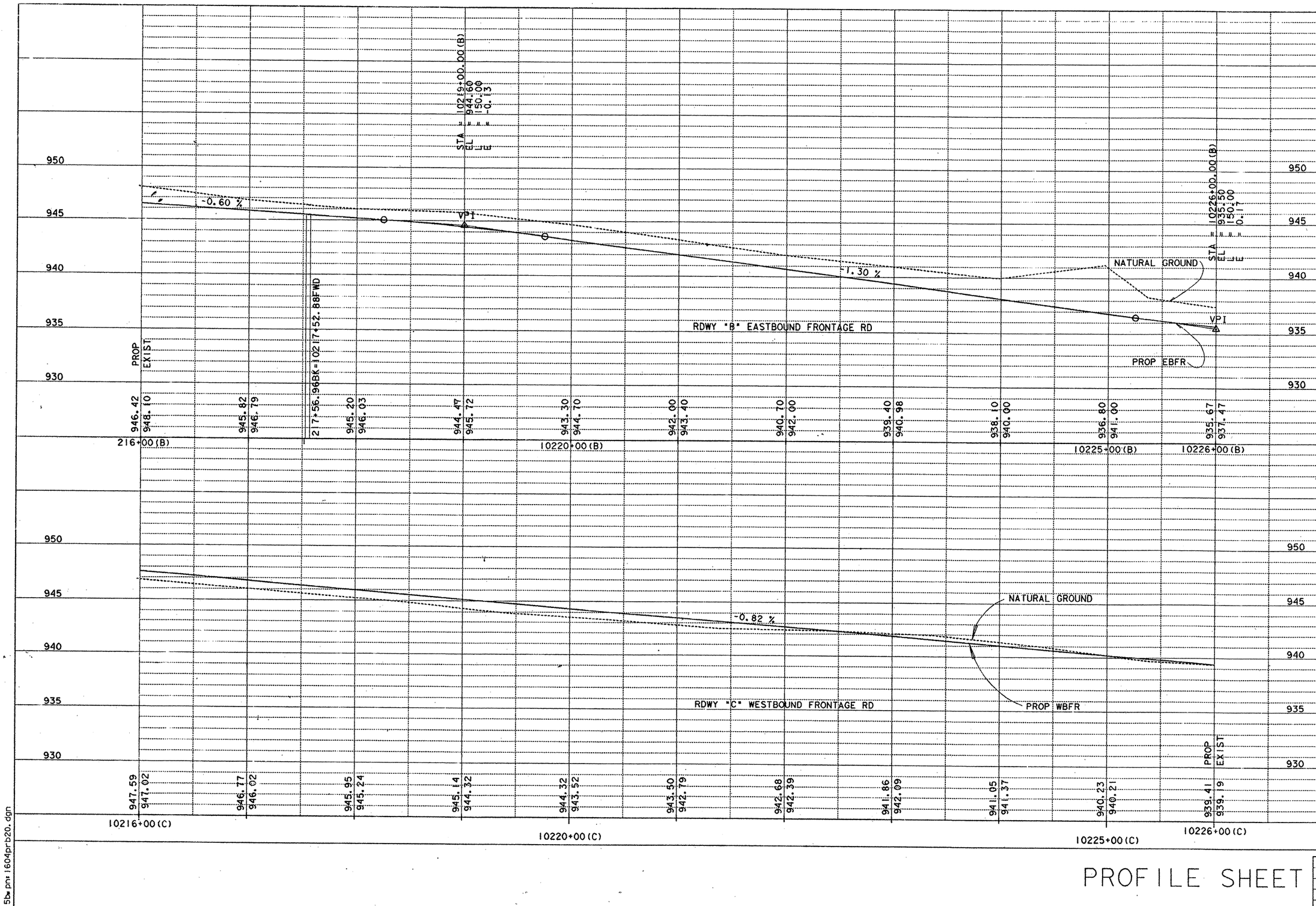
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		78

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA20.DGN

PROF1



STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec. 19, 1991

Carol G. Luschen

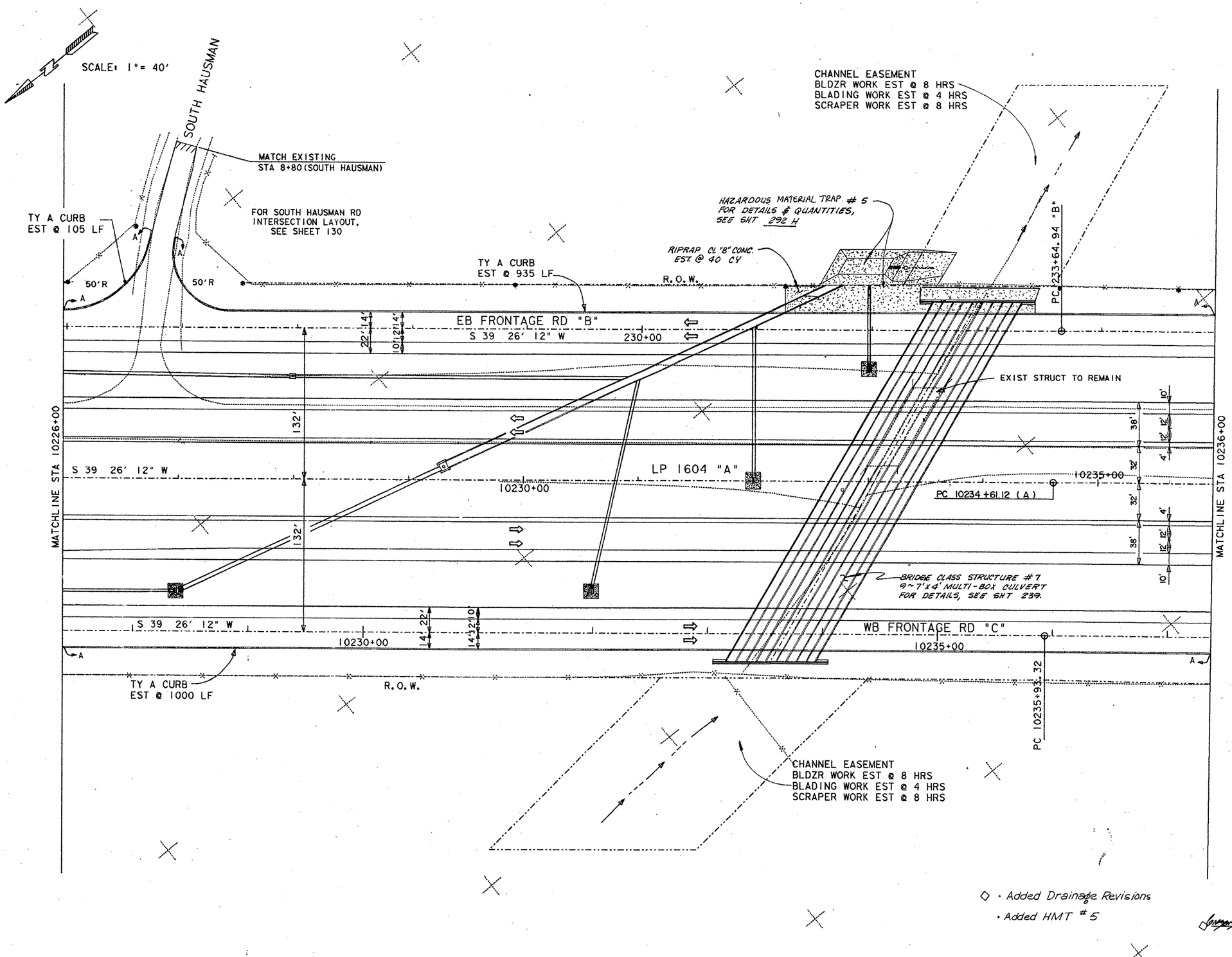
SCALE: 1" = 40' HORIZ
1" = 4' VERT

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			79
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

15bx pn: 1604prb20.dgn

PROF I



◇ · Added Drainage Revisions

· Added HMT # 5

ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
PREP ROW	STA	10
BLAD	HR	8
BLDZR WORK (ORD COMP)	HR	16
SCRAPER WORK	HR	16
FURN & PLAC TPSL	SY	17784
BRDCST SEED (BERMUDA)	SY	17784
FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	3942
✳ ASPH STAB BS (GR 4) (4")	SY	17278
✳ ONE CRSE SURF TREAT	SY	17772
✳ ASPH CONC (TY C)	SY	17056
✳ ASPH CONC (TY C) (SURF)	SY	16444
CONC CURB (TY A)	LF	2040
RIPRAP CL "B" CONC. (4")	CY	40
PLANING ASPHALTIC SURFACE	SY	2670
EXCAVATION	CY	4063
EMBANKMENT (ORD COMP) (TY B)	CY	21215

✳ FOR CONTRACTORS INFORMATION ONLY

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

STATE OF TEXAS
GREGORY A. BIEDRON
61429
REGISTERED PROFESSIONAL ENGINEER

Gregory A. Biedron P.E. Nov 26, 1993

LP 1604
PLAN SHEET

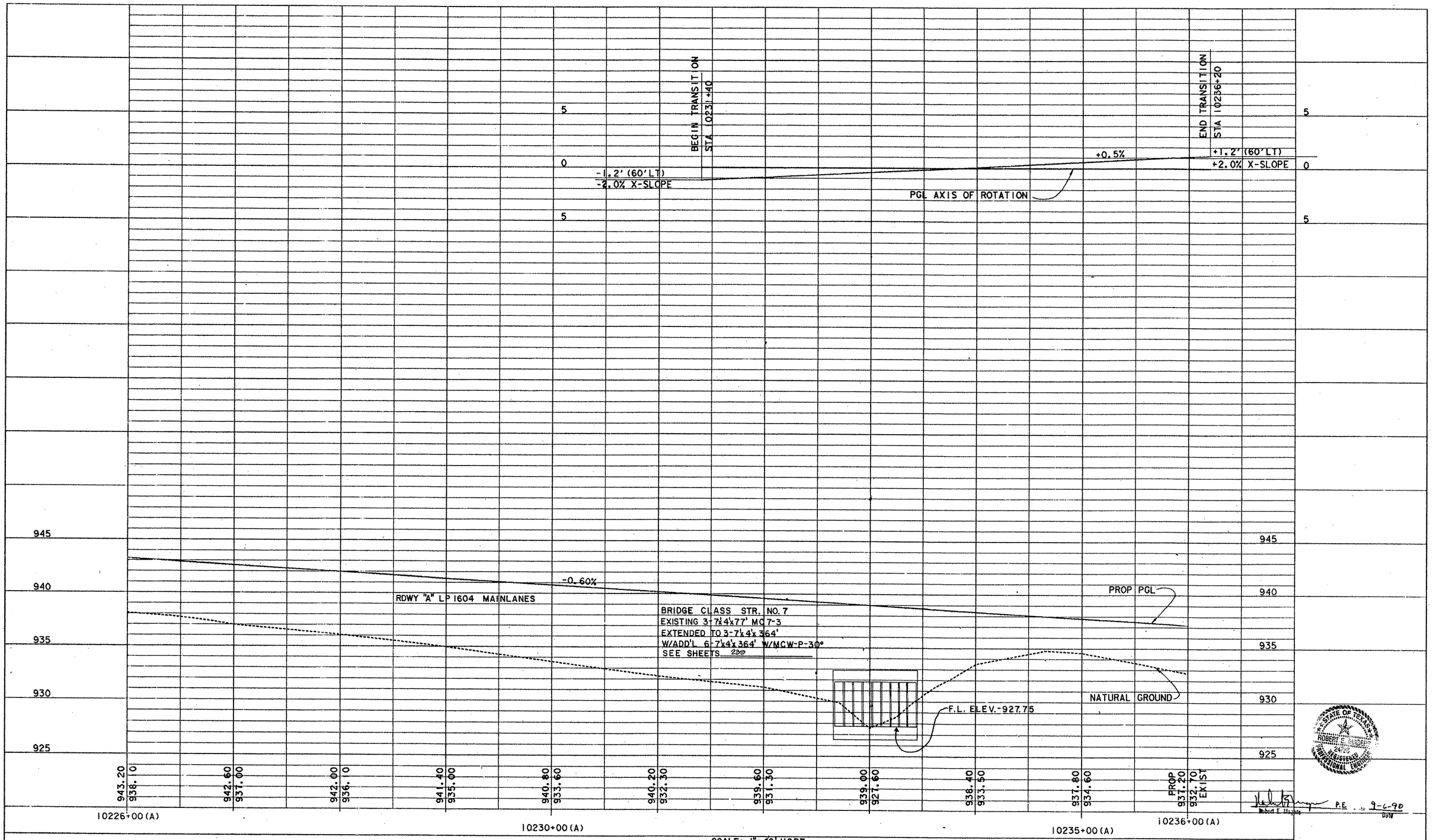
SHEET 11 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					80
STATE DIST NO	COUNTY	CONT.	SECT.	JOB		HWY. NO.
15	BEXAR	2452	02	023		LP160

ETC

Revised 10-7-93

1604PL21.DGN



SCALE: 1"=40' HORZ.
1"= 4' VERT.

STATE OF TEXAS
ROBERT E. MAGEE
24726
REGISTERED
PROFESSIONAL ENGINEER

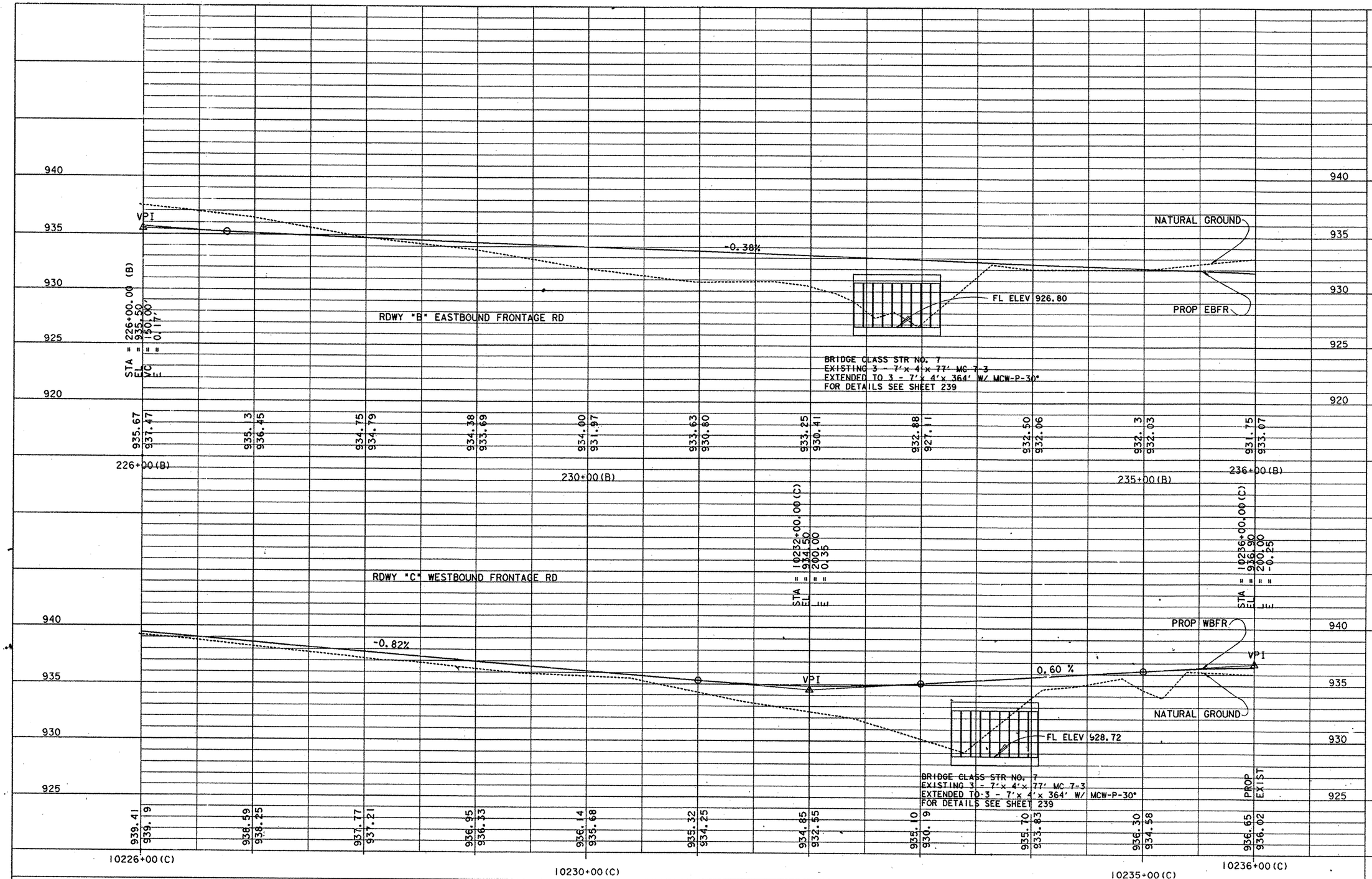
Robert E. Magee P.E. 9-6-90
Date

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			81
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA21.DGN

PROF1



STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec. 13, 1991

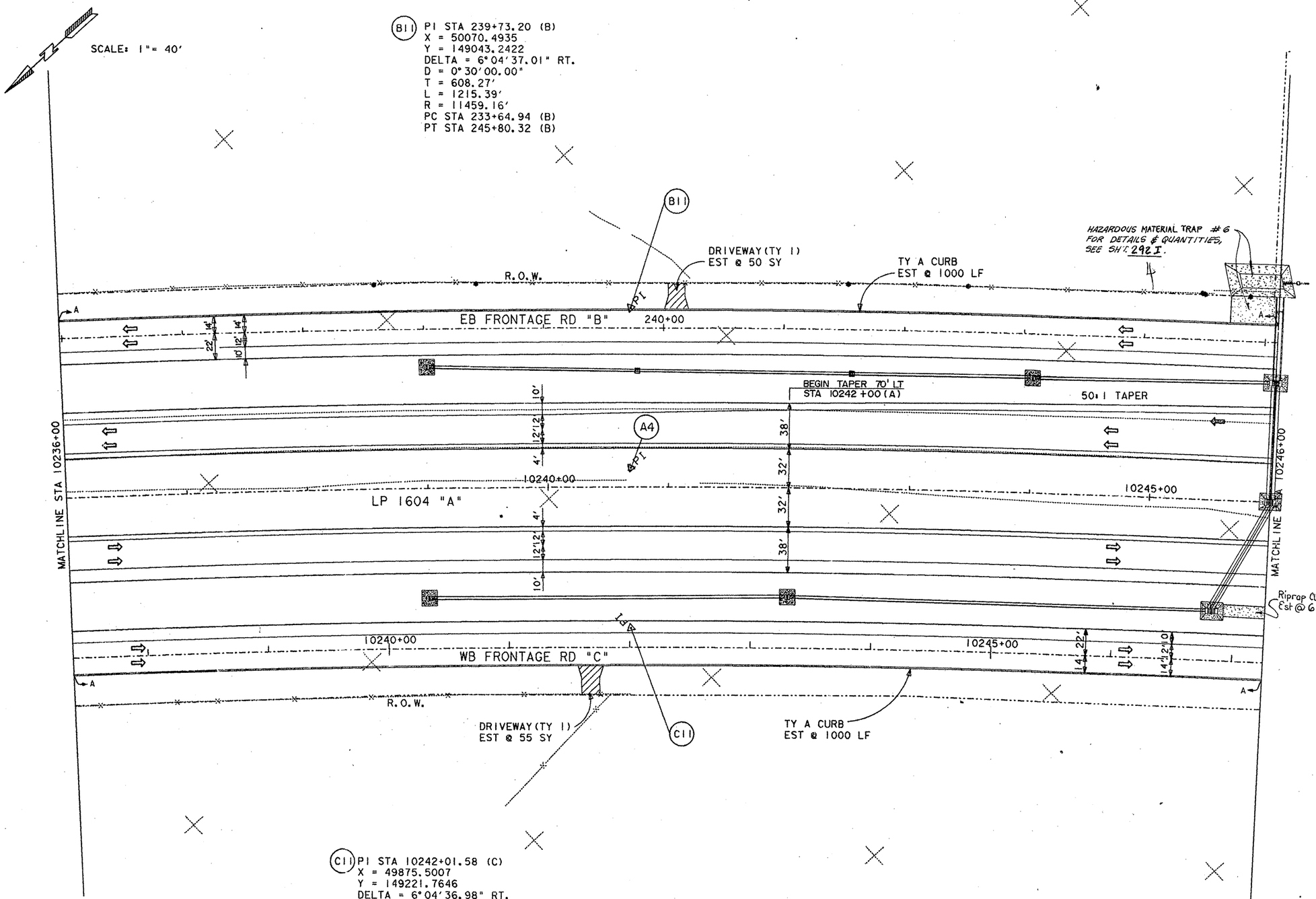
Carol G. Luschen

SCALE: 1" = 40' HORIZ
1" = 4' VERT

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			82
STATE	STATE DIST. NO.	COUNTY	
TEXAS		BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRB21.DGN



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Y = 149132.5034
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D = 0°30'00.00"
T = 608.26'
L = 1215.39'
R = 11459.16'
PC STA 10234+61.12 (A)
PT STA 10246+76.51 (A)

C11 PI STA 10242+01.58 (C)
X = 49875.5007
Y = 149221.7646
DELTA = 6°04'36.98" RT.
D = 0°30'00.00"
T = 608.26'
L = 1215.39'
R = 11459.16'
PC STA 10235+93.32 (C)
PT STA 10248+08.70 (C)

ESTIMATED QUANTITIES

	ITEM	UNIT	QTY.
	PREP ROW	STA	10
	FURN & PLAC TPSL	SY	16802
	BRDCST SEED (BERMUDA)	SY	16802
	FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	3962
*	ASPH STAB BS (GR 4) (4")	SY	8889
*	ONE CRSE SURF TREAT	SY	17772
*	ASPH CONC (TY C)	SY	17056
*	ASPH CONC (TY C) (SURF)	SY	16444
	CONC CURB (TY A)	LF	2000
	DRIVEWAY (TY 1)	SY	105
	Riprap CL'B" Conc (4")	CY	6
	PLANING ASPHALTIC SURFACE	SY	2670
	EXCAVATION	CY	23446
	EMBANKMENT (ORD COMP) (TY B)	CY	1186

* FOR CONTRACTORS INFORMATION ONLY

STATE OF TEXAS
CAROL GREINER LUSCHEN
68460
REGISTERED
PROFESSIONAL ENGINEER

Carol H. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

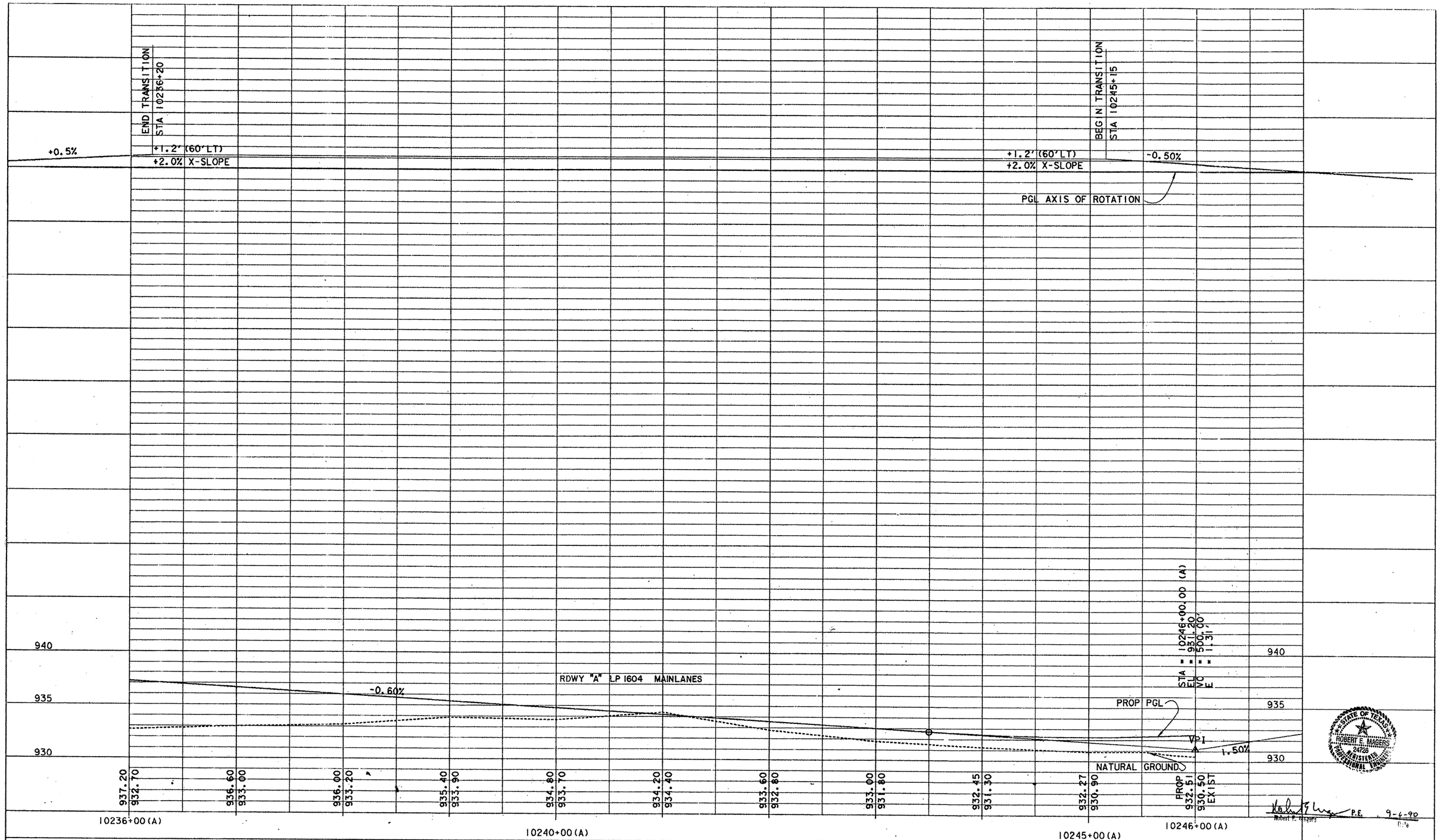
LP 1604
PLAN SHEET
SHEET 12 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					83
STATE DIST NO	COUNTY	CONT.	SECT.	JOB		HWY. NO
15	BEXAR	2452	02	023		LP1604

Revised 10-7-93

ETC

1604PL22.DGN



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90
Date

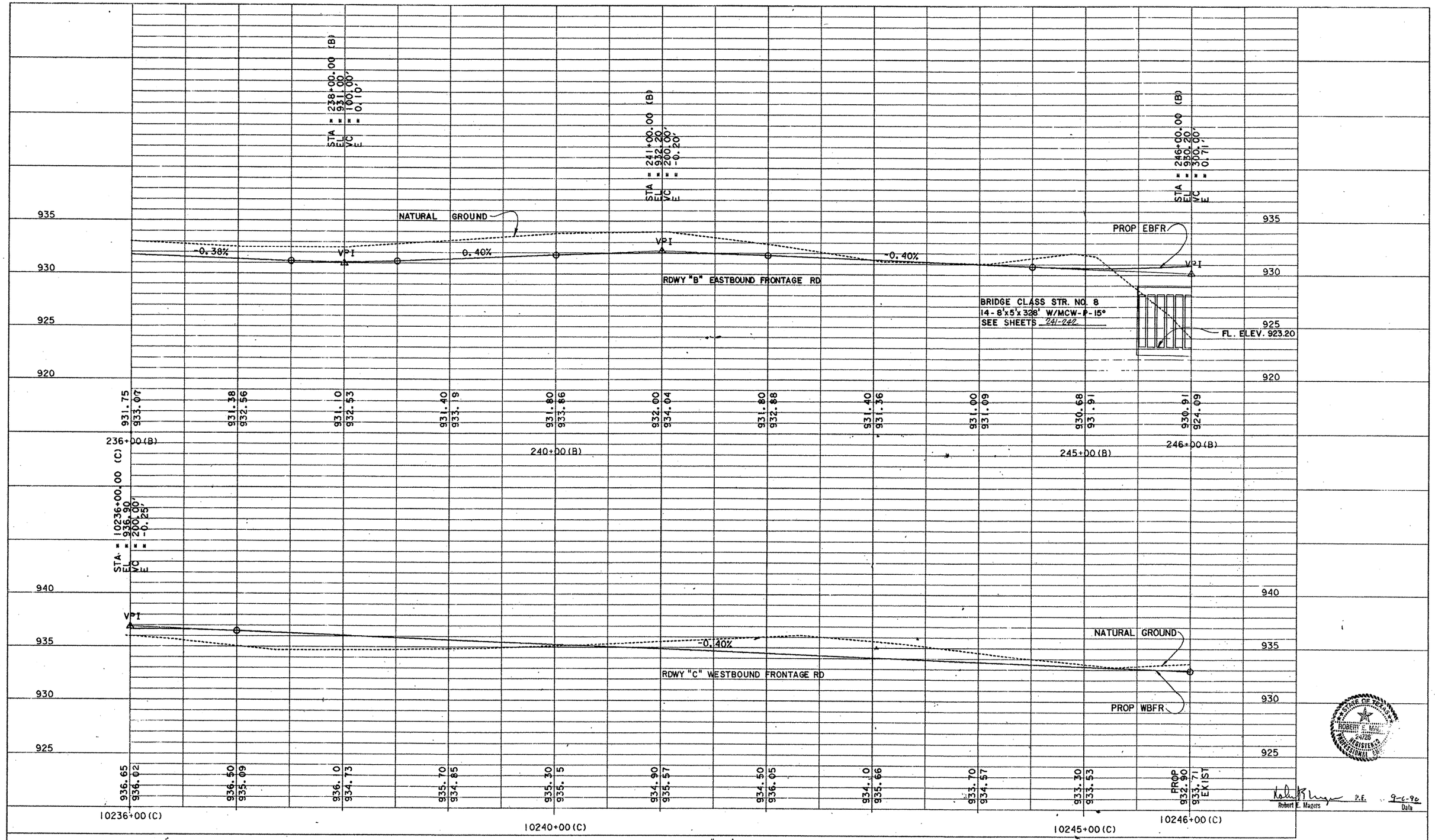
PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		84

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA22.DGN

PROF I



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

PROFILE SHEET

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

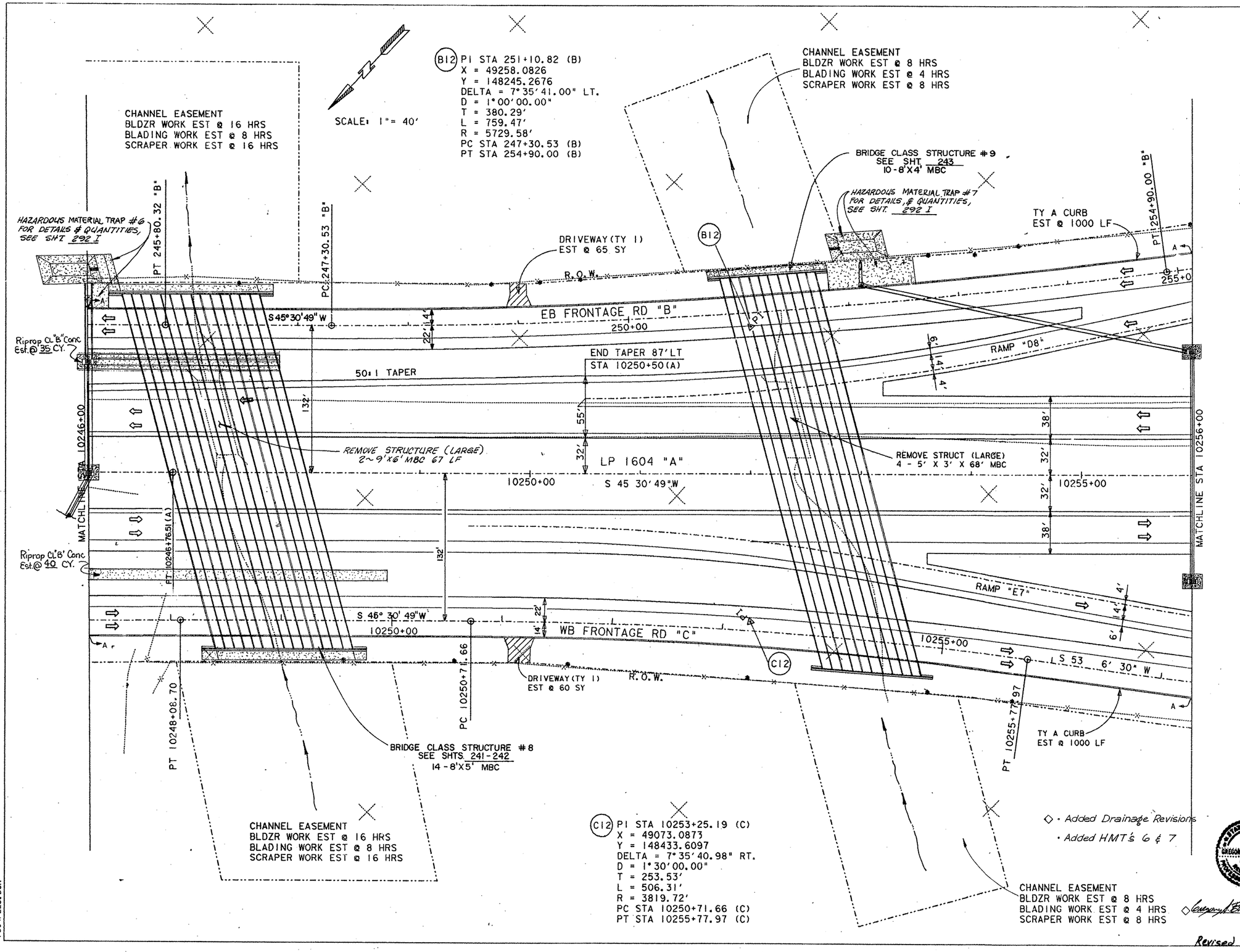
Robert E. Magers P.E. 9-6-90
Robert E. Magers Date

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		85

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRB22. DGN



◇ · Added Drainage Revisions
· Added HMT's 6 & 7

ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
PREP ROW	STA	10
BLAD	HR	24
BLDZR WORK (ORD COMP)	HR	48
SCRAPER WORK	HR	48
FURN & PLAC TPSL	SY	18385
BRDCST SEED (BERMUDA)	SY	18385
FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	4541
✳ ASPH STAB BS (GR 4) (4")	SY	12307
✳ ONE CRSE SURF TREAT	SY	21140
✳ ASPH CONC (TY C)	SY	20363
✳ ASPH CONC (TY C) (SURF)	SY	19641
CONC CURB (TY A)	LF	2000
DRIVEWAY (TY 1)	SY	125
REMOVE STR (LARGE)	EA	2
RIPRAP CL "B" CONC. (4")	CY	75
PLANING ASPHALTIC SURFACE	SY	2670
EXCAVATION	CY	4589
EMBANKMENT (ORD COMP) (TY B)	CY	32087

✳ FOR CONTRACTORS INFORMATION ONLY

FOR RAMP D8 LAYOUT
SEE SHEET 135

FOR RAMP E7 LAYOUT
SEE SHEET 141-142

Carol G Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

Gregory A. Bledsoe P.E. Nov 26, 1993

LP 1604
PLAN SHEET

SHEET 13 OF 22

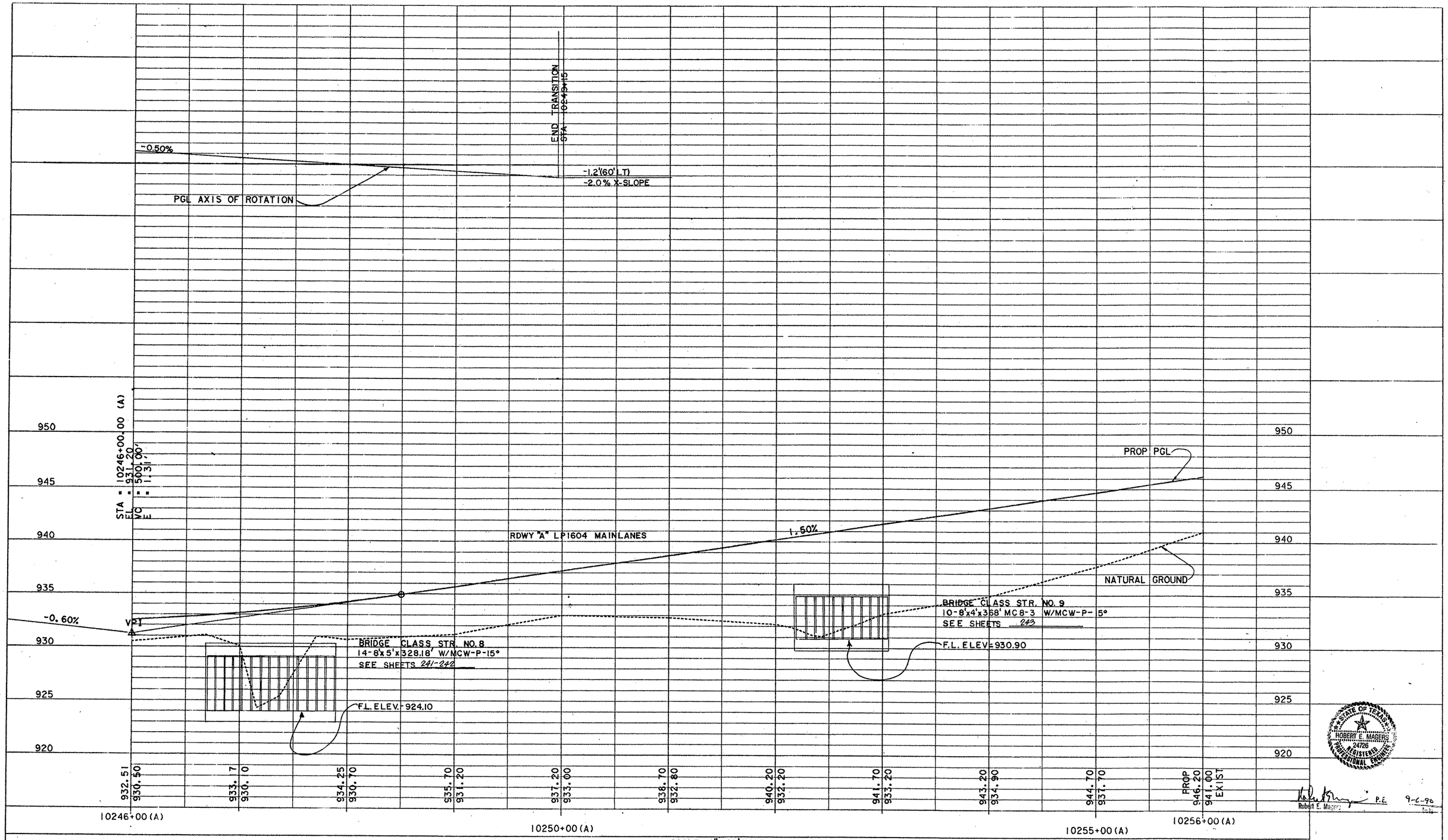
FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS		86

STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.
15	BEXAR	2452	02	023	LP160

ETC

Revised 10-7-93

1604PL23.DGN



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-96

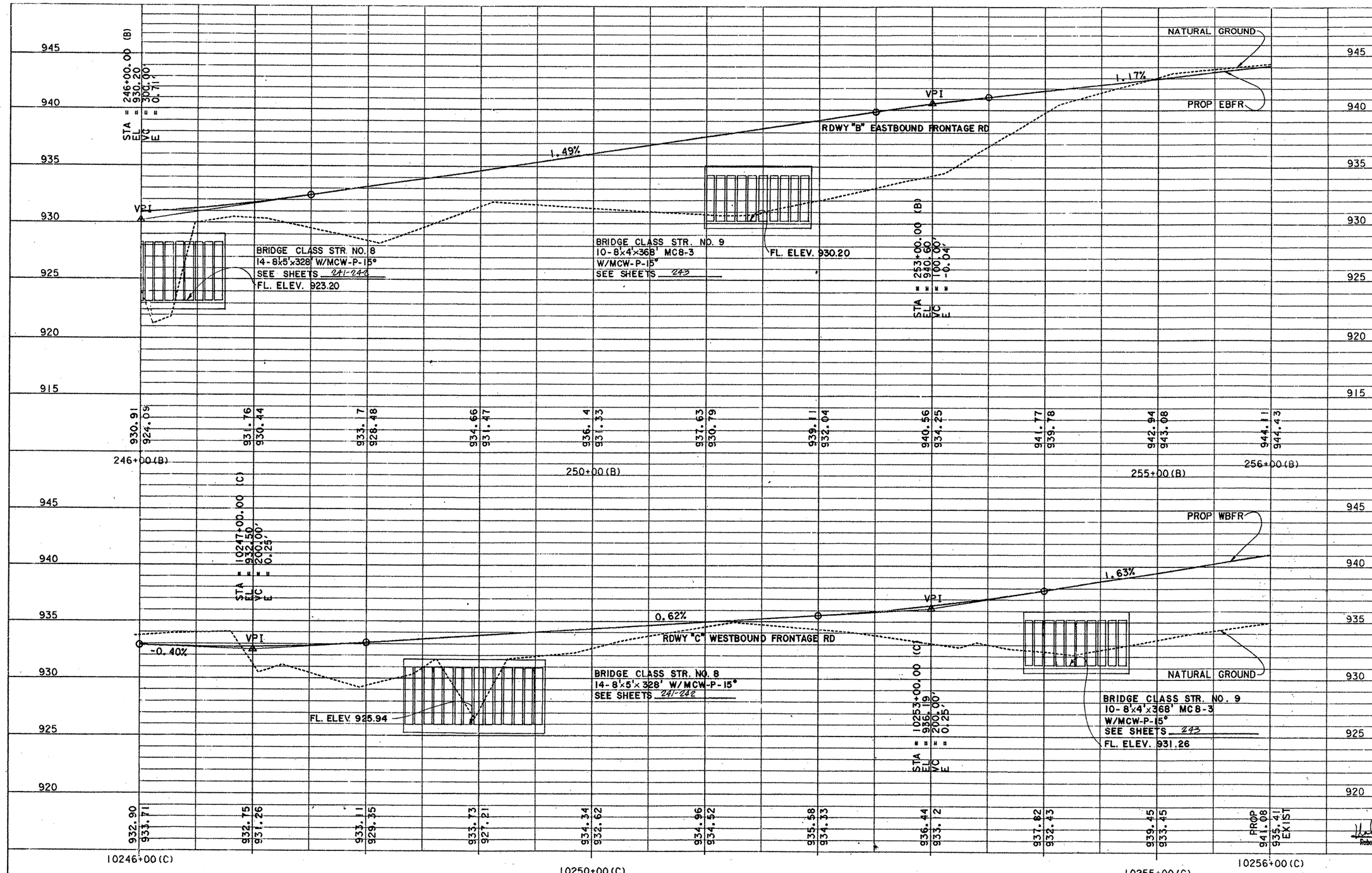
PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		87

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA23.DGN

PROFI



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

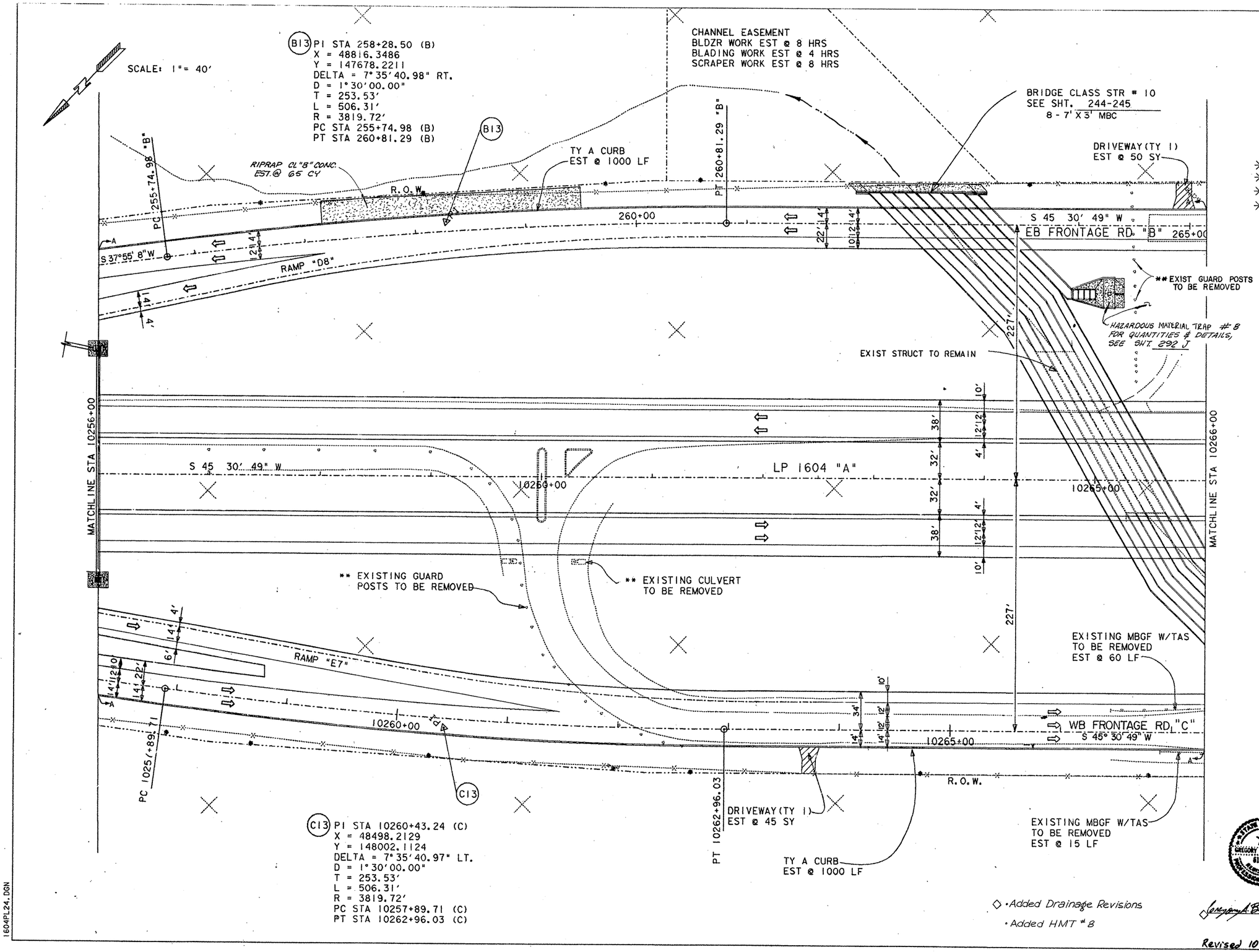
Robert E. Magers P.E. 9-6-90
Date

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			23
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRB23.DGN

PROFI



ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
PREP ROW	STA	10
BLAD	HR	4
BLDZR WORK (ORD COMP)	HR	8
SCRAPER WORK	HR	8
FURN & PLAC TPSL	SY	34542
BRDCST SEED (BERMUDA)	SY	34542
FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	4686
* ASPH STAB BS (GR 4) (4")	SY	11068
* ONE CRSE SURF TREAT	SY	21178
* ASPH CONC (TY C)	SY	20476
* ASPH CONC (TY C) (SURF)	SY	19848
CONC CURB (TY A)	LF	2000
DRIVEWAY (TY 1)	SY	95
REMOVE MBGF	LF	75
REMOVE TERM ANCH SECT	EA	2
RIPRAP CL "B" CONC (4")	CY	65
PLANING ASPHALTIC SURFACE	SY	2670
EXCAVATION	CY	23624
EMBANKMENT (ORD COMP) (TY B)	CY	24633

* FOR CONTRACTORS INFORMATION ONLY

** SUBSIDIARY TO VARIOUS BID ITEMS

FOR RAMP D8 LAYOUT
SEE SHEET 138

FOR RAMP E7 LAYOUT
SEE SHEET 141-142

◇ • Added Drainage Revisions
• Added HMT # 8

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

LP 1604
PLAN SHEET

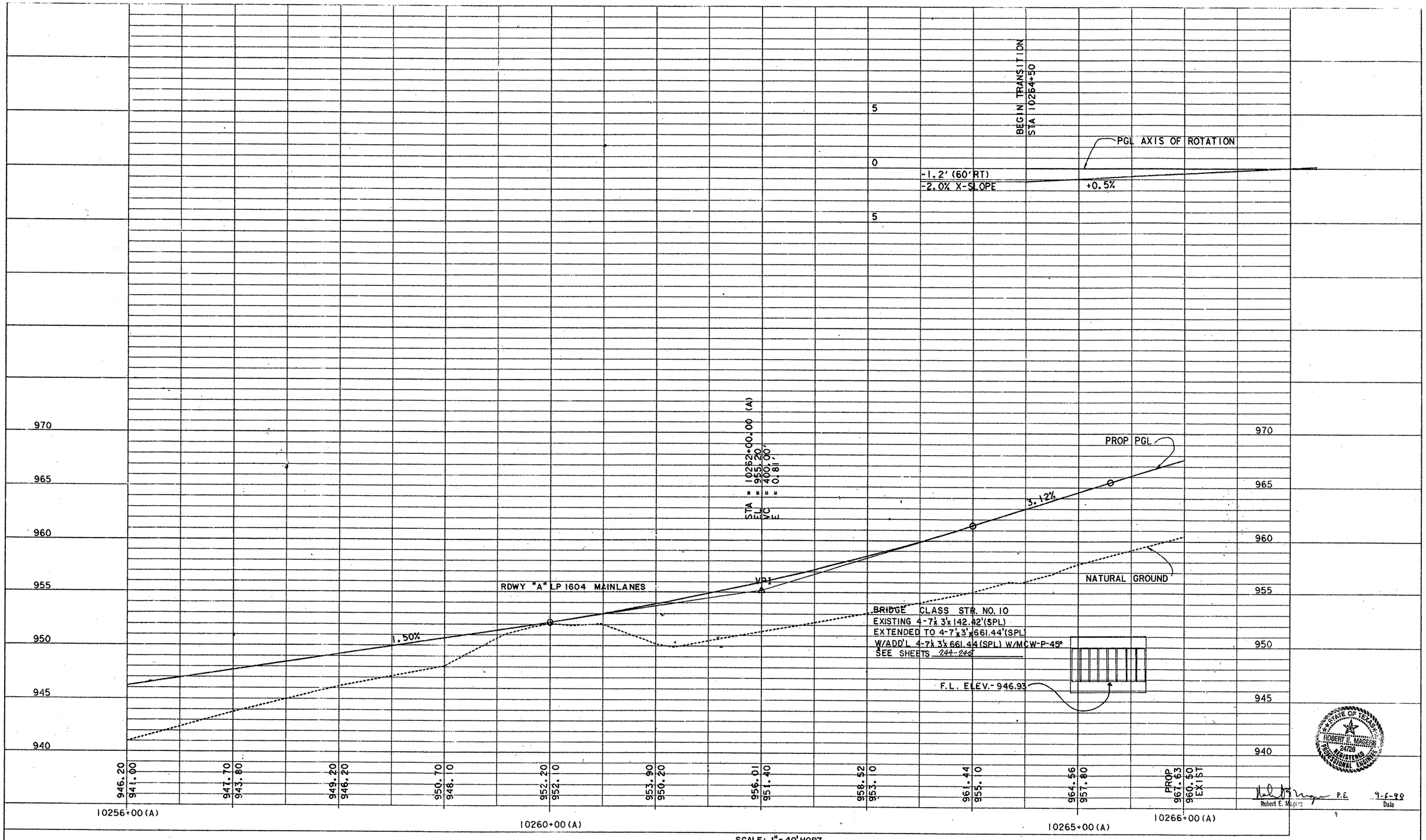
SHEET 14 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					89
STATE DIST NO	COUNTY	CONT.	SECT.	JOB		HWY. NO
15	BEXAR	2452	02	023		LP160

ETC

Revised 10-7-93

1604PL24.DGN



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90
Date

PROFILE SHEET

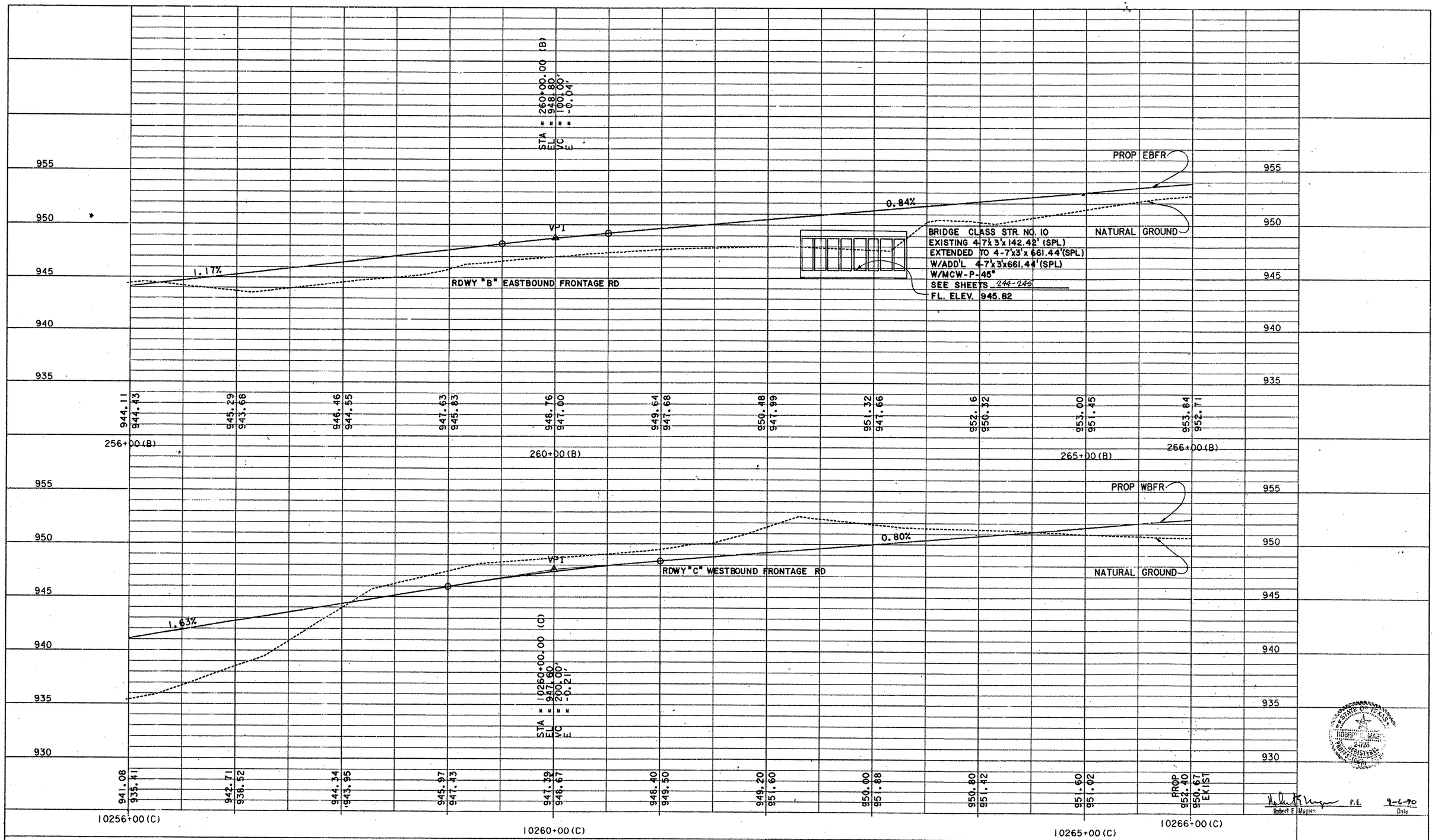
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		90

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA24.DGN

PROF I



Robert E. Magee P.E. 9-6-90
Robert E. Magee Date

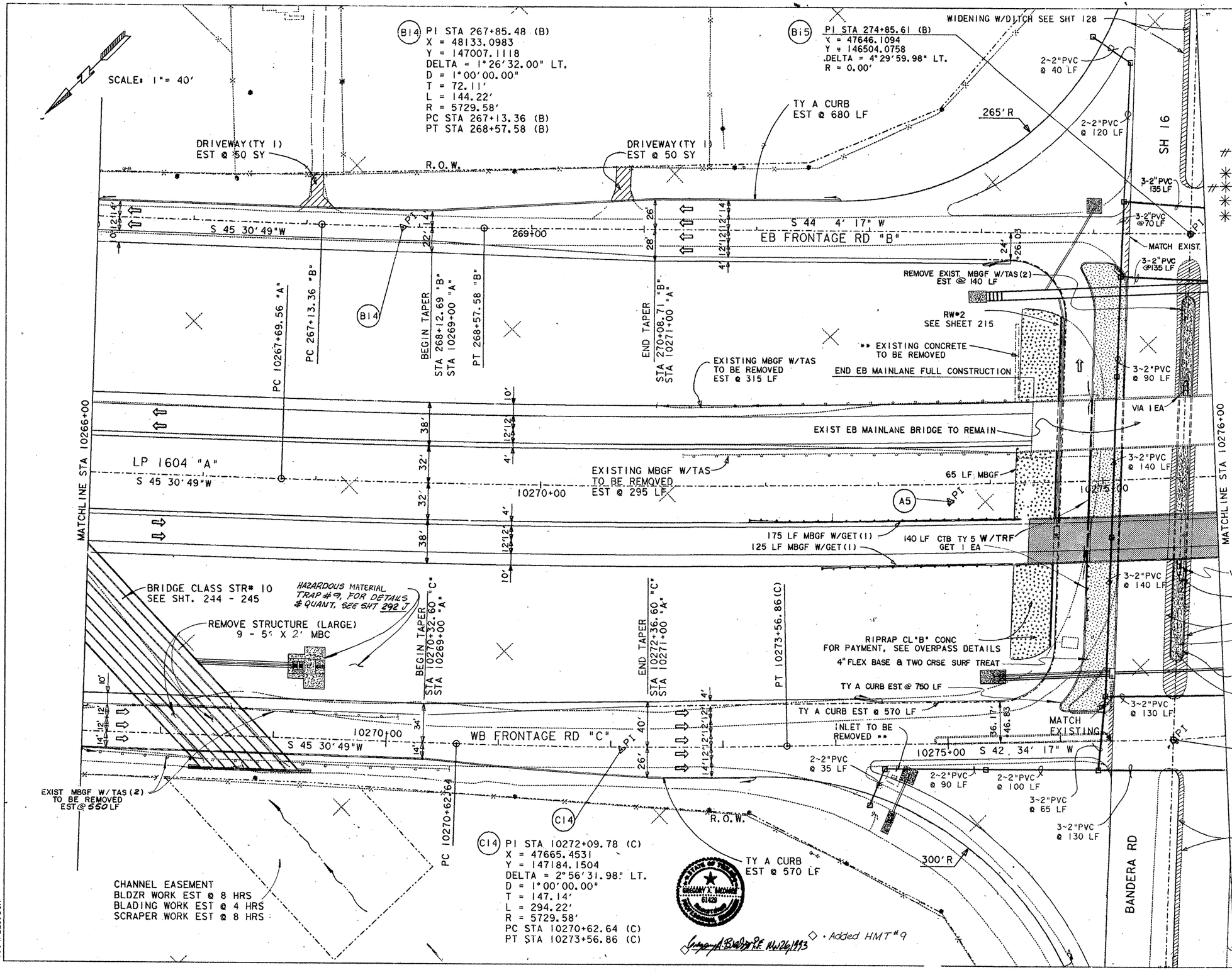
SCALE: 1" = 40' HORZ.
1" = 4' VERT.

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		91

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRB24.DGN



ESTIMATED QUANTITIES

ITEM	CSJ 2452-02-023 UNIT	QTY
PREP ROW	STA	10
BLAD	HR	4
BLDZR WORK (ORD COMP)	HR	8
SCRAPER WORK	HR	8
FURN & PLAC TPSL	SY	31219
BRDCST SEED (BERMUDA)	SY	31219
FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	6297
ASPH STAB BS (GR 4) (4")	SY	5913
ONE CRSE SURF TREAT	SY	30874
ASPH CONC (TY C)	SY	19704
ASPH CONC (TY C) (SURF)	SY	31602
CONC CURB (TY A)	LF	3105
MBGF (12 GA) (TIM POST)	LF	365
GUARDRAIL EXTRUDER TERM.	EA	3
PULL BOX	EA	11
2" PVC (SCH 80)	LF	3815
RIPRAP (CONC) (CL B)	CY	48
REM METAL BEAM GD FENCE	LF	1460
REMOVE TERM ANCH SECT	EA	8
DRVWY (TY 1)	SY	100
REMOVE STR (LARGE)	EA	1
CTB TY 5	LF	140
VIA	EA	2
PLANING ASPHALTIC SURFACE	SY	2670
EXCAVATION	CY	9517
EMBANK (QRD COMP) (TY B)	CY	72835

✳ FOR CONTRACTORS INFORMATION ONLY

✳✳ SUBSIDIARY TO VARIOUS BID ITEMS

// INCLUDES QUANTITIES FOR TRAFFIC ISLANDS W/4" FLEX BASE & TWO CRSE SURF TREAT

□ DENOTES PULL BOX

WHEELCHAIR RAMP: EST @ .5 CY EA RIPRAP(CONC)(CL B) FOR DETAILS, SEE SHT # 147

NOTE: PAVEMENT QUANTITES ABOVE INCLUDE BANDERA RD INTERSECTION

BANDERA RD INTERSECTION & TURNAROUND LAYOUT SEE SHEETS 122 - 123

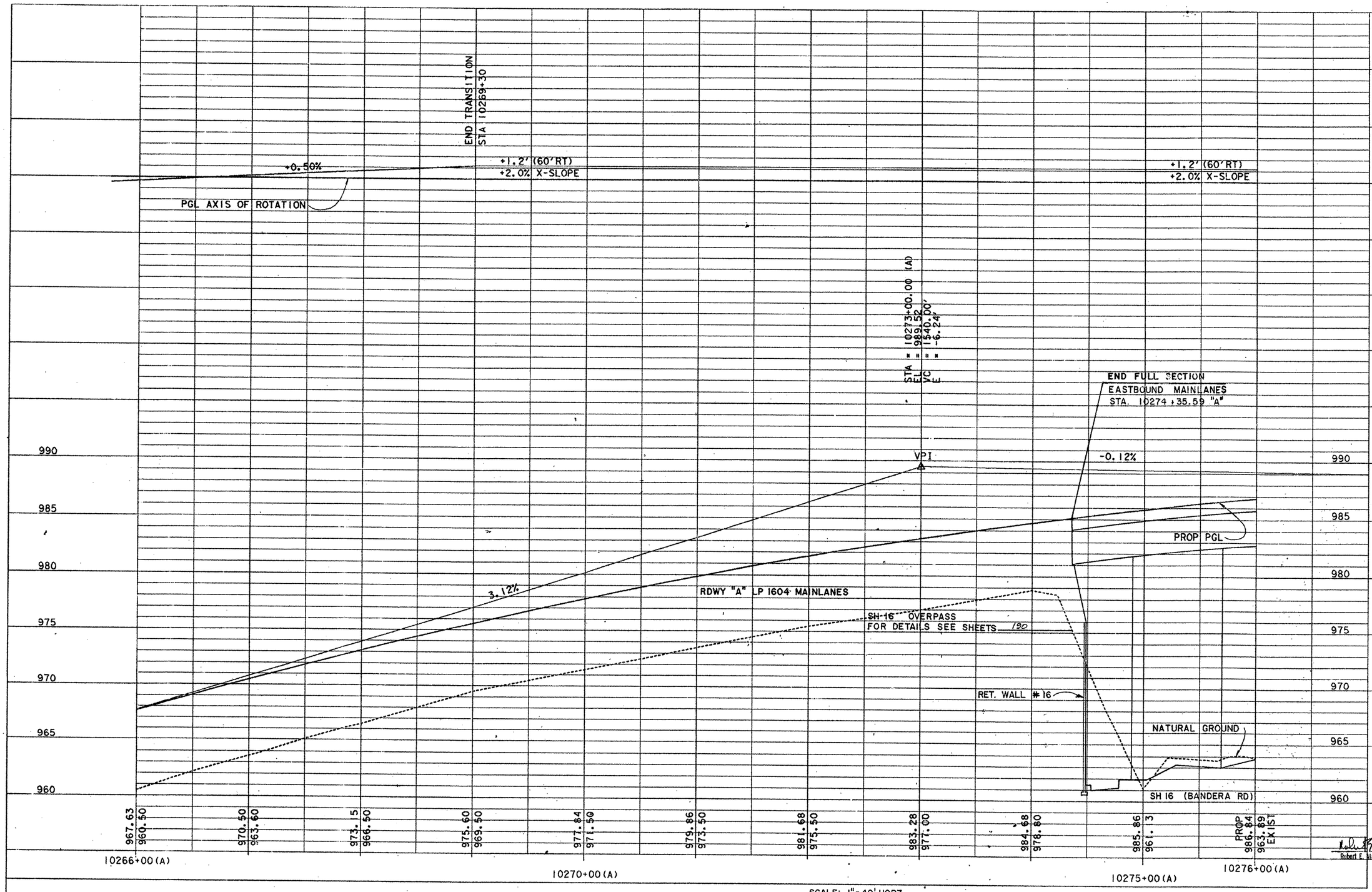
BANDERA RD (WB MAINLANES) OVERPASS DETAILS, SEE SHTS 190-195

LP 1604
PLAN SHEET

SHEET 15 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					92
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP16C	

ETC



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

PROFILE SHEET

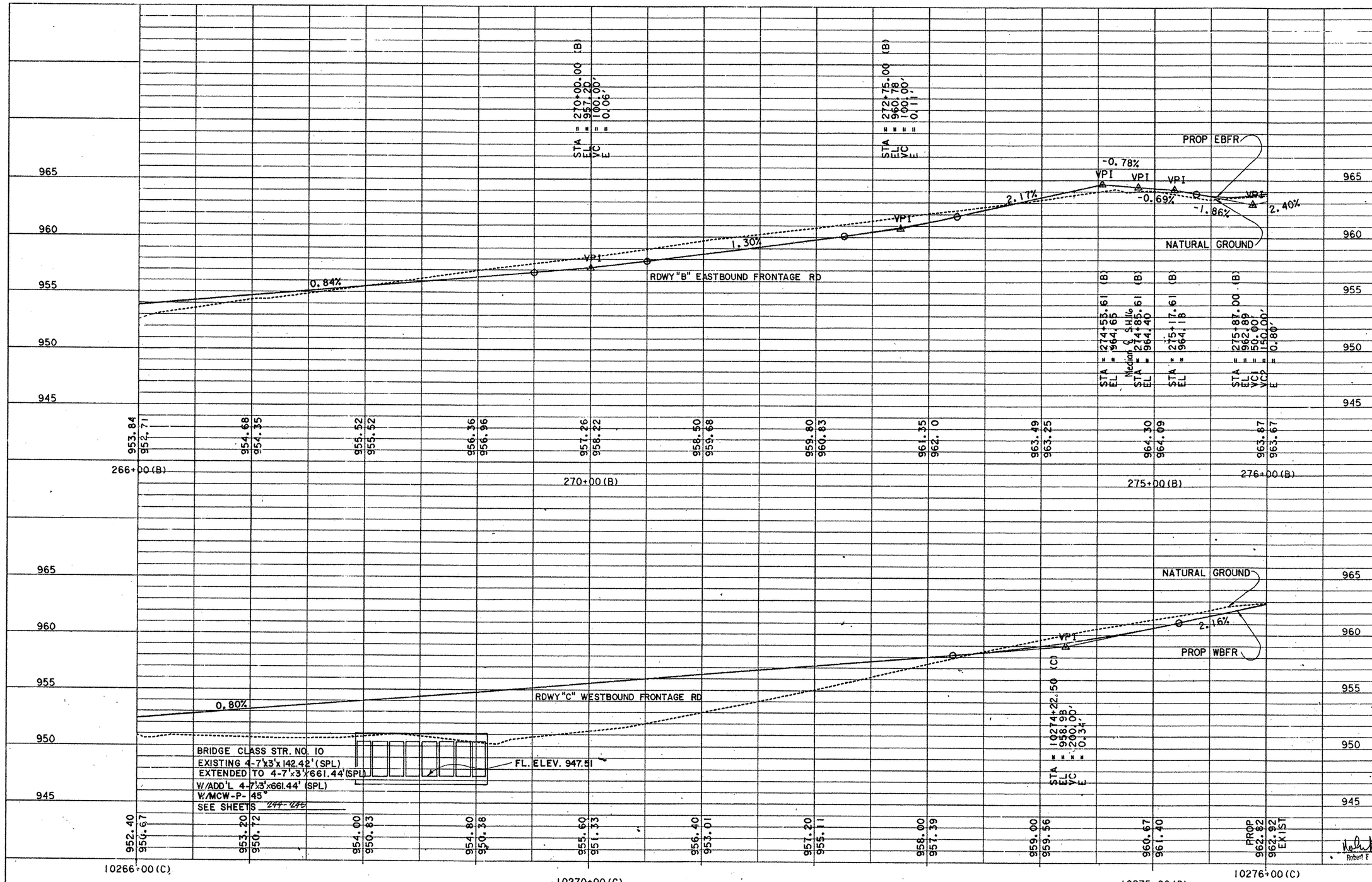
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			93
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90
Robert E. Magers Date

1604PRA25.DGN

PROF I



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

PROFILE SHEET

STATE OF TEXAS
ROBERT E. MARSH
24026
REGISTERED
PROFESSIONAL ENGINEER

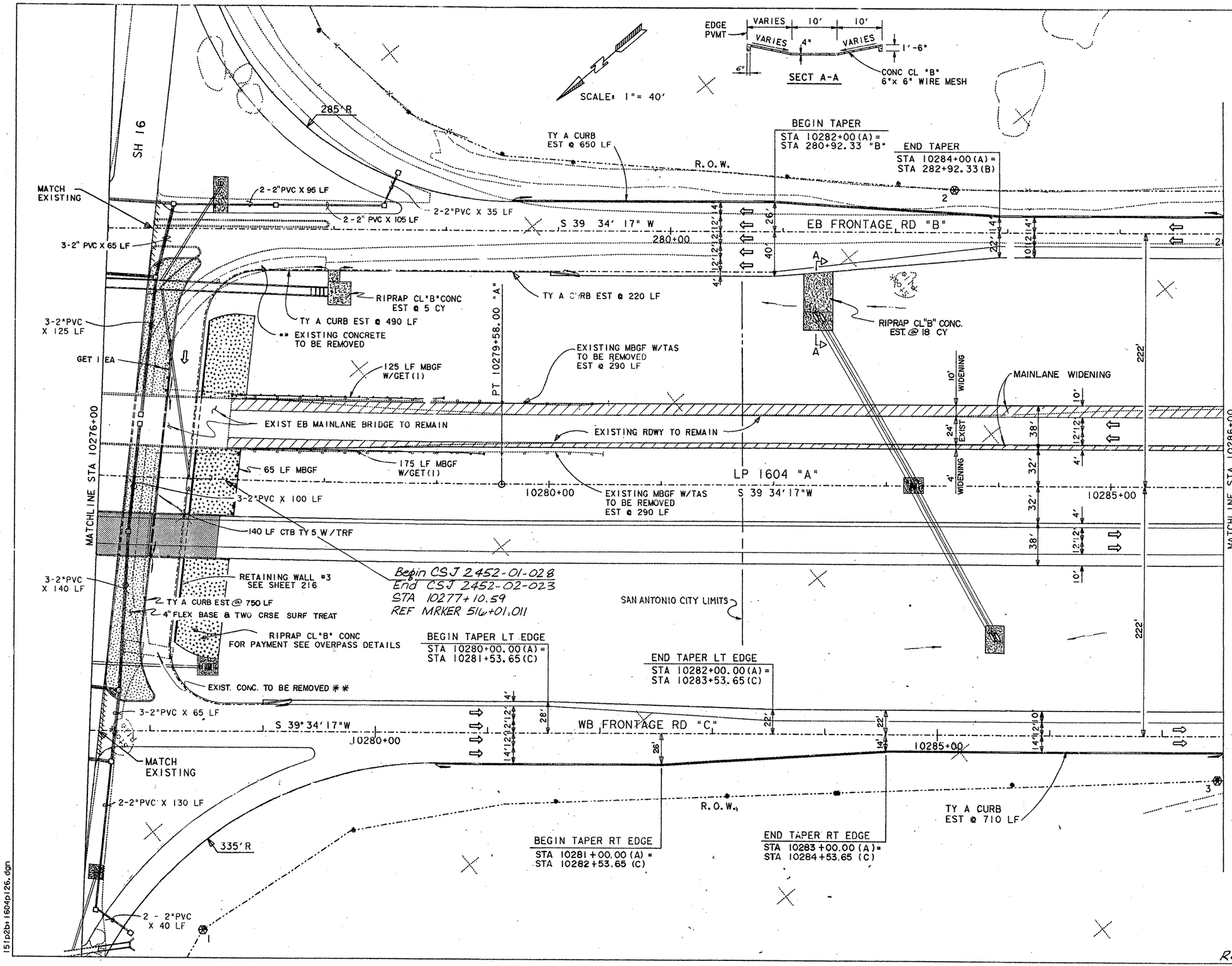
Robert E. Marsh P.E. 9-6-90
Robert E. Marsh Date

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		94

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRB25.DGN



ESTIMATED QUANTITIES

	ITEM	UNIT	QTY.
	PREP ROW	STA	10
	FURN & PLAC TPSL	SY	31728
	BRDCST SEED (BERMUDA)	SY	31728
#	FLEX BASE (DEL)(DC) (TY A GR 1 MOD)(CL 3)	CY	5028
✳	ASPH STAB BS(GR 4)(4")	SY	5538
# ✳	ONE CRSE SURF TREAT	SY	18159
✳	ASPH CONC(TY C)	SY	17534
✳	ASPH CONC(TY C)(SURF)	SY	19121
	CONC CURB (TY A)	LF	2820
⊗	ROW MARK (TY11)	EA	3
	MBGF (12 GA)(TIM POST)	LF	300
	GUARDRAIL EXTRUDER TERM	EA	3
	RIPRAP (CONC)(CL B)	CY	24
	REMOVE METAL BM GD FENCE	LF	580
	REMOVE TERM ANCH SECT	EA	2
	CEMENT STAB BASE (TY G)	CY	457
	PULL BOX	EA	12
	2" PVC (SCH 80)	LF	2295
	PLANING ASPHALTIC SURFACE	SY	911
	CTB TY 5	LF	140
	EXCAVATION	CY	42075
	EMBANK (ORD COMP)(TY B)	CY	37552

✳ FOR CONTRACTORS INFORMATION ONLY

✳✳ SUBSIDIARY TO PREP R.O.W.

INCLUDES QUANTITIES FOR TRAFFIC ISLANDS W/4" FLEX BASE & TWO CRSE SURF TREAT

◻ DENOTES PULL BOX

WHEELCHAIR RAMP; EST @ .5 CY EA RIPRAP (CONC)(CL B) *FOR DETAILS, SEE SHT# 147*

NOTE: PAVEMENT QUANTITIES ABOVE INCLUDE BANDERA RD INTERSECTION

BANDERA RD INTERSECTION & TURNAROUNDS LAYOUT SEE SHTS 122-123

BANDERA RD (WB MAINLANES) OVERPASS DETAILS, SEE SHTS 190-195

⊗ R.O.W. MARKERS (TY 11)	
1	398.53'RT STA 10277+02.69 "A"
2	260.00'LT STA 10283+60.01 "A"
3	260.00'RT STA 10285+95.65 "A"

STATE OF TEXAS
CAROL GREINER LUSCHEN
80459
REGISTERED PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

LP 1604
PLAN SHEET

SHEET 16 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS	-				95
STATE DIST NO	COUNTY	CONT.	SECT.	JOB		HWY. NO
15	BEXAR	2452	02	023		LP16

Revised 10-4-93

ETC

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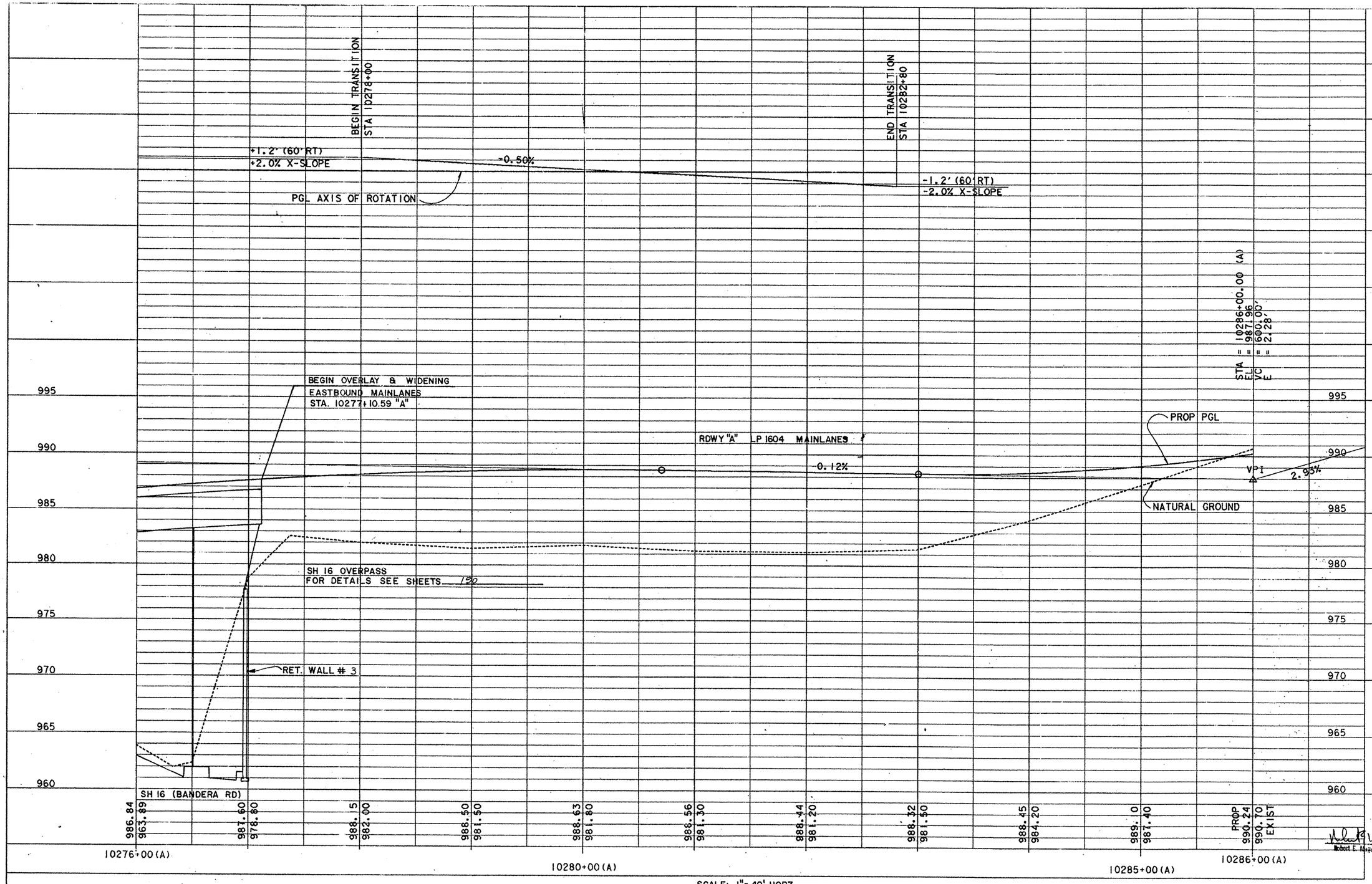


SCALE: 1" = 40' HORZ.
1" = 4' VERT.

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		96

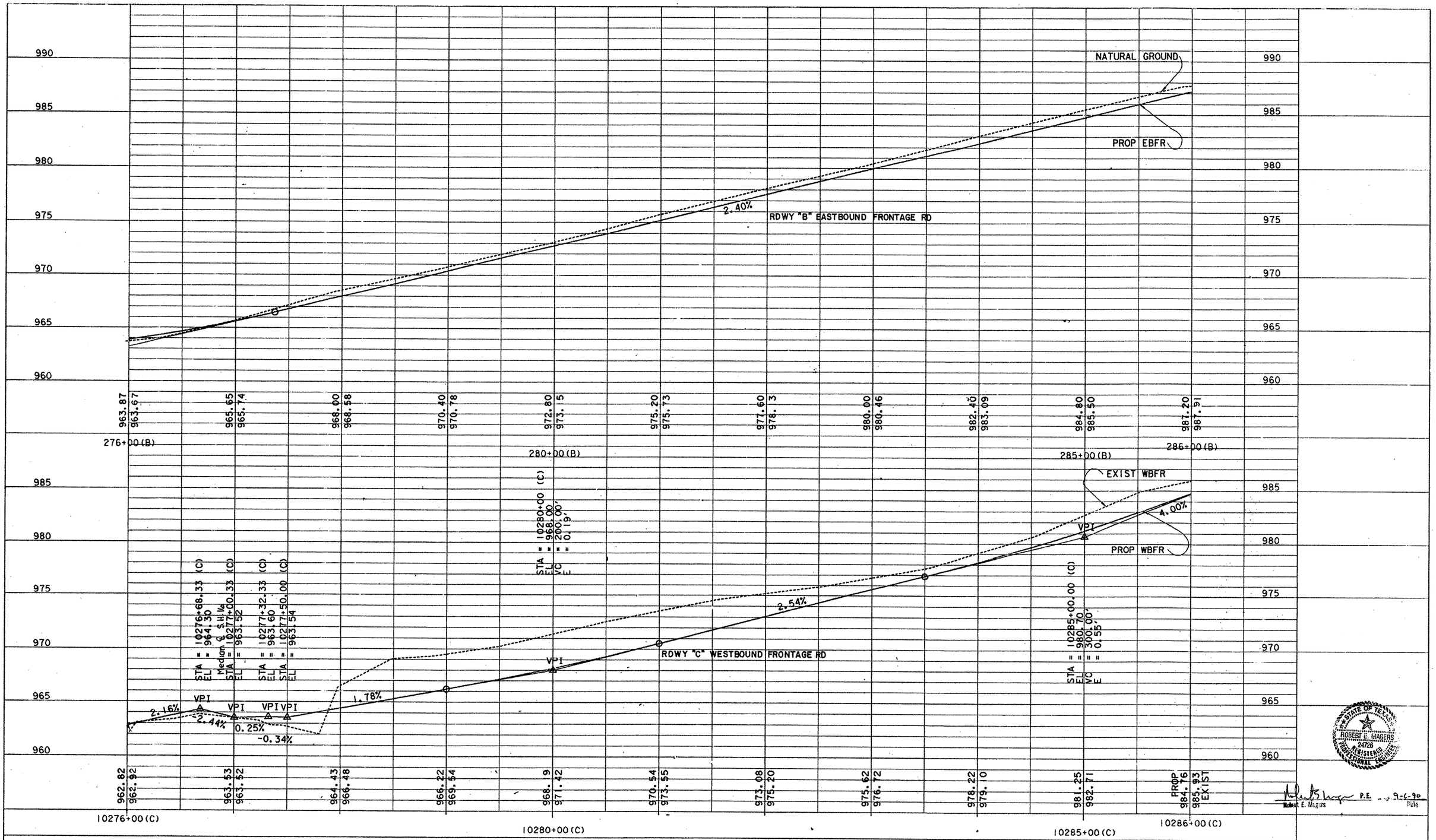
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90

1604PRA26.DGN

PROFI



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

PROFILE SHEET

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

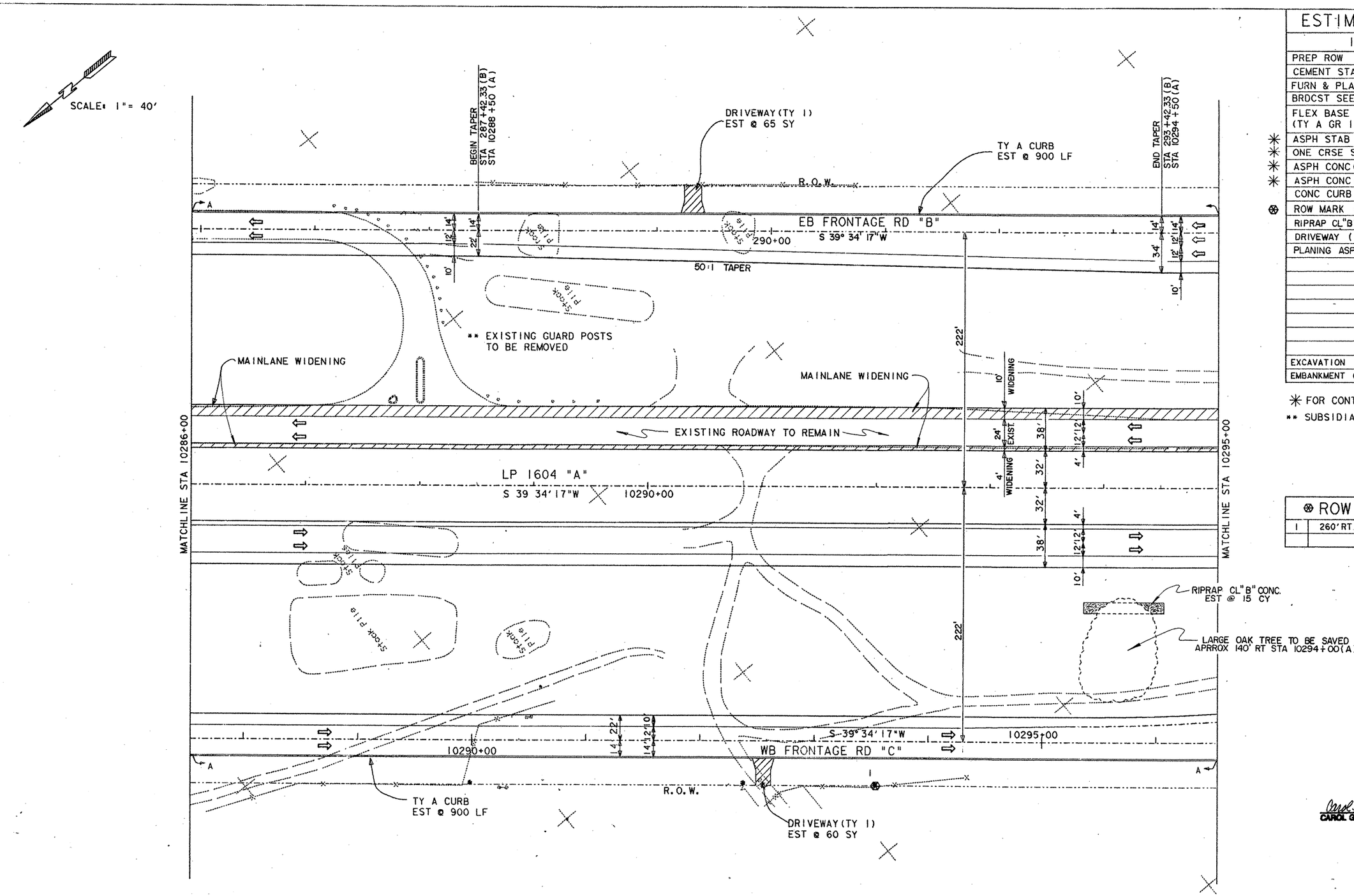
Robert E. Magers P.E. 9-6-90
Robert E. Magers Date

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		97

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRB26.DGN



ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
PREP ROW	STA	9
CEMENT STAB BASE (TY G)	CY	444
FURN & PLAC TPSL	SY	31879
BRDCST SEED (BERMUDA)	SY	31879
FLEX BASE (DEL) (DC) (TY A GR I MOD) (CL 3)	CY	3164
✳ ASPH STAB BS (GR 4) (4")	SY	5600
✳ ONE CRSE SURF TREAT	SY	13550
✳ ASPH CONC (TY C)	SY	12950
✳ ASPH CONC (TY C) (SURF)	SY	14800
CONC CURB (TY A)	LF	1800
⊛ ROW MARK (TY II)	EA	1
RIPRAP CL"B" CONC.	CY	15
DRIVEWAY (TY I)	SY	125
PLANING ASPHALTIC SURFACE	SY	722
EXCAVATION	CY	68955
EMBANKMENT (ORD COMP) (TY B)	CY	253

✳ FOR CONTRACTORS INFORMATION ONLY
** SUBSIDIARY TO VARIOUS BID ITEMS

⊛ ROW MARKERS (TY II)

1	260' RT STA 10292+00 (A)

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

LP 1604
PLAN SHEET

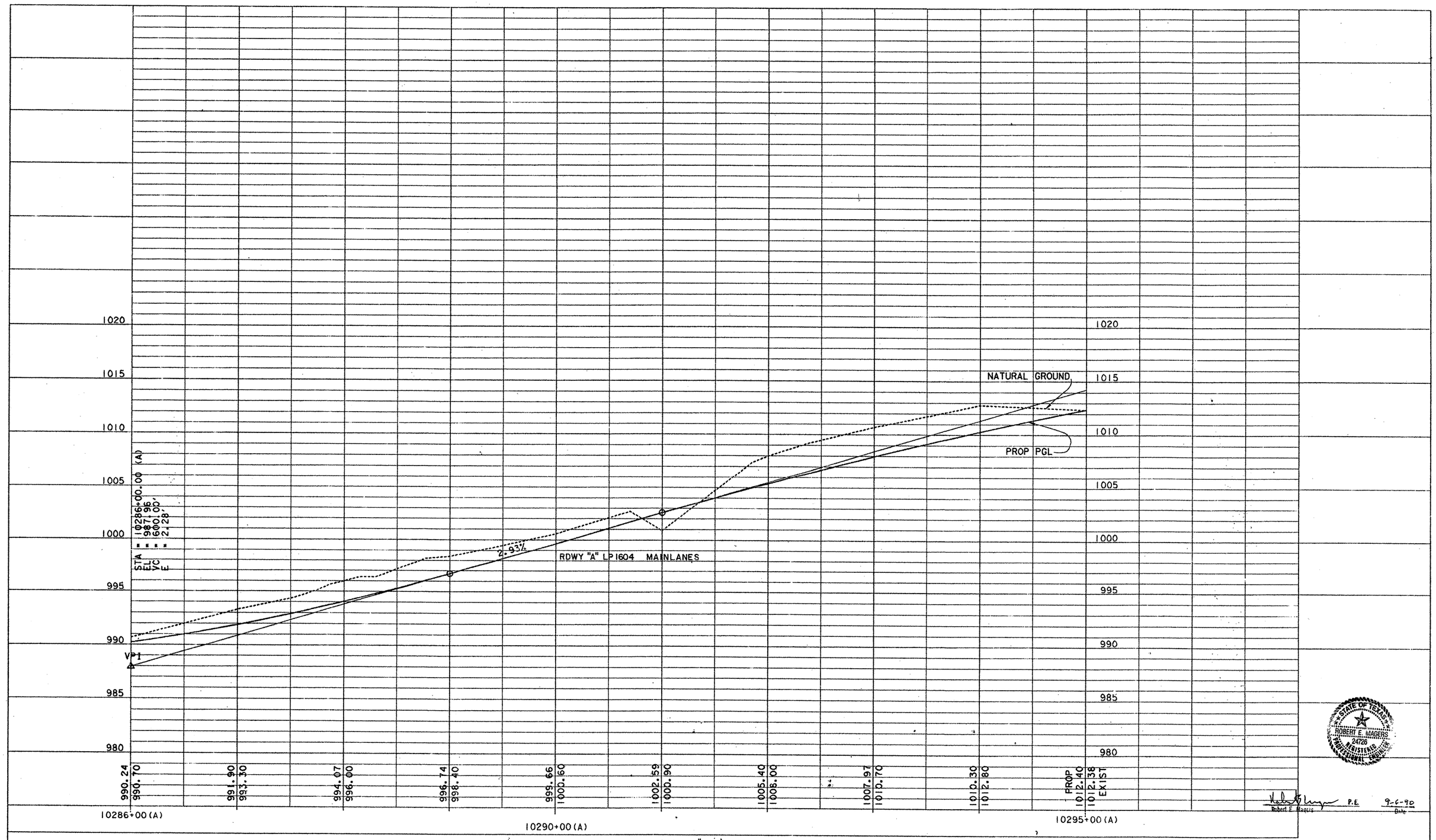
SHEET 17 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					98
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY NO	
15	BEXAR	2452	02	023	LF	

ETC

Revised 10-4-93

1604PL27.DGN



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

Robert E. Magers P.E. 9-6-90 Date

STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

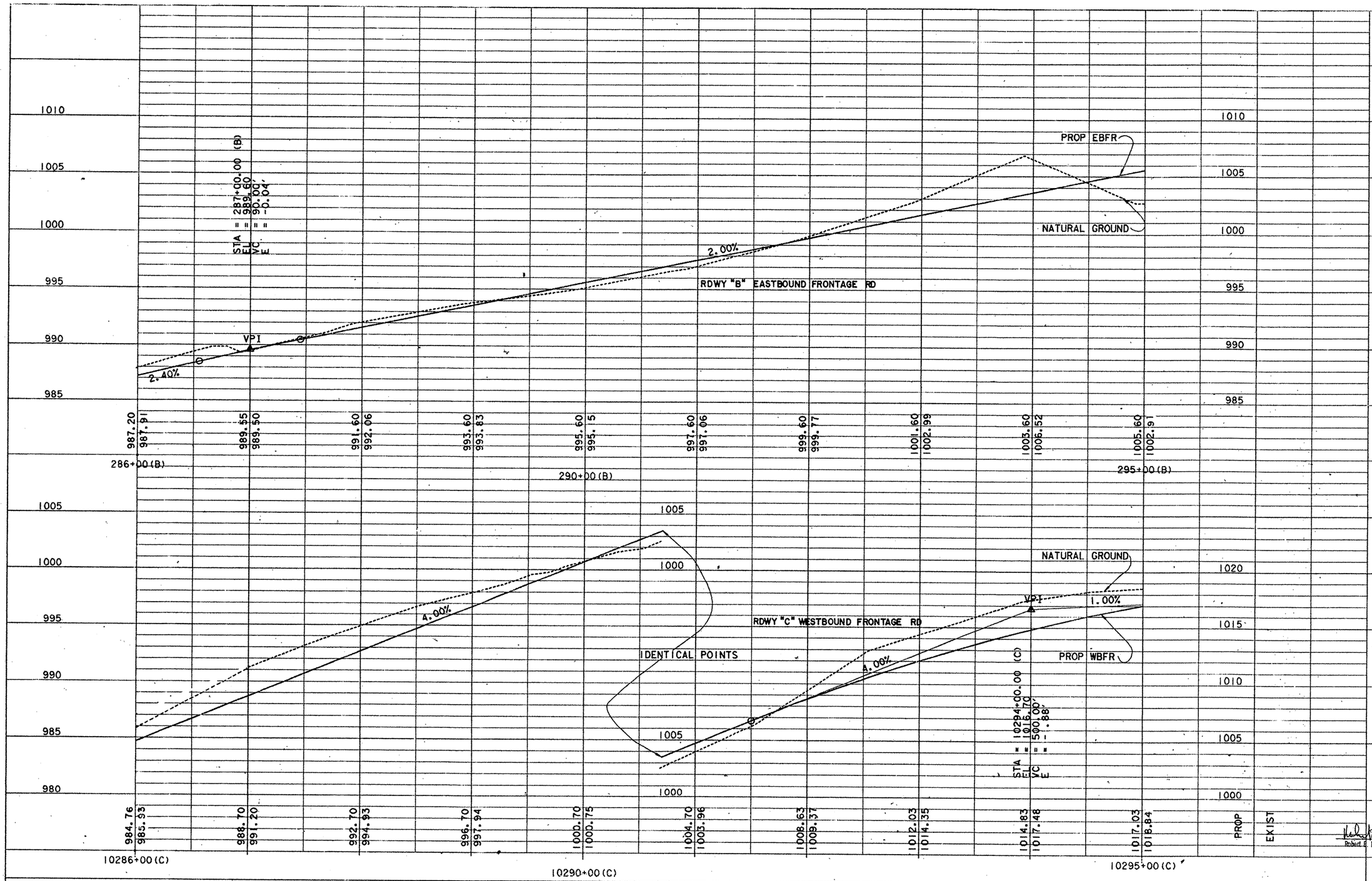
PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		93

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA27.DGN

PROFI



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

PROFILE SHEET

Robert E. Meyers P.E. 9-6-90 Date

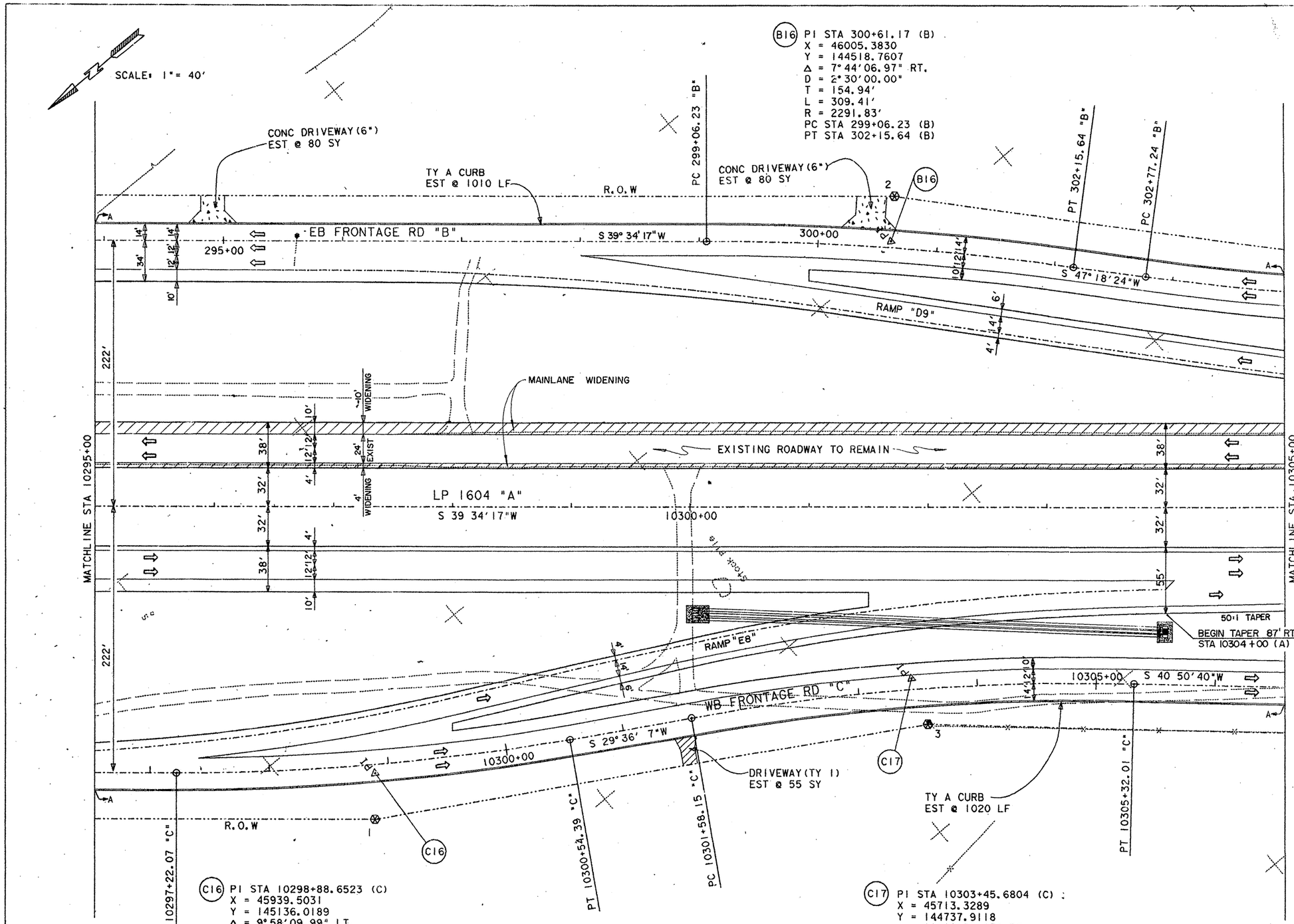
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		100

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRB27.DGN

PROF I



B16 PI STA 300+61.17 (B)
X = 46005.3830
Y = 144518.7607
Δ = 7°44'06.97" RT.
D = 2°30'00.00"
T = 154.94'
L = 309.41'
R = 2291.83'
PC STA 299+06.23 (B)
PT STA 302+15.64 (B)

C16 PI STA 10298+88.6523 (C)
X = 45939.5031
Y = 145136.0189
Δ = 9°58'09.99" LT.
D = 3°00'00.00"
T = 166.58'
L = 332.31'
R = 1909.86'
PC STA 10297+22.0745 (C)
PT STA 10300+54.3892 (C)

C17 PI STA 10303+45.6804 (C)
X = 45713.3289
Y = 144737.9118
Δ = 11°12'56.27" RT.
D = 3°00'00.00"
T = 187.53'
L = 373.85'
R = 1909.86'
PC STA 10301+58.1540 (C)
PT STA 10305+32.0084 (C)

ESTIMATED QUANTITIES

	ITEM	UNIT	QTY.
	PREP ROW	STA	10
	FURN & PLAC TPSL	SY	28500
	BRDCST SEED (BERMUDA)	SY	28500
	FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	4408
✳	ASPH STAB BS (GR 4) (4")	SY	8432
✳	ONE CRSE SURF TREAT	SY	19121
✳	ASPH CONC (TY C)	SY	19204
✳	ASPH CONC (TY C) (SURF)	SY	20811
	CONC CURB (TY A)	LF	2030
⊗	ROW MARK (TY 11)	EA	3
	CONC DRIVEWAY (6")	SY	160
	DRIVEWAY (TY 1)	SY	55
	CEMENT STAB BASE (TY G)	CY	~~494~~
	PLANING ASPHALTIC SURFACE	SY	1589
	EXCAVATION	CY	52756
	EMBANKMENT (ORD COMP) (TY B)	CY	1096

✳ FOR CONTRACTORS INFORMATION ONLY
** SUBSIDIARY TO VARIOUS BID ITEMS

FOR RAMP "D9" LAYOUT
SEE SHT 136-137

FOR RAMP "E8" LAYOUT
SEE SHT 143

⊗ ROW MARKERS (TY 11)

1	260.00' RT STA 10297+35.00 (A)
2	259.87' LT STA 10301+72.36 (A)
3	180.00' RT STA 10302+00.00 (A)

STATE OF TEXAS
CAROL GREINER LUSCHEN
80450
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

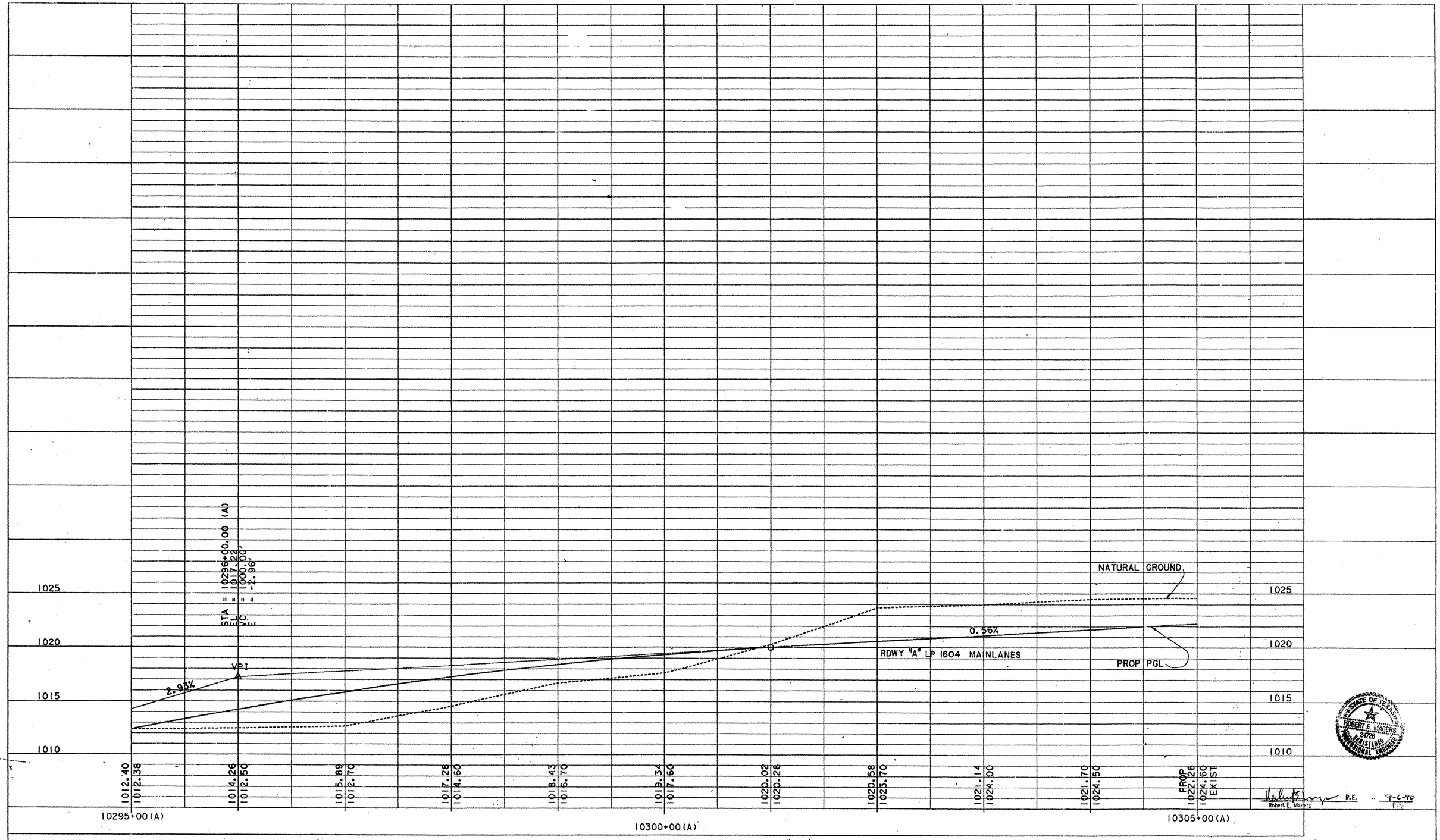
LP 1604
PLAN SHEET
SHEET 18 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS	-			101
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.
15	BEXAR	2452	02	023	LP1604

Revised 10-4-93

ETC

1604PL28.DGN



Robert E. Masers P.E. 9-6-90
Date

SCALE: 1" = 40' HORZ.
1" = 4' VERT.

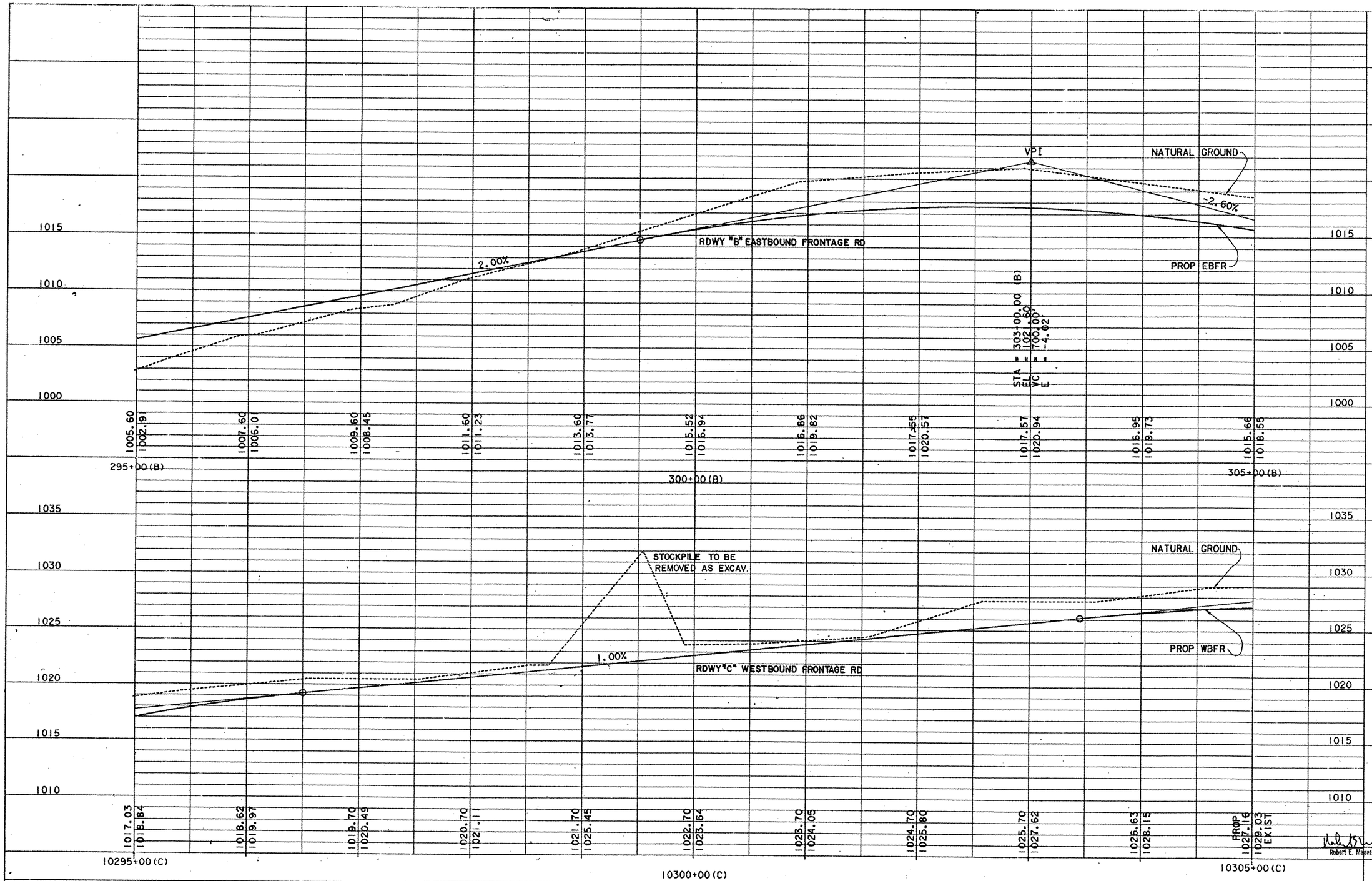
PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		102

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA28.DGN

PROFI



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

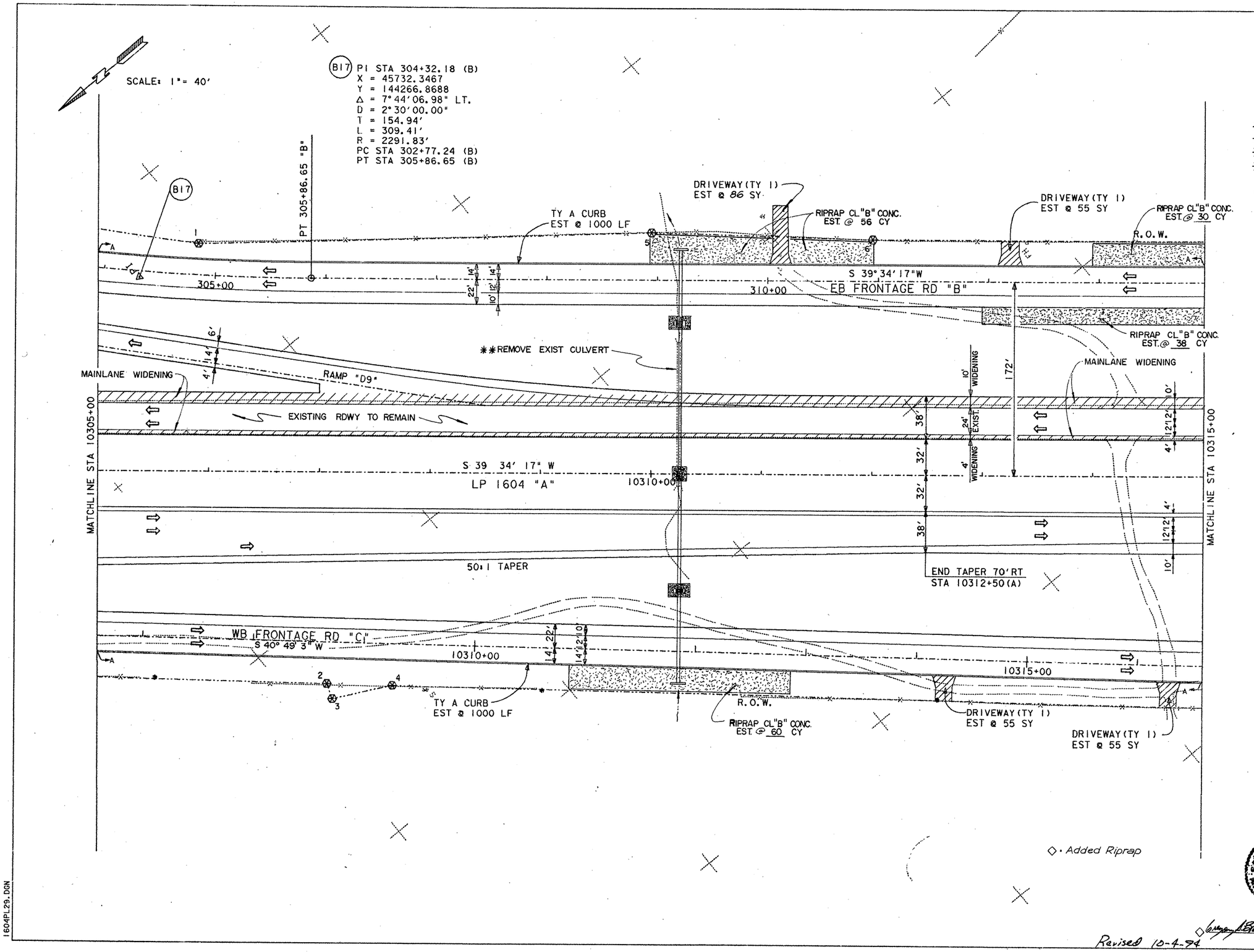
Robert E. Magers P.E. 9-6-90
Date

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	"		103
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRB28.DGN

PROFI



ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
PREP ROW	STA	10
FURN & PLAC TPSL	SY	24300
BRDCST SEED (BERMUDA)	SY	24300
FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	3696
✳ ASPH STAB BS (GR 4) (4")	SY	7262
✳ ONE CRSE SURF TREAT	SY	16096
✳ ASPH CONC (TY C)	SY	15388
✳ ASPH CONC (TY C) (SURF)	SY	17444
CONC CURB (TY A)	LF	2000
⊛ ROW MARK (TY 11)	EA	6
DRIVEWAY (TY 1)	SY	251
CEMENT STAB BASE (TY G)	CY	494
PLANING ASPHALTIC SURFACE	SY	2467
RIPRAP CL "B" CONC. (4")	CY	184
EXCAVATION	CY	27041
EMBANKMENT (ORD COMP) (TY B)	CY	28014

✳ FOR CONTRACTORS INFORMATION ONLY

** SUBSIDIARY TO VARIOUS BID ITEMS

FOR RAMP "D9" LAYOUT
SEE SHTS 136-137

⊛ ROW MARKERS (TY 11)

1	203.05' LT STA 10305+90.67 (A)
2	191.28' RT STA 10307+07.54 (A)
3	205.04' RT STA 10307+12.59 (A)
4	192.60' RT STA 10307+66.83 (A)
5	215.00' LT STA 10310+00.00 (A)
6	210.00' LT STA 10312+00.00 (A)

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

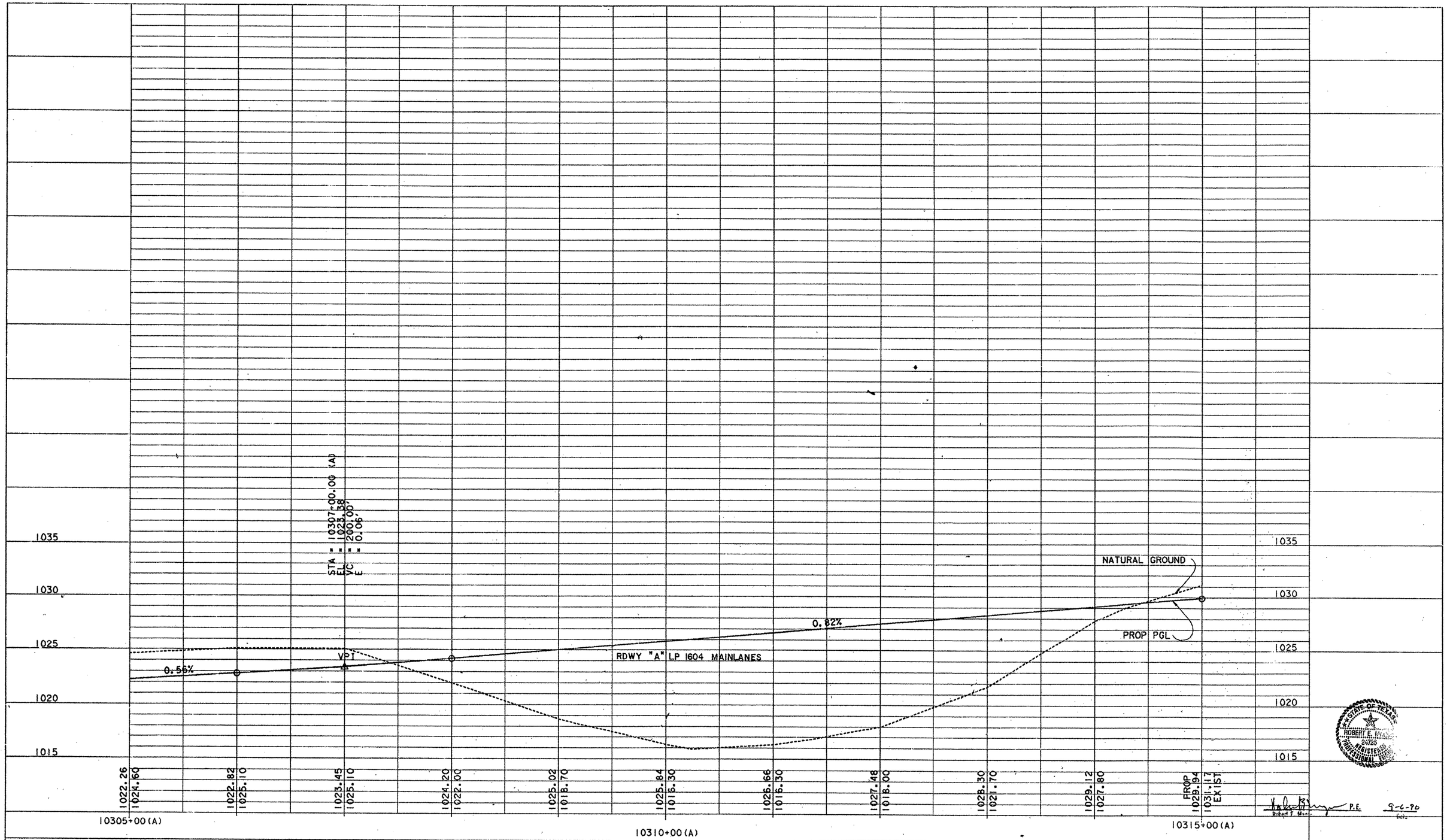
LP 1604
PLAN SHEET
SHEET 19 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				104
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.
15	BEXAR	2452	02	023	LP16C

ETC

Revised 10-4-94

1604PL29.DGN



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

PROFILE SHEET

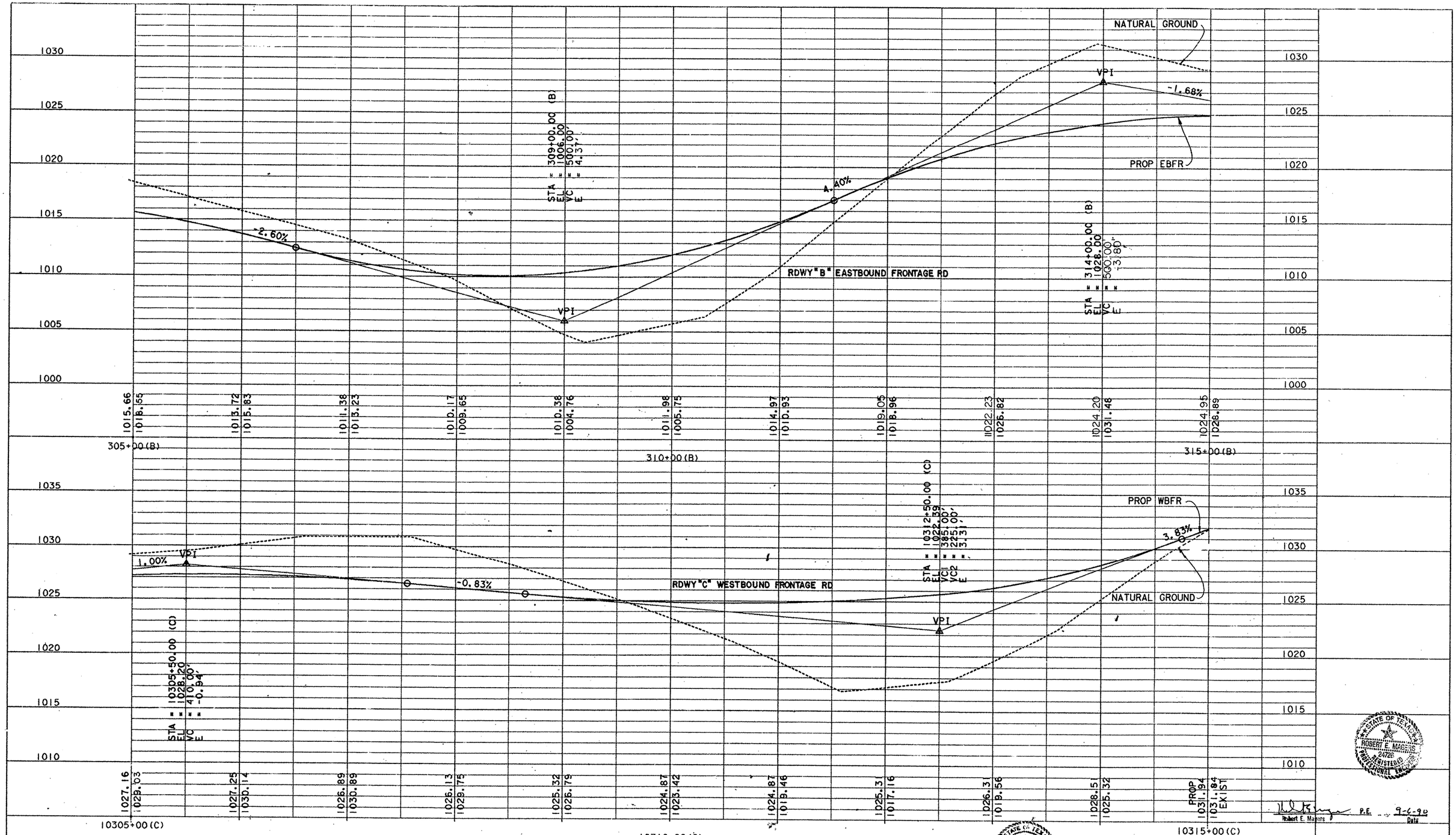
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		105

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA29. DGN

PROFI



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

◇ Revised Profile

◇ Gregory A. Biediger P.E.
Mar 26, 1993

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED
PROFESSIONAL ENGINEER

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90
Date

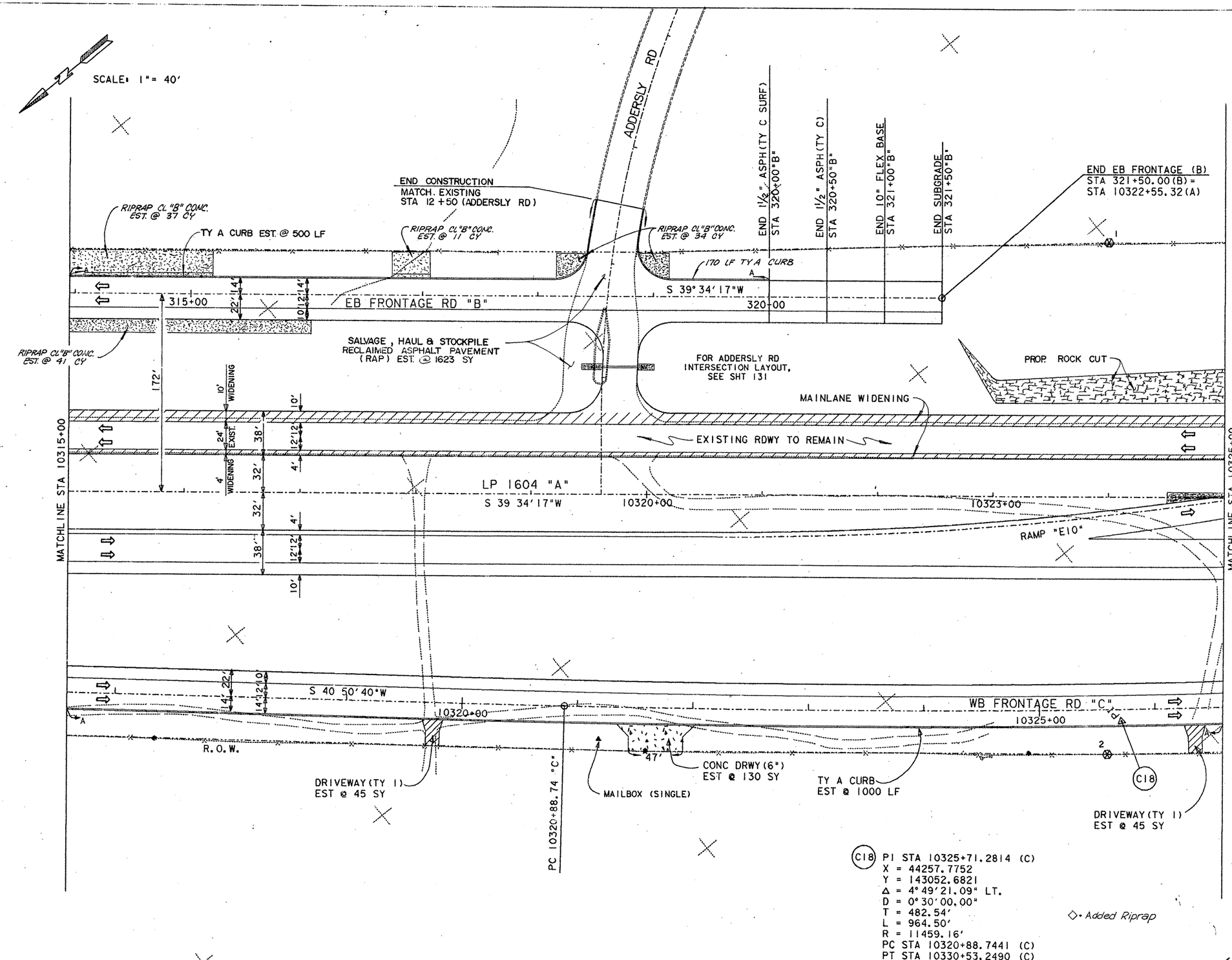
PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		106

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRB29.DGN

PROF I



C18 PI STA 10325+71.2814 (C)
X = 44257.7752
Y = 143052.6821
Δ = 4° 49' 21.09" LT.
D = 0° 30' 00.00"
T = 482.54'
L = 964.50'
R = 11459.16'
PC STA 10320+88.7441 (C)
PT STA 10330+53.2490 (C)

◇ = Added Riprap

ESTIMATED QUANTITIES

	ITEM	UNIT	QTY.
	PREP ROW	STA	10
	FURN & PLAC TPSL	SY	26531
	BRDCST SEED (BERMUDA)	SY	26531
	FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	3221
✳	ASPH STAB BS (GR 4) (4")	SY	6972
✳	ONE CRSE SURF TREAT	SY	14299
✳	ASPH CONC (TY C)	SY	13628
✳	ASPH CONC (TY C) (SURF)	SY	15711
	CONC CURB (TY A)	LF	1670
⊗	ROW MARK (TY 11)	EA	2
	CONC DRIVEWAY (6")	SY	130
	DRIVEWAY (TY 1)	SY	90
	MAILBOX (SINGLE)	EA	1
	CEMENT STAB BASE (TY G)	CY	454
	SALVAGE, HAUL & STOCKPILE RECLAIMED ASPH PVMT (RAP)	SY	1623
	PLANING ASPHALTIC SURFACE	SY	2600
	RIPRAP CL "B" CONC. (4")	CY	123
	EXCAVATION	CY	63451
	EMBANKMENT (ORD COMP) (TY B)	CY	5034

✳ FOR CONTRACTORS INFORMATION ONLY

FOR RAMP E10 LAYOUT SEE SHEET 145

⊗ ROW MARKERS (TY 11)

1	220' LT STA 10324+00 (A)
2	220' RT STA 10324+00 (A)

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

Gregory A. Blanke P.E. Mar 26, 1993

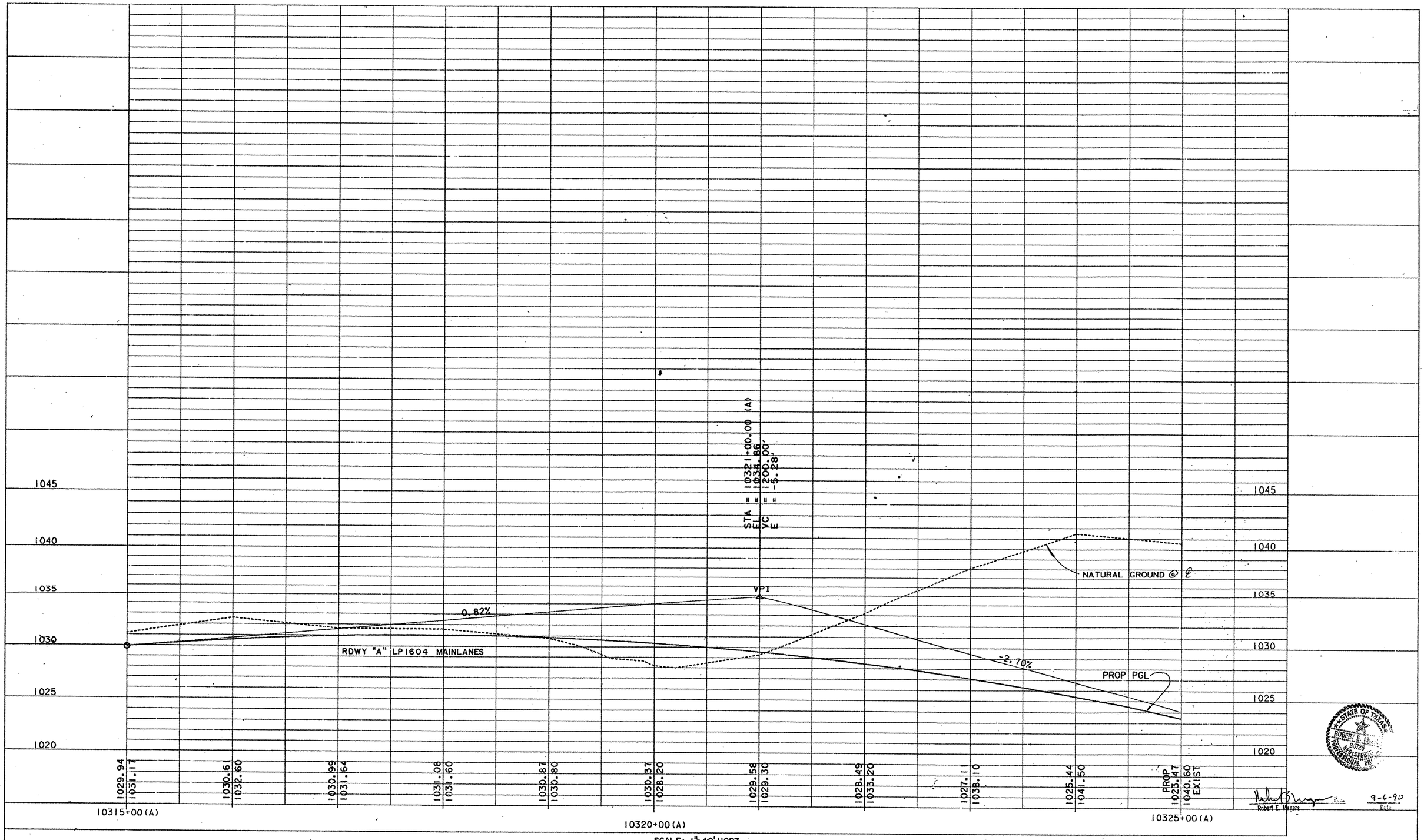
Revised 10-4-93

LP 1604
PLAN SHEET
SHEET 20 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				107
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.
15	BEXAR	2452	02	023	LP1604

ETC

1604PL30.DGN



SCALE: 1" = 40' HORZ.
1" = 4' VERT.

PROFILE SHEET

STATE OF TEXAS
ROBERT E. MAGERS
2720
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers
Robert E. Magers

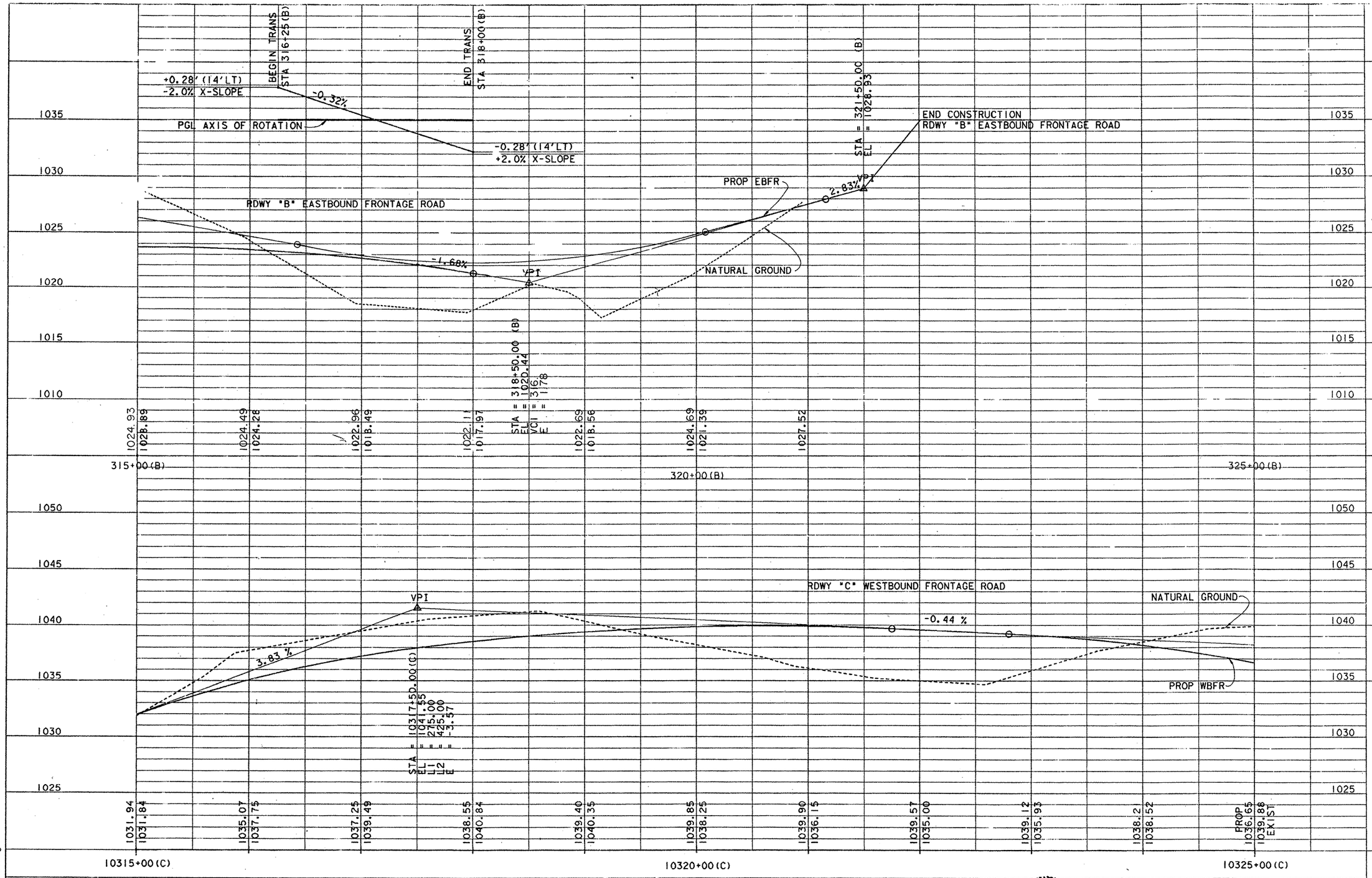
9-6-90
Date

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		108

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA30.DGN

PROF I



SCALE: 1"=40' H
1"= 4' V

◇ Revised Profile

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED PROFESSIONAL ENGINEER

Gregory A. Biediger P.E.
Mar 26, 1993

STATE OF TEXAS
CAROL GREINER LUSCHER
69459
REGISTERED PROFESSIONAL ENGINEER

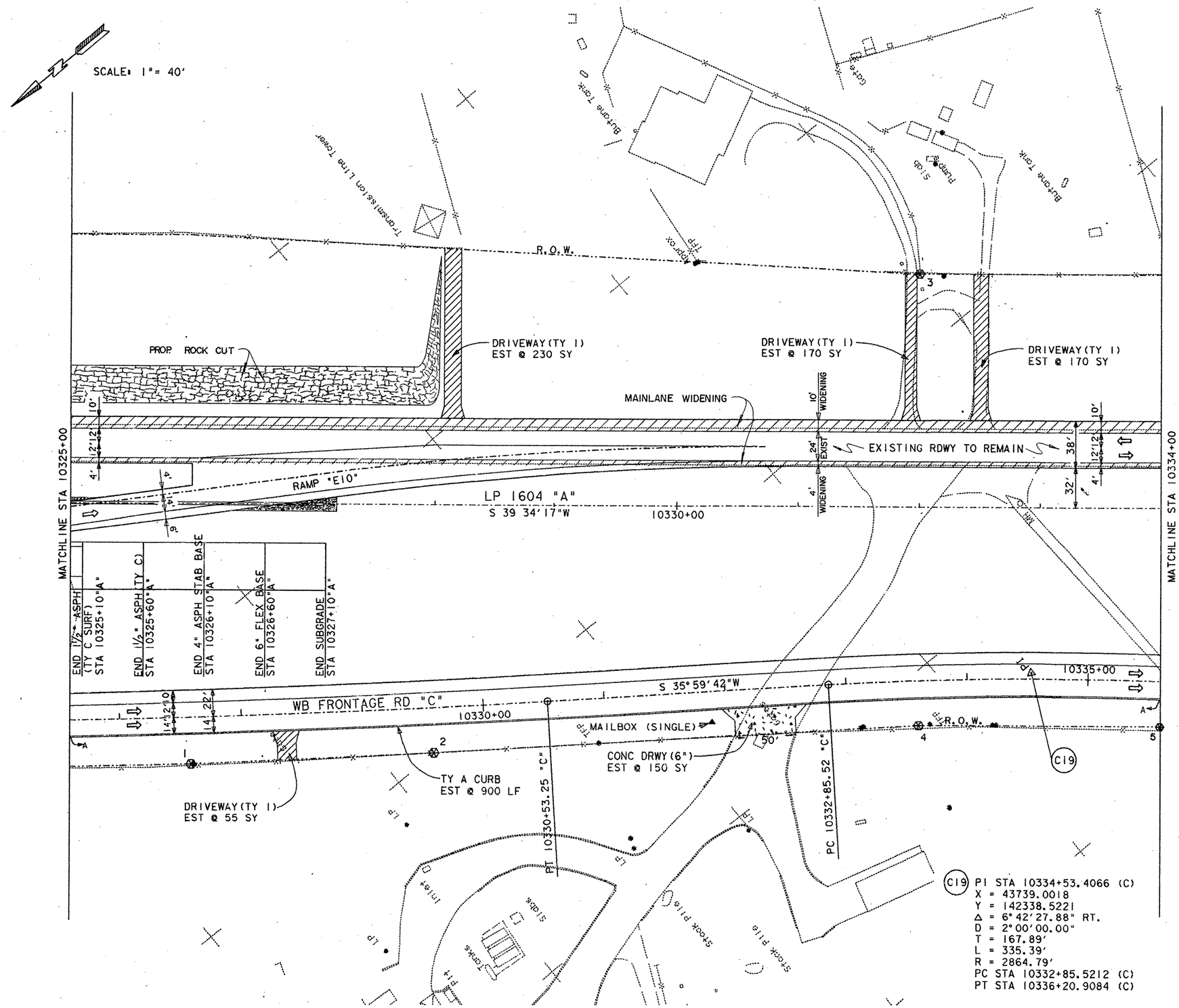
The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec. 19, 1991

Carol G. Luschen

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			109
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

15bx pn: 1604prb30.dgn



C19 PI STA 10334+53.4066 (C)
X = 43739.0018
Y = 142338.5221
Δ = 6° 42' 27.88" RT.
D = 2° 00' 00.00"
T = 167.89'
L = 335.39'
R = 2864.79'
PC STA 10332+85.5212 (C)
PT STA 10336+20.9084 (C)

ESTIMATED QUANTITIES

	ITEM	UNIT	QTY.
	PREP ROW	STA	9
	FURN & PLAC TPSL	SY	17401
	BRDCST SEED (BERMUDA)	SY	17401
	FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	1792
✳	ASPH STAB BS (GR 4) (4")	SY	3956
✳	ONE CRSE SURF TREAT	SY	7948
✳	ASPH CONC (TY C)	SY	7534
✳	ASPH CONC (TY C) (SURF)	SY	9563
	CONC CURB (TY A)	LF	900
⊛	ROW MARK (TY 11)	EA	5
	CONC DRWY (6")	SY	150
	DRIVEWAY (TY 1)	SY	625
	MAILBOX (SINGLE)	EA	1
	CEMENT STAB BASE (TY G)	CY	444
	PLANING ASPHALTIC SURFACE	SY	667
	EXCAVATION	CY	51619
	EMBANKMENT (ORD COMP) (TY B)	CY	488

✳ FOR CONTRACTORS INFORMATION ONLY

FOR RAMP "E10" LAYOUT
SEE SHT 145

⊛ ROW MARKERS (TY 11)

1	215' RT STA 10326+00 (A)
2	205' RT STA 10328+00 (A)
3	190' LT STA 10332+00 (A)
4	180' RT STA 10332+00 (A)
5	180' RT STA 10334+00 (A)

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

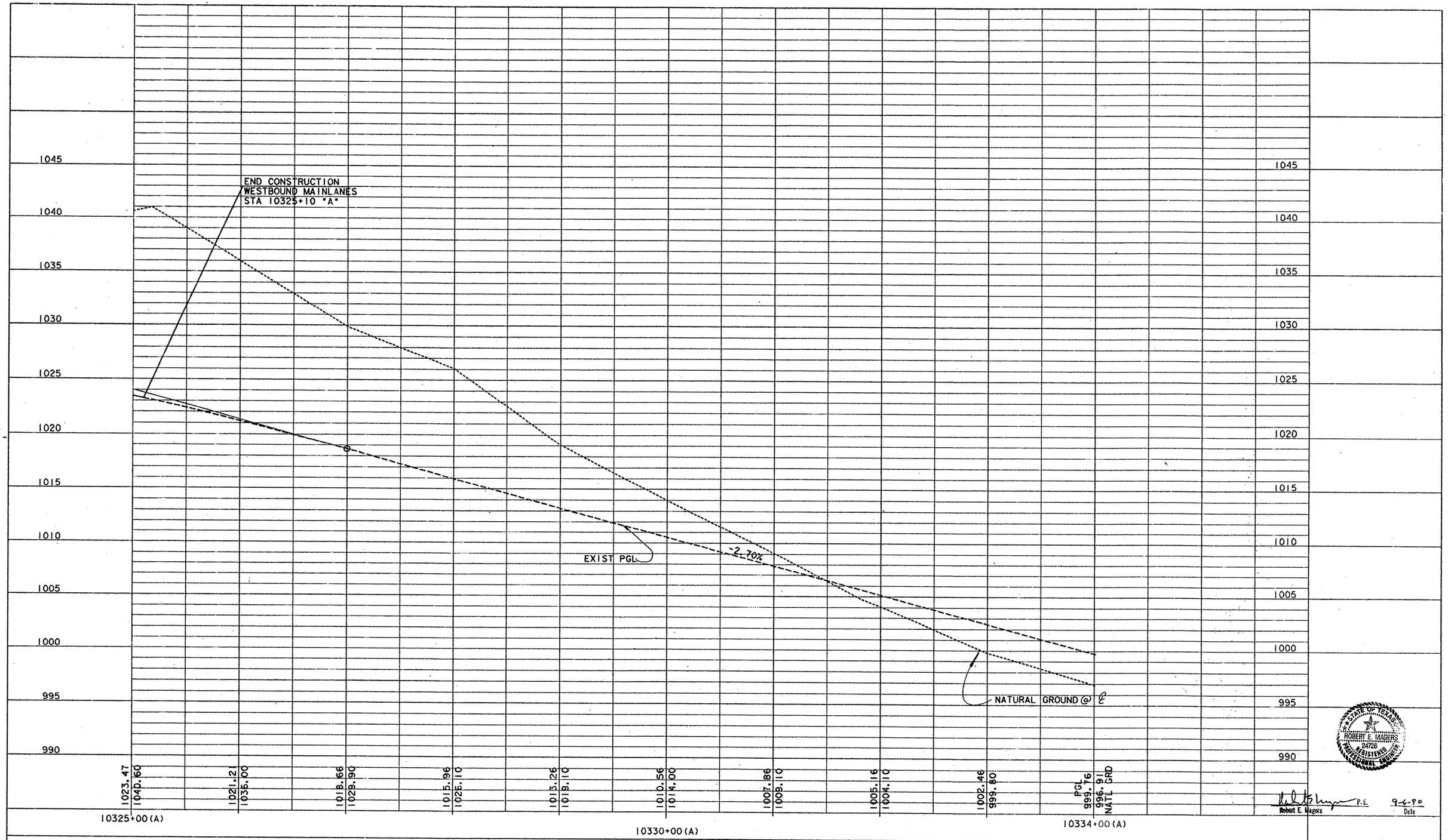
LP 1604
PLAN SHEET
SHEET 21 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					110
STATE DIST NO	COUNTY	CONT.	SECT.	JOB		HWY. NO.
15	BEXAR	2452	02	023		LP1604

Revised 10-4-93

FTC

1604PL31.DGN



SCALE: 1"=40'H
1"= 4'V

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		///

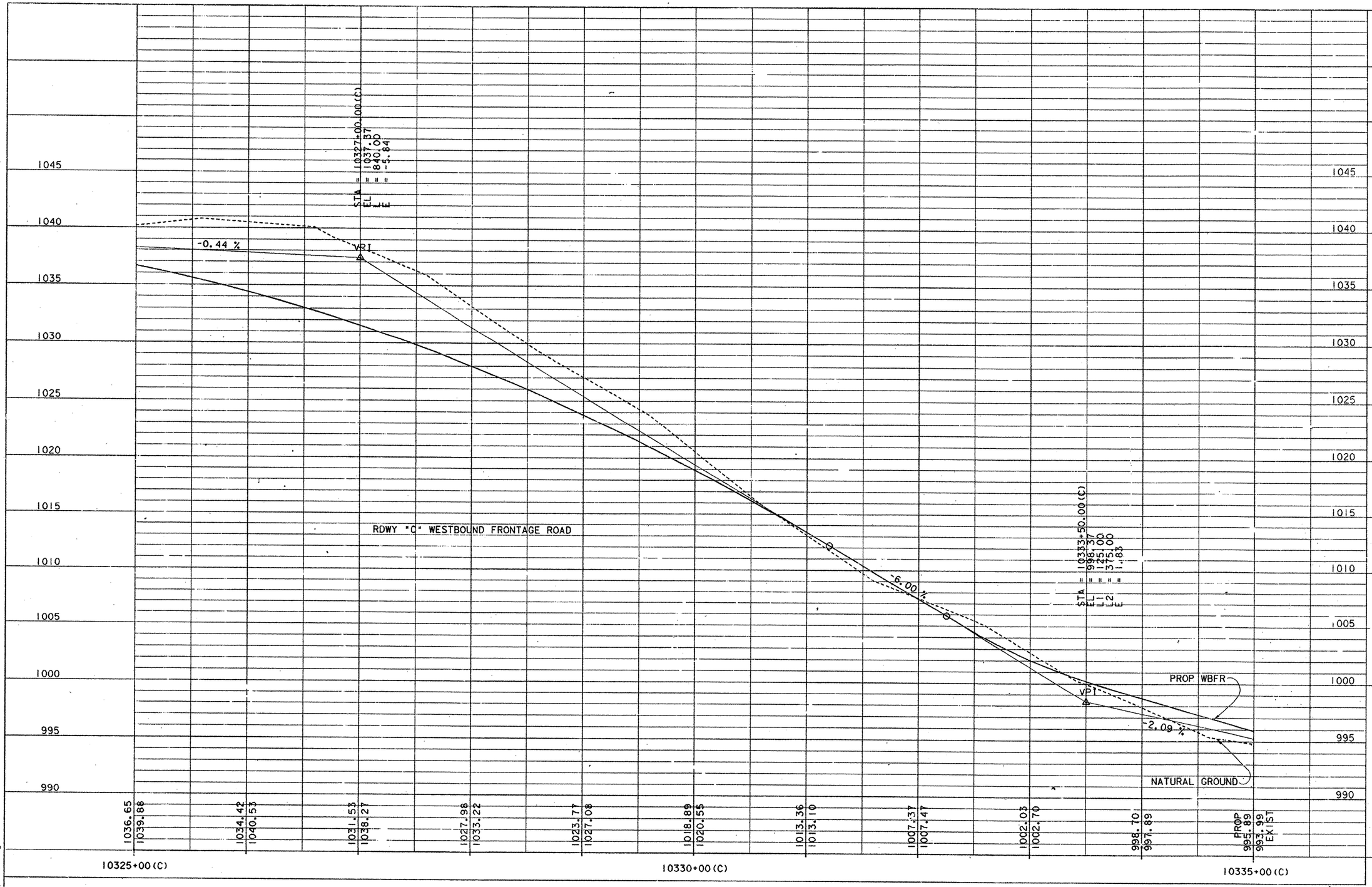
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90
Date

1604PRA31.DGN

PROFI



SCALE: 1"=40' H
1"= 4' V

PROFILE SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		112

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

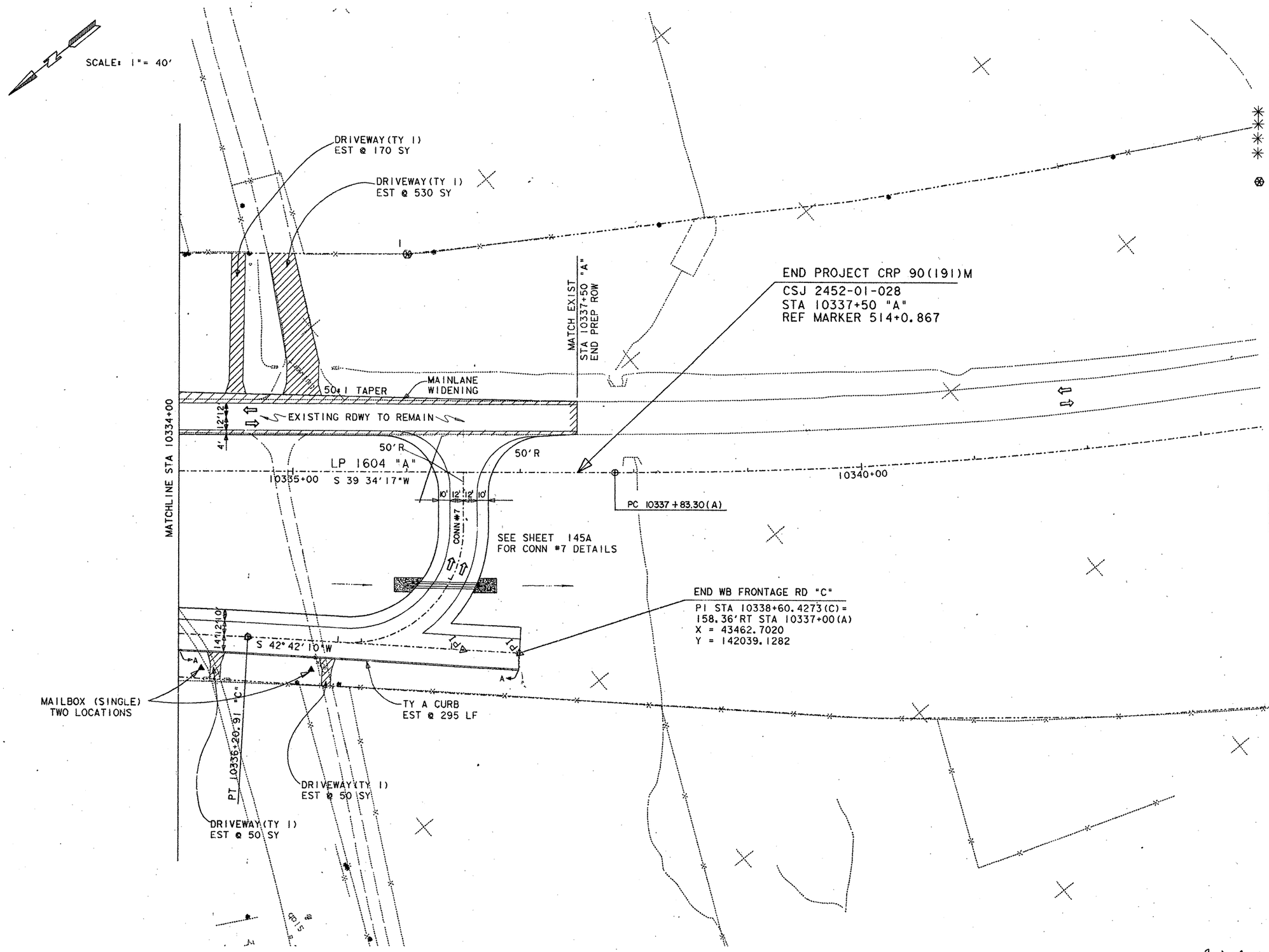
STATE OF TEXAS
CAROL GREINER LUSCHER
69459
REGISTERED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec. 19, 1991

Carol G. Luschen

15bxpnt 1604prb31.dgn

PROF 1



ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
PREP ROW	STA	3.5
FURN & PLAC TPSL	SY	7638
BRDCST SEED (BERMUDA)	SY	7638
FLEX BASE (DEL) (DC) (TY A GR 1 MOD) (CL 3)	CY	624
✳ ASPH STAB BS (GR 4) (4")	SY	1491
✳ ONE CRSE SURF TREAT	SY	2841
✳ ASPH CONC (TY C)	SY	2691
✳ ASPH CONC (TY C) (SURF)	SY	3625
CONC CURB (TY A)	LF	295
⊛ ROW MARK (TY II)	EA	1
DRIVEWAY (TY I)	SY	800
MAILBOX (SINGLE)	EA	2
CEMENT STAB BASE (TY G)	CY	102
EXCAVATION	CY	567
EMBANKMENT (ORD COMP) (TY B)	CY	4260

✳ FOR CONTRACTORS INFORMATION ONLY

⊛ ROW MARKERS (TY II)

1	190' LT STA 10336+00 (A)

STATE OF TEXAS
CAROL GREINER LUSCHEN
68459
REGISTERED PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

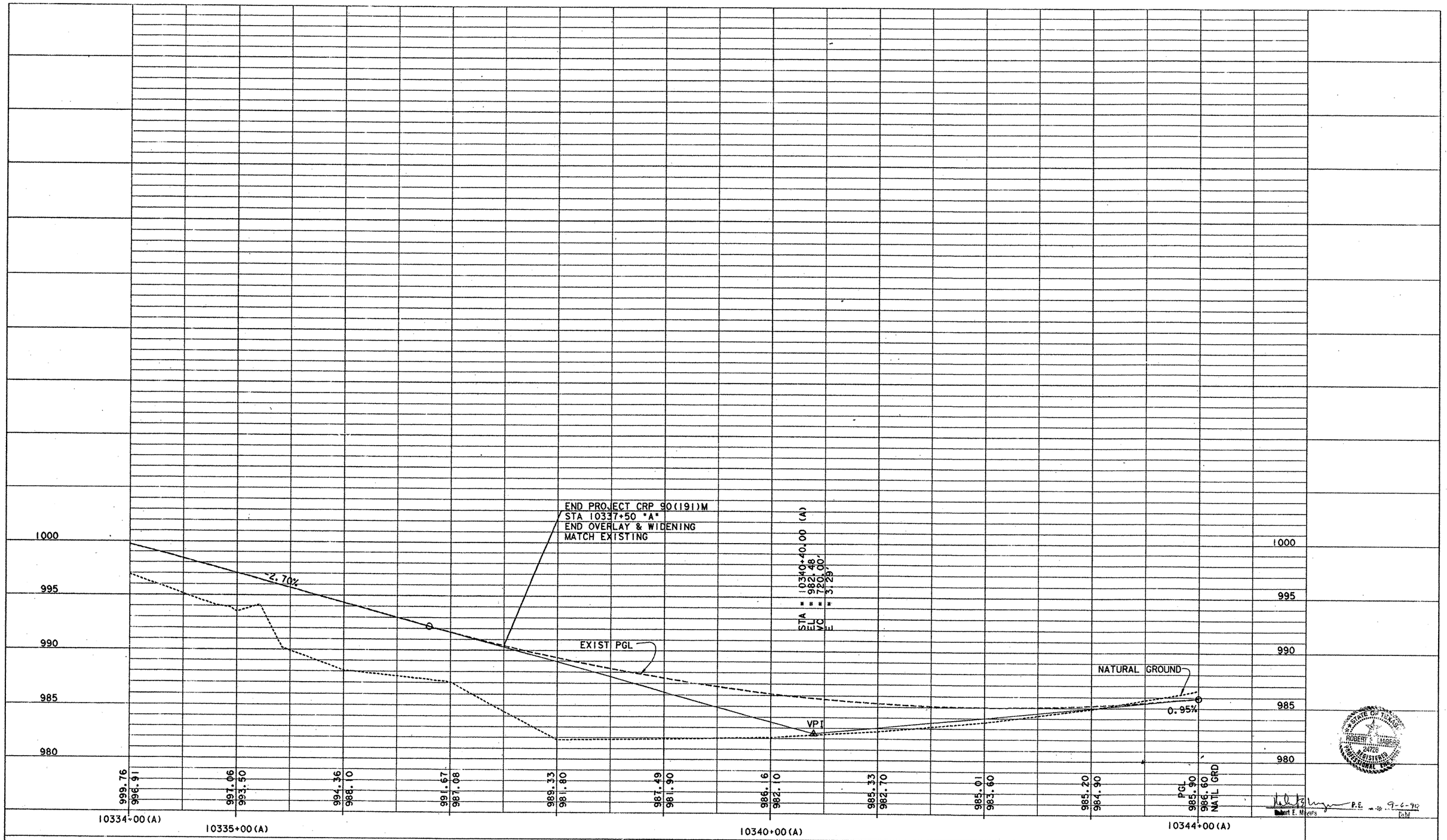
LP 1604
PLAN SHEET
SHEET 22 OF 22

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				113
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.
15	BEXAR	2452	02	023	LP1604

ETC

Revised 10-4-93

1604PL32.DGN



SCALE: 1"=40' H
1"= 4' V

PROFILE SHEET

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

P.E. 9-6-90
Robert E. Magers
Date

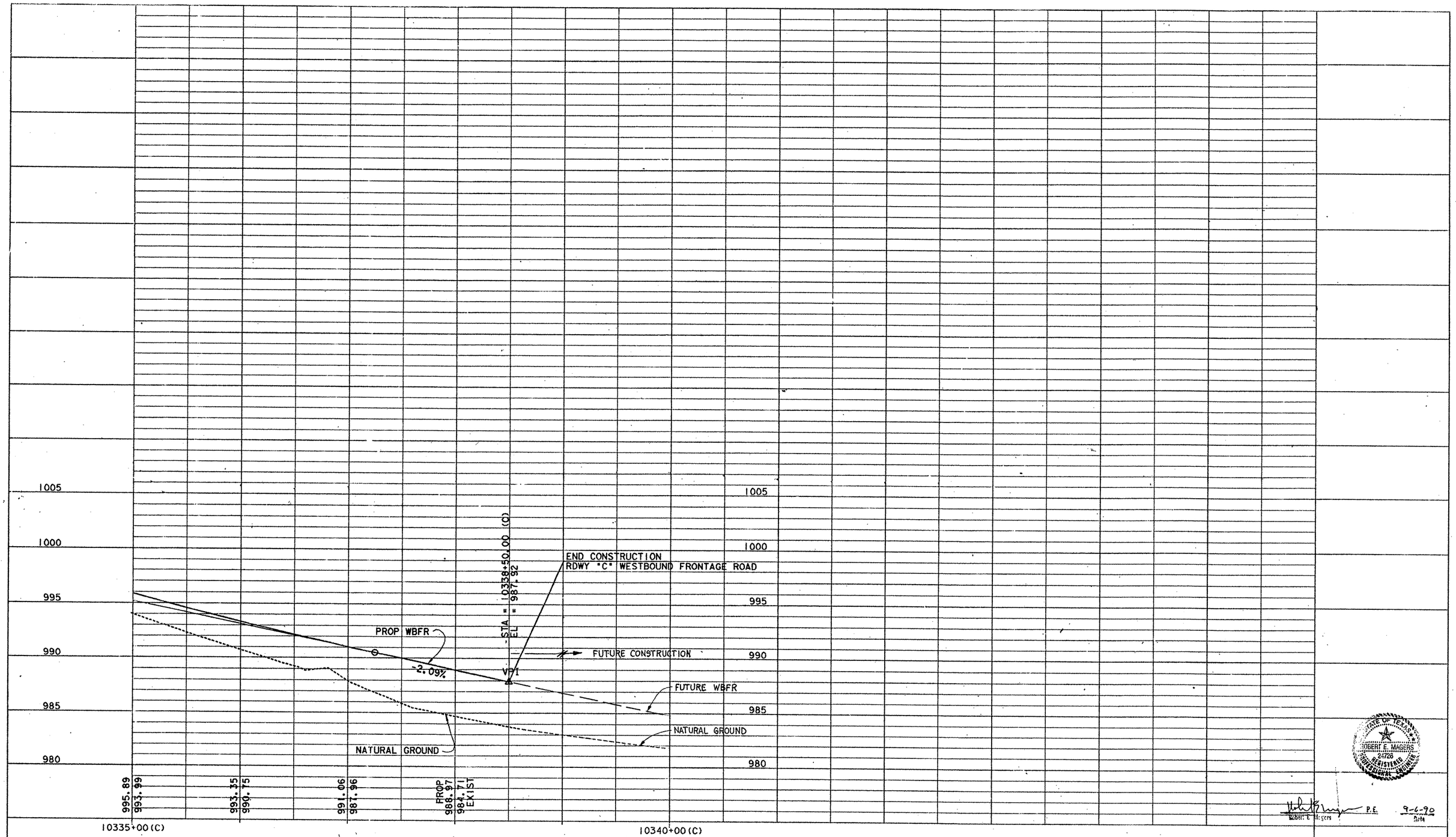
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	-	114

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRA32.DGN

PROF I



SCALE: 1"=40' H
1"= 4' V

STATE OF TEXAS
ROBERT E. MAGERS
24728
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90
Date

PROFILE SHEET

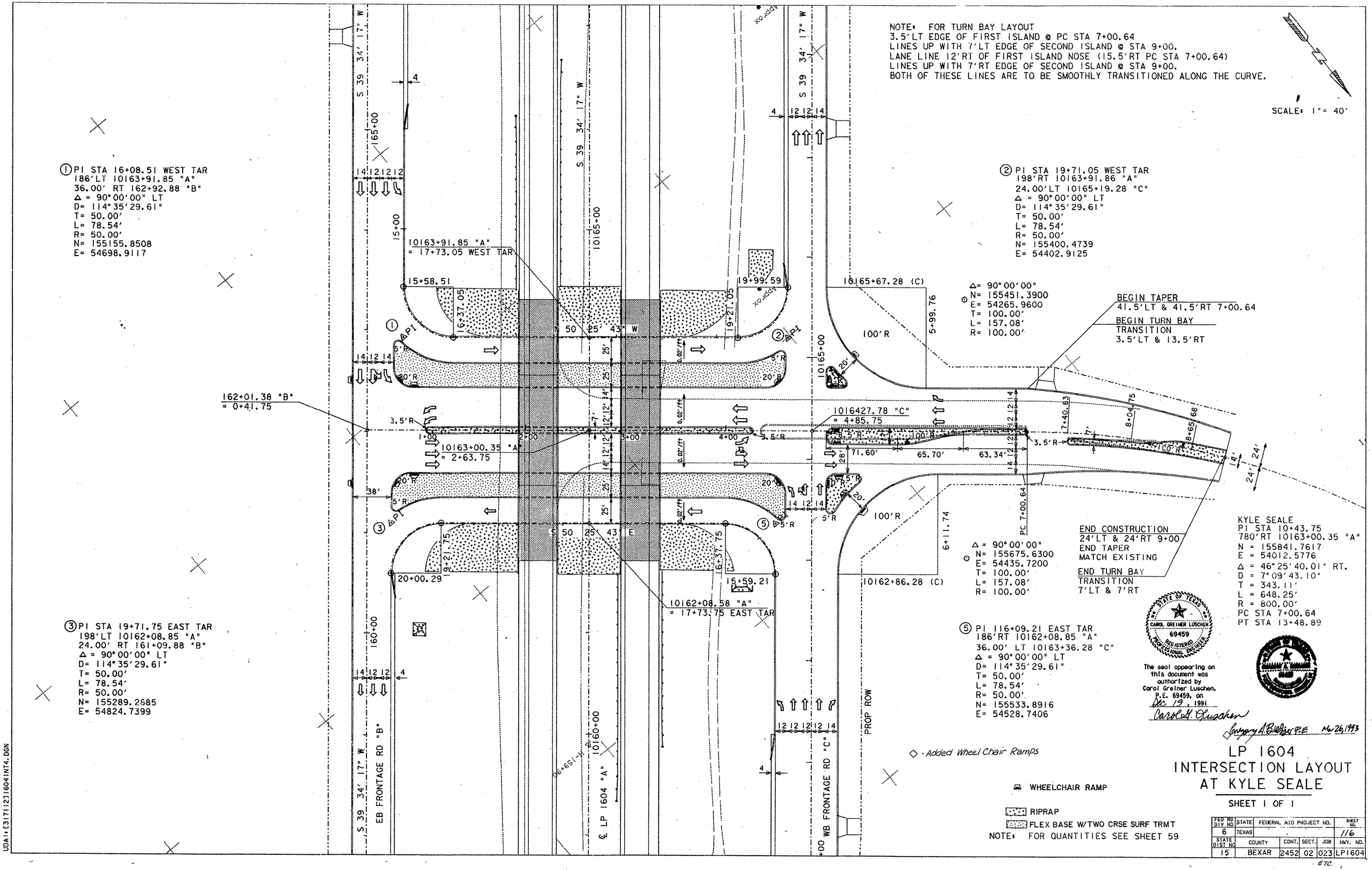
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		115

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

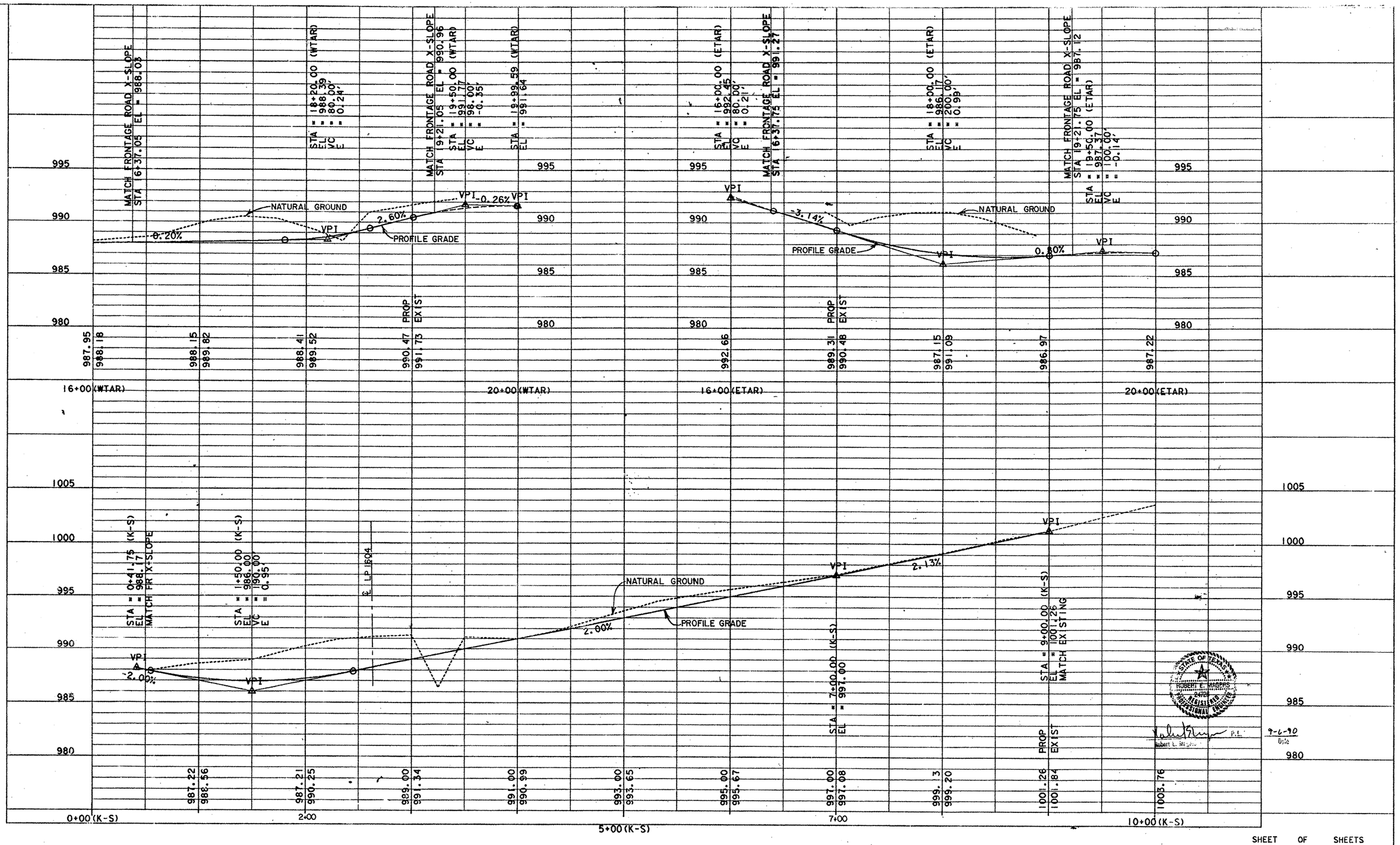
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc	LP 1604

1604PRB32. DGN

PROF I



NOTE: FOR TURN BAY LAYOUT
3.5'LT EDGE OF FIRST ISLAND @ PC STA 7+00.64
LINES UP WITH 7'LT EDGE OF SECOND ISLAND @ STA 9+00.
LANE LINE 12'RT OF FIRST ISLAND NOSE (15.5'RT PC STA 7+00.64)
LINES UP WITH 7'RT EDGE OF SECOND ISLAND @ STA 9+00.
BOTH OF THESE LINES ARE TO BE SMOOTHLY TRANSITIONED ALONG THE CURVE.
SCALE: 1" = 40'
① PI STA 16+08.51 WEST TAR
186'LT 10163+91.85 "A"
36.00' RT 162+92.88 "B"
Δ = 90°00'00" LT
D= 114°35'29.61"
T= 50.00'
L= 78.54'
R= 50.00'
N= 155155.8508
E= 54698.9117
② PI STA 19+71.05 WEST TAR
198'RT 10163+91.86 "A"
24.00'LT 10165+19.28 "C"
Δ = 90°00'00" LT
D= 114°35'29.61"
T= 50.00'
L= 78.54'
R= 50.00'
N= 155400.4739
E= 54402.9125
③ PI STA 19+71.75 EAST TAR
198'LT 10162+08.85 "A"
24.00' RT 161+09.88 "B"
Δ = 90°00'00" LT
D= 114°35'29.61"
T= 50.00'
L= 78.54'
R= 50.00'
N= 155289.2685
E= 54824.7399
⑤ PI 116+09.21 EAST TAR
186'RT 10162+08.85 "A"
36.00' LT 10163+36.28 "C"
Δ = 90°00'00" LT
D= 114°35'29.61"
T= 50.00'
L= 78.54'
R= 50.00'
N= 155533.8916
E= 54528.7406
10163+91.85 "A"
= 17+73.05 WEST TAR
162+01.38 "B"
= 0+41.75
10163+00.35 "A"
= 2+63.75
10162+08.58 "A"
= 17+73.75 EAST TAR
10165+67.28 (C)
10162+86.28 (C)
10165+00
10160+00
S 39 34' 17" W
N 50 25' 43" W
S 50 25' 43" E
EB FRONTAGE RD "B"
℄ LP 1604 "A"
WB FRONTAGE RD "C"
PROP ROW
BEGIN TAPER
41.5'LT & 41.5'RT 7+00.64
BEGIN TURN BAY
TRANSITION
3.5'LT & 13.5'RT
END CONSTRUCTION
24'LT & 24'RT 9+00
END TAPER
MATCH EXISTING
END TURN BAY
TRANSITION
7'LT & 7'RT
Δ= 90°00'00"
N= 155451.3900
E= 54265.9600
T= 100.00'
L= 157.08'
R= 100.00'
Δ = 90°00'00"
N= 155675.6300
E= 54435.7200
T= 100.00'
L= 157.08'
R= 100.00'
KYLE SEALE
PI STA 10+43.75
780'RT 10163+00.35 "A"
N = 155841.7617
E = 54012.5776
Δ = 46°25'40.01" RT.
D = 7°09'43.10"
T = 343.11'
L = 648.25'
R = 800.00'
PC STA 7+00.64
PT STA 13+48.89
◇ · Added Wheel Chair Ramps
WHEELCHAIR RAMP
RIPRAP
FLEX BASE W/TWO CRSE SURF TRMT
NOTE: FOR QUANTITIES SEE SHEET 59
STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED
PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec 19, 1991
Carol G. Luschen
Gregory A. Bledger P.E. Mar 26, 1993
LP 1604
INTERSECTION LAYOUT
AT KYLE SEALE
SHEET 1 OF 1
FED RD DIV NO 6
STATE TEXAS
FEDERAL AID PROJECT NO.
SHEET NO. 116
STATE DIST NO 15
COUNTY BEXAR
CONT. 2452
SECT. 02
JOB 023
HWY. NO. LP1604
ETC.
UDA1:[317112]16041NT4.DGN



PROFILE SHEET

KYLE SEALE INTERSECTION

SHEET	OF	SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		117

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

ETC

1604INT4P.DGN

SCALE: 1" = 40'

① PI STA 17+10.54 (S TAR)
36.00' LT STA 195+58.87 (B)
Δ= 129° 14' 30.01" LT
D= 76° 23' 39.74"
T= 158.10'
L= 169.18'
R= 75.00'
N= 152557.8337
E= 52720.0146

Δ 50° 45' 25"
⊙ N 152433.09
E 52950.82
T 94.87
L 177.18
R 200

BEGIN CONSTRUCTION
BEGIN WIDENING
STA 90+00
MATCH EXIST. PVMT.
EL= 972.04

BEGIN TAPER
12.00' LT 91+00

EXISTING PVMT
TO REMAIN

END TAPER
39.50' LT 93+00

END WIDENING
STA. 96+00

96+10.725 (H)

200' R

195+35.96 (B)

Sign

EB FRONTAGE RD "B"

195+00

S 31° 25' 35" W

66'

62'

15+52.44

PT 17+22.29

EAST BOUND MAINLANES

10200+00

10198+45.83 "A"
= 18+10.14 (S TAR)

S 82° 5" W

S 82° 11' 5" W

90+00

℄ HAUSMAN RD

95+00

3.5' R

194+11.32 "B"
= 97+06.91

10197+27.68 "A"
= 100+00

BEGIN TAPER
12.00' RT 90+00 (H)

END TAPER
51.50' RT 92+00

94+20.45 (H)

100' R

20+00

② API

10196+09.54 "A"
= 17+69.14 (N TAR)

N 82° 11' 5" E

PC 19+83.77

PT 20+72.36

10195+00

Δ= 129° 14' 45.24"
⊙ N= 152846.3471
E= 53086.1478
T= 210.82'
L= 225.58'
R= 100.00'

191+12.77 (B)

PT 190+54.33 "B"

190+00

PT 10192+04.40 "A"

℄ LP 1604 "A"

② PI STA 20+31.21 (N TAR)
24.00' RT STA 192+65.35 (B)
Δ= 50° 45' 30" LT
D= 57° 17' 44.81"
T= 47.44'
L= 88.59'
R= 100.00'
N= 152761.5661
E= 52858.5651

◇ Added Wheelchair Ramps

WHEELCHAIR RAMP
FLEX BASE W TWO CRSE SURF TRMT
RIPRAP

FOR QUANTITIES SEE SHT 68

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Feb 19, 1991

Carol G. Luschen

STATE OF TEXAS
GREGORY A. BRUKICH
61429

Gregory A. Brukich P.E. Mar 26, 1993

LP 1604
INTERSECTION LAYOUT
HAUSMAN RD

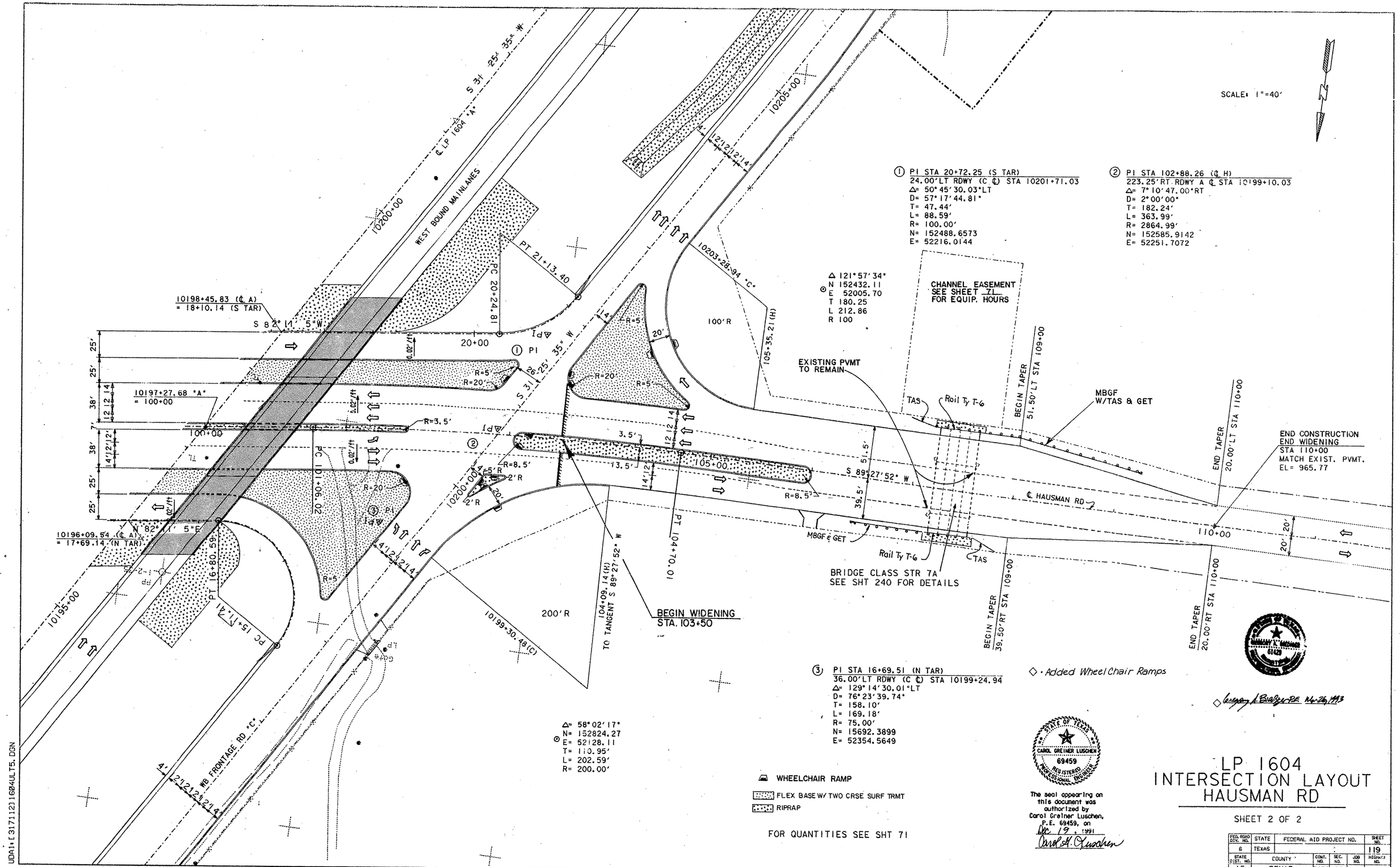
SHEET 1 OF 2

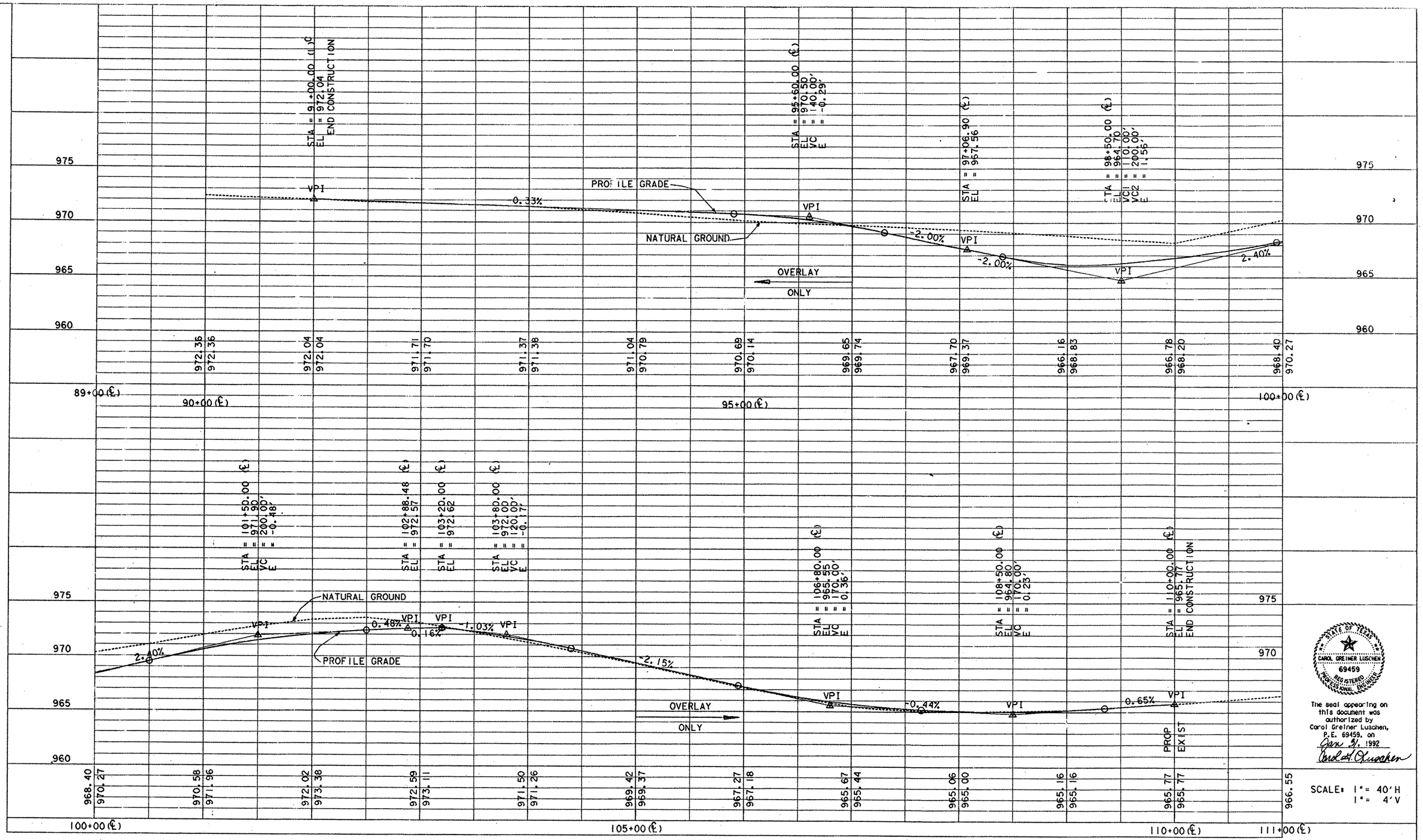
FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				118
STATE DIST. NO.	COUNTY	CONT. NO.	SEC. NO.	JOB NO.	HIGHWAY
15	BEXAR	2452	02	023	004

ETC

04ULT5.DGN

UDAI: (317.12)


SCALE: 1"=40'
① PI STA 20+72.25 (S TAR)
24.00'LT RDWY (C ℄) STA 10201+71.03
Δ= 50°45'30.03"LT
D= 57°17'44.81"
T= 47.44'
L= 88.59'
R= 100.00'
N= 152488.6573
E= 52216.0144
② PI STA 102+88.26 (℄ H)
223.25'RT RDWY A ℄ STA 10199+10.03
Δ= 7°10'47.00"RT
D= 2°00'00"
T= 182.24'
L= 363.99'
R= 2864.99'
N= 152585.9142
E= 52251.7072
③ PI STA 16+69.51 (N TAR)
36.00'LT RDWY (C ℄) STA 10199+24.94
Δ= 129°14'30.01"LT
D= 76°23'39.74"
T= 158.10'
L= 169.18'
R= 75.00'
N= 15692.3899
E= 52354.5649
Δ= 58°02'17"
N= 152824.27
E= 52128.11
T= 110.95'
L= 202.59'
R= 200.00'
Δ 121°57'34"
N 152432.11
E 52005.70
T 180.25
L 212.86
R 100
CHANNEL EASEMENT
SEE SHEET 71
FOR EQUIP. HOURS
EXISTING PVMT
TO REMAIN
MBGF
W/TAS & GET
BEGIN TAPER
51.50'LT STA 109+00
END TAPER
20.00'LT STA 110+00
END CONSTRUCTION
END WIDENING
STA 110+00
MATCH EXIST. PVMT.
EL= 965.77
BRIDGE CLASS STR 7A
SEE SHT 240 FOR DETAILS
BEGIN WIDENING
STA. 103+50
WEST BOUND MAINLANES
℄ LP 1604 "A"
℄ HAUSMAN RD
WB FRONTAGE RD "C"
10198+45.83 (℄ A)
= 18+10.14 (S TAR)
10197+27.68 "A"
= 100+00
10196+09.54 (℄ A)
= 17+69.14 (N TAR)
10203+28.94 "C"
105+35.21 (H)
104+09.14 (H)
TO TANGENT S 89°27'52" W
10199+30.48 (C)
PT 21+13.40
PC 20+24.81
PC 101+06.02
PT 16+80.59
PC 15+11.41
PT 104+70.01
S 89°27'52" W
S 31°25'35" W
S 82°11'5" W
N 82°11'5" E
100'R
200'R
20+00
100+00
105+00
110+00
10195+00
10200+00
10205+00
WHEELCHAIR RAMP
FLEX BASE W/ TWO CRSE SURF TRMT
RIPRAP
FOR QUANTITIES SEE SHT 71
◇ · Added Wheel Chair Ramps
STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED
PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec 19, 1991
Carol G. Luschen
LP 1604
INTERSECTION LAYOUT
HAUSMAN RD
SHEET 2 OF 2
FED. ROAD DIV. NO. 6
STATE TEXAS
FEDERAL AID PROJECT NO.
SHEET NO. 119
STATE DIST. NO. 15
COUNTY BEXAR
CONT. NO. 2452
SEC. NO. 02
JOB NO. 023
HIGHWAY NO. LP1604
ETC
UDA1:[317112]1604ULT5.DGN



STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Jan 9, 1992

Carol G. Luschen

SCALE: 1" = 40' H
1" = 4' V

PROFILE SHEET

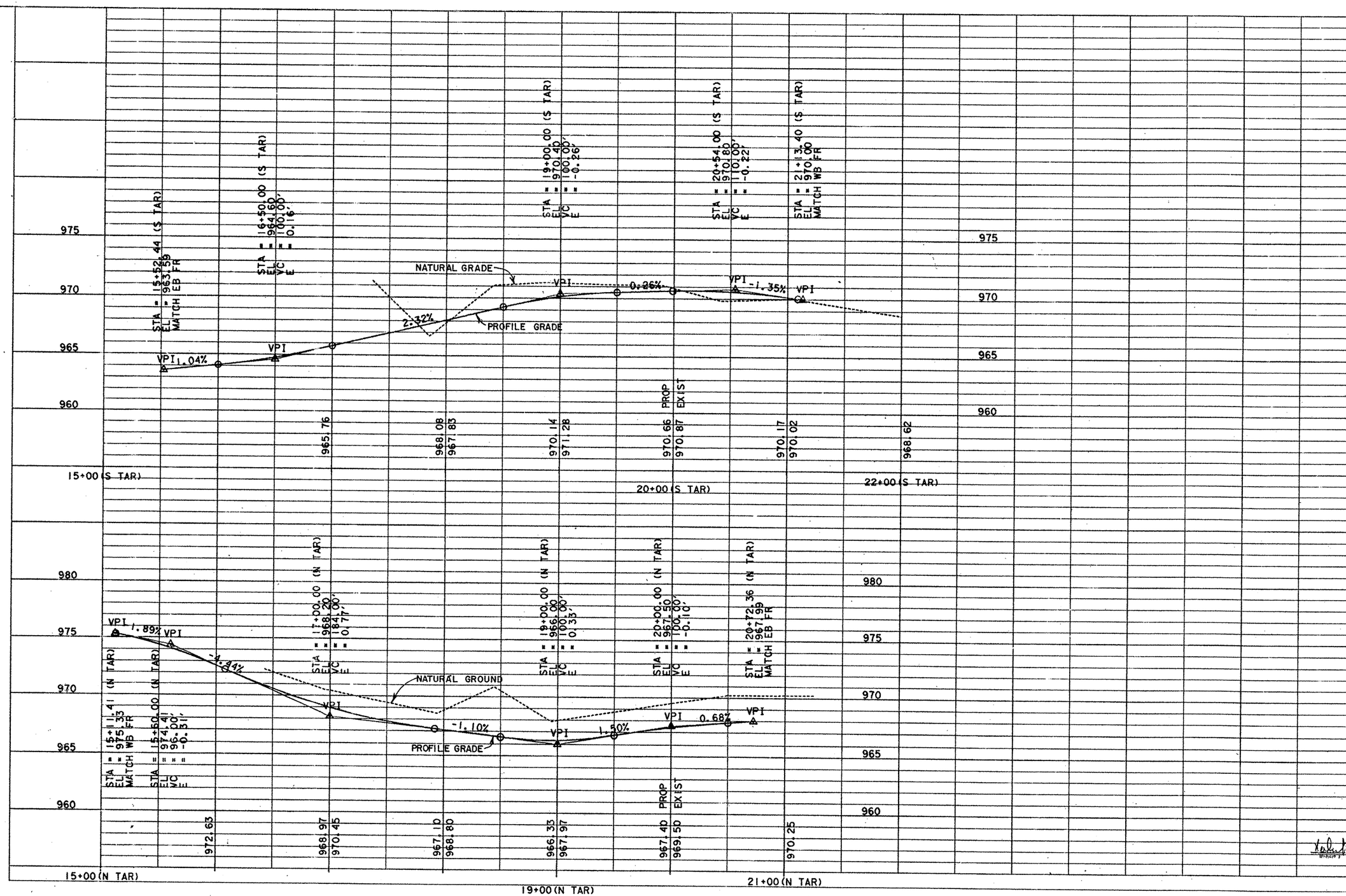
HAUSMAN RD (FM 1560) INTERSECTION

SHEET 1 OF 1 SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			120
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

ETC.

151p2a1 16041nt5p.dgn



STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

P.E. 9-6-90
Date

SHEET / OF / SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			121
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

ETC.

PROFILE SHEET

HAUSMAN RD (FM 1560) TURNAROUNDS

16041NT5P.DGN

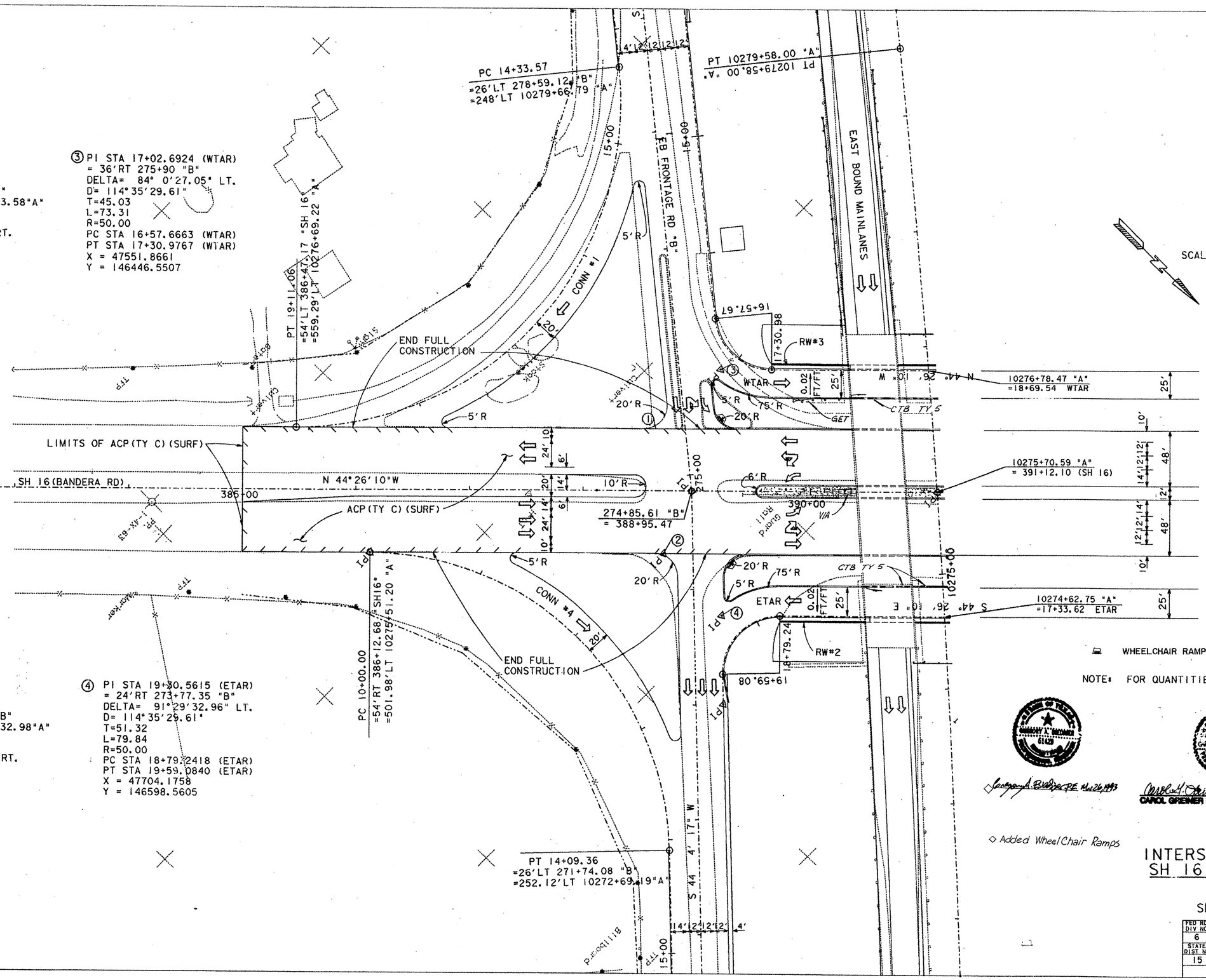
CONN #1
① PI STA 17+50.05
=26'LT 275+42.61"B"
=243.78'LT 10276+43.58"A"
X = 47629.8255
Y = 146443.5581
Δ = 95°59'33.03" RT.
D = 20°06'13.62"
T = 316.48'
L = 477.48'
R = 285.00'
PC STA 14+33.57
PT STA 19+11.06

③ PI STA 17+02.6924 (WTAR)
= 36'RT 275+90 "B"
DELTA= 84° 0'27.05" LT.
D= 114°35'29.61"
T=45.03
L=73.31
R=50.00
PC STA 16+57.6663 (WTAR)
PT STA 17+30.9767 (WTAR)
X = 47551.8661
Y = 146446.5507

SH 16
PI STA 381+12.10
X = 48194.5556
Y = 145944.7316

CONN #4
② PI STA 12+58.19
=26'LT 274+32.27"B"
=244.39'LT 10275+32.98"A"
X = 47701.8936
Y = 146524.3179
Δ = 88°30'27.00" RT.
D = 21°37'15.78"
T = 258.19'
L = 409.36'
R = 265.00'
PC STA 10+00.00
PT STA 14+09.36

④ PI STA 19+30.5615 (ETAR)
= 24'RT 273+77.35 "B"
DELTA= 91°29'32.96" LT.
D= 114°35'29.61"
T=51.32
L=79.84
R=50.00
PC STA 18+79.2418 (ETAR)
PT STA 19+59.0840 (ETAR)
X = 47704.1758
Y = 146598.5605



NOTE: FOR QUANTITIES SEE SHEET 92

◇ Added WheelChair Ramps

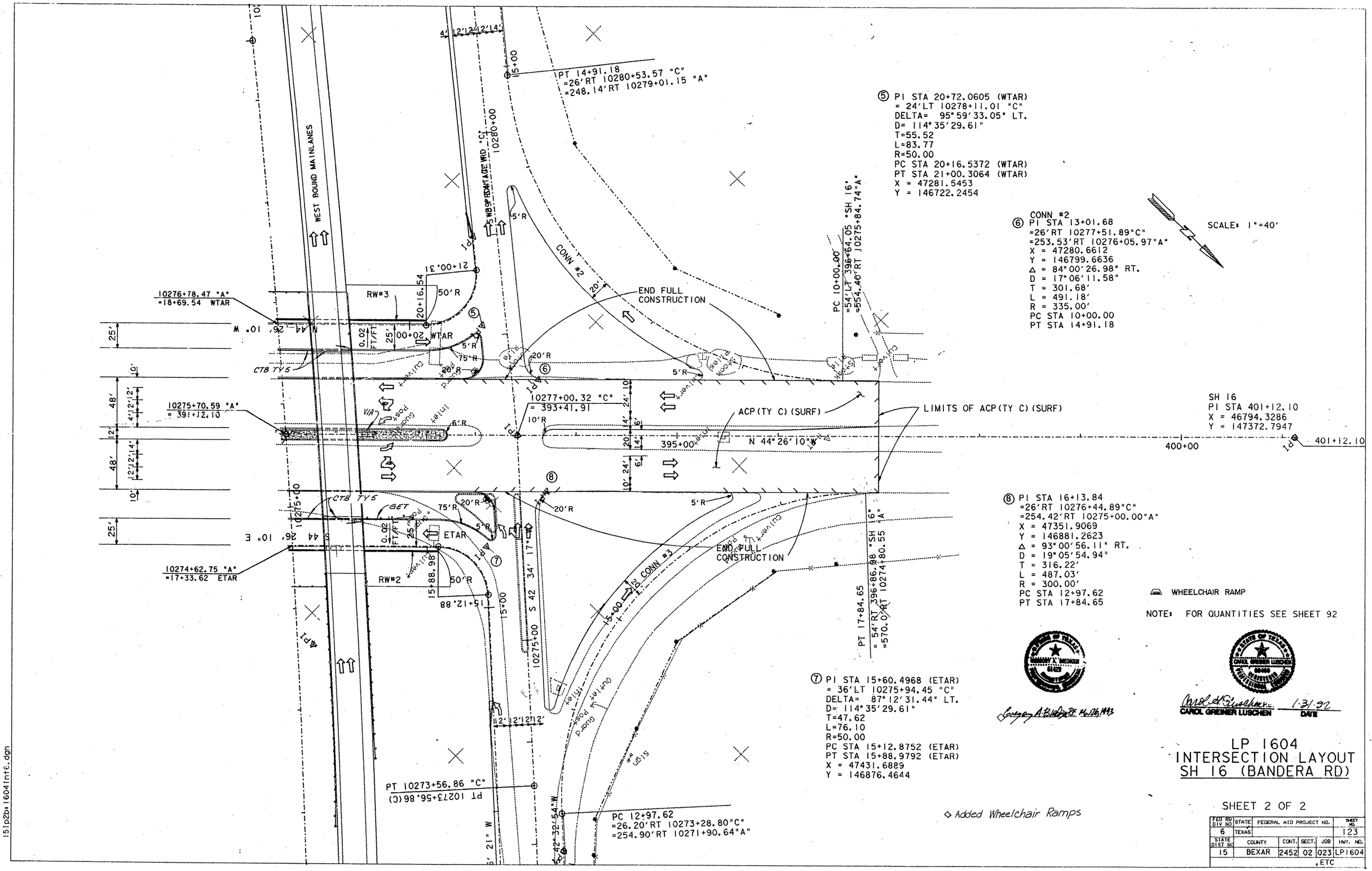
CAROL GREINER LUSCHEN 1-31-92
DATE

LP 1604
INTERSECTION LAYOUT
SH 16 (BANDERA RD)

SHEET 1 OF 2

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					122
STATE DIST NO	COUNTY	CONT.	SECT.	JOB		HWY. NO.
15	BEXAR	2452	02	023		LP1604
						ETC

151p2bx1604int6.dgn



⑤ PI STA 20+72.0605 (WTAR)
= 24'LT 10278+11.01 "C"
DELTA= 95°59'33.05" LT.
D= 114°35'29.61"
T=55.52
L=83.77
R=50.00
PC STA 20+16.5372 (WTAR)
PT STA 21+00.3064 (WTAR)
X = 47281.5453
Y = 146722.2454

⑥ CONN #2
PI STA 13+01.68
=26'RT 10277+51.89"C"
=253.53'RT 10276+05.97"A"
X = 47280.6612
Y = 146799.6636
Δ = 84°00'26.98" RT.
D = 17°06'11.58"
T = 301.68'
L = 491.18'
R = 335.00'
PC STA 10+00.00
PT STA 14+91.18

SCALE: 1"=40'

⑧ PI STA 16+13.84
=26'RT 10276+44.89"C"
=254.42'RT 10275+00.00"A"
X = 47351.9069
Y = 146881.2623
Δ = 93°00'56.11" RT.
D = 19°05'54.94"
T = 316.22'
L = 487.03'
R = 300.00'
PC STA 12+97.62
PT STA 17+84.65

WHEELCHAIR RAMP

NOTE: FOR QUANTITIES SEE SHEET 92

⑦ PI STA 15+60.4968 (ETAR)
= 36'LT 10275+94.45 "C"
DELTA= 87°12'31.44" LT.
D= 114°35'29.61"
T=47.62
L=76.10
R=50.00
PC STA 15+12.8752 (ETAR)
PT STA 15+88.9792 (ETAR)
X = 47431.6889
Y = 146876.4644

◇ Added Wheelchair Ramps

Gregory A. Bledsoe P.E. Mar 26, 1993

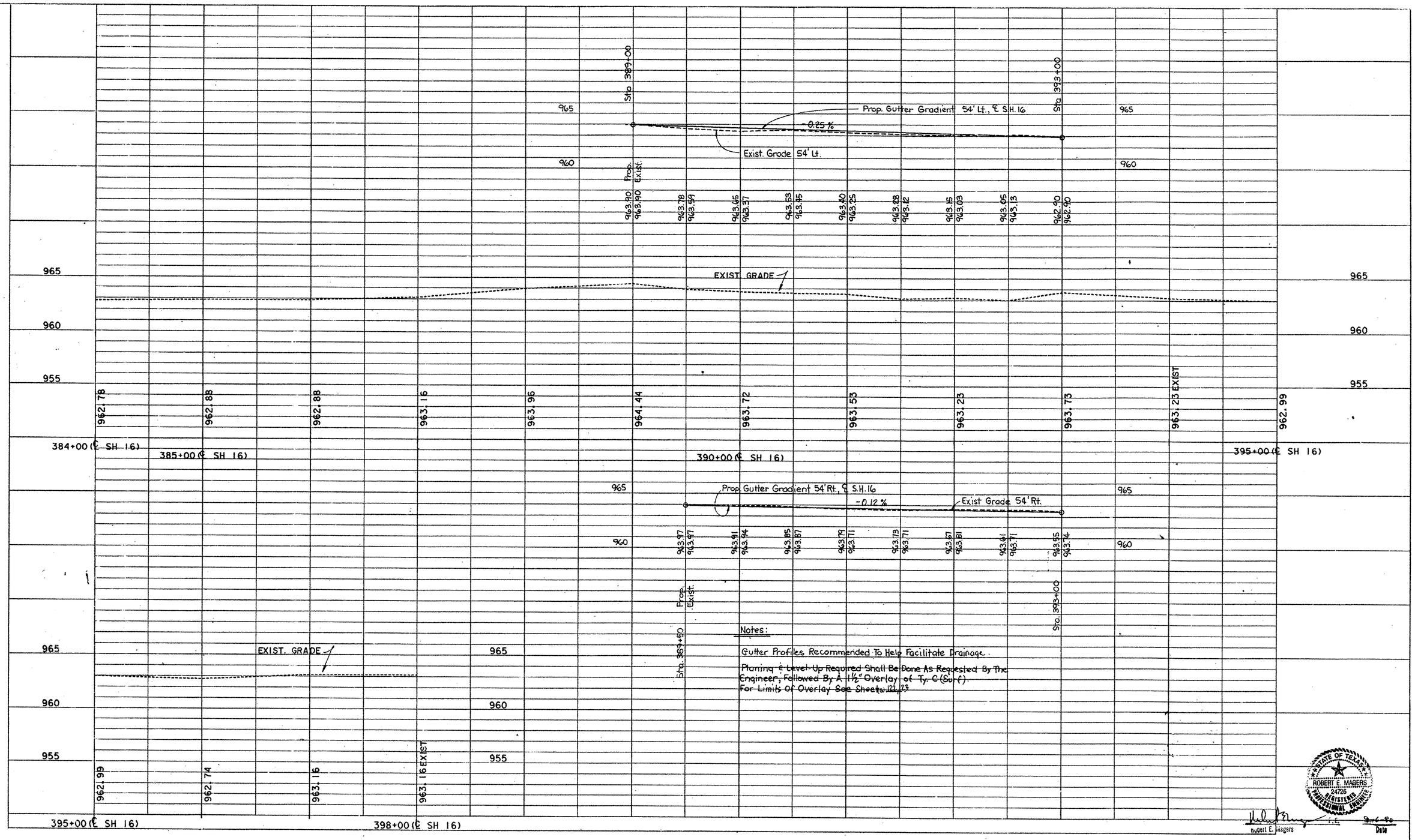
Carol A. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

LP 1604
INTERSECTION LAYOUT
SH 16 (BANDERA RD)

SHEET 2 OF 2

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					123
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP1604	
					,ETC	

151p2b1604Int6.dgn



Notes:

Gutter Profiles Recommended To Help Facilitate Drainage.

~~Planing & Level Up Required Shall Be Done As Requested By The Engineer, Followed By A 1½" Overlay of Ty. C (Su-C).~~
~~For Limits Of Overlay See Sheets 122, 23~~

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E.

9-6-90
Date

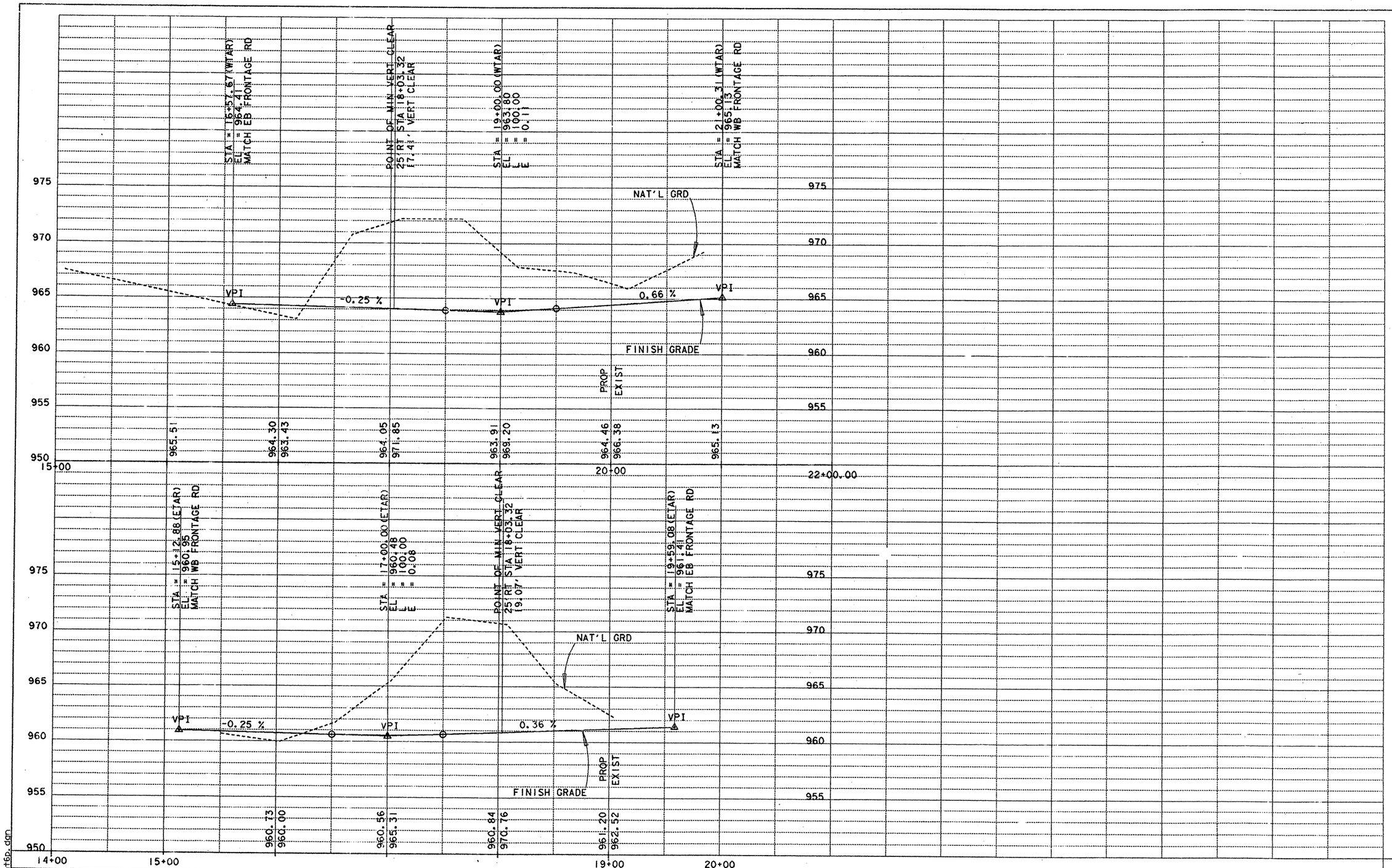
SHEET / OF / SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			124
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

PROFILE SHEET

BANDERA RD (SH 16) INTERSECTION

1604 INTGP_DGN



The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec. 19, 1991

Carol G. Luschen

SCALE: 1" = 40' H
1" = 4' V

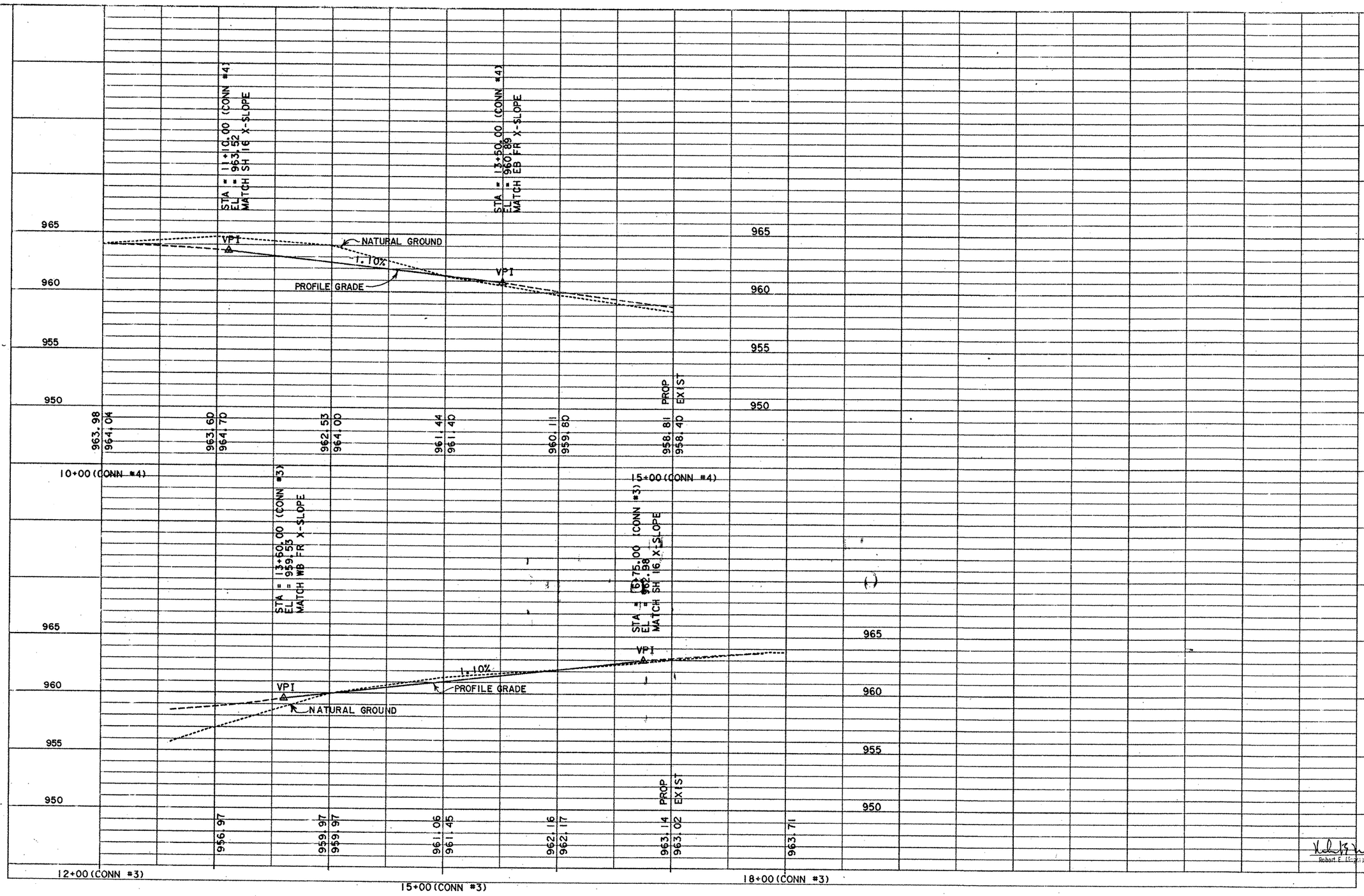
SHEET 1 OF 1 SHEET

PROFILE SHEET

BANDERA RD (SH 16) TURNAROUNDS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			125
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY
2452	02	023	LP 1604

151p2b1 16041nt6p.dgn



STATE OF TEXAS
ROBERT E. MAGERS
24720
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90
Robert E. Magers Date

1604INT6P.DGN

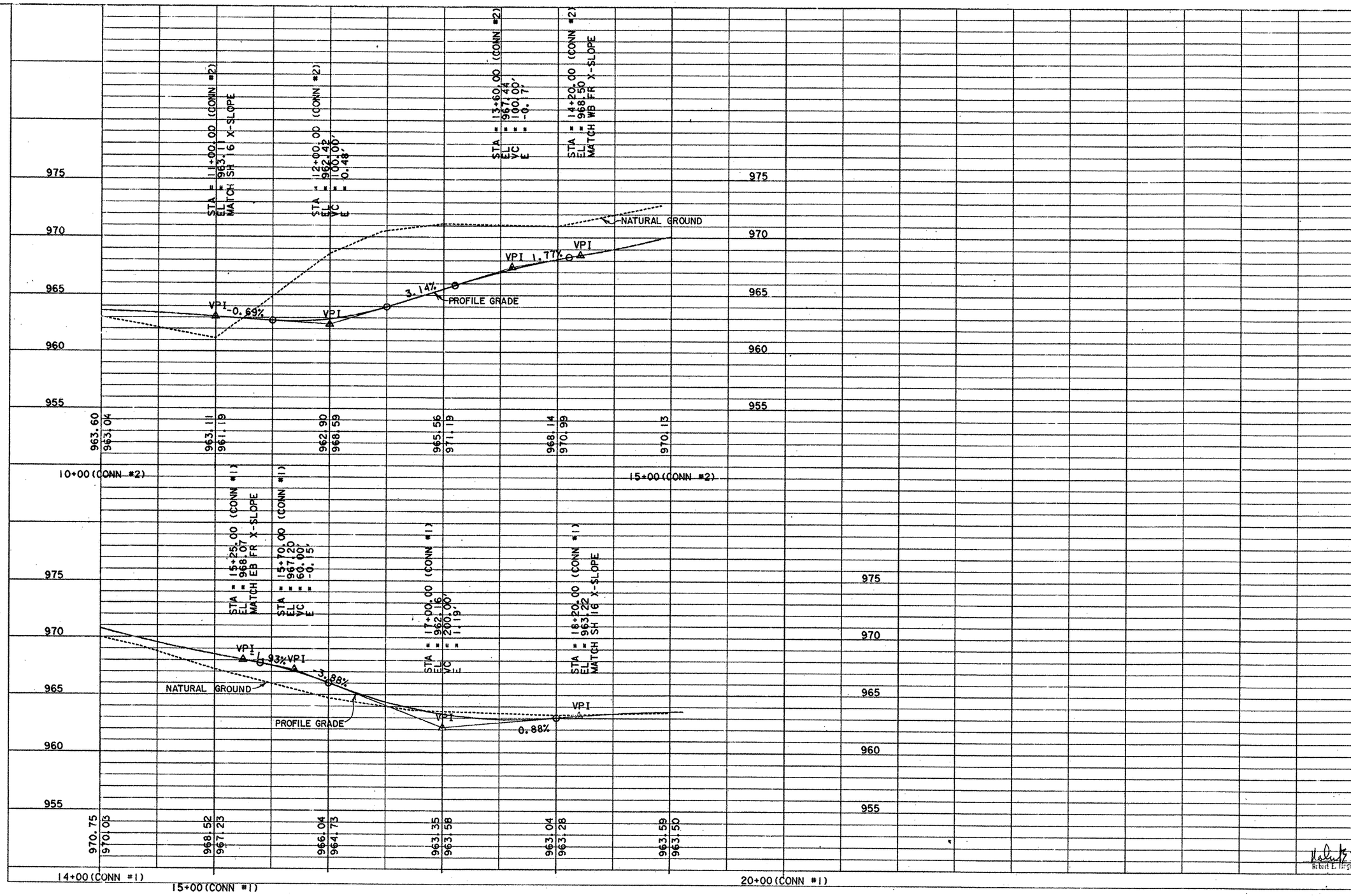
SHEET 1 OF 2 SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			126
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

ETC.

PROFILE SHEET

BANDERA RD (SH 16) CONNECTORS



STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers, P.E.

9-6-90
Date

SHEET 1 OF 2 SHEETS

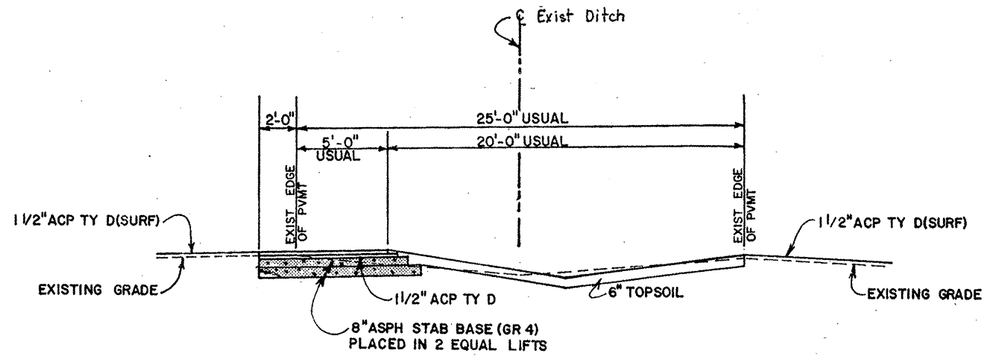
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			127
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

PROFILE SHEET

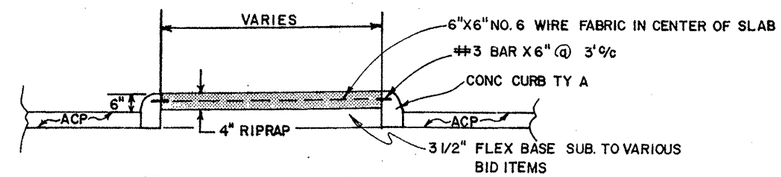
BANDERA RD (SH 16) CONNECTORS

1604INT6P.DGN

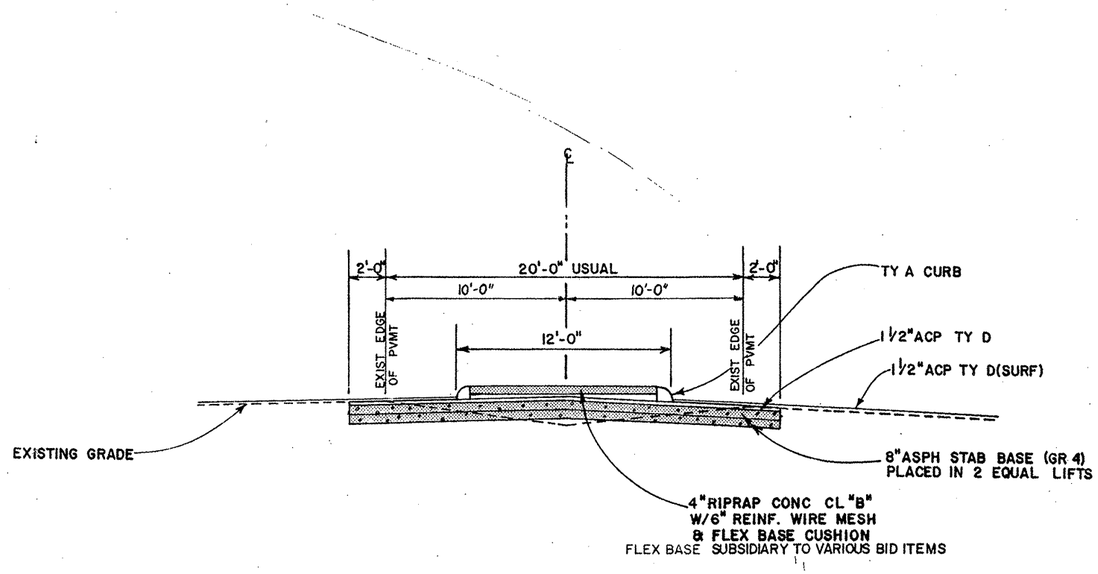
ETC



TYPICAL RDWY WIDENING
W/DITCH SECTION



TYPICAL SECTION
CONCRETE MEDIAN



TYPICAL RDWY WIDENING
W/CONCRETE ISLAND

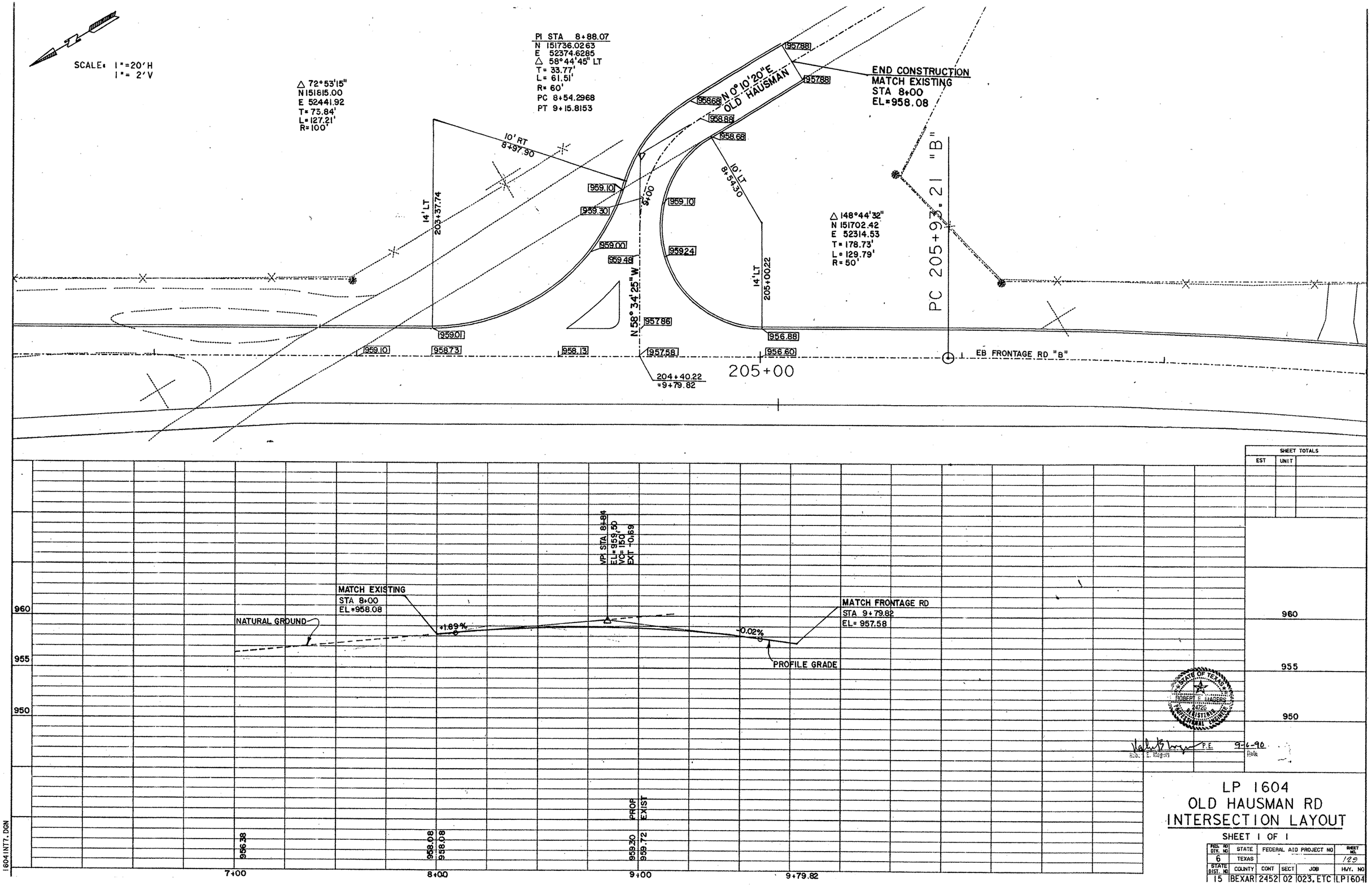
STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90

MISC. ROADWAY DETAILS
@ BANDERA ROAD
SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	⊕ FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS					12B
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB		HIGHWAY NO.
15	BEXAR	2452	02	023		LP1604

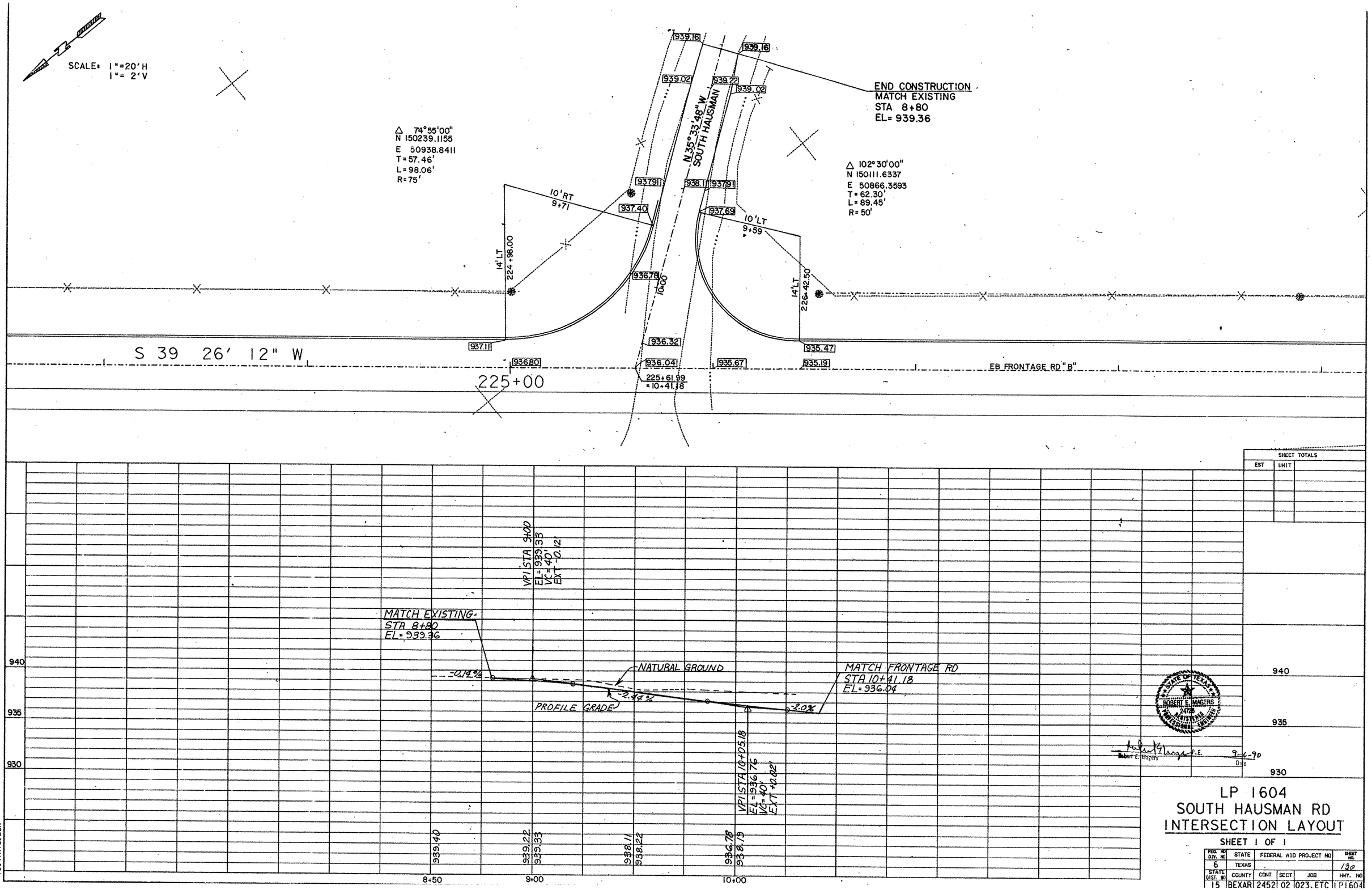
ETT

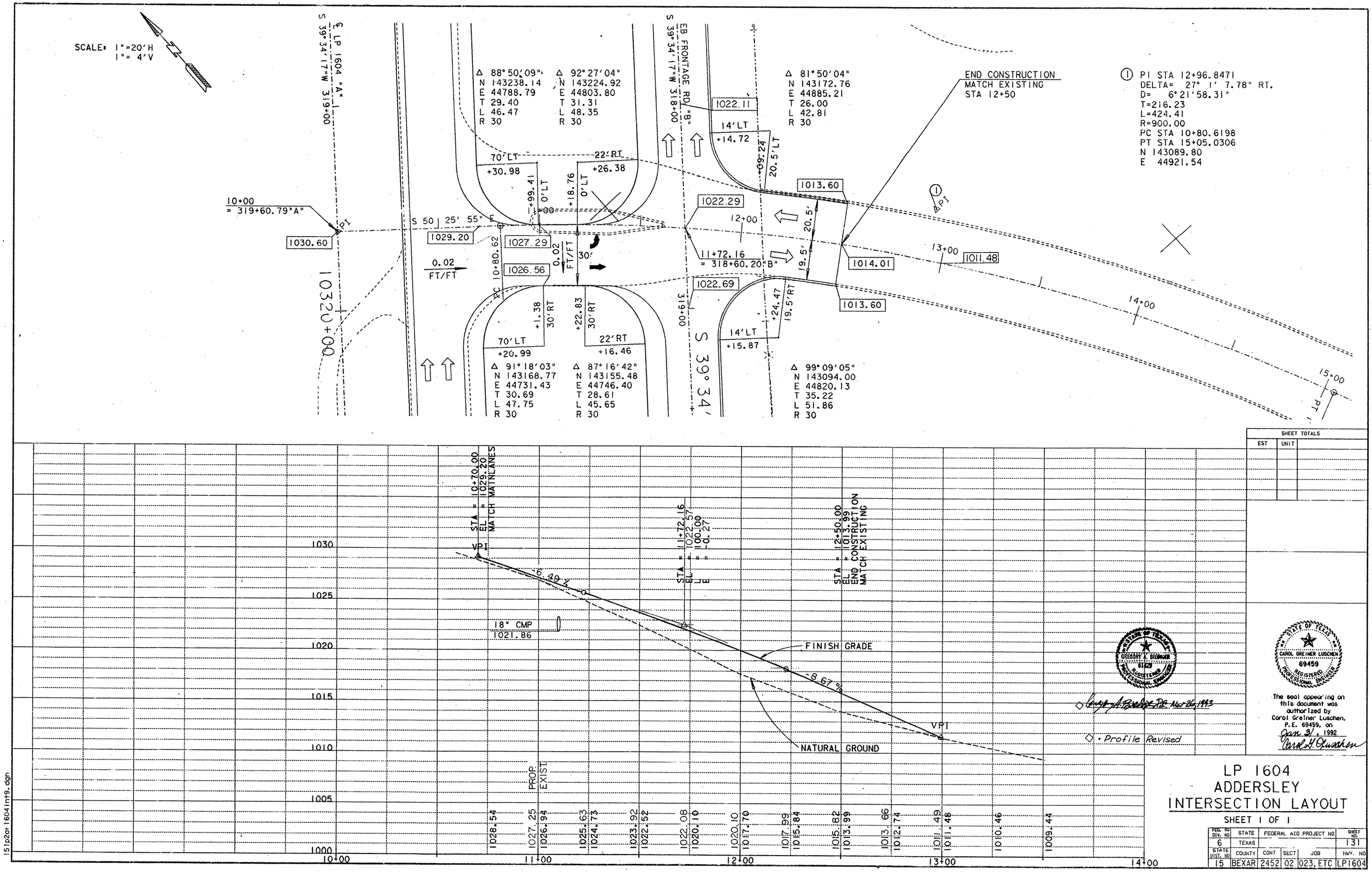


LP 1604
OLD HAUSMAN RD
INTERSECTION LAYOUT

SHEET 1 OF 1

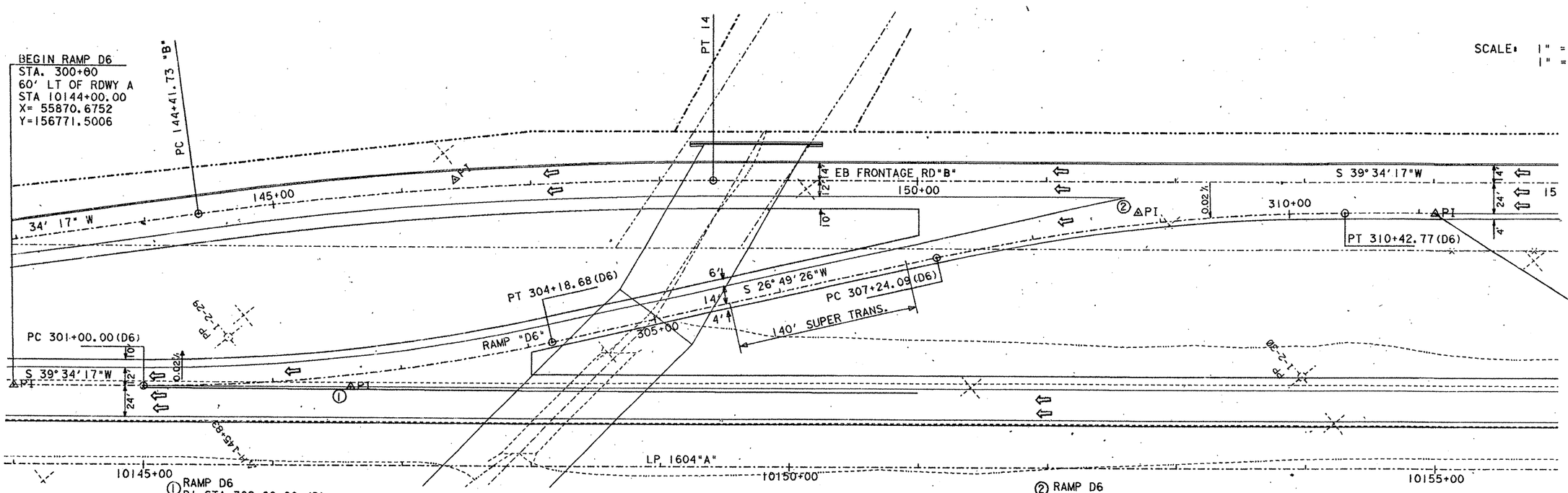
FED. RD DIV. NO	STATE	FEDERAL AID PROJECT NO			SHEET NO.
6	TEXAS				129
STATE DIST. NO	COUNTY	CONT	SECT	JOB	HWY. NO
15	BEXAR	2452	02	023, ETC	LP1604


SCALE: 1"=20' H
1"= 2' V
END CONSTRUCTION
MATCH EXISTING
STA 8+80
EL= 939.36
Δ 74°55'00"
N 150239.1155
E 50938.8411
T=57.46'
L=98.06'
R=75'
Δ 102°30'00"
N 150111.6337
E 50866.3593
T=62.30'
L=89.45'
R=50'
N 35°33'48" W
SOUTH HAUSMAN
10' RT
9+71
10' LT
9+59
14' LT
224+98.00
14' LT
226+42.50
10.00
939.16
939.16
939.02
939.22
939.02
937.91
938.11
937.91
937.40
937.69
936.78
937.11
936.32
936.80
936.04
935.67
935.47
935.19
S 39 26' 12" W
225+00
225+61.99
=10+41.18
EB FRONTAGE RD "B"
VPI STA 9+00
EL= 939.33
VC= 40'
EX -0.12'
MATCH EXISTING
STA 8+80
EL= 939.36
-0.14%
NATURAL GROUND
PROFILE GRADE
2.44%
-2.0%
MATCH FRONTAGE RD
STA 10+41.18
EL= 936.04
VPI STA 10+05.18
EL= 936.76
VC= 40'
EXT +0.02'
940
935
930
939.40
939.22
939.33
938.11
938.22
936.78
938.13
8+50
9+00
10+00
STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER
Robert E. Magers P.E.
9-6-90
Date
SHEET TOTALS
EST
UNIT
LP 1604
SOUTH HAUSMAN RD
INTERSECTION LAYOUT
SHEET 1 OF 1
REG. HD DIV. NO
STATE
FEDERAL AID PROJECT NO
SHEET NO.
6
TEXAS
130
STATE DIST. NO
COUNTY
CONT
SECT
JOB
HWY. NO
15
BEXAR
2452
02
023. ETC
P1604
1604INT8.DGN


SCALE: 1"=20'H
1"= 4'V
℄ LP 1604 "A"
S 39°34'17"W 319+00
EB FRONTAGE RD "B"
S 39°34'17"W 318+00
Δ 88°50'09"
N 143238.14
E 44788.79
T 29.40
L 46.47
R 30
Δ 92°27'04"
N 143224.92
E 44803.80
T 31.31
L 48.35
R 30
Δ 81°50'04"
N 143172.76
E 44885.21
T 26.00
L 42.81
R 30
END CONSTRUCTION
MATCH EXISTING
STA 12+50
① PI STA 12+96.8471
DELTA= 27° 1' 7.78" RT.
D= 6°21'58.31"
T=216.23
L=424.41
R=900.00
PC STA 10+80.6198
PT STA 15+05.0306
N 143089.80
E 44921.54
10+00
= 319+60.79"A"
S 50 25' 55" E
1030.60
1029.20
1027.29
1026.56
1022.11
1022.29
1022.69
1013.60
1014.01
1011.48
11+72.16
= 318+60.20"B"
0.02
FT/FT
10320+00
S 39° 34'
Δ 91°18'03"
N 143168.77
E 44731.43
T 30.69
L 47.75
R 30
Δ 87°16'42"
N 143155.48
E 44746.40
T 28.61
L 45.65
R 30
Δ 99°09'05"
N 143094.00
E 44820.13
T 35.22
L 51.86
R 30
STA = 10+70.00
EL = 1029.20
MATCH MAINLANES
STA = 11+72.16
EL = 1022.57
L = 100.00
E = -0.27
STA = 12+50.00
EL = 1013.99
END CONSTRUCTION
MATCH EXISTING
VPI
-6.49 %
18" CMP
1021.86
FINISH GRADE
-8.67 %
NATURAL GROUND
PROP.
EXIST.
1030
1025
1020
1015
1010
1005
1000
10+00
11+00
12+00
13+00
14+00
1028.54
1027.25
1026.94
1025.63
1024.73
1023.92
1022.52
1022.08
1020.10
1020.10
1017.70
1017.99
1015.84
1015.82
1013.99
1013.66
1012.74
1011.49
1011.48
1010.46
1009.44
◇ Profile Revised
SHEET TOTALS
EST
UNIT
GREGORY A. BIEDIGER
61829
REGISTERED PROFESSIONAL ENGINEER
STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Jan 31, 1992
Carol G. Luschen
LP 1604
ADDERSLEY
INTERSECTION LAYOUT
SHEET 1 OF 1
FED. RD DIV. NO 6
STATE TEXAS
FEDERAL AID PROJECT NO
SHEET NO. 131
STATE DIST. NO 15
COUNTY BEXAR
CONT 2452
SECT 02
JOB 023, ETC
HWY. NO LP1604
151p2a: 1604int9.dgn

BEGIN RAMP D6
STA. 300+00
60' LT OF RDWY A
STA 10144+00.00
X= 55870.6752
Y=156771.5006

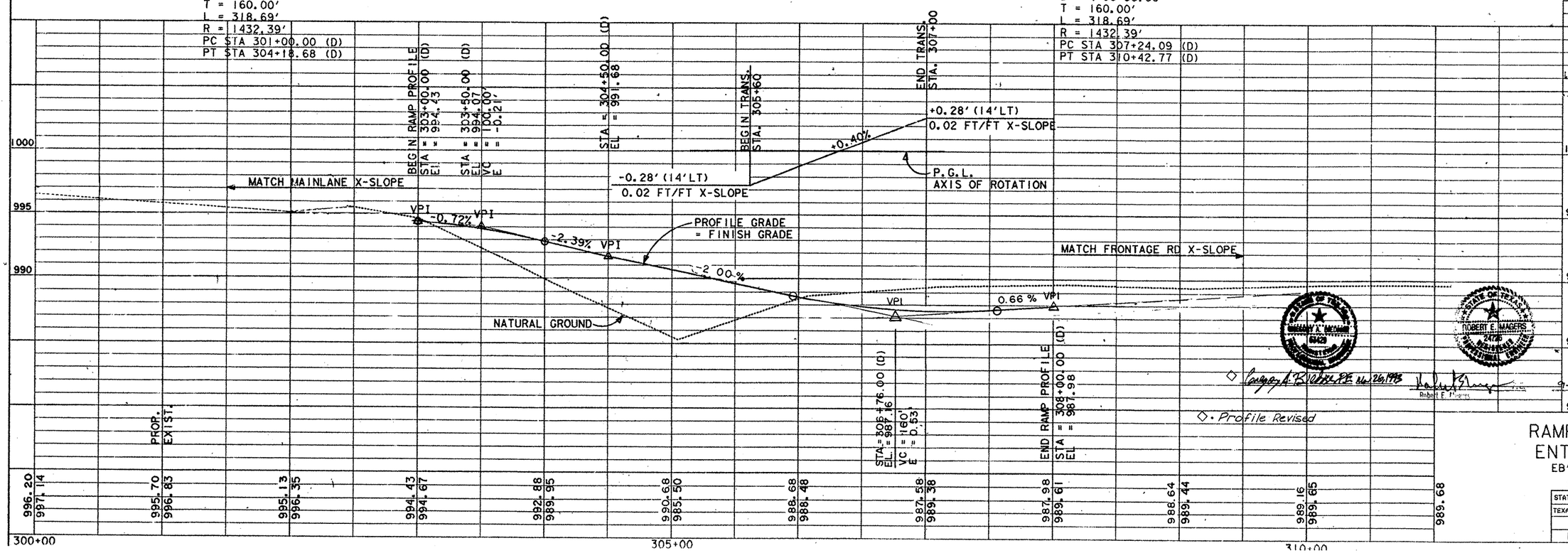
SCALE: 1" = 40' HORZ.
1" = 4' VERT.



END RAMP D6
STA. 311+12.79
24'RT RDWY C
STA. 154+01.03
198'LT RDWY A
STA. 10155+00.00
X= 55276.3069
Y=155835.6745

① RAMP D6
PI STA 302+60.00 (D)
=60'LT 10146+60 RDWY "A"
X = 55705.0450
Y = 156571.0845
Δ = 12°44'51.06" LT.
D = 4°00'00.00"
T = 160.00'
L = 318.69'
R = 1432.39'
PC STA 301+00.00 (D)
PT STA 304+18.68 (D)

② RAMP D6
PI STA 308+84.09 (D)
=198'LT 10152+70 RDWY "A"
X = 55422.8282
Y = 156012.9685
Δ = 12°44'51.01" RT.
D = 4°00'00.00"
T = 160.00'
L = 318.69'
R = 1432.39'
PC STA 307+24.09 (D)
PT STA 310+42.77 (D)



SHEET TOTALS	
EST	UNIT

◇ Company A. B. Coker, P.E. No. 26,1998

Robert E. Magers 9-6-90
Date

◇. Profile Revised

RAMP D6 LAYOUT
ENTRANCE RAMP
EB'D @ KYLE SEALE

SHEET 1 OF 1

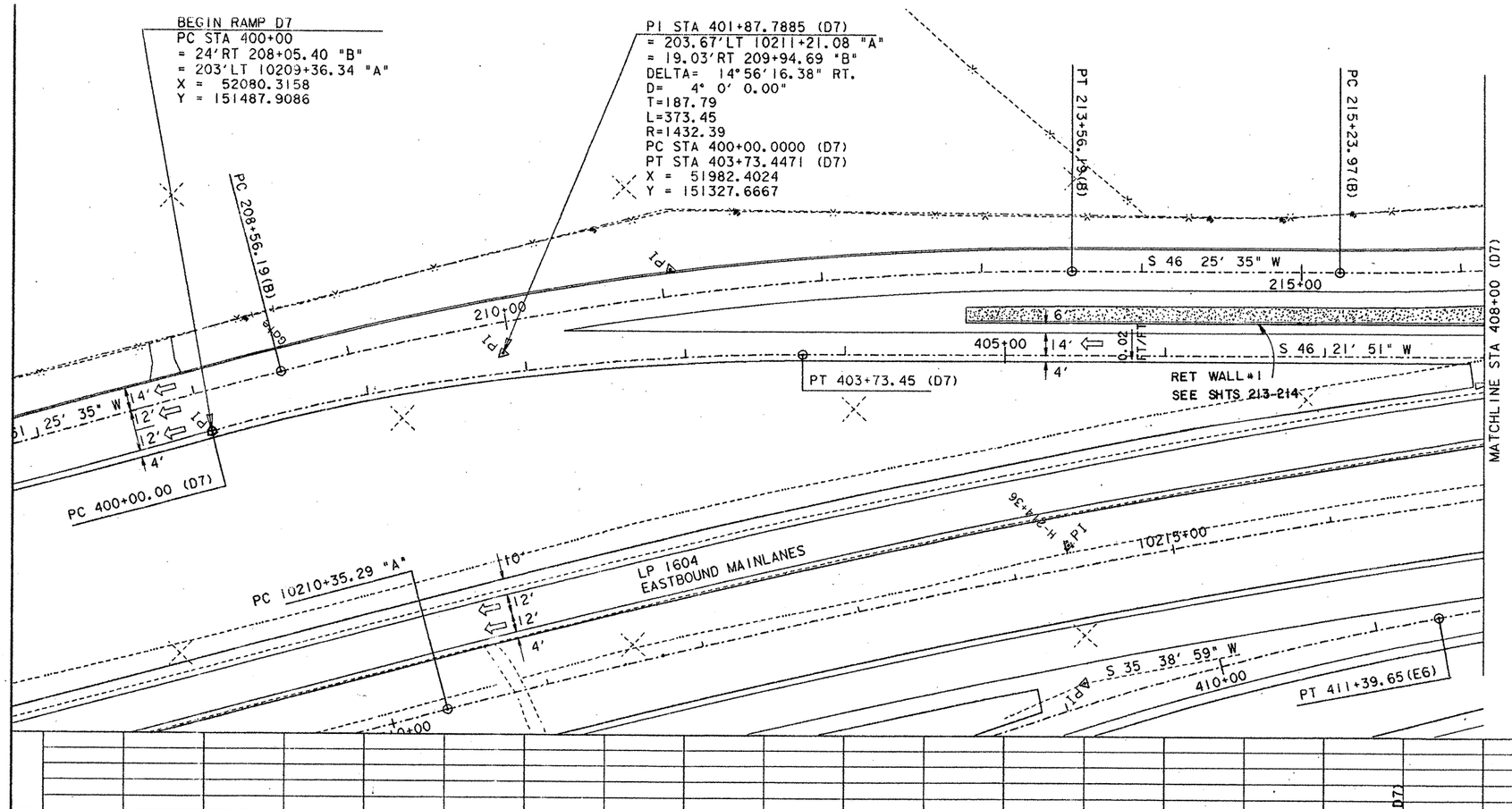
STATE	FEDERAL AID PROJECT NO.				SHEET NO.
TEXAS					132
COUNTY	CONT.	SECT.	JOB	HWY. NO.	
BEXAR	2452	02	023	LP1604	

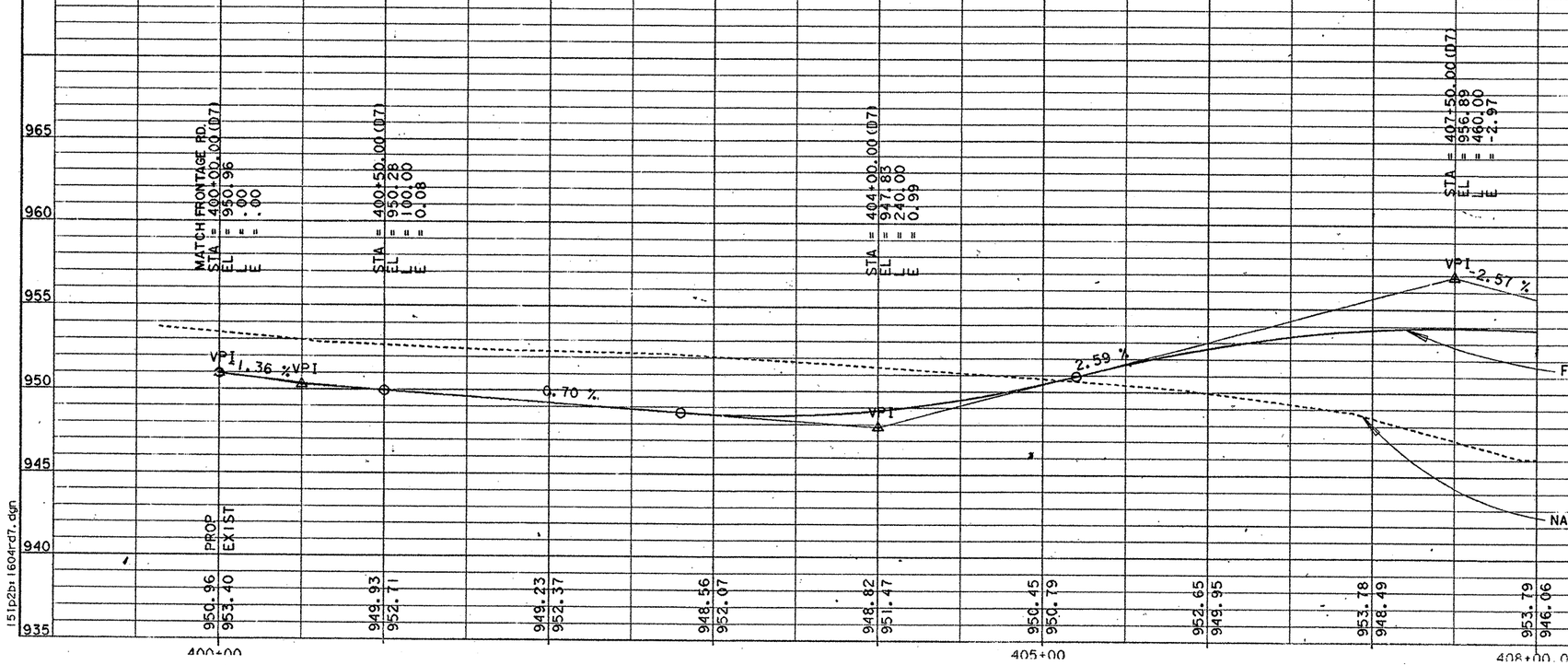
ETC

BEGIN RAMP D7
PC STA 400+00
= 24'RT 208+05.40 "B"
= 203'LT 10209+36.34 "A"
X = 52080.3158
Y = 151487.9086

PI STA 401+87.7885 (D7)
= 203.67'LT 10211+21.08 "A"
= 19.03'RT 209+94.69 "B"
DELTA= 14°56'16.38" RT.
D= 4° 0' 0.00"
T=187.79
L=373.45
R=1432.39
PC STA 400+00.0000 (D7)
PT STA 403+73.4471 (D7)
X = 51982.4024
Y = 151327.6667

SCALE: 1"=40' HORZ.
1"=4' VERT.





SHEET TOTALS		
EST	UNIT	

STATE OF TEXAS
CAROL GREINER LUSCHER
68459
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen 1-31-92
CAROL GREINER LUSCHEN DATE

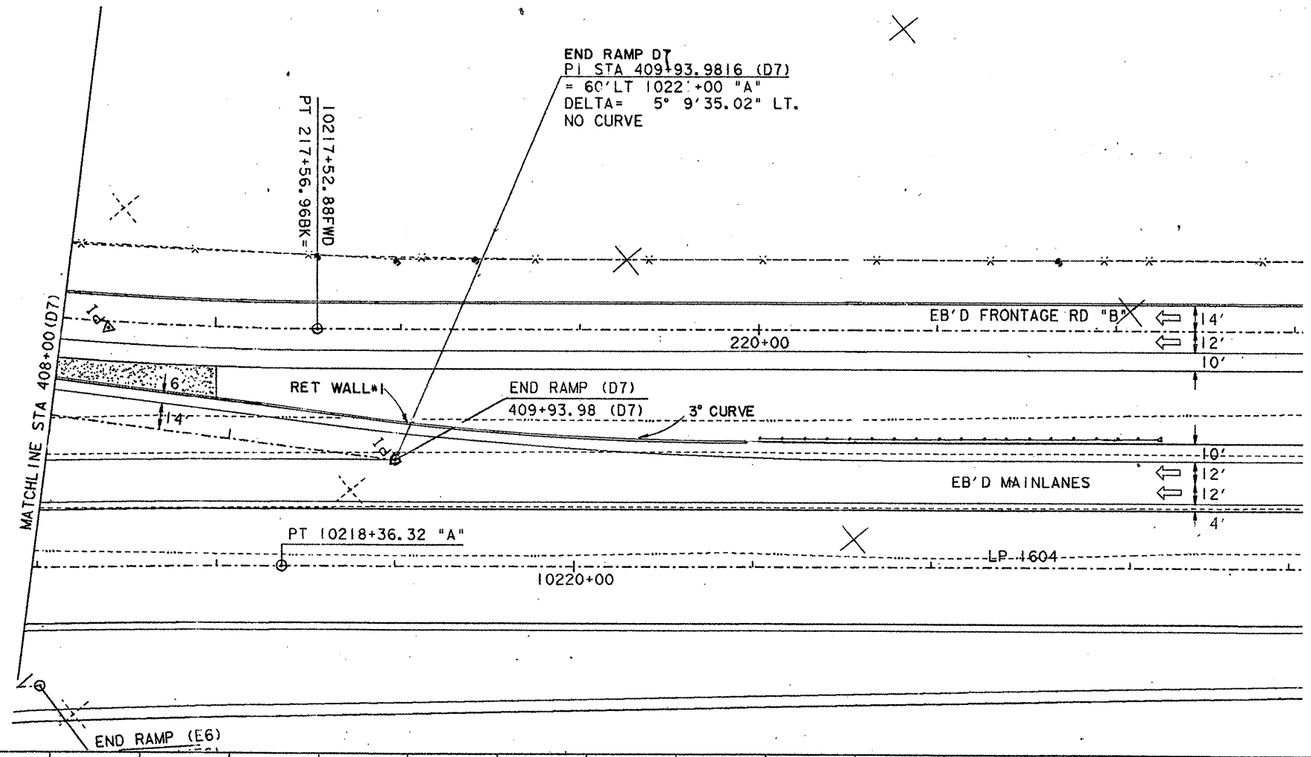
RAMP D7 LAYOUT
EXIT RAMP
E'BD @ HAUSMAN RD

SHEET 1 OF 2

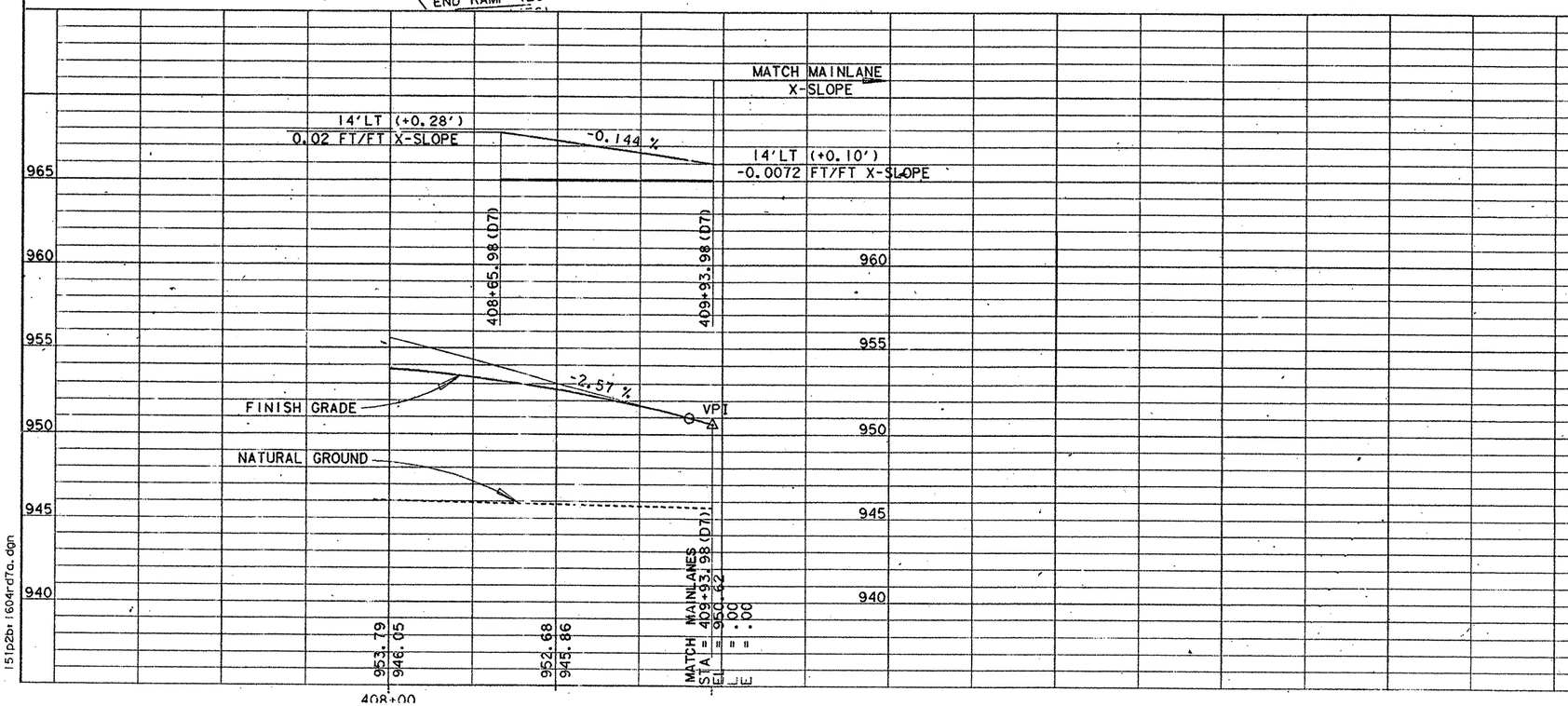
STATE	FEDERAL AID PROJECT NO.				SHEET NO.
TEXAS					133
COUNTY	CONT.	SECT.	JOB	HWY. NO.	
BEXAR	2452	02	023	LP1604	

, ETC

151p2b1 1604rd7.dgn



SCALE: 1"=40' HORZ.
1"=4' VERT.



SHEET TOTALS	
EST	UNIT

STATE OF TEXAS
CAROL GREINER LUSCHEN
30459
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

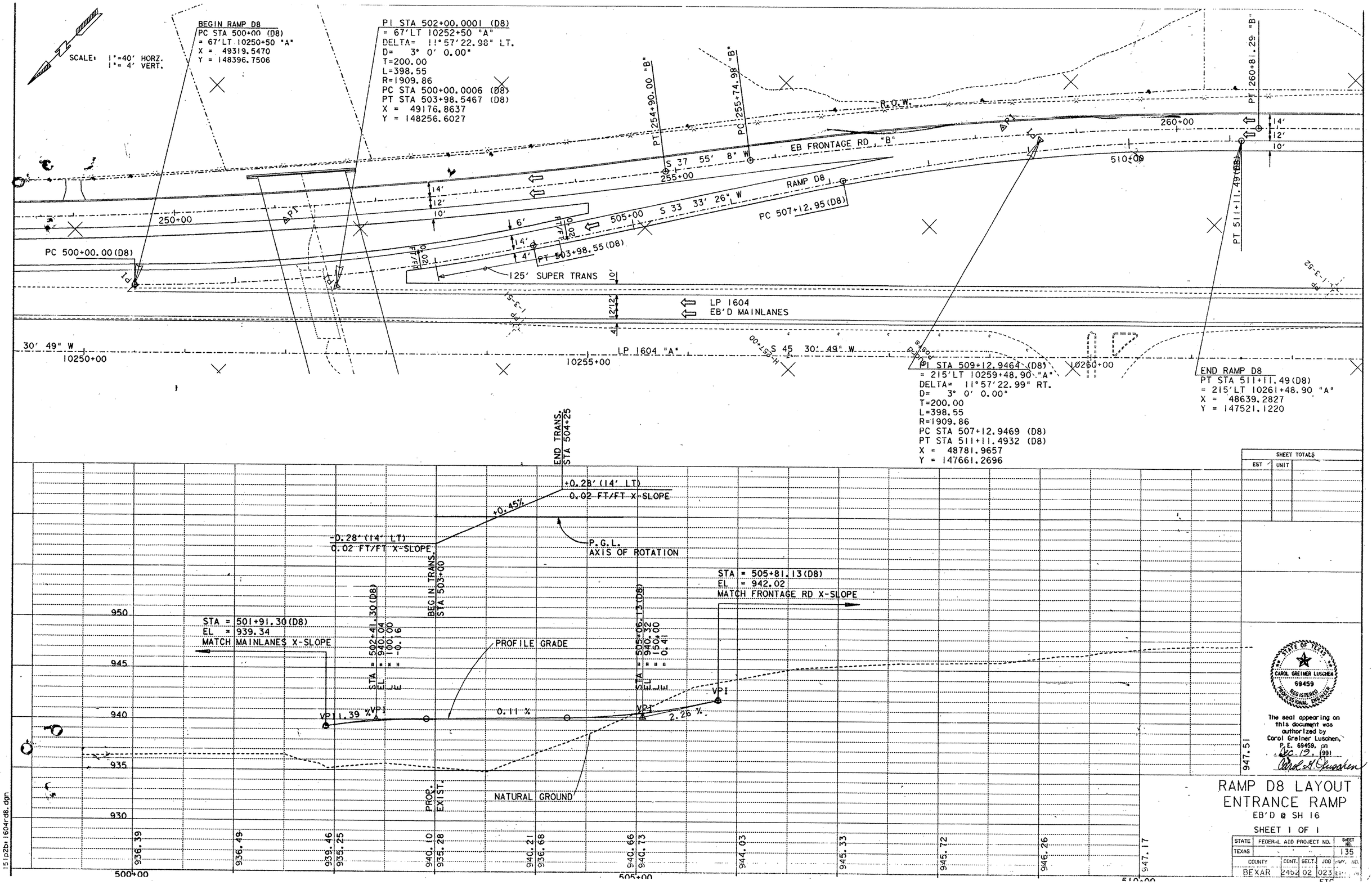
RAMP D7 LAYOUT
EXIT RAMP
E'BD @ HAUSMAN RD

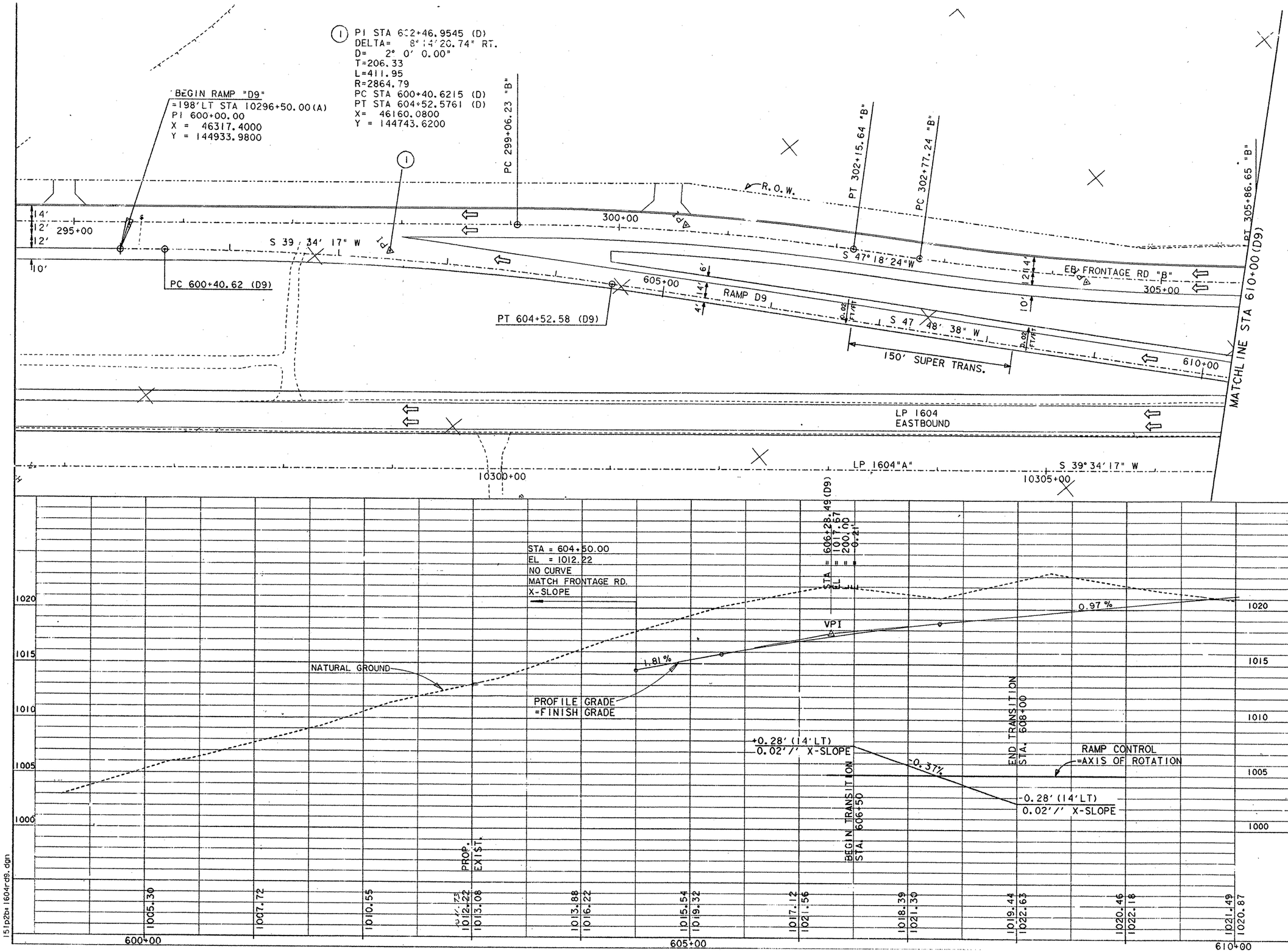
SHEET 2 OF 2

STATE	FEDERAL AID PROJECT NO.				SHEET NO.
TEXAS					134
COUNTY	CONT.	SECT.	JOB	HWY. NO.	
BEXAR	2452	02	023	LP1604	

, ETC

151p2b: 1604-d7a.dgn


SCALE: 1"=40' HORZ. 1"= 4' VERT.
BEGIN RAMP D8
PC STA 500+00 (D8)
= 67'LT 10250+50 "A"
X = 49319.5470
Y = 148396.7506
PI STA 502+00.0001 (D8)
= 67'LT 10252+50 "A"
DELTA= 11°57'22.98" LT.
D= 3° 0' 0.00"
T=200.00
L=398.55
R=1909.86
PC STA 500+00.0006 (D8)
PT STA 503+98.5467 (D8)
X = 49176.8637
Y = 148256.6027
PT 254+90.00 "B"
PC 255+74.98 "B"
R.O.W.
PT 260+81.29 "B"
EB FRONTAGE RD "B"
S 37 55' 8" W
255+00
260+00
510+00
RAMP D8
PC 507+12.95 (D8)
S 33 33' 26" W
505+00
250+00
PC 500+00.00 (D8)
PT 503+98.55 (D8)
125' SUPER TRANS
PT 511+11.49 (D8)
LP 1604
EB'D MAINLANES
30' 49" W
10250+00
LP 1604 "A"
10255+00
S 45 30' 49" W
10260+00
PI STA 509+12.9464 (D8)
= 215'LT 10259+48.90 "A"
DELTA= 11°57'22.99" RT.
D= 3° 0' 0.00"
T=200.00
L=398.55
R=1909.86
PC STA 507+12.9469 (D8)
PT STA 511+11.4932 (D8)
X = 48781.9657
Y = 147661.2696
END RAMP D8
PT STA 511+11.49 (D8)
= 215'LT 10261+48.90 "A"
X = 48639.2827
Y = 147521.1220
END TRANS. STA 504+25
+0.28' (14' LT)
0.02 FT/FT X-SLOPE
+0.45%
-0.28' (14' LT)
0.02 FT/FT X-SLOPE
P.G.L.
AXIS OF ROTATION
BEGIN TRANS. STA 503+00
STA = 505+81.13 (D8)
EL = 942.02
MATCH FRONTAGE RD X-SLOPE
STA = 501+91.30 (D8)
EL = 939.34
MATCH MAINLANES X-SLOPE
STA = 502+41.30 (D8)
EL = 940.04
LL = 100.00
E = -0.16
STA = 505+06.13 (D8)
EL = 940.32
LL = 150.00
E = 0.41
PROFILE GRADE
VPI
1.39 %
0.11 %
2.26 %
NATURAL GROUND
PROP. EXIST.
950
945
940
935
930
936.39
936.49
939.46
935.25
940.10
935.28
940.21
936.68
940.66
940.73
944.03
945.33
945.72
946.26
947.17
947.51
500+00
505+00
510+00
SHEET TOTALS
EST
UNIT
STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec. 19, 1991
Carol G. Luschen
RAMP D8 LAYOUT
ENTRANCE RAMP
EB'D @ SH 16
SHEET 1 OF 1
STATE
FEDERAL AID PROJECT NO.
SHEET NO.
TEXAS
135
COUNTY
CONT.
SECT.
JOB
BEXAR
2452
02
023
151p2b1604rd8.dgn



SHEET TOTALS	
EST	UNIT

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Oct. 19, 991

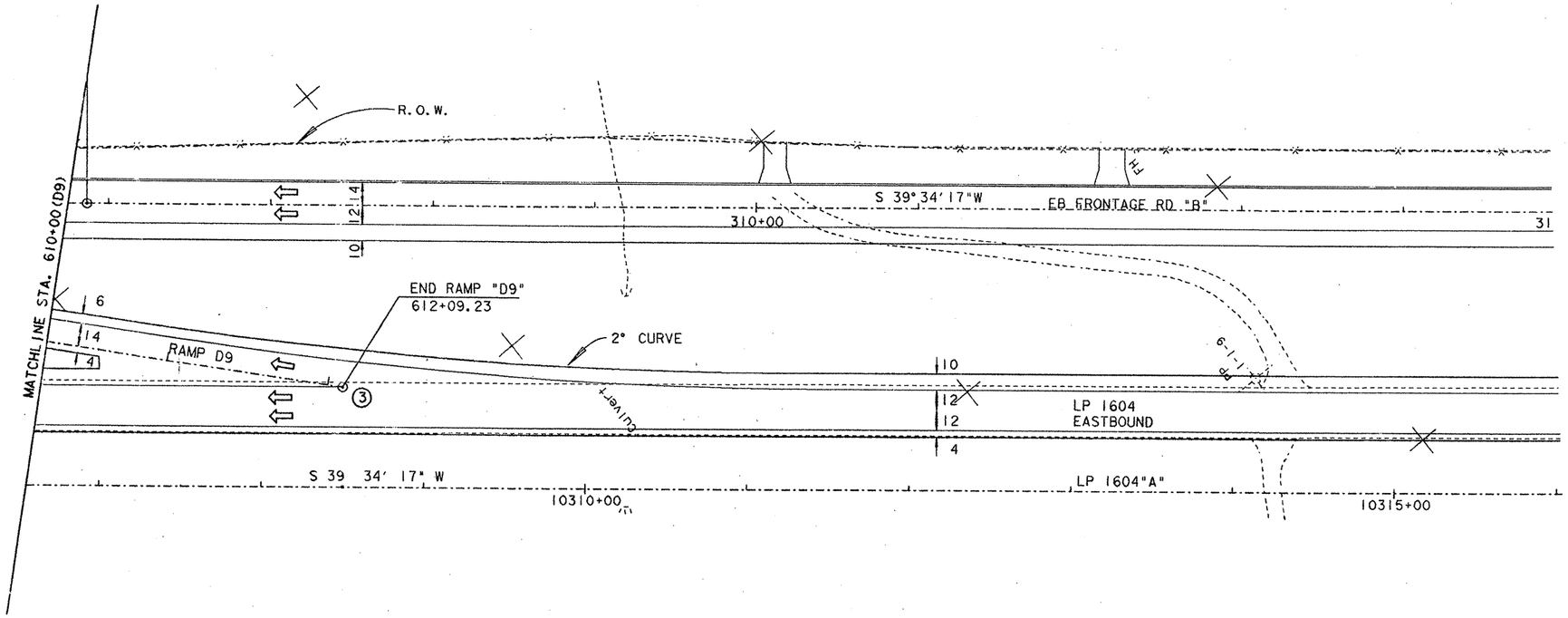
Carol G. Luschen

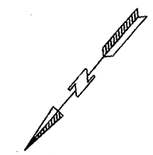
RAMP D9 LAYOUT
EXIT RAMP
EB @ SH 16
SHEET 1 OF 2

STATE	FEDERAL AID PROJECT NO.			SHEET NO.
TEXAS				136
COUNTY	CONT.	SECT.	JOB	HWY. NO.
BEXAR	2452	02	023	LP1604

.ETC

151p2bx 1604rd9.dgn





SCALE: 1"=40' HORZ.
1"=4' VERT.

③ END RAMP D9
PI STA 612+09.23 (D9)
= 60' LT 10308+50 "A"
X = 45446.5789
Y = 144096.8968

STA 610+60.00
EL 102.81
NO CURVE
MATCH MAINLANE X-SLOPE

PROFILE GRADE
=FINISH GRADE

0.96 %

NATURAL GROUND

1020
1015
1010
1005
1000

PROP.
EXIST.

1021.49
1020.50

1021.29

610+00

SHEET TOTALS	
EST	UNIT

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec. 19, 1991

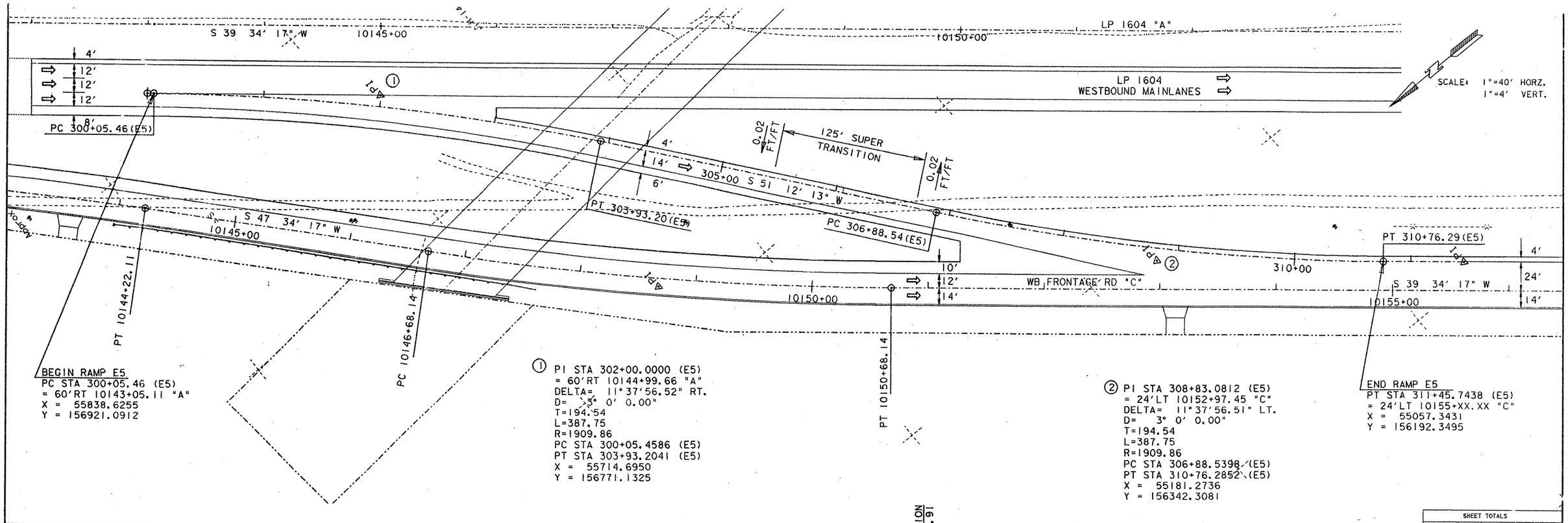
Carol G. Luschen

RAMP D9 LAYOUT
EXIT RAMP
EB @ SH 16
SHEET 2 OF 2

STATE	FEDERAL AID PROJECT NO.				SHEET
TEXAS					137
COUNTY	CONT.	SECT.	JOB		HWY. NO.
BEXAR	2452	02	023		LP1604

ETC

151p2b1604rd9a.dgn



SHEET TOTALS		
EST	UNIT	

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec. 19, 1991

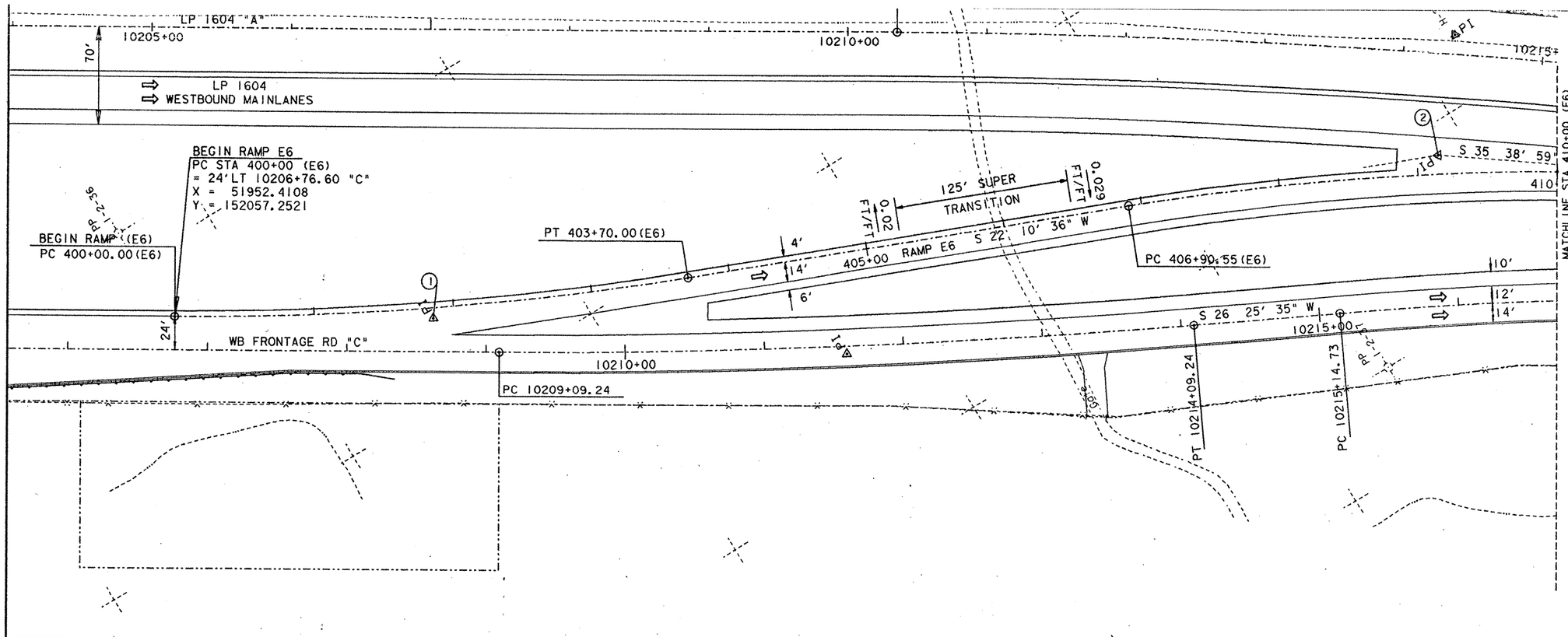
Carol G. Luschen

RAMP E5 LAYOUT
EXIT RAMP
WB @ KYLE SEALE
SHEET 1 OF 1

STATE	FEDERAL AID PROJECT NO.				SHEET NO.
TEXAS					138
COUNTY	CONT.	SECT.	JOB	HWY.	ID.
BEXAR	2452	02	023	LP1604	

151p2b. 1604re5. dgn

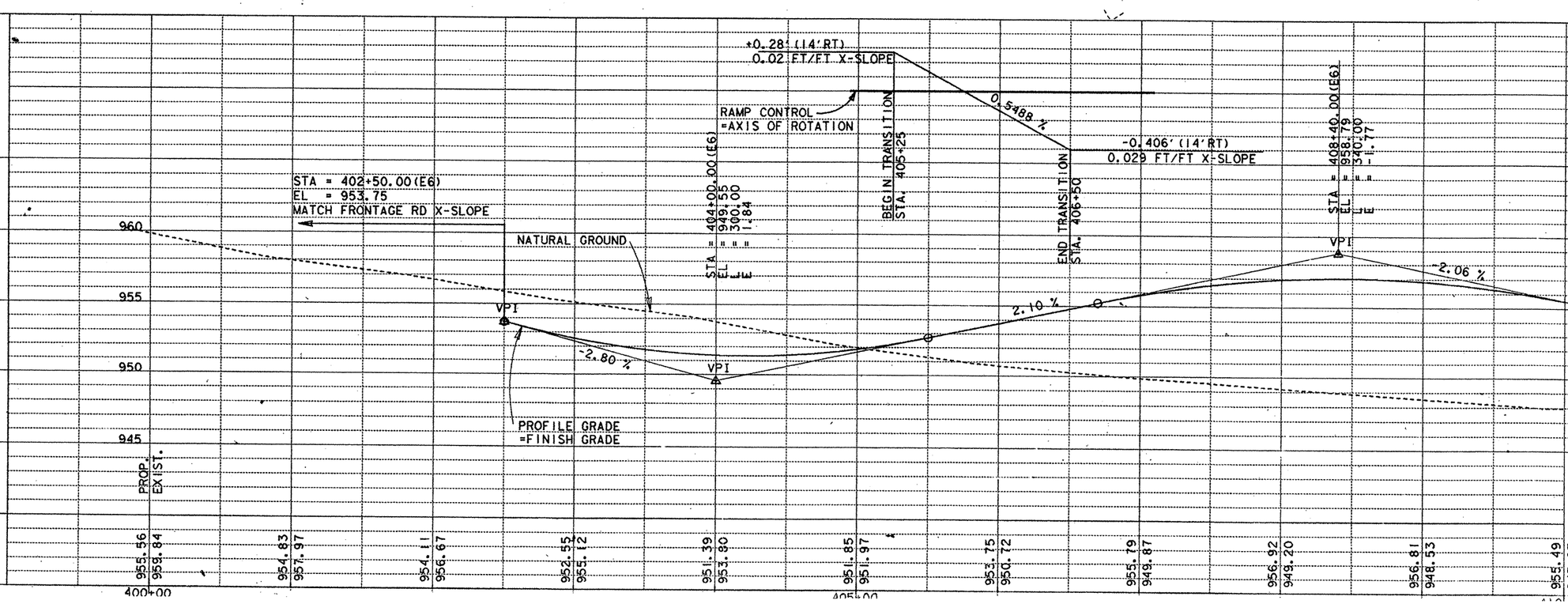
ETC



SCALE: 1"=40' HORZ.
1"= 4' VERT.

① PI STA 401+85.4029 (E6)
= 24'LT 10208+61.99 "C"
DELTA= 9°14'59.16" LT.
D= 2°30' 0.00"
T=185.40
L=369.99
R=2291.83
PC STA 400+00.0048 (E6)
PT STA 403+69.9954 (E6)
X = 51855.7412
Y = 151899.0458

② PI STA 409+16.1396 (E6)
= 72'RT 10214+29.91 "A"
DELTA= 13°28'22.92" RT.
D= 3° 0' 0.00"
T=225.59
L=449.10
R=1909.86
PC STA 406+90.5485 (E6)
PT STA 411+39.6497 (E6)
X = 51579.6110
Y = 151221.6196



SHEET TOTALS		
EST	UNIT	

STATE OF TEXAS
CAROL GREINER LUSCHER
69459
REGISTERED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec 19, 1991

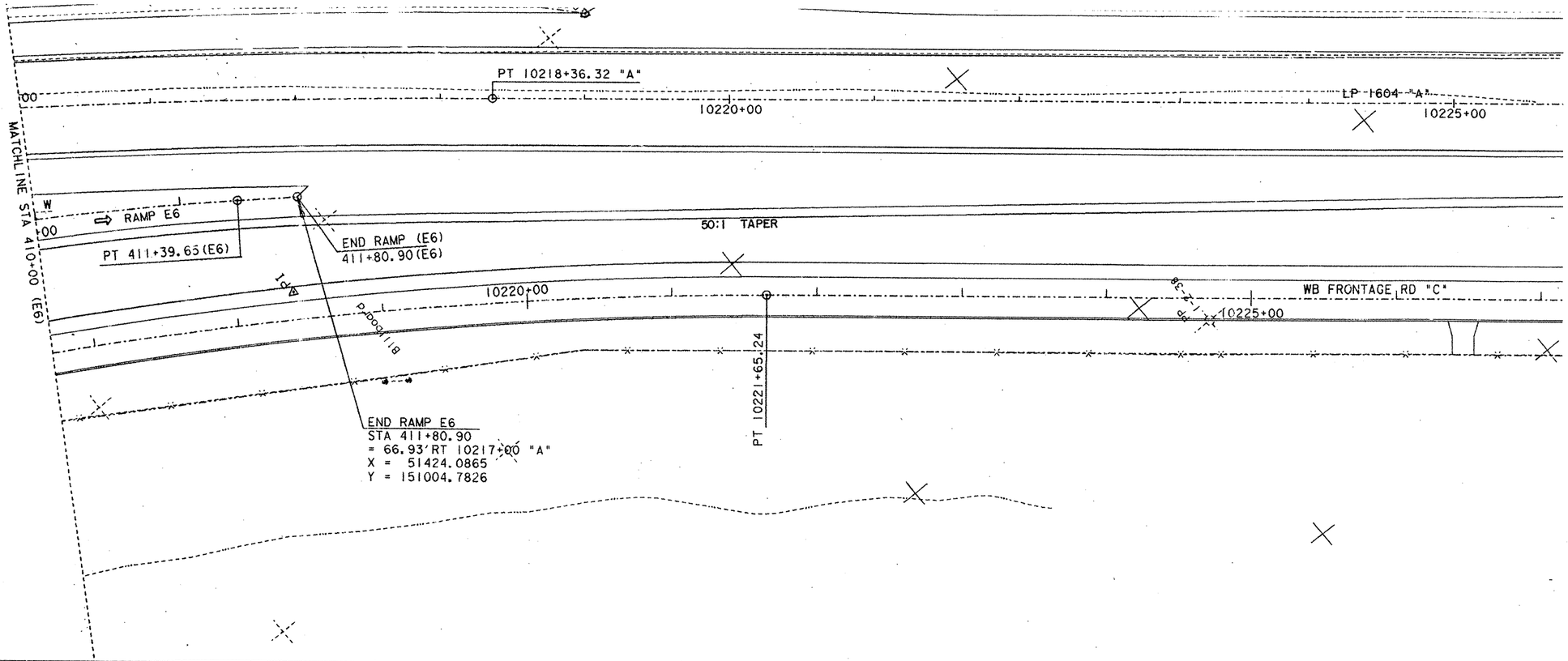
Carol G Luschen

RAMP E6 LAYOUT
ENTRANCE RAMP
WB @ HAUSMAN RD

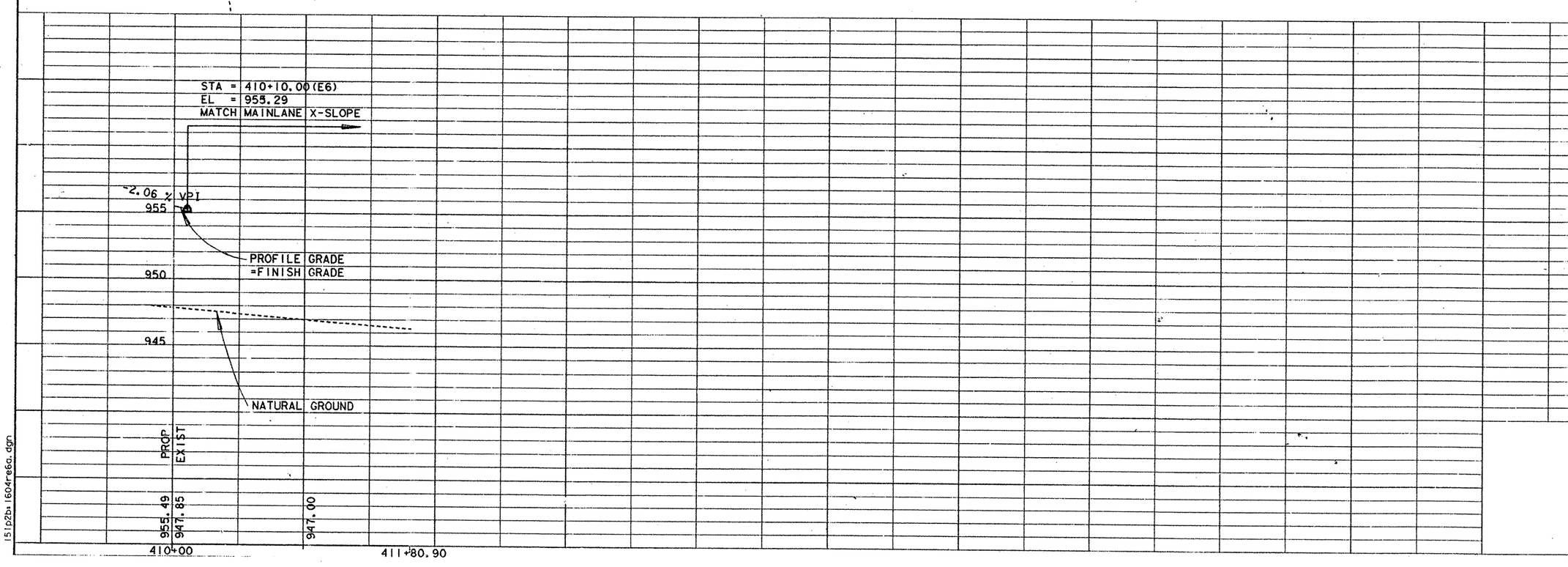
SHEET 1 OF 2

STATE	FEDERAL AID PROJECT NO.				SHEET NO.
TEXAS					139
COUNTY		CONT.	SECT.	JOB	HWY. NO.
BEXAR		2452	02	023	LP1604

151p2b: 1604re6.dgn



SCALE: 1"=40' HORZ.
1"= 4' VERT.



SHEET TOTALS		
EST	UNIT	

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec. 19, 1991

Carol G. Luschen

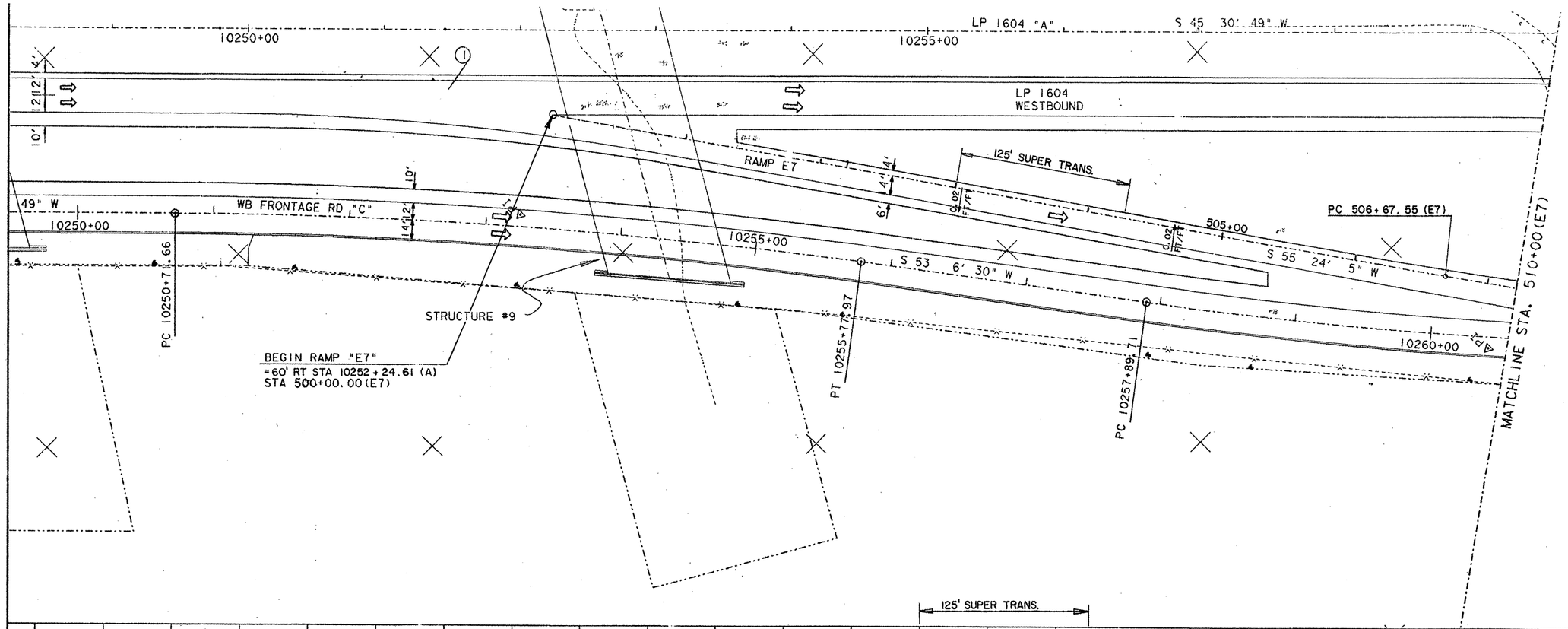
RAMP E6 LAYOUT
ENTRANCE RAMP
WB @ HAUSMAN RD

SHEET 2 OF 2

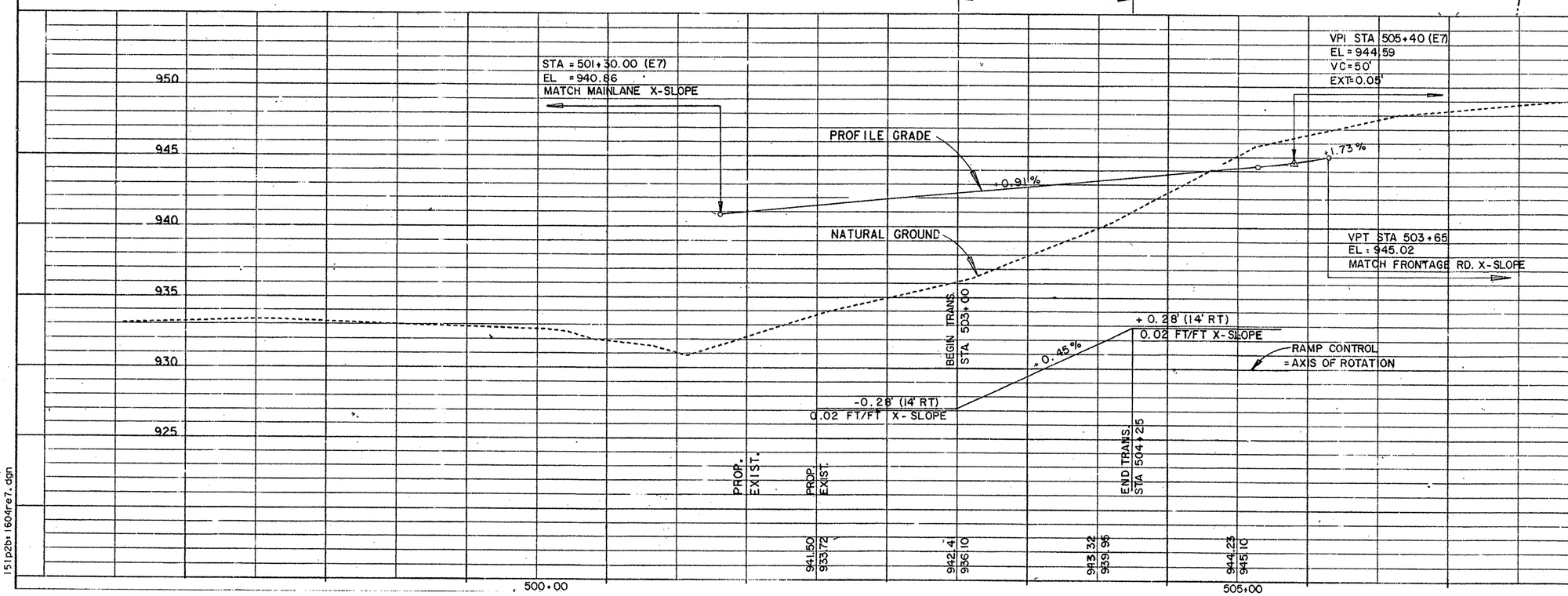
STATE	FEDERAL AID PROJECT NO.			SHEET NO.
TEXAS				140
COUNTY	CONT.	SECT.	JOB	HWY. NO.
BEXAR	2452	02	023	LP1604

ETC

151p2b1604re6a.dgn



SCALE: 1"=40' HORZ.
1"=4' VERT.



SHEET TOTALS		
EST	UNIT	

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec. 19, 1991

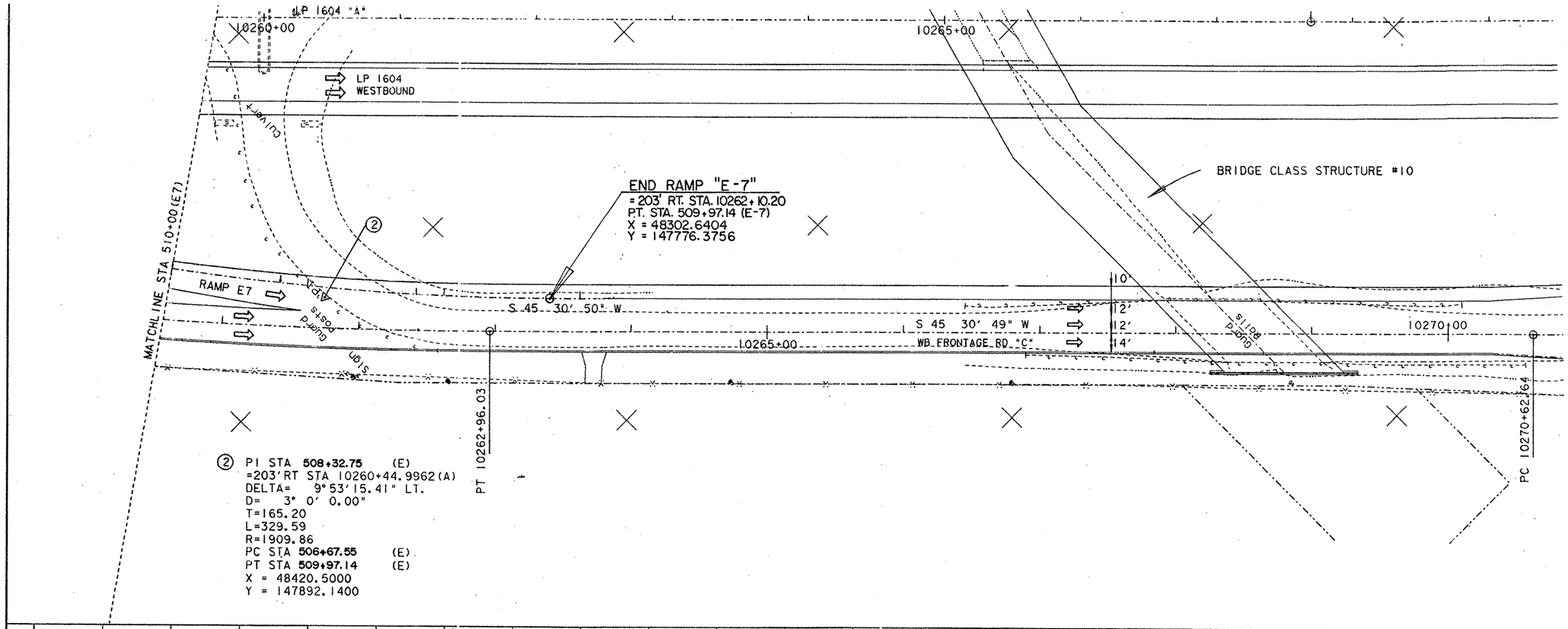
Carol G. Luschen

RAMP E7 LAYOUT
EXIT RAMP
WB'D @ SH 16
SHEET 1 OF 2

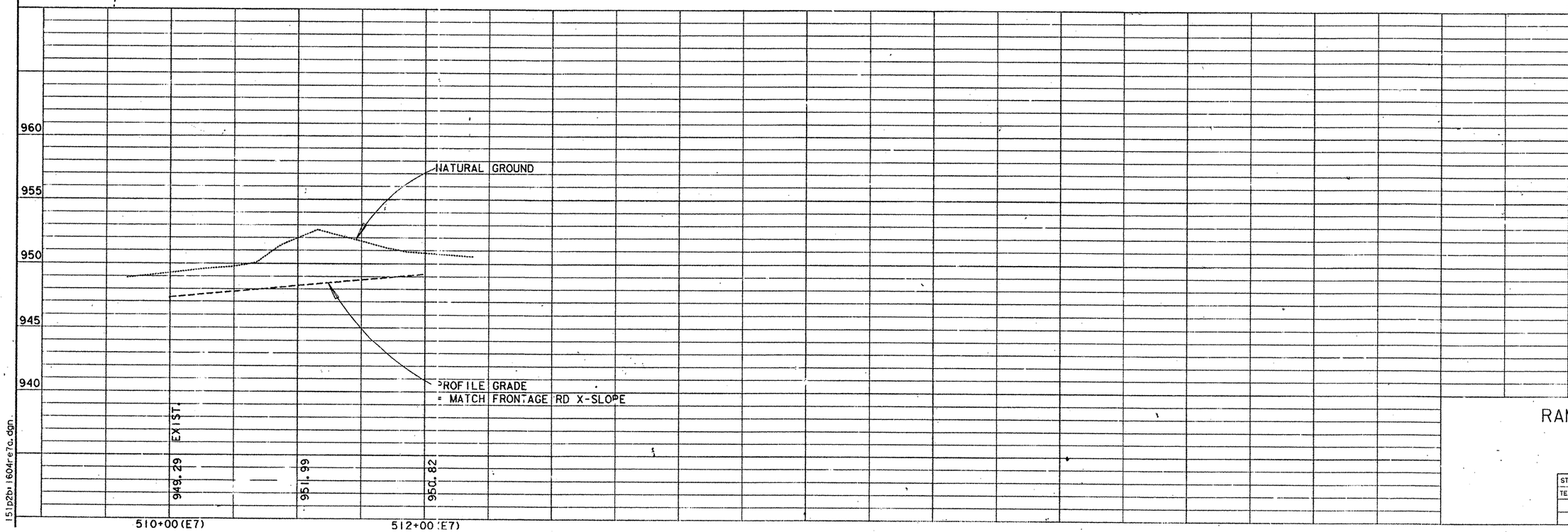
STATE	FEDERAL AID PROJECT NO.			SHEET NO.
TEXAS				141
COUNTY	CONT.	SECT.	JOB	HWY. NO.
BEXAR	2452	02	02	LP 1604

ETC

151p2b: 1604re7.dgn



SCALE: 1"=40' HORZ.
1"=4' VERT.



SHEET TOTALS		
EST	UNIT	

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec. 19, 1991
Carol G. Luschen

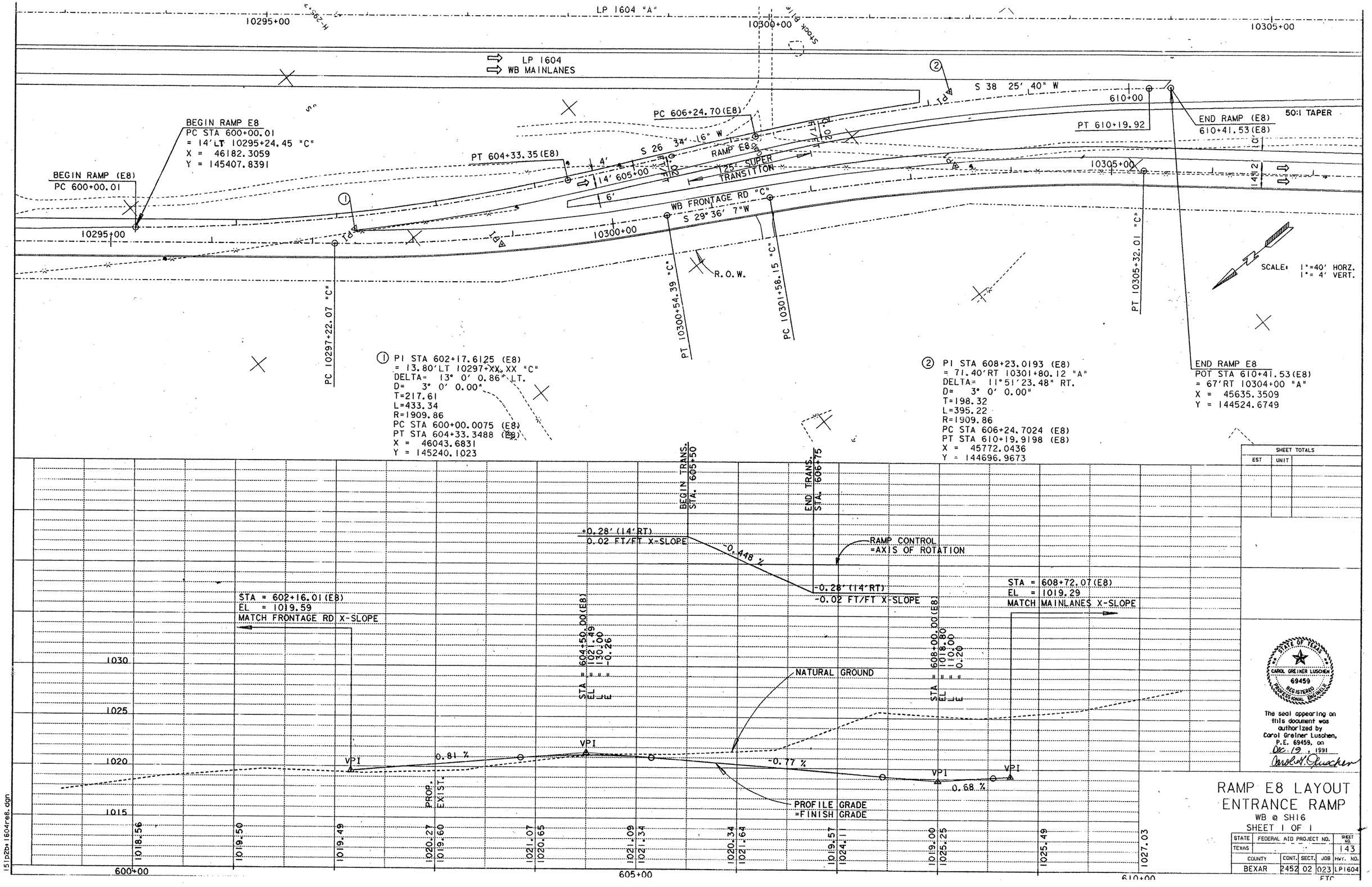
RAMP E7 LAYOUT
EXIT RAMP
WB'D @ SH 16

SHEET 2 OF 2

STATE	FEDERAL AID PROJECT NO.			SHEET NO.
TEXAS				142
COUNTY	CONT.	SECT.	JOB	HWY. NO.
BEXAR	2452	02	023	LP1604

ETC

151p2b1604re7a.dgn



SHEET TOTALS	
EST	UNIT

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Dec. 19, 1991

Carol G. Luschen

RAMP E8 LAYOUT
ENTRANCE RAMP
WB @ SH16
SHEET 1 OF 1

STATE	FEDERAL AID PROJECT NO.			SHEET NO.
TEXAS				143
COUNTY	CONT.	SECT.	JOB	HWY. NO.
BEXAR	2452	02	023	LP1604

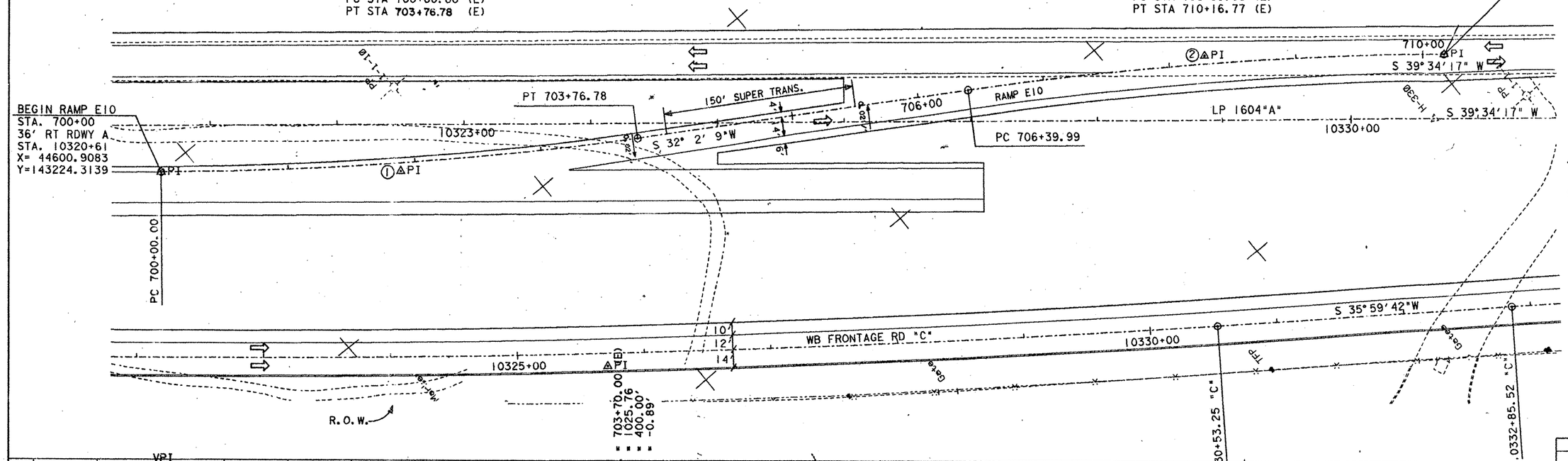
FTC

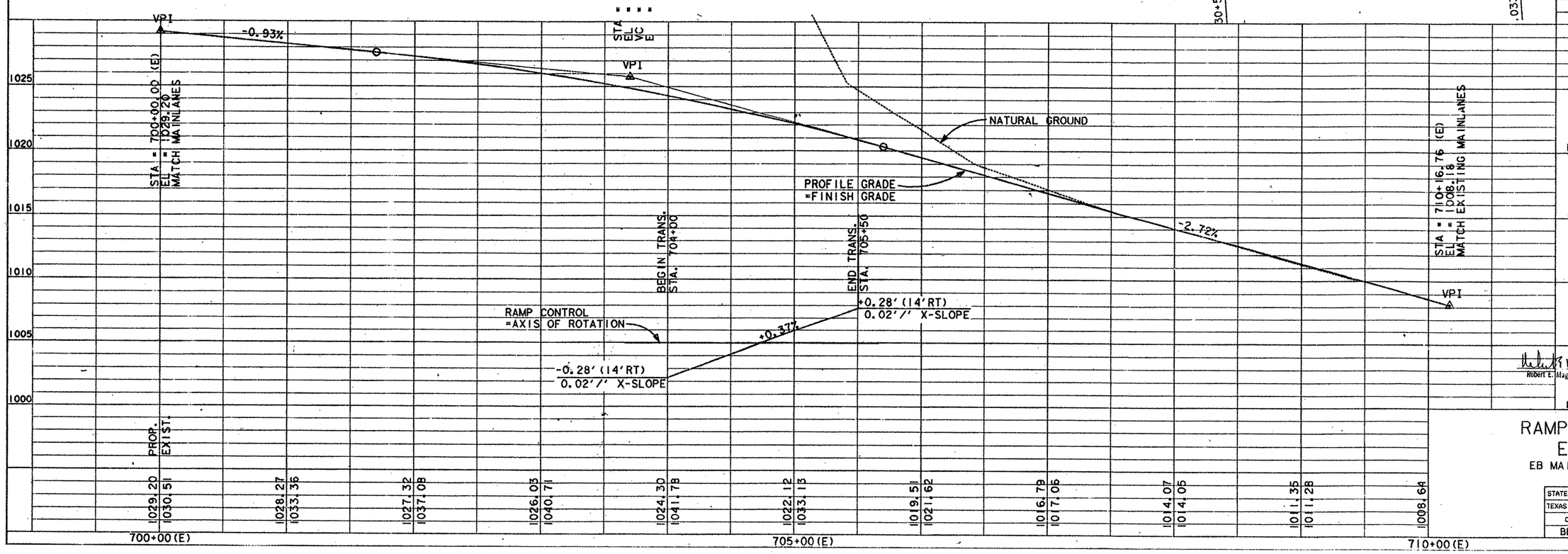
151p2b1604re8.dgn

① PI STA 701+88.66 (E)
X = 44480.7242
Y = 143078.8885
DELTA = 7° 32' 08.00" LT.
D = 2° 00' 00.00"
T = 188.66'
L = 376.78'
R = 2864.79'
PC STA 700+00.00 (E)
PT STA 703+76.78 (E)

② PI STA 708+28.65 (E)
X = 44140.9544
Y = 142535.8992
Δ = 7° 32' 08.00" RT.
D = 2° 00' 00.00"
T = 188.66'
L = 376.78'
R = 2864.79'
PC STA 706+39.99 (E)
PT STA 710+16.77 (E)

END RAMP E10
STA. 710+16.76
48' LT RDWY A
STA. 10330+73.66
X= 44020.7705
Y=142390.4740





SHEET TOTALS	
EST	UNIT

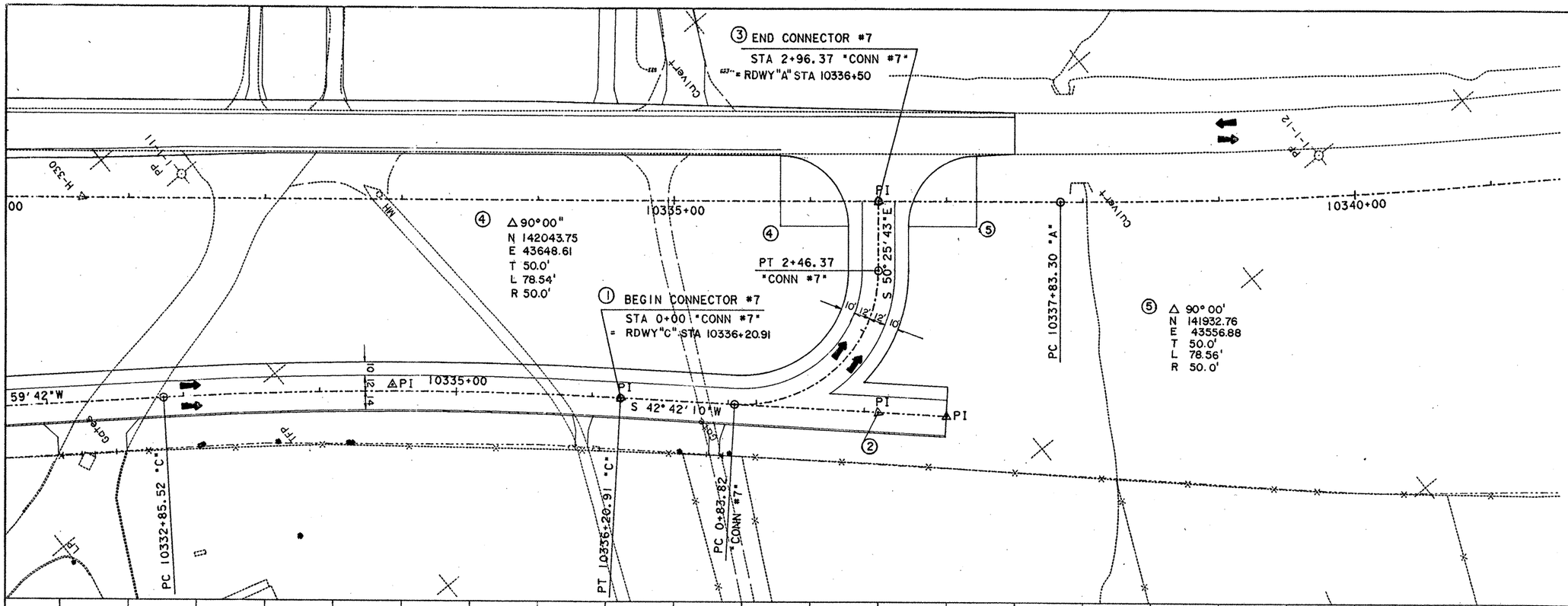
STATE OF TEXAS
ROBERT E. MAGERS
24128
LICENSED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90
Robert E. Magers Date

RAMP E10 LAYOUT
EXIT RAMP
EB MAINLANES @ ADDERSLY
SHEET 1 OF 1

STATE	FEDERAL AID PROJECT NO.				SHEET NO.
TEXAS					144
COUNTY	CONT.	SECT.	JOB	HWY. NO.	
BEXAR	2452	02	023	LP1604	

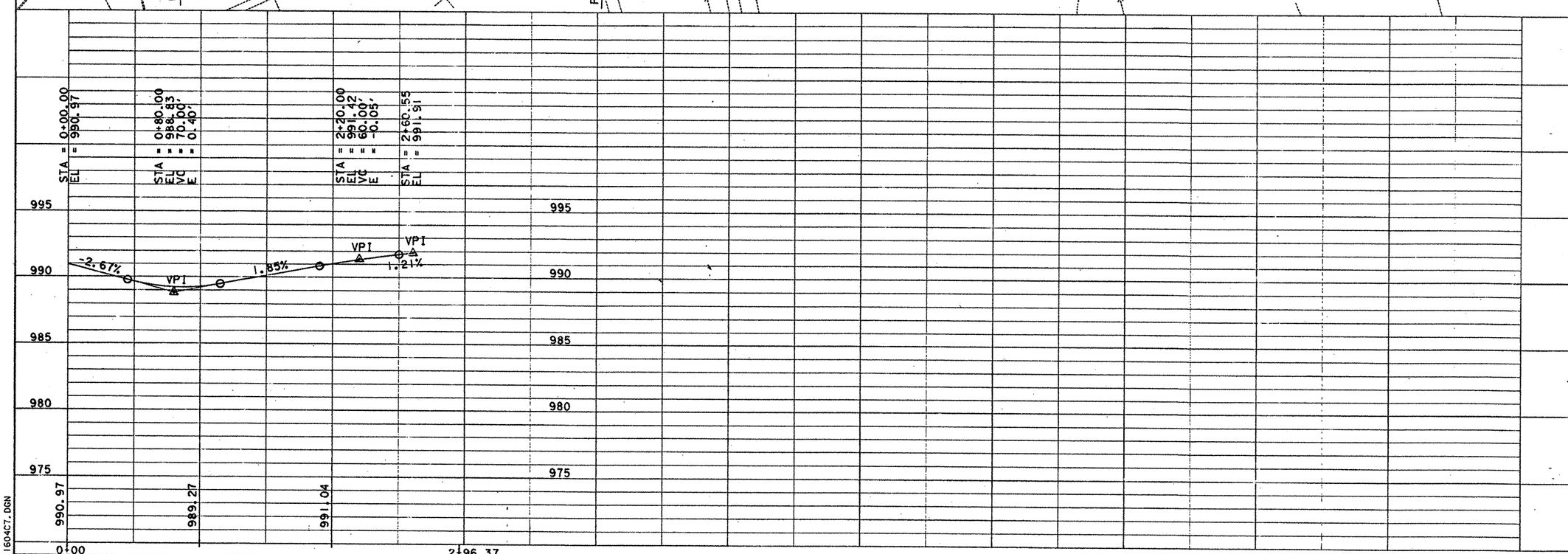
ETC



③ END CONNECTOR #7
STA 2+96.37 "CONN #7"
X = 43616.6194
Y = 141976.7911

② PI STA 1+89.44 "CONN #7"
X = 43496.6625
Y = 142075.9272
Δ = 93°07'53.11" LT.
D = 57°17'44.81"
T = 105.62'
L = 162.54'
R = 100.00'
PC STA 0+83.82 "CONN #7"
PT STA 2+46.37 "CONN #7"

① BEGIN CONNECTOR #7
STA 0+00 "CONN #7"
X = 43625.1427
Y = 142215.1462



1604C7.DGN

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-6-90
Robert E. Magers Date

LP 1604
CONNECTOR "7"
LAYOUT

SHEET 1 OF 1

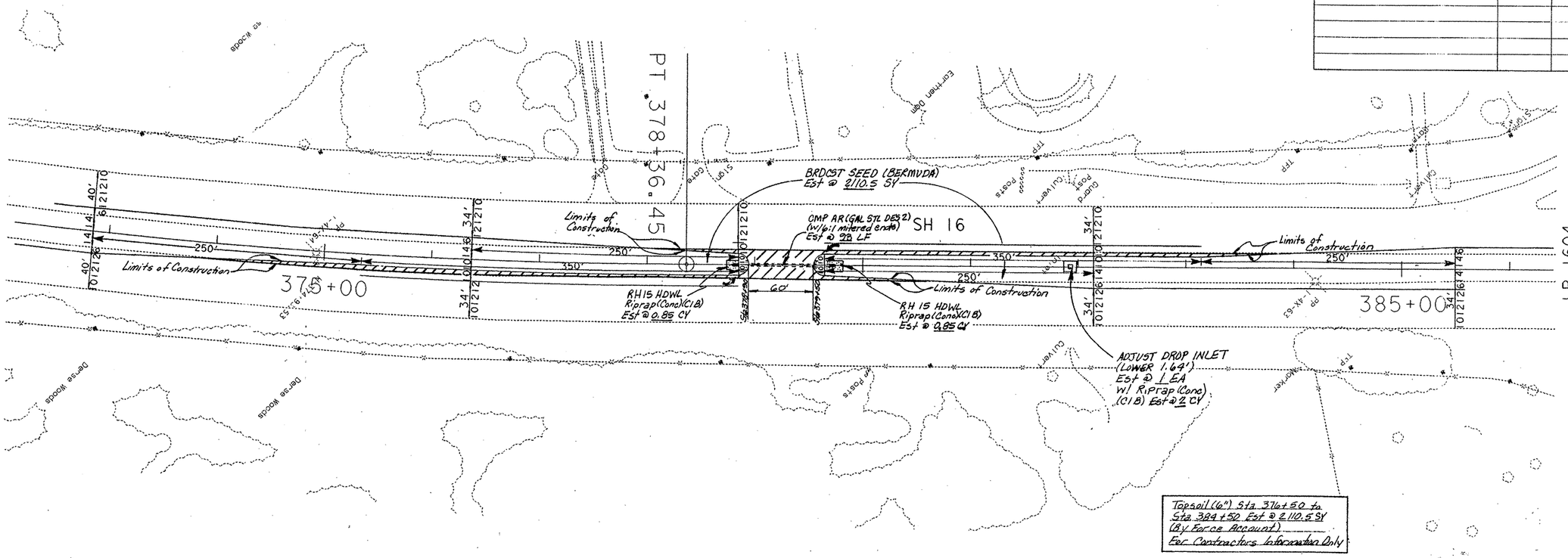
FED. RD DIV. NO	STATE	FEDERAL AID PROJECT NO				SHEET NO.
6	TEXAS					145
STATE DIST. NO	COUNTY	CONT	SECT	JOB		HWY. NO
15	BEXAR	2452	02	023		LP1604

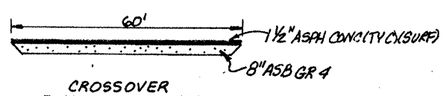
FTC

ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
ASPH CONC (TY C)(SURF)	CY	24.1
ASPH STAB BS(GR4)	TON	254.5
EXCAV	CY	681.8
EMBANK (OC)(TYB)	CY	60.8
RIPRAP(CONC)(CLB)	CY	3.7
ADJUST DROP INLET	EA	1
CMP AR(GAL STL DES2)	LF	93
BRDCST SEED(BERMUDA)	SY	2110.5

SCALE: 1" = 50'





CROSSOVER
TYPICAL SECTION

CHANGE ORDER NO. 8

SHEET 1 OF 2

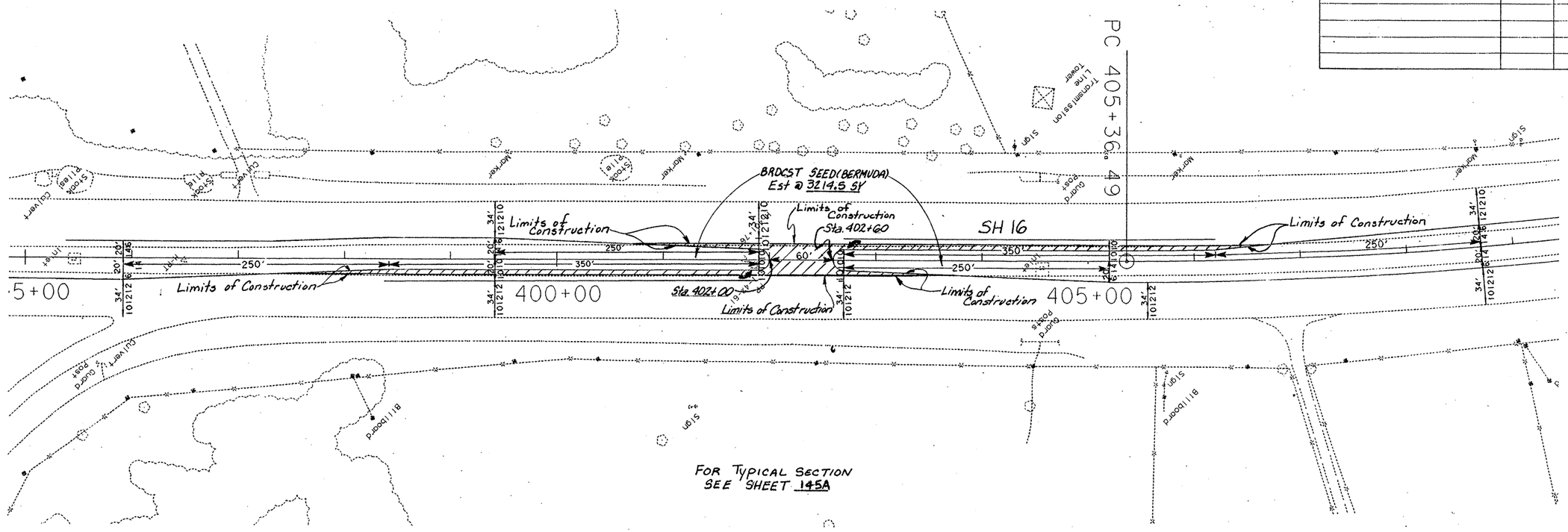
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	NH 90(191)M		145A
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP1604

PLAN 12/22/95 D15PC2D/D155802/LP1604/C08P2.DGN

ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
ASPH CONC (TY C)(SURF)	CY	24.1
ASPH STAB BS (GR 4)	TON	254.5
EXCAV	CY	819.4
EMBANK (ORD COMP)(TY B)	CY	209.4
BRDCST SEED (BERMUDA)	SY	3215

SCALE: 1" = 50'



Topsoil (6") Sta. 395+45 to Sta. 407+00 Est @ 3219.5 SY (By Force Account) For Contractors Information Only

CHANGE ORDER NO. 8

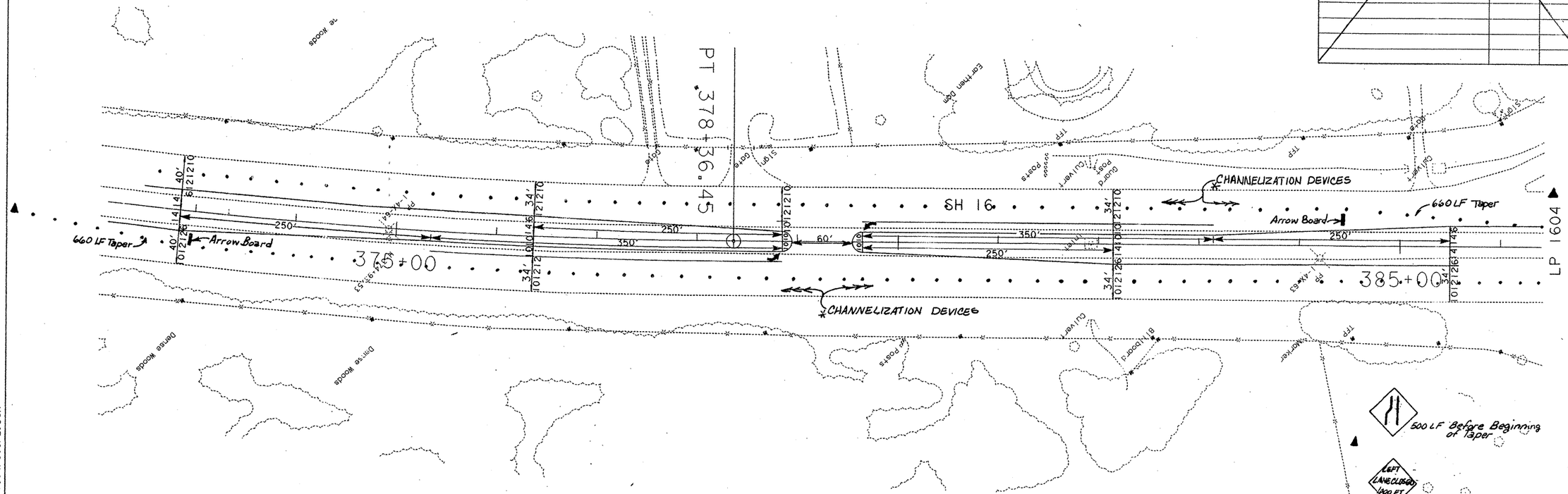
SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	NH 90(191)M		145B
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP1604

PLAN 12/22/95 d15pc2d/d155802/1604/co8p1.dgn

SCALE: 1" = 50'

ESTIMATED QUANTITIES		
ITEM	UNIT	QTY.



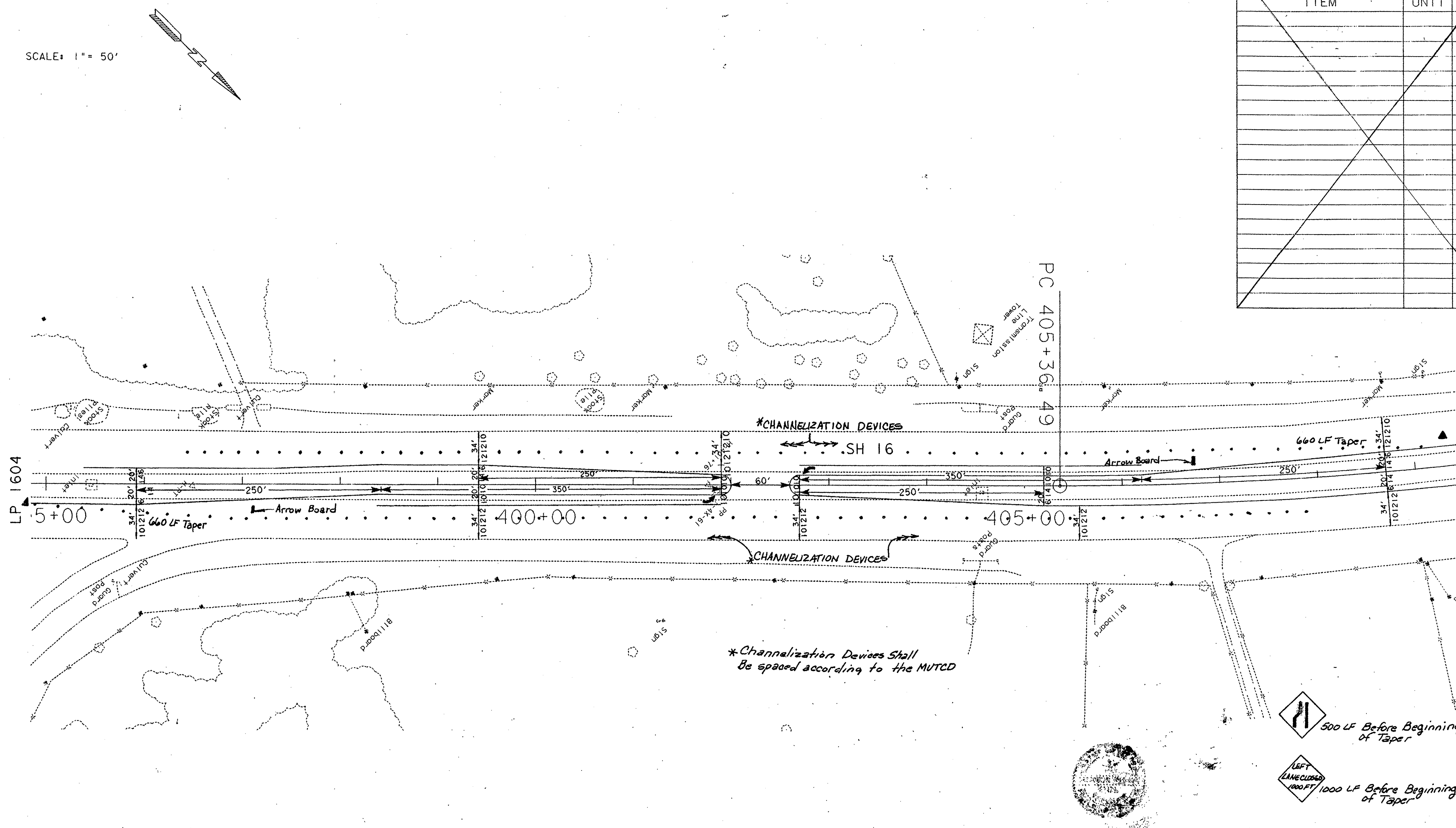
* Channelization Devices Shall Be Spaced according to the MUTCD

PLAN 12/22/95 D15PC20/D155802/LP1604/C08P2.DGN

TRAFFIC CONTROL
CHANGE ORDER NO. 8

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	NH 90(191)M		145C
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP1604



ESTIMATED QUANTITIES

ITEM	UNIT	QTY.

d15pc2d/d155802/1604/co8pl.dgn

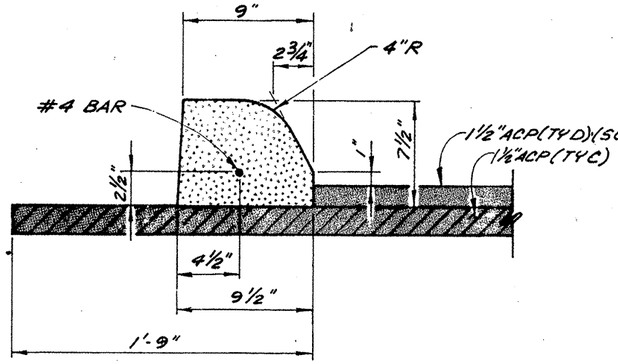
12/22/95

PLAN

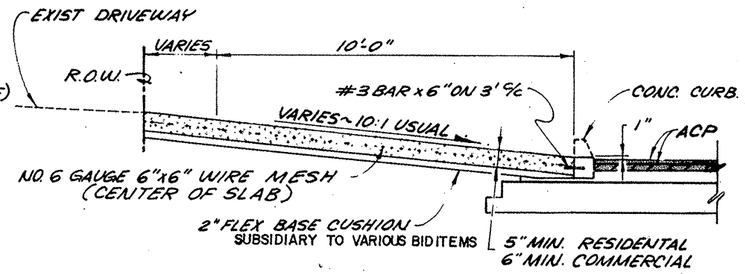
TRAFFIC CONTROL
CHANGE ORDER NO. 8

SHEET 2 OF 2

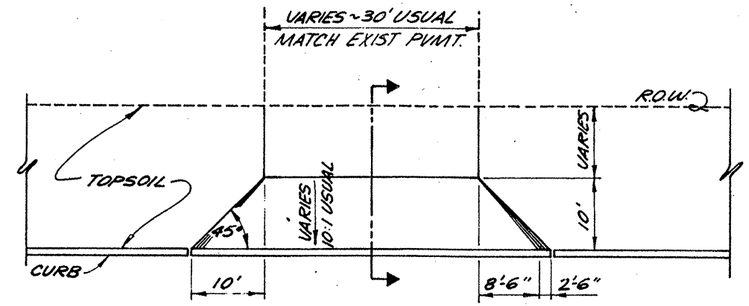
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.			SHEET NO.
6	NH 90(191)M			145D
STATE	STATE DIST. NO.	COUNTY		
TEXAS	15	BEXAR		
CONT.	SECT.	JOB	HIGHWAY NO.	
2452	02	023	LP1604	



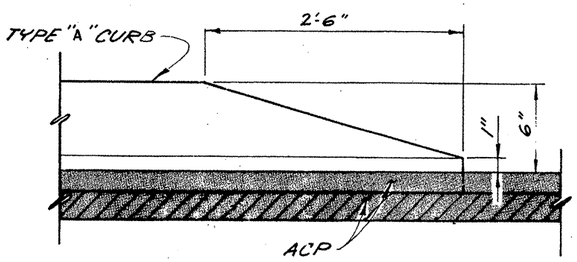
TYPE "A" CURB



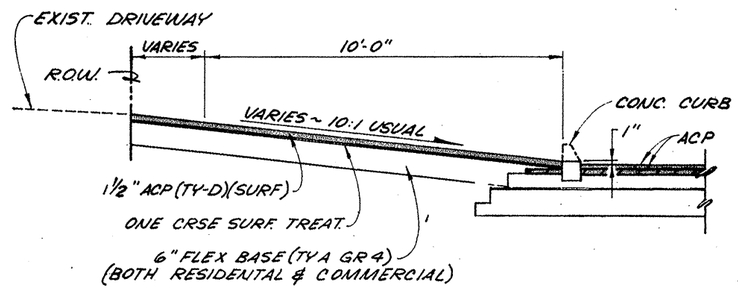
TYPICAL CONCRETE DRIVEWAY



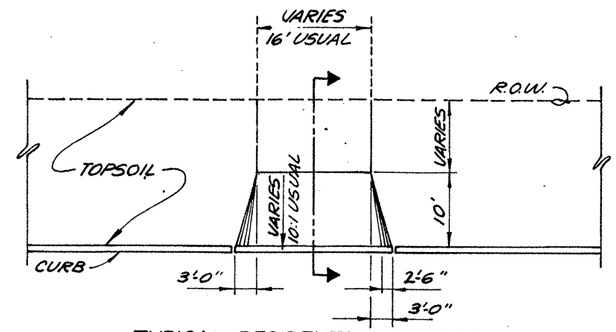
TYPICAL COMMERCIAL DRIVEWAY



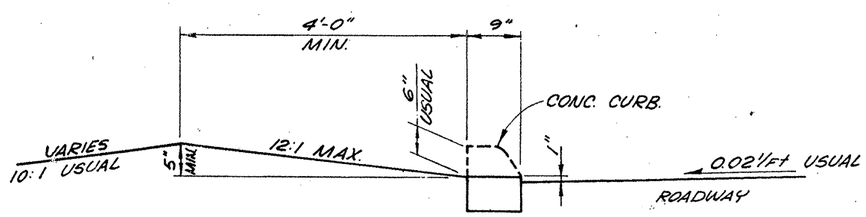
CURB END SECTION
@ INTERSECTING STREETS
WITHOUT CURB



TYPICAL ASPHALT DRIVEWAY
(TYPE I)

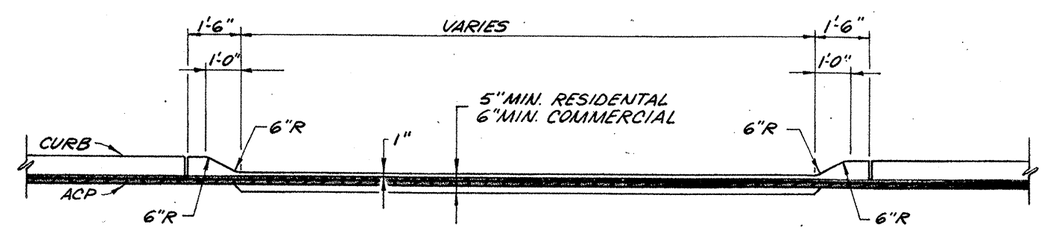


TYPICAL RESIDENTAL DRIVEWAY



THE CREST OF THE DRIVEWAY BERM SHALL BE ROUND TO CONFORM TO A 6 FT. VERTICAL CURVE

MINIMUM DRIVEWAY BERM
FOR FILL SECTION



TYPICAL DRIVEWAY ELEVATION

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

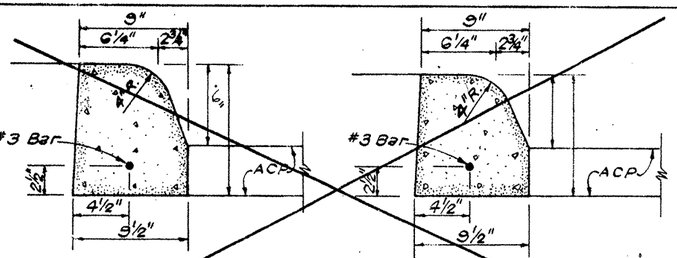
Robert E. Magers P.E.

9-6-90
Date

MISC. ROADWAY DETAILS

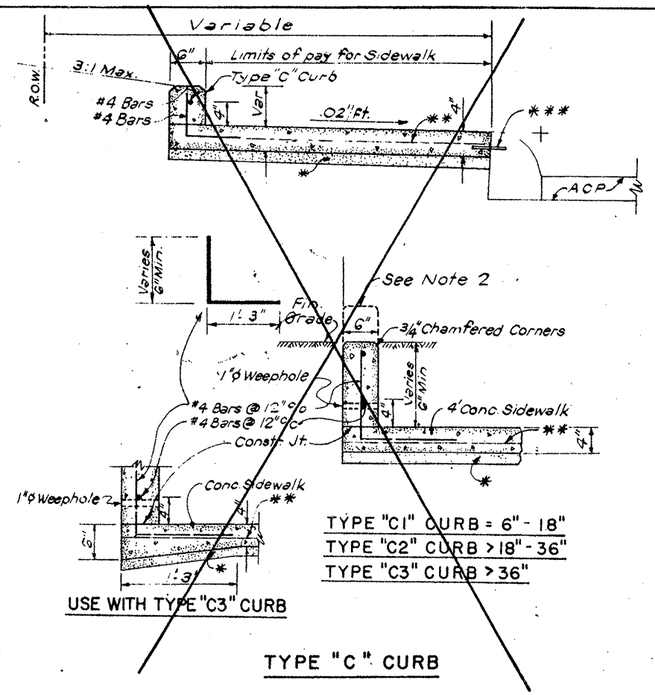
Sheet 1 of 3

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS					146
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB		PROJECT NO.
15	BEXAR	2452	02	023		



TYPE "A" CURB

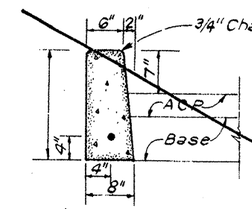
TYPE "B" CURB



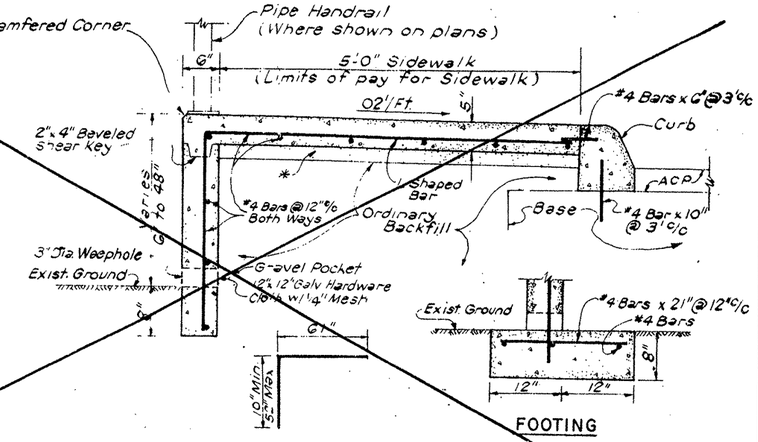
USE WITH TYPE "C3" CURB

TYPE "C1" CURB = 6" - 18"
TYPE "C2" CURB > 18" - 36"
TYPE "C3" CURB > 36"

TYPE "C" CURB



TYPE "D" CURB

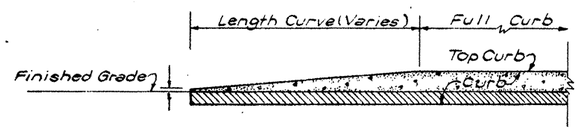


FOOTING

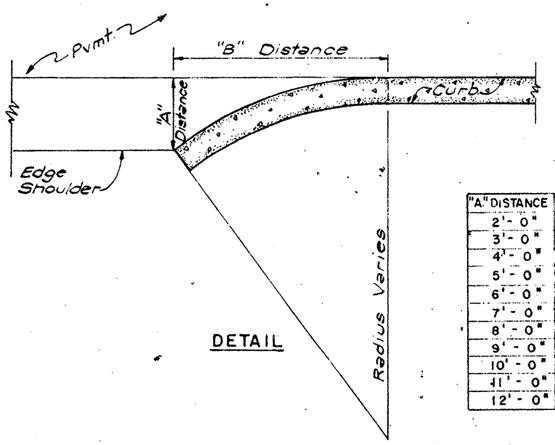
* 2" Flex. base cushion
** 6"x6" No. 6 Wire Fabric in center of slab
*** #3 bar x 2' @ 3' c/c

TYPE "E1" CURB > 8" - 18" WITHOUT FOOTING
TYPE "E2" CURB > 18" - 48" WITH FOOTING

TYPE "E" CURB



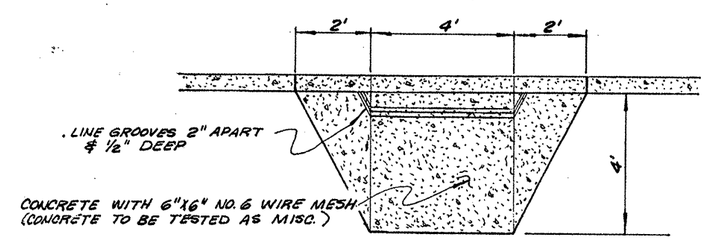
SECTION



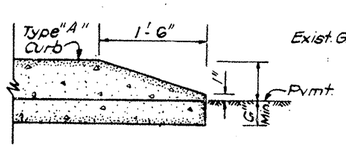
DETAIL

"A" DISTANCE	RADIUS	LENGTH CURVE	"B" DISTANCE
2'-0"	10'	6.44	6.00
3'-0"	15'	9.65	9.00
4'-0"	20'	12.87	12.00
5'-0"	25'	16.09	15.80
6'-0"	30'	19.31	18.00
7'-0"	35'	22.52	21.00
8'-0"	40'	25.74	24.00
9'-0"	45'	28.96	27.00
10'-0"	50'	32.18	30.00
11'-0"	55'	35.39	33.00
12'-0"	60'	38.61	36.00

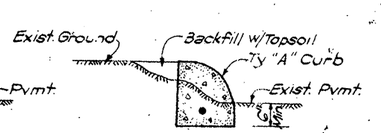
CURB END TERMINAL
ROADWAY WITH SHOULDER



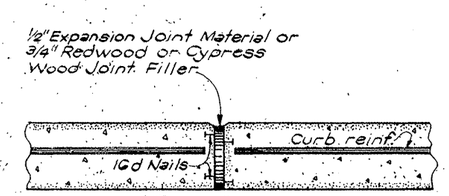
TOP VIEW



CURB END TERMINAL
AT INTERSECTING STREETS
WITHOUT CURB

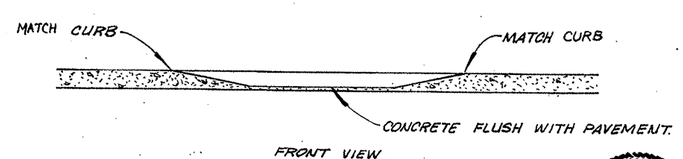


COMPLETED SECTION
NEW CURB OUTSIDE
CONSTRUCTION AREA



NOTE:
Expansion joints are to be placed at the beginning and end of curves adjacent to driveways or at a minimum of 50 ft spacing

DETAIL
AT CURB EXP. JOINT



FRONT VIEW

WHEEL CHAIR RAMP DETAILS

◇ · Wheel Chair Ramp Details

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

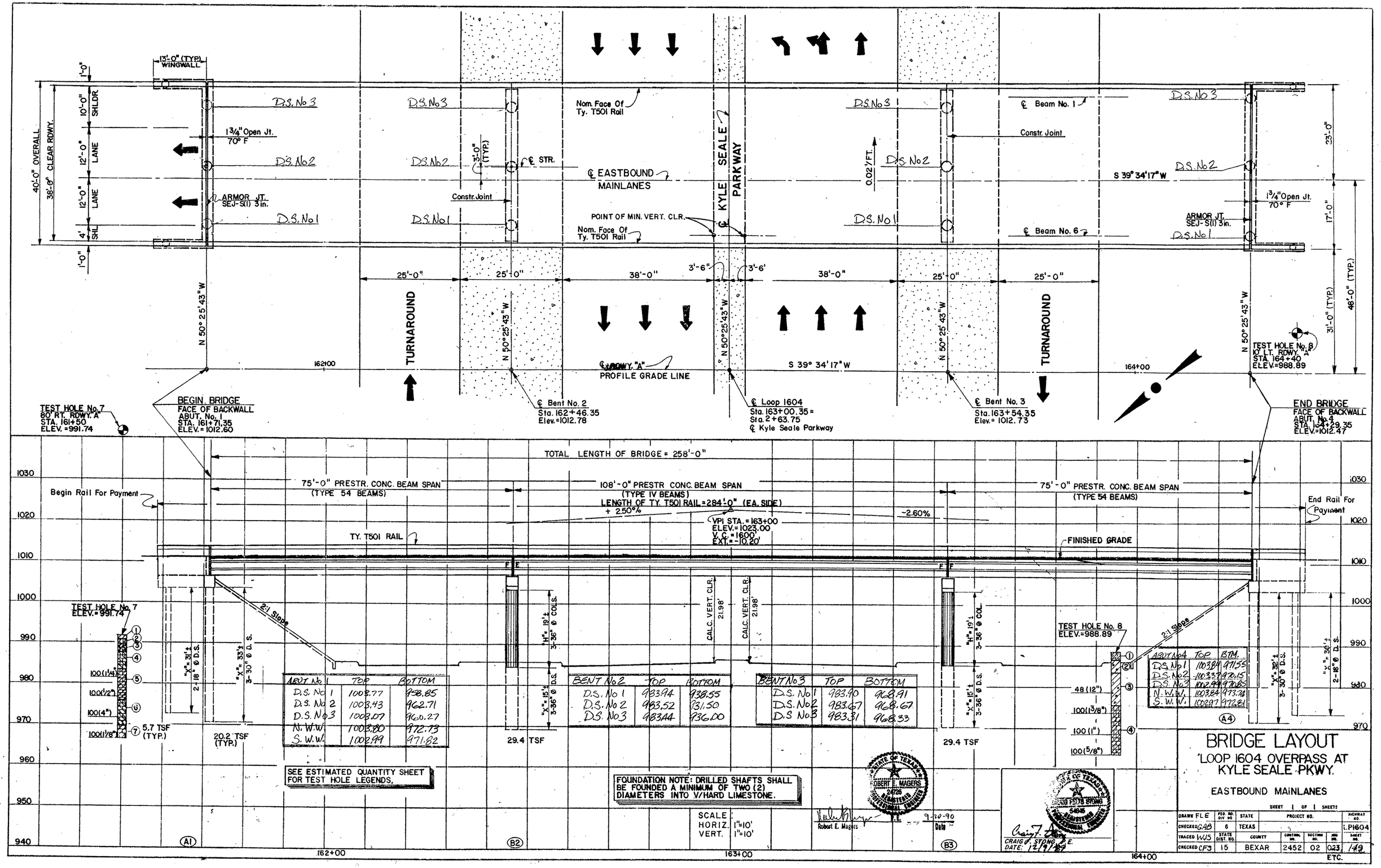
Robert E. Magers P.E. 9-6-90
Robert E. Magers Date

STATE OF TEXAS
GREGORY A. BUCKLEY
61429
REGISTERED
PROFESSIONAL ENGINEER

◇ Gregory A. Buckley P.E. Mar 26, 1993

MISCELLANEOUS
ROADWAY DETAILS
SHEET 2 OF 3

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			SHEET NO.
6	TEXAS	CRP 90(18) M			147
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR	2452	02	023	LP 1604



ABUT No 1	TOP	BOTTOM
D.S. No 1	1003.77	958.85
D.S. No 2	1003.43	962.71
D.S. No 3	1003.07	960.27
N.W.W.	1003.00	972.73
S.W.W.	1002.99	971.82

BENT No 2	TOP	BOTTOM
D.S. No 1	983.94	938.55
D.S. No 2	983.52	931.50
D.S. No 3	983.44	936.00

BENT No 3	TOP	BOTTOM
D.S. No 1	983.90	968.91
D.S. No 2	983.67	968.67
D.S. No 3	983.31	968.33

ABUT No 4	TOP	BTM.
D.S. No 1	1003.84	971.55
D.S. No 2	1003.57	972.15
D.S. No 3	1002.99	970.85
N.W.W.	1003.84	973.74
S.W.W.	1002.97	972.81

SEE ESTIMATED QUANTITY SHEET FOR TEST HOLE LEGENDS.

FOUNDATION NOTE: DRILLED SHAFTS SHALL BE FOUNDED A MINIMUM OF TWO (2) DIAMETERS INTO V/HARD LIMESTONE.

SCALE
HORIZ. 1" = 10'
VERT. 1" = 10'

STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers, P.E. 9-20-90 Date

STATE OF TEXAS CRAIG D. STONG 54645 REGISTERED PROFESSIONAL ENGINEER

CRAIG D. STONG, P.E.
DATE: 12/9/88

BRIDGE LAYOUT

LOOP 1604 OVERPASS AT KYLE SEALE PKWY.

EASTBOUND MAINLANES

SHEET 1 OF 1 SHEETS

DRAWN FLE	FED. RD. DIV. NO.	STATE	PROJECT NO.					HIGHWAY NO.
CHECKED GAB	6	TEXAS						L.P1604
TRACED WJS	STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.		
CHECKED CFJ	15	BEXAR	2452	02	023	149		

ETC.

SUMMARY OF ESTIMATED QUANTITIES

ITEM / DESCRIPTION	DRILLED SHAFTS 18"φ L.F.	DRILLED SHAFTS 30"φ L.F.	DRILLED SHAFTS 36"φ L.F.	CLASS "C" CONCRETE ABUT. C.Y.	CLASS "C" CONCRETE BENT C.Y.	REINF. CONCRETE SLAB S.F.	PRESTRESSED CONCRETE BEAM TY 54 L.F.	PRESTRESSED CONCRETE BEAM TY IV L.F.	CONCRETE SURFACE TREATM'T S.Y.	SEALED EXP. JOINT (3 IN.) L.F.	RAILING TY T501 L.F.	RIPRAP (CONC) (CL. B) C.Y.
ABUT 1 & 4	122	195		59.8							52.0	174
BENT 2 & 3			90		61.0							
DECK UNIT 1						10320	896.00	646.00	1065	75	516.0	
TOTAL	122	195	90	59.8	61.0	10320	896.00	646.00	1065	75	568.0	174

BEARING SEAT ELEVATIONS ⊕

LOCATION		BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5	BEAM 6
ABUT 1	(FWD)	1005.7949	1005.9309	1006.0668	1006.2028	1006.3388	1005.4748
BENT 2	(BK)	1005.9721	1006.1081	1006.2441	1006.3801	1006.5161	1006.6521
	(FWD)	1005.9736	1006.1096	1006.2456	1006.3816	1006.5178	1006.6538
BENT 3	(BK)	1005.9192	1006.0552	1006.1912	1006.3271	1006.4631	1006.5991
	(FWD)	1005.9162	1006.0522	1006.1882	1006.3242	1006.4604	1006.5964
ABUT 4	(BK)	1005.6635	1005.7995	1005.9355	1006.0715	1006.2075	1006.3435

⊕ BEAMS LOWERED 1⅜" DUE TO EXCESS CAMBER.

TEST HOLE LEGEND

TEST HOLE 7

1. CLAY, BROWN, SOFT
2. CLAY, TAN & ORANGE, SILTY, V/STIFF
3. CLAY, TAN, W/LIMESTONE ROCK, V/STIFF
4. LIMESTONE, TAN, W/LAYERS OF GRAYISH-WHITE LIMESTONE, CRYSTALLINE, FRACTURED SL/HONEYCOMB, W/LAYERS OF TAN CLAY, HARD
5. LIMESTONE, GRAYISH-WHITE, CRYSTALLINE, FRACTURED, HONEYCOMB, W/SEAMS OF ORANGE & TAN CLAY, V/HARD
6. LIMESTONE, TAN V/CHALKY, HONEYCOMB, W/SEAMS OF ORANGE LIMESTONE, W/SEAMS OF TAN CLAY, HARD
7. LIMESTONE, GRAYISH-WHITE, CRYSTALLINE, FRACTURED, HONEYCOMB, W/SEAMS OF TAN CLAY, V/HARD

TEST HOLE 8

1. CLAY, BROWN, W/TRACE OF GRAVEL, SOFT
2. CLAY, TAN, W/LIMESTONE FRAGMENTS, STIFF
3. CLAY, TAN, W/SEAMS OF ORANGE CLAY, W/TRACE OF CALCAREOUS MATERIAL, STIFF
4. LIMESTONE, TAN, CHALKY, HONEYCOMB, W/SEAMS ORANGE CLAY, HARD

DATE:

STATE OF TEXAS CRAIG FELTS STONG 54846 REGISTERED PROFESSIONAL ENGINEER

CRAIG F. STONG P.E.
DATE: 12/9/89

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

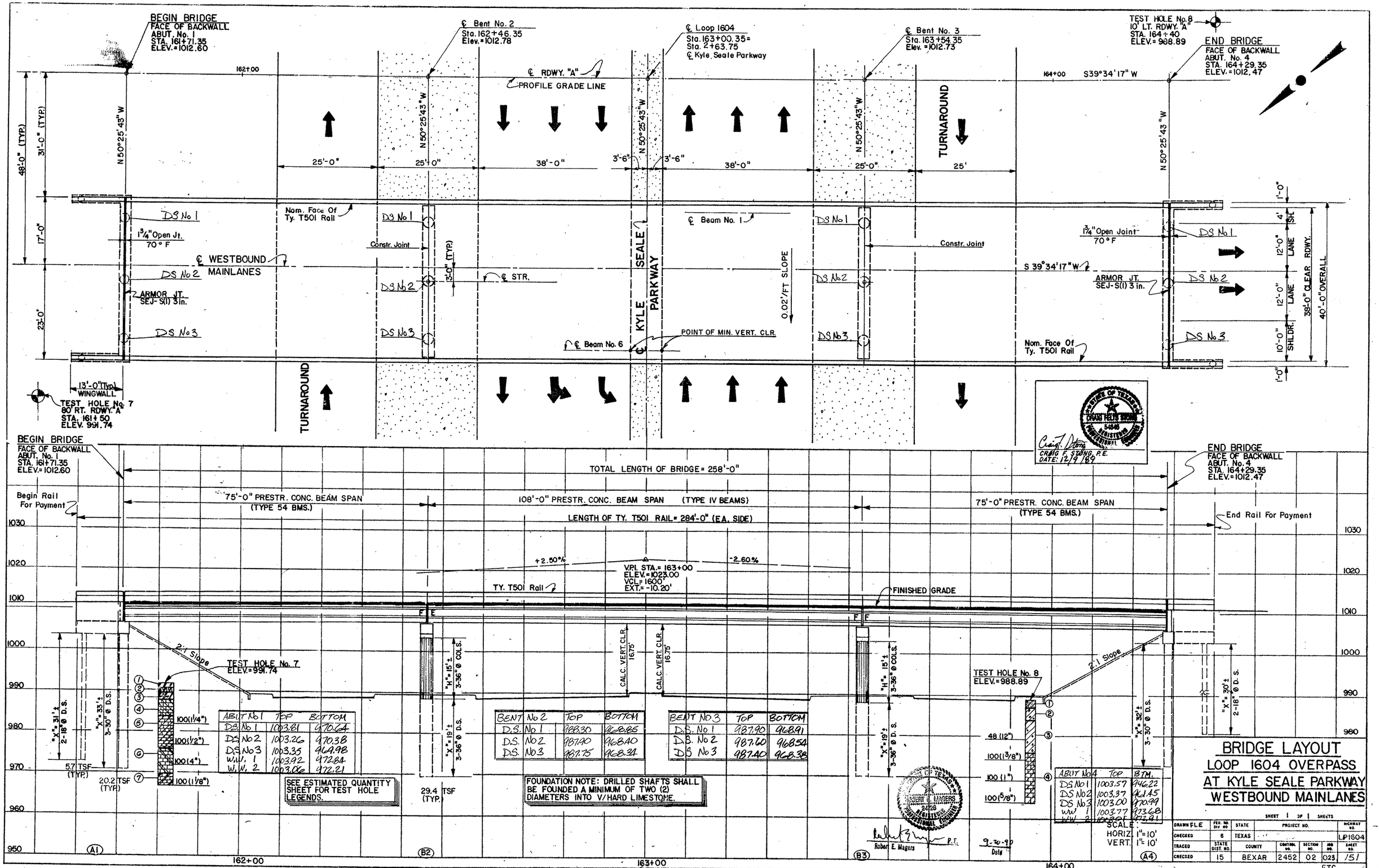
ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS

LOOP 1604 OVERPASS AT KYLE SEALE PKWY.

EASTBOUND MAINLAINES

ORIGINAL DRAWING DATE: JULY 1989		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #	SHEET
DN.: CFS	REVISIONS	15	6		150
CK.: KK	- -	COUNTY		CONTROL SECTION JOB	HIGHWAY
DN.: MRM	- -	BEXAR		2452 02 023	LP1604
CK.: CFS	- -				

ETC.



ABUT No 1	TOP	BOTTOM
DS No 1	1003.81	970.64
DS No 2	1003.26	970.38
DS No 3	1003.35	969.98
W.W. 1	1003.92	972.84
W.W. 2	1003.06	972.21

SEE ESTIMATED QUANTITY SHEET FOR TEST HOLE LEGENDS.

BENT No 2	TOP	BOTTOM
D.S. No 1	988.30	968.85
D.S. No 2	987.90	968.40
D.S. No 3	987.75	968.24

BENT No 3	TOP	BOTTOM
D.S. No 1	987.90	968.91
D.S. No 2	987.60	968.54
D.S. No 3	987.40	968.38

FOUNDATION NOTE: DRILLED SHAFTS SHALL BE FOUNDED A MINIMUM OF TWO (2) DIAMETERS INTO V/HARD LIMESTONE.

ABUT No 4	TOP	BTM.
DS No 1	1003.57	946.22
DS No 2	1003.37	961.45
DS No 3	1003.00	970.99
WW 1	1003.77	973.68
WW 2	1003.51	972.91

STATE OF TEXAS
CRAIG FELTS STONG
54848
REGISTERED
PROFESSIONAL ENGINEER
Craig F. Stong
CRAIG F. STONG, P.E.
DATE: 12/9/89

STATE OF TEXAS
ROBERT E. MAGERS
24128
REGISTERED
PROFESSIONAL ENGINEER
Robert E. Magers P.E.
9-20-90
Date

SCALE:
HORIZ. 1" = 10'
VERT. 1" = 10'

BRIDGE LAYOUT
LOOP 1604 OVERPASS
AT KYLE SEALE PARKWAY
WESTBOUND MAINLANES

SHEET 1 OF 1 SHEETS

DRAWN F.L.E.	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CHECKED	6	TEXAS				LP1604
TRACED	STATE DIST. NO.	COUNTY	CONTRAC. NO.	SECTION NO.	JOB NO.	SHEET NO.
CHECKED	15	BEXAR	2452	02	023	151

SUMMARY OF ESTIMATED QUANTITIES

ITEM / DESCRIPTION	DRILLED SHAFTS 18"φ	DRILLED SHAFTS 30"φ	DRILLED SHAFTS 36"φ	CLASS "C" CONCRETE ABUT.	CLASS "C" CONCRETE BENT	REINF. CONCRETE SLAB	PRESTRESSED CONCRETE BEAM TY 54	PRESTRESSED CONCRETE BEAM TY IV	CONCRETE SURFACE TREATM'T	SEALED EXP. JOINT (3 IN.)	RAILING TY T501	RIPRAP (CONC) (CL. B)
	L.F.	L.F.	L.F.	C.Y.	C.Y.	S.F.	L.F.	L.F.	S.Y.	L.F.	L.F.	C.Y.
ABUT 1 & 4	122	195		59.8							52.0	174
BENT 2 & 3			114		54.8							
DECK UNIT 1						10320	896.00	646.00	1065	75	516.0	
TOTAL	122	195	114	59.8	54.8	10320	896.00	646.00	1065	75	568.0	174

BEARING SEAT ELEVATIONS ⊕

LOCATION		BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5	BEAM 6
ABUT 1	(FWD)	1006.4748	1006.3388	1006.2028	1006.0668	1005.9309	1005.7949
BENT 2	(BK)	1006.6521	1006.5161	1006.3801	1006.2441	1006.1081	1005.9721
	(FWD)	1006.6538	1006.5178	1006.3816	1006.2456	1006.1096	1005.9736
BENT 3	(BK)	1006.5991	1006.4631	1006.3271	1006.1912	1006.0552	1005.9192
	(FWD)	1006.5964	1006.4604	1006.3242	1006.1882	1006.0522	1005.9162
ABUT 4	(BK)	1006.3435	1006.2075	1006.0715	1005.9355	1005.7995	1005.6635

⊕ BEAMS LOWERED 1 3/8" DUE TO EXCESS CAMBER

TEST HOLE LEGEND

TEST HOLE 7

1. CLAY, BROWN, SOFT
2. CLAY, TAN & ORANGE, SILTY, V/STIFF
3. CLAY, TAN, W/LIMESTONE ROCK, V/STIFF
4. LIMESTONE, TAN, W/LAYERS OF GRAYISH-WHITE LIMESTONE, CRYSTALLINE, FRACTURED SL/HONEYCOMB, W/LAYERS OF TAN CLAY, HARD
5. LIMESTONE, GRAYISH-WHITE, CRYSTALLINE, FRACTURED, HONEYCOMB, W/SEAMS OF ORANGE & TAN CLAY, V/HARD
6. LIMESTONE, TAN V/CHALKY, HONEYCOMB, W/SEAMS OF ORANGE LIMESTONE, W/SEAMS OF TAN CLAY, HARD
7. LIMESTONE, GRAYISH-WHITE, CRYSTALLINE, FRACTURED, HONEYCOMB, W/SEAMS OF TAN CLAY, V/HARD

TEST HOLE 8

1. CLAY, BROWN, W/TRACE OF GRAVEL, SOFT
2. CLAY, TAN, W/LIMESTONE FRAGMENTS, STIFF
3. CLAY, TAN, W/SEAMS OF ORANGE CLAY, W/TRACE OF CALCAREOUS MATERIAL, STIFF
4. LIMESTONE, TAN, CHALKY, HONEYCOMB, W/SEAMS ORANGE CLAY, HARD

DATE:

STATE OF TEXAS
CRAIG FELTS STONG
54845
REGISTERED
PROFESSIONAL ENGINEER

CRAIG F. STONG P.E.
DATE: 12/9/89

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS

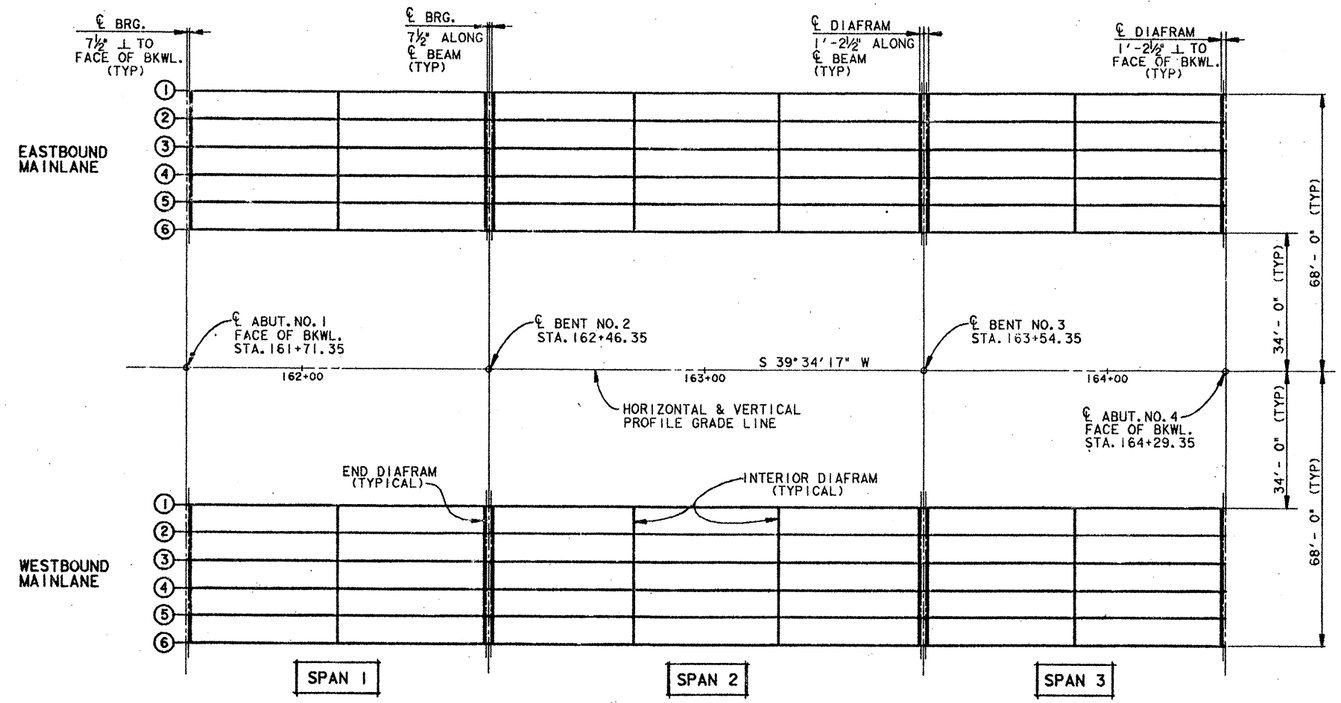
LOOP 1604 OVERPASS AT KYLE SEALE PKWY.

WESTBOUND MAINLAINES

ORIGINAL DRAWING DATE: JULY 1989

DN.: CFS	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
CK.: KK	- -	15	6			152
DN.: MRM	- -	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
CK.: CFS	- -	BEXAR		2452	02	023	LP160

ETC.



BENT REPORT
EASTBOUND & WESTBOUND MAINLANES
SPAN 1-3

BEAM NO.	BEAM SPAC. (C.L. BENT)	BEAM ANGLE
1	0.0000	90° 0' 0.00"
2	6.8000	90° 0' 0.00"
3	6.8000	90° 0' 0.00"
4	6.8000	90° 0' 0.00"
5	6.8000	90° 0' 0.00"
6	6.8000	90° 0' 0.00"
TOTAL	34.0000	———

NOTE: DISTANCE BETWEEN PROFILE GRADE LINE & EASTBOUND MAINLANE BEAM NO. 1 = 68.0000' (L)
DISTANCE BETWEEN PROFILE GRADE LINE & WESTBOUND MAINLANE BEAM NO. 1 = 34.0000' (R)

DIAFRAM LOCATIONS
EASTBOUND & WESTBOUND MAINLANES
SPAN 1 & 3
C.L. BENT TO C.L. BENT

BM. NO.	DISTANCE TO		DISTANCE TO	
	DIAPH.	BEAM END	DIAPH.	BEAM END
1	37.5000	37.5000	37.5000	75.0000
2	37.5000	37.5000	37.5000	75.0000
3	37.5000	37.5000	37.5000	75.0000
4	37.5000	37.5000	37.5000	75.0000
5	37.5000	37.5000	37.5000	75.0000
6	37.5000	37.5000	37.5000	75.0000

INT. DIAFRAM
EASTBOUND & WESTBOUND MAINLANES
SPAN 1 - 3

BEAMS	LENGTH
1 - 2	6.8000
2 - 3	6.8000
3 - 4	6.8000
4 - 5	6.8000
5 - 6	6.8000

DIAFRAM LOCATIONS
EASTBOUND & WESTBOUND MAINLANES
SPAN 2
C.L. BENT TO C.L. BENT

BM. NO.	DISTANCE TO		DISTANCE TO		DISTANCE TO	
	DIAPH.	BEAM END	DIAPH.	BEAM END	DIAPH.	BEAM END
1	36.0000	36.0000	36.0000	72.0000	36.0000	108.0000
2	36.0000	36.0000	36.0000	72.0000	36.0000	108.0000
3	36.0000	36.0000	36.0000	72.0000	36.0000	108.0000
4	36.0000	36.0000	36.0000	72.0000	36.0000	108.0000
5	36.0000	36.0000	36.0000	72.0000	36.0000	108.0000
6	36.0000	36.0000	36.0000	72.0000	36.0000	108.0000

BEAM REPORT - EASTBOUND MAINLANE

BM. NO.	SPAN 1			SPAN 2			SPAN 3		
	HORIZ. DIST. C-C BENT	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE	HORIZ. DIST. C-C BENT	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE	HORIZ. DIST. C-C BENT	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
1	75.0000	74.6669	0.00240	108.0000	107.6667	-0.00051	75.0000	74.6671	-0.00343
2	75.0000	74.6669	0.00240	108.0000	107.6667	-0.00051	75.0000	74.6671	-0.00343
3	75.0000	74.6669	0.00240	108.0000	107.6667	-0.00051	75.0000	74.6671	-0.00343
4	75.0000	74.6669	0.00240	108.0000	107.6667	-0.00051	75.0000	74.6671	-0.00343
5	75.0000	74.6669	0.00240	108.0000	107.6667	-0.00051	75.0000	74.6671	-0.00343
6	75.0000	74.6669	0.00240	108.0000	107.6667	-0.00051	75.0000	74.6671	-0.00343

BEAM REPORT - WESTBOUND MAINLANE

BM. NO.	SPAN 1			SPAN 2			SPAN 3		
	HORIZ. DIST. C-C BENT	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE	HORIZ. DIST. C-C BENT	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE	HORIZ. DIST. C-C BENT	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
1	75.0000	74.6669	0.00240	108.0000	107.6667	-0.00051	75.0000	74.6671	-0.00343
2	75.0000	74.6669	0.00240	108.0000	107.6667	-0.00051	75.0000	74.6671	-0.00343
3	75.0000	74.6669	0.00240	108.0000	107.6667	-0.00051	75.0000	74.6671	-0.00343
4	75.0000	74.6669	0.00240	108.0000	107.6667	-0.00051	75.0000	74.6671	-0.00343
5	75.0000	74.6669	0.00240	108.0000	107.6667	-0.00051	75.0000	74.6671	-0.00343
6	75.0000	74.6669	0.00240	108.0000	107.6667	-0.00051	75.0000	74.6671	-0.00343

NOTE: TRUE DISTANCE BOTTOM BEAM FLANGE ARE ACTUAL BOTTOM FLANGE LENGTH WITH ADJUSTMENT MADE FOR BEAM SLOPE.
ALL BEAMS ARE ON A BEARING OF S 39°34'17.00"W.

GENERAL NOTES:

1) ALL BENTS, ABUTMENTS AND DIAFRAM ARE ON A BEARING OF N 50°25'43.00" W
2) ALL BEAMS ARE ON A BEARING OF S 39°34'17.00" W
3) ALL DISTANCES SHOWN ARE IN A HORIZONTAL PLANE.
4) ALL DISTANCES SHOWN ARE FROM FACE OF ABUTMENTS BACKWALL TO ℄ INTERIOR DIAFRAM TO ℄ BENT, OR FROM ℄ BENT TO ℄ DIAFRAMS TO ℄ BENT.
5) ALL DIAFRAM LENGTH ARE FROM ℄ BEAM TO ℄ OF BEAM.

DATE:

STATE OF TEXAS
CRAIG WELLS STONG
54848
REGISTERED
PROFESSIONAL ENGINEER

CRAIG F. STONG P.E.
DATE: 12/9/89

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

BEAM & DIAFRAM LAYOUT

LOOP 1604 OVERPASS AT KYLE SEALE PARKWAY
EASTBOUND & WESTBOUND MAINLANES

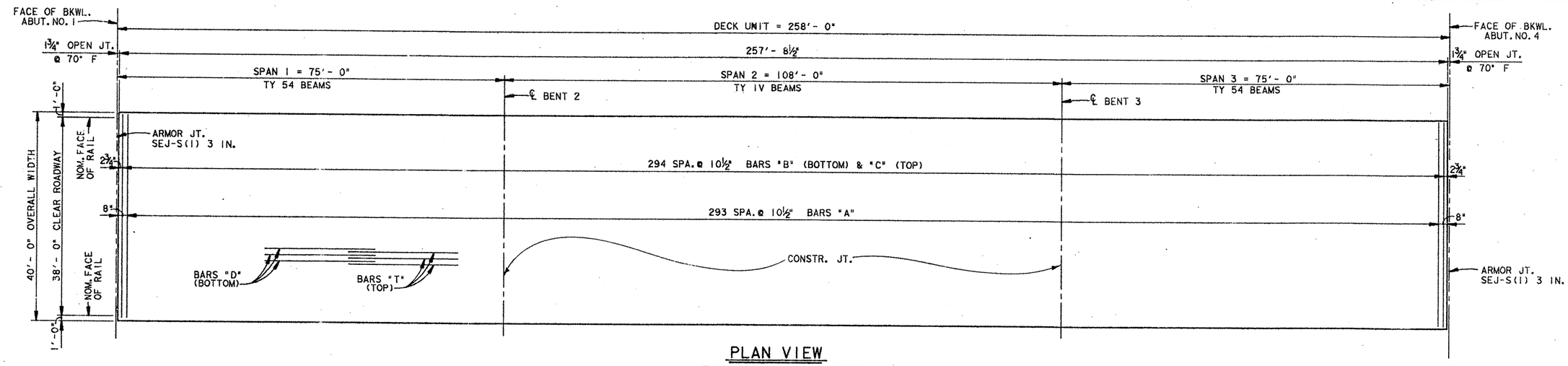
ORIGINAL DRAWING DATE: JUNE 1989

DN. CFS	REVISIONS	
CK. KK	- -	
DW. MRM	- -	
CK. CFS	- -	

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #	SHEET
15	6		153

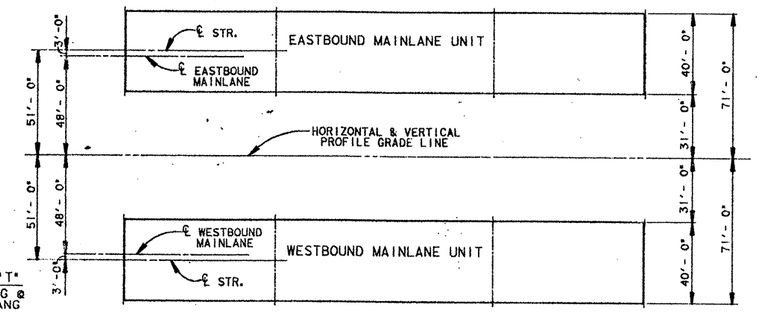
COUNTY	CONTROL	SECTION	JOB	HIGHWAY
BEXAR	2452	02	023	L1604

ETC

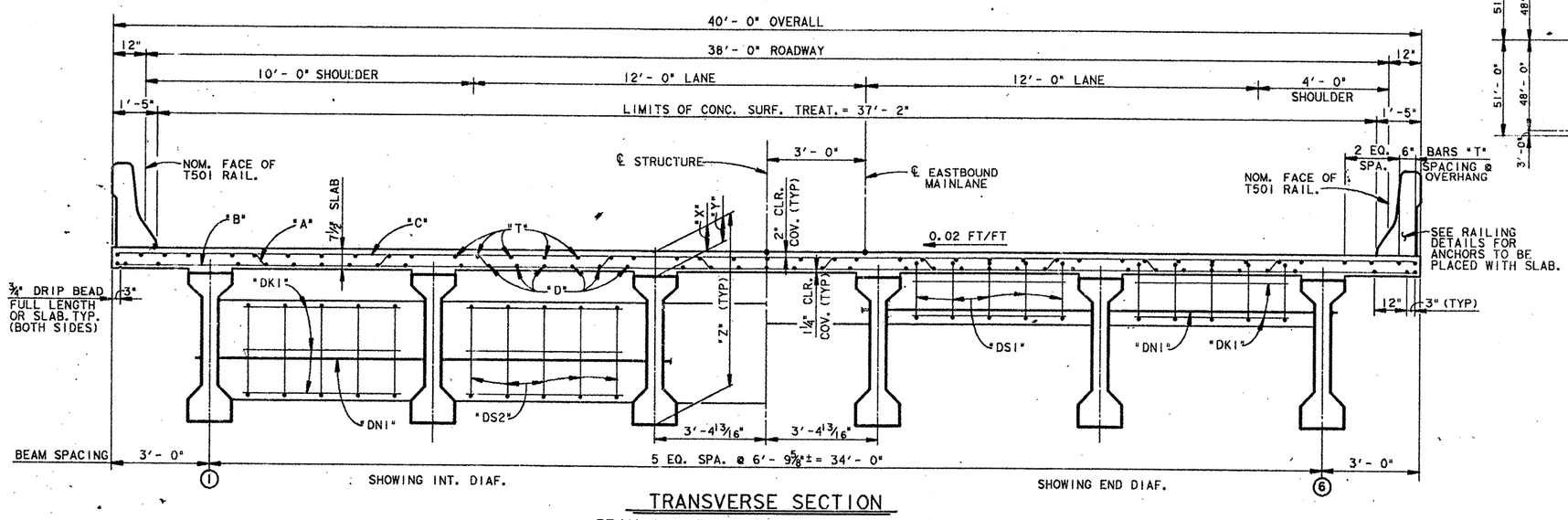


PLAN VIEW
EASTBOUND MAINLANE

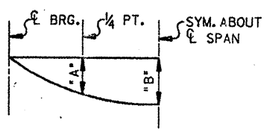
NOTE: SEE BEAM & DIAFRAM LAYOUT SHEET FOR ACTUAL BEAM LENGTHS, SPACING, SLOPE, BEARINGS AND DIAFRAM LOCATIONS AND LENGTHS.



MAINLANE LAYOUT



TRANSVERSE SECTION
SPAN 1 & 3 EASTBOUND MAINLANE
(LOOKING STATIONWISE)



SPAN	BM.	"A"	"B"
1 & 3	1-6	0.0358'	0.0503'

DEAD LOAD DEFLECTION DIAGRAM
NOTE: DEFLECTIONS SHOWN ARE DUE TO CAST-IN-PLACE CONCRETE ONLY. ($E = 5 \times 10^6$ psi)

SECTION DEPTH TABLE

SPAN NO.	BEAM NO.	@ ℄ BRG. "X"	@ MID SPAN "Y" ⌘	@ ℄ BRG. "Z"
1 & 3	1-6	8⅞"	8 1/16"	5'-2⅞"

⌘ THEORETICAL DIMENSION

SEE SHEET 2 OF 2 FOR GENERAL NOTES.

SHEET 1 OF 2

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

DECK DETAILS

LOOP 1604 OVERPASS AT KYLE SEALE PARKWAY EASTBOUND & WESTBOUND MAINLANES

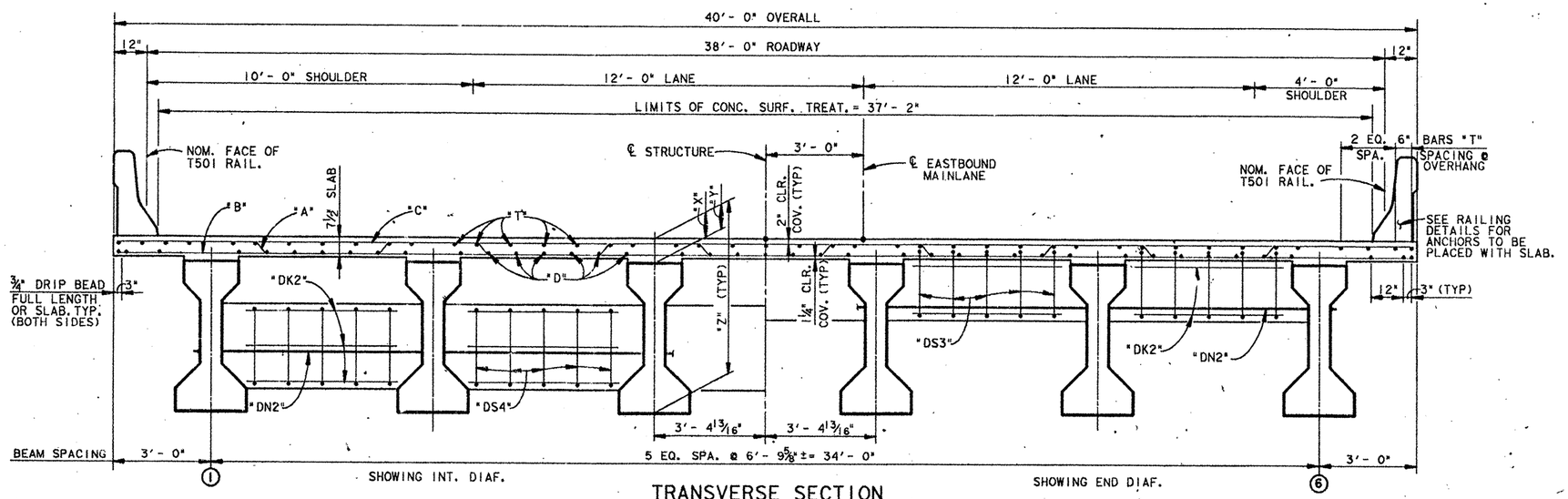
DATE:

STATE OF TEXAS — CRAIG WELLS STONG — 54845 — REGISTERED PROFESSIONAL ENGINEER

CRAIG T. STONG P.E.
DATE: 12/9/89

ORIGINAL DRAWING DATE: JUNE 1989		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #	SHEET
DN.: CFS	REVISIONS	15	6		154
CK.: KK	- -	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DM.: MRM	- -	BEXAR	2452	02	023	L1604
CK.: CFS	- -					

ETC.



TRANSVERSE SECTION

SPAN 2 = EASTBOUND MAINLANE
(LOOKING STATIONWISE)

ESTIMATED QUANTITIES

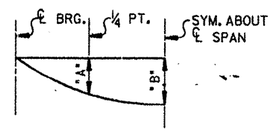
FOR ONE MAINLANE UNIT ONLY

BAR	NO.	SIZE	SPA.	LENGTH	WEIGHT
A	294	#5	SHN	41'-0"	12572
B	295	#4	SHN	39'-9"	7833
C	295	#5	SHN	39'-9"	12230
⊙ D	41	#5	~	263'-2"	11254
DK1	140	#5	~	5'-2"	754
DK2	100	#5	~	4'-10"	504
DN1	6	#8	~	34'-11"	559
DN2	4	#8	~	35'-0"	374
DS1	100	#4	12"±	4'-10"	323
DS2	50	#4	12"±	6'-10"	228
DS3	50	#4	12"±	5'-4"	178
DS4	50	#4	12"±	6'-0"	200
▲ T	43	#4	~	262'-2"	7530
REINF. STEEL ✱				LBS.	54539
CL "S" CONC. (SLAB) ✱				C.Y.	255.0
REINF. CONC. SLAB				S.F.	10320
PRESTR. CONC. BM. (TY. 54)				L.F.	896.00
PRESTR. CONC. BM. (TY. IV)				L.F.	646.00
CONC. SURF. TREAT.				S.Y.	1065
SEALED EXP. JT. (3 IN.)				L.F.	75

✱ FOR CONTRACTORS INFO ONLY
▲ INCLUDES 4 ~ 1'- 2" MIN. LAPS
⊙ INCLUDES 4 ~ 1'- 5" MIN. LAPS

SECTION DEPTH TABLE				
SPAN NO.	BEAM NO.	@ ℄ BRG. "X"	@ MID SPAN "Y"	@ ℄ BRG. "Z"
2	1-6	8⅞"	7 15/16"	5'-2⅞"

✱ THEORETICAL DIMENSION



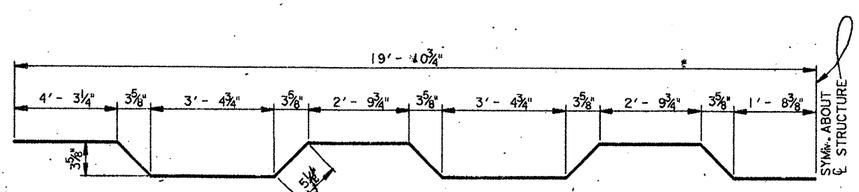
SPAN	BM.	"A"	"B"
2	1-6	0.0905'	0.1270'

DEAD LOAD DEFLECTION DIAGRAM

NOTE: DEFLECTIONS SHOWN ARE DUE TO CAST-IN-PLACE CONCRETE ONLY. ($E = 5 \times 10^6$ psi)

GENERAL NOTES:

DESIGN: HS20 LOADING IN ACCORDANCE WITH A.A.S.H.T.O. 1983 STANDARD SPEC'S. AND INTERIM SPECIFICATIONS THERETO.
ALL CONCRETE SHALL BE CLASS "S".
DESIGN f_c = 1200 P.S.I.
CHAMFER ALL EXPOSED EDGES 3/4" UNLESS OTHERWISE NOTED.



BARS "A"

SHEET 2 OF 2

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

DECK DETAILS

LOOP 1604 OVERPASS AT KYLE SEALE PARKWAY
EASTBOUND & WESTBOUND MAINLANES

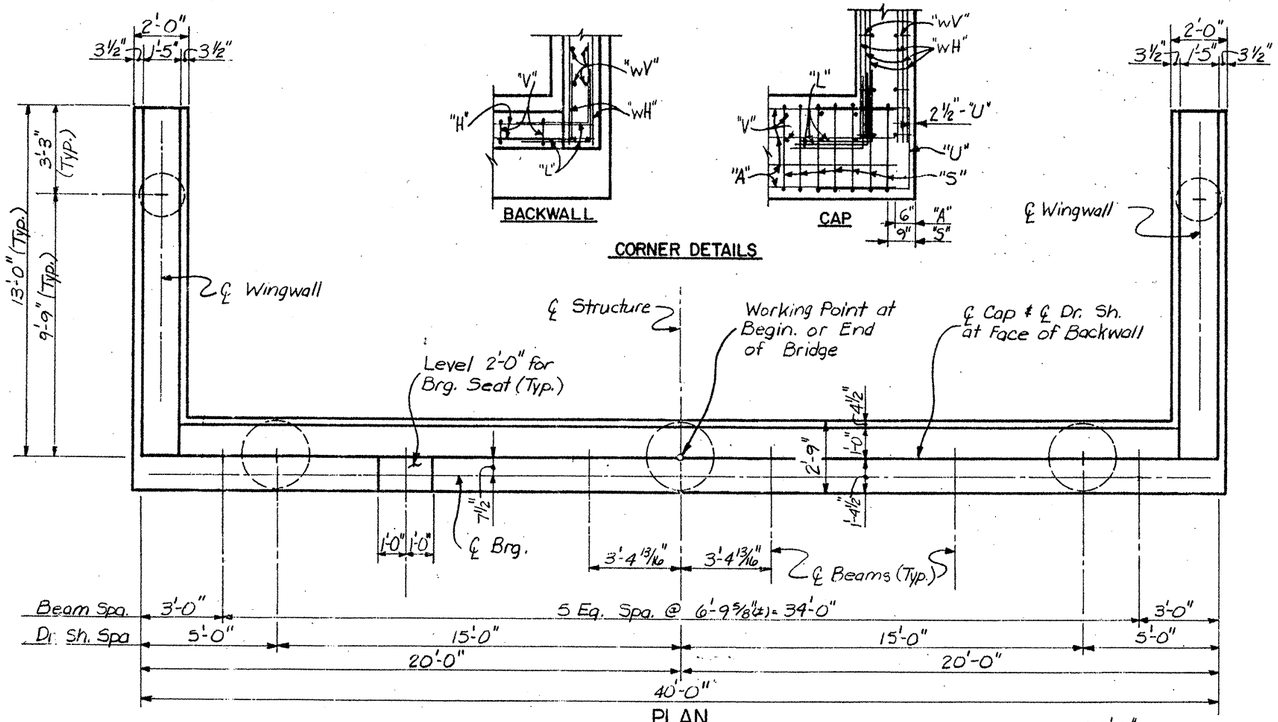
DATE:

STATE OF TEXAS — CRAIG E. STONG — 54546 — REGISTERED PROFESSIONAL ENGINEER

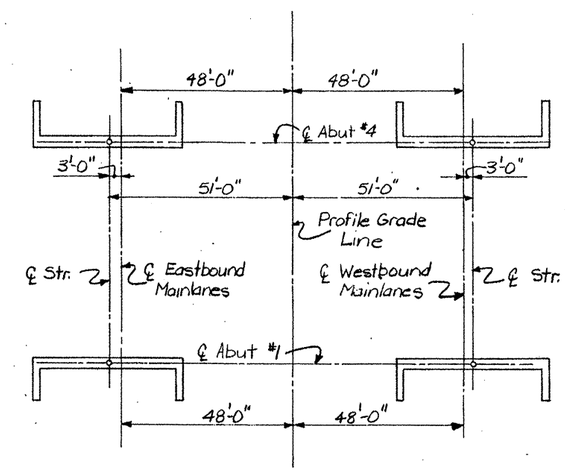
CRAIG E. STONG P.E.
DATE: 12/9/89

ORIGINAL DRAWING DATE: JUNE 1989		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.: CFS	REVISIONS	15	6		155
CK.: KK	- -	COUNTY		CONTROL SECTION JOB	HIGHWAY
DN.: MRM	- -	BEXAR		2452 02 023	L1604
CK.: CFS	- -				

ETC



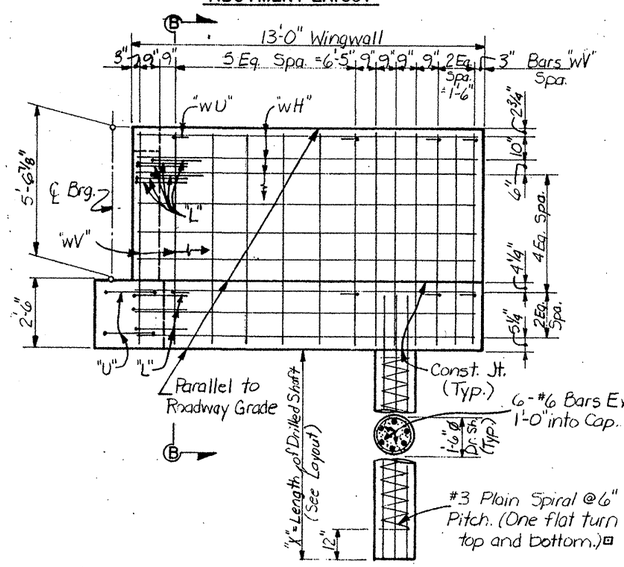
PLAN



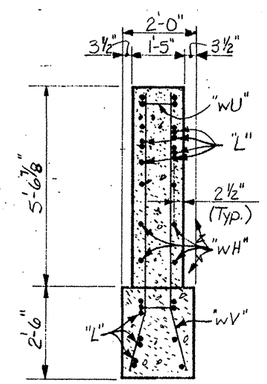
ABUTMENT LAYOUT

ESTIMATED QUANTITIES (FOR ONE ABUTMENT)				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	9	#11	39'-0"	1865
H	12	#5	39'-9"	498
L	18	#6	4'-0"	108
S	56	#5	9'-8"	564
Tbk	1	#5	39'-0"	41
U	4	#6	7'-4"	44
V	38	#5	13'-8"	542
wH	36	#6	12'-9"	689
wU	16	#4	2'-0"	21
wV	52	#5	7'-7"	411
REINF. STEEL			* LBS	4783
CL. C CONC. (Abut.)			C.Y.	29.9

* For Contractor's Information Only.



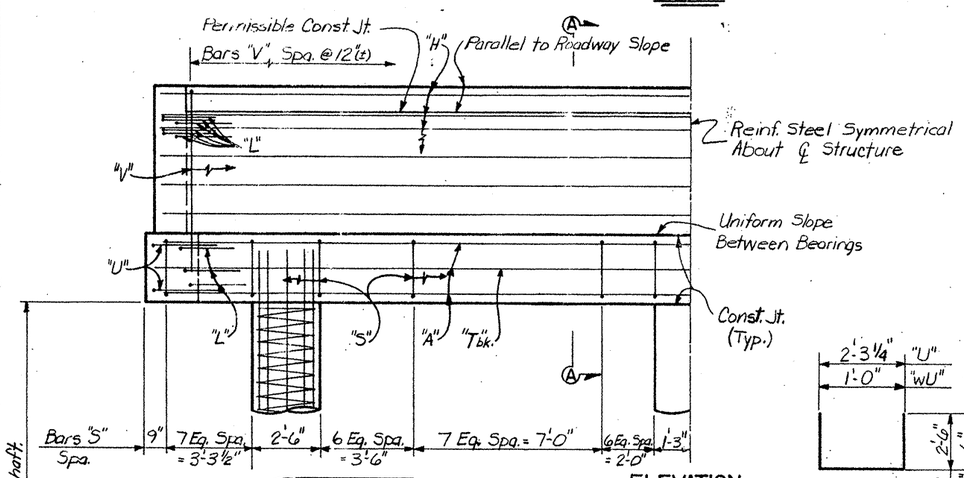
WINGWALL ELEVATION



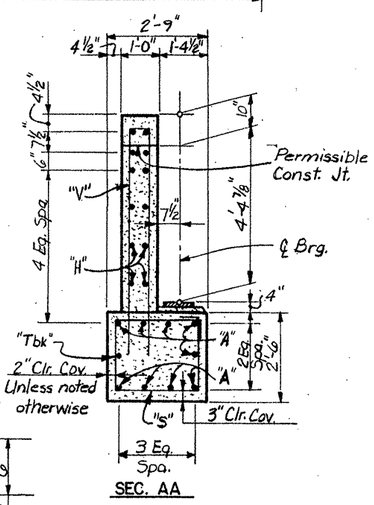
SEC. BB

GENERAL NOTES:

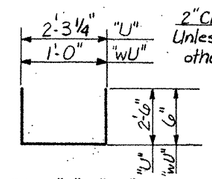
Design: HS-20 Loading in accordance with A.A.S.H.T.O. 1983 Standard Spec's and interim revisions thereto.
All concrete for Cap, Bkwall & Wings shall be Cl. C.
All reinf. steel for Cap, Bkwall & Wings shall be Gr. 60.
All concrete for Drilled Shafts shall be Cl. A.
All reinf. steel for Drilled Shafts shall be Gr. 40
Design f'c = 1440 p.s.i. Avg. calc. load = 99 Tons/p.s.
Chamfer all exposed edges ¾" unless noted otherwise.



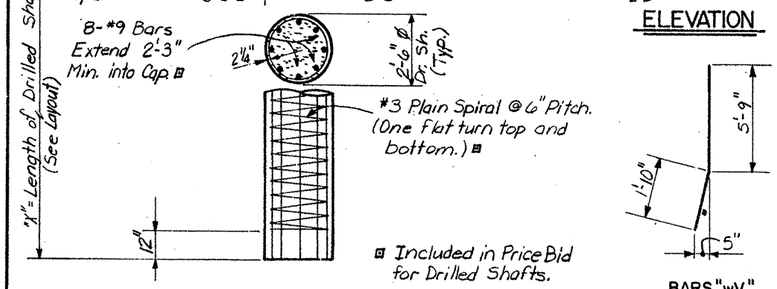
ELEVATION



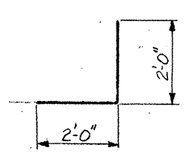
SEC. AA



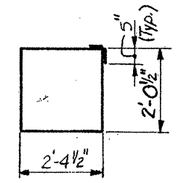
BARS "U" & "wU"



BARS "wV"



BARS "L"



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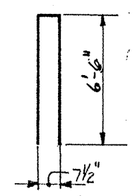
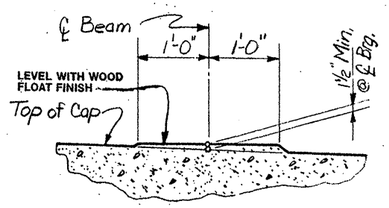


BARS "V"



BEARING SEAT DETAIL

BEARING SURFACE SHALL BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.

DATE:

DAVID FELTS STONE 6245 REGISTERED PROFESSIONAL ENGINEER

DAVID F. STONE, P.E.
DATE: 12/1/87

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

ABUTMENT DETAILS

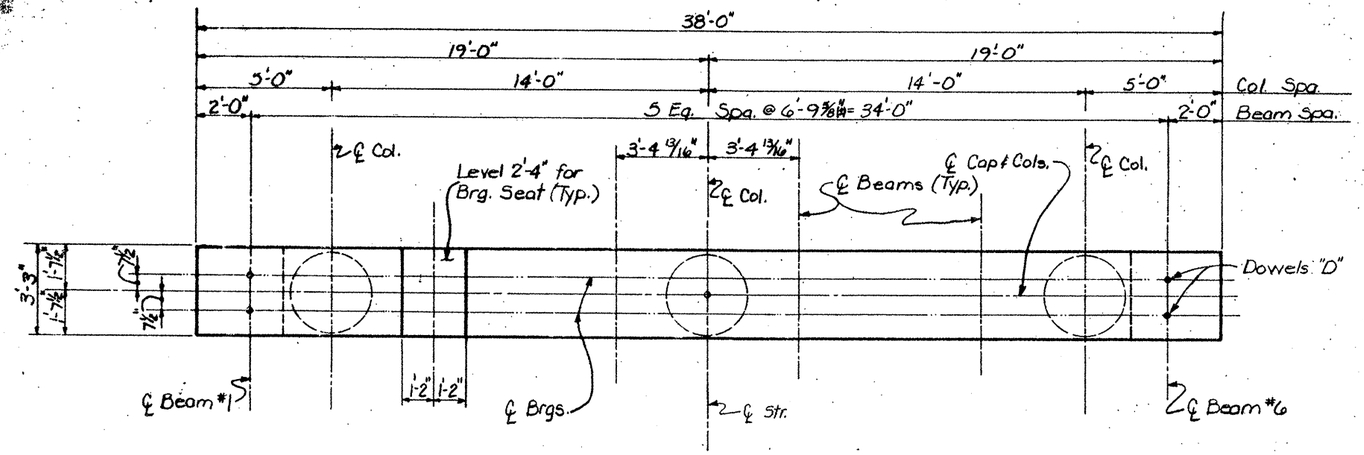
ABUTMENT Nos. 1 & 4

LOOP 1604 OVERPASS AT KYLE SEALE PKWY.

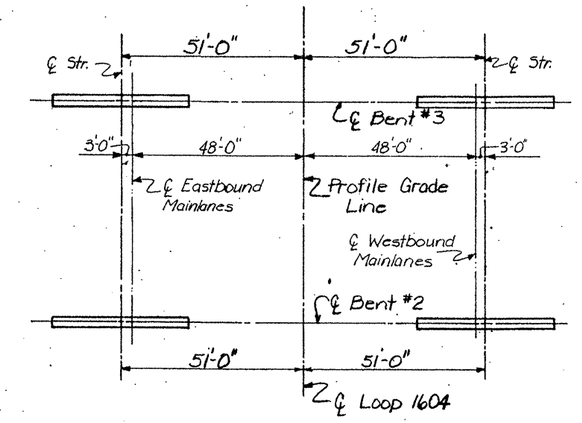
EASTBOUND & WESTBOUND MAINLANES

Dn. CFS	Drawing ORIGINAL	Date JUNE 1989	Fed. Road Div. No. 6	State TEXAS	Federal Aid Project No.			Sheet No. 156
Ck. Dn. KK								
Dw. WIS								
Ck. Dw. CFS								
Tr.			State Dist. No. 15	County BEXAR	Control No. 2452	Section No. 02	Job No. 023	Highway No. IH604
Ck. Tr.								

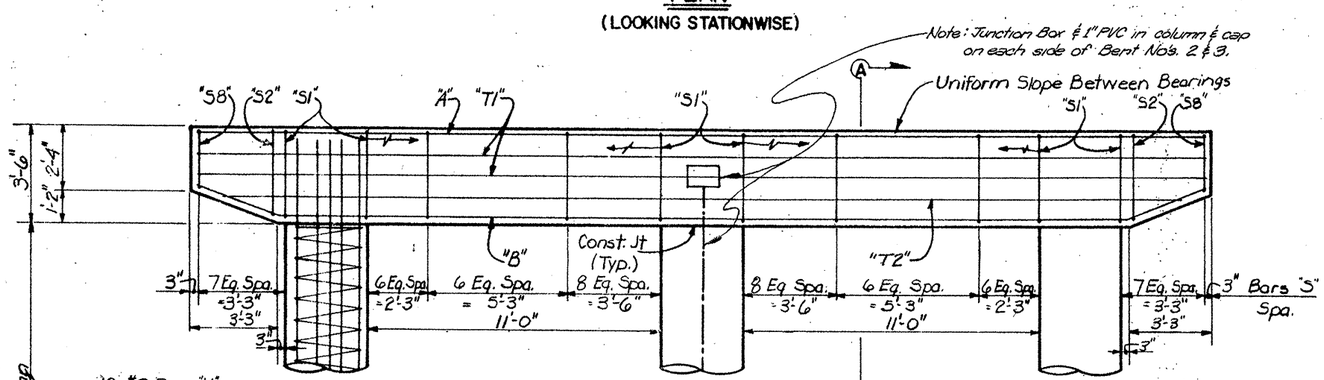
ETC.



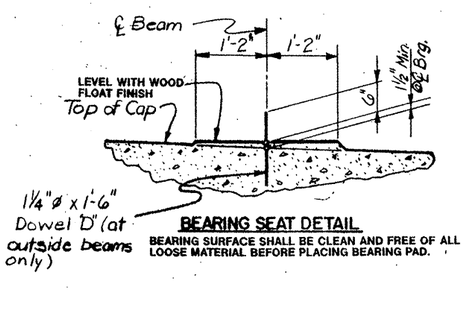
PLAN
(LOOKING STATIONWISE)



BENT LAYOUT

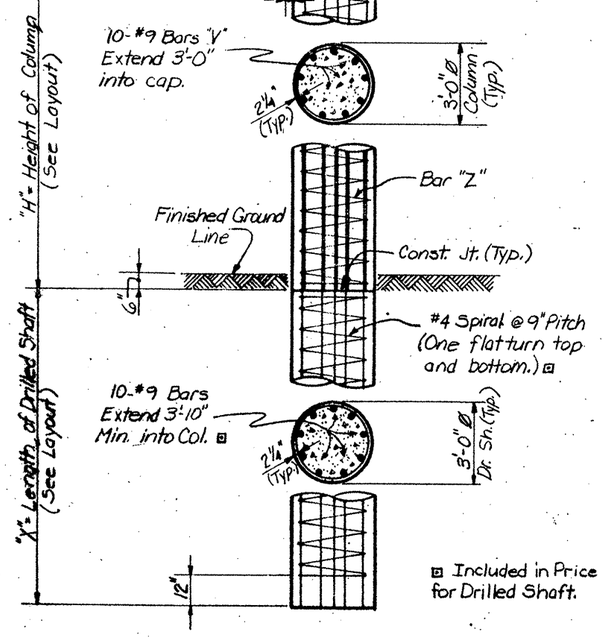


ELEVATION

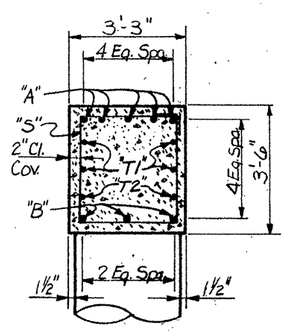


BEARING SEAT DETAIL

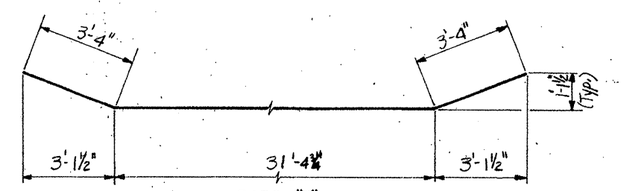
BEARING SURFACE SHALL BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.



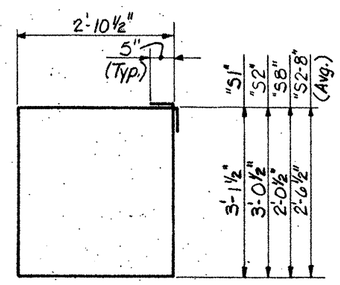
⊡ Included in Price Bid for Drilled Shaft.



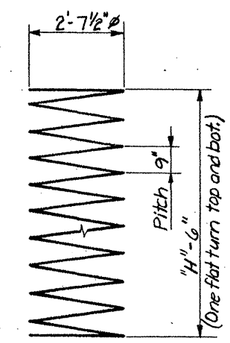
SEC. A-A



BARS "B"



BARS "S"



BARS "Z"

ESTIMATED QUANTITIES
(FOR ONE INTERIOR BENT CAP)

BAR	NO.	SIZE	LENGTH	WEIGHT
A	5	#11	37'-9"	1003
B	3	#11	38'-1"	607
D	4	1¼"∅	1'-6"	25
S1	44	#5	12'-10"	589
S2-8	14	#5	✦ 11'-8"	170
T1	4	#5	37'-9"	157
T2	2	#5	36'-8"	76
REINF. STEEL			✱ LBS.	2627
CL. C CONC. (BENT)			CY	15.6

✱ For Contractor's Information Only.
✦ Average Length of Bars

VARIABLE QUANTITIES
(FOR 3-36" ∅ ROUND COLUMNS)

"H"	BARS "Z" 3-#4 PLAIN SPIRAL		BARS "V" 30-#9 BARS		REINF. STEEL TOTAL	CL. C CONC. (BENT)
Ft.	Length	Wt. ✱	Length	Wt. ✱	Lbs. ✱	C.Y.
12	143'	287	15'-0"	1530	1817	9.42
13	155'	311	16'-0"	1632	1943	10.21
14	166'	333	17'-0"	1734	2067	11.00
15	177'	355	18'-0"	1836	2191	11.78
16	188'	377	19'-0"	1938	2315	12.57
17	199'	399	20'-0"	2040	2439	13.35
18	210'	421	21'-0"	2142	2563	14.14
19	221'	443	22'-0"	2244	2687	14.92
20	232'	465	23'-0"	2346	2811	15.71
21	243'	487	24'-0"	2448	2935	16.49
22	254'	509	25'-0"	2550	3059	17.28
23	265'	531	26'-0"	2652	3183	18.06

GENERAL NOTES:

Design: HS-20 Loading in accordance with A.A.S.H.T.O. 1983 Standard Specs and interim revisions thereto.
All concrete for Cap and Columns shall be Cl. "C"
All reinf. steel for Cap and Columns shall be Gr. 60.
All concrete for drilled shafts shall be Cl. "A".
All reinf. steel for drilled shafts shall be Gr. 40.
Design fc = 1440 p.s.i. Avg. Calc. load = 208 Tons/p.s.
Chamfer all exposed edges ¾" unless noted otherwise.

DATE:

STATE OF TEXAS — CRAIG FELIX STONG — 64548 — REGISTERED PROFESSIONAL ENGINEER

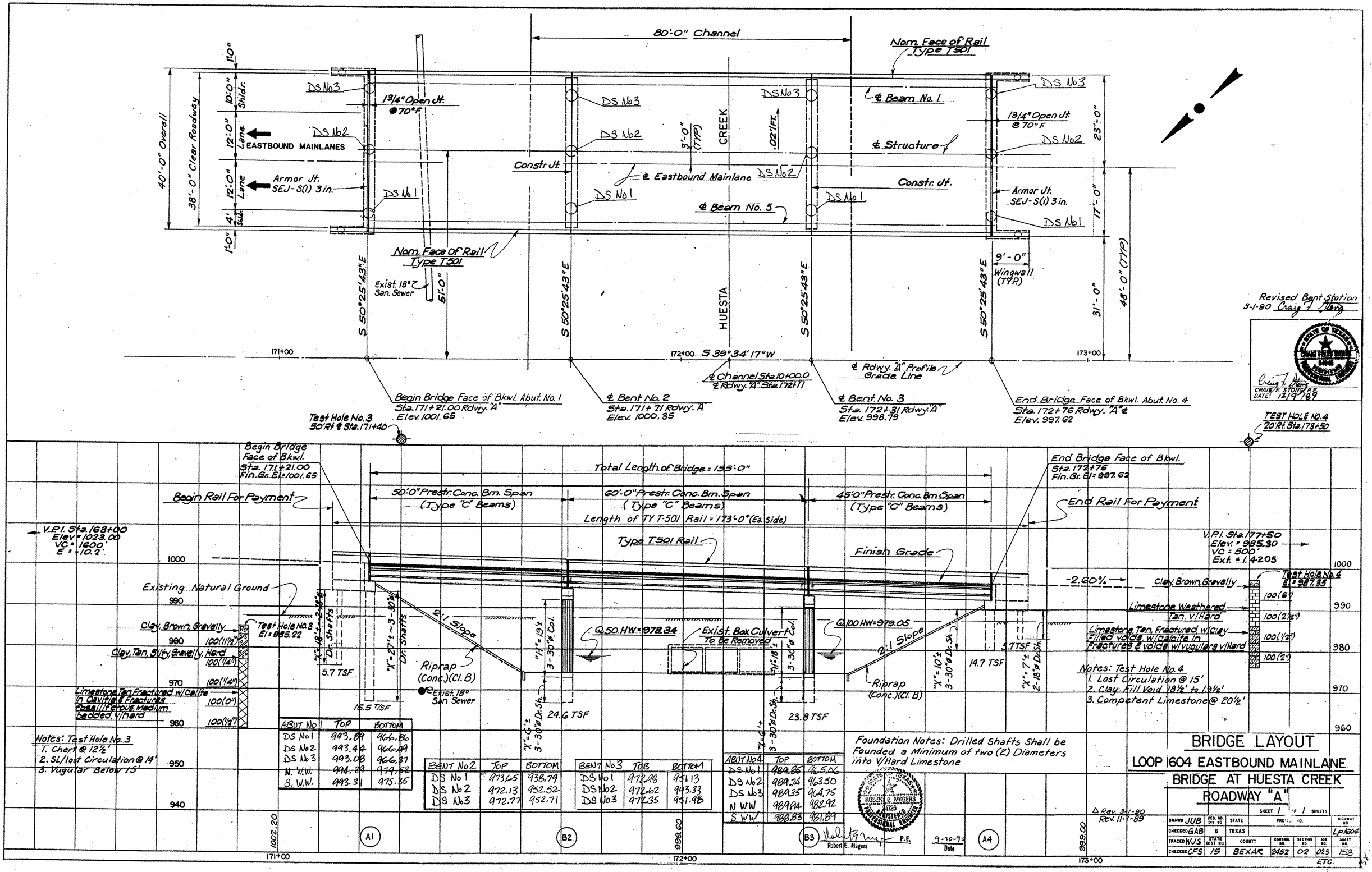
CRAIG F. STONG, P.E.
DATE: 12/9/87

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

INTERIOR BENT DETAILS
BENT No. 2 & 3
LOOP 1604 OVERPASS AT
KYLE SEALE PARKWAY
EASTBOUND & WESTBOUND MAINLANES

Dn. CFS / Ck. Dn. KK / Dw. WJS / Ck. Dw. CFS / Tr. / Ck. Tr.	DRAWING ORIGINAL	DATE MAY 1989	FED. ROAD DIV. NO. 6	STATE TEXAS	FEDERAL AID PROJECT NO.				SHEET NO. 157
			STATE DIST. NO. 15	COUNTY BEXAR	CONTROL NO. 2452	SECTION NO. 02	JOB NO. 023	HIGHWAY NO. L.P.1604	

ETC.



ABUT No1	TOP	BOTTOM
DS No1	993.89	966.86
DS No2	993.44	966.49
DS No3	993.08	966.37
N. W.W.	994.39	979.52
S. W.W.	993.31	975.35

BENT No2	TOP	BOTTOM
DS No1	973.65	938.79
DS No2	972.13	952.52
DS No3	972.77	952.71

BENT No3	TOB	BOTTOM
DS No1	972.98	951.13
DS No2	972.62	943.33
DS No3	972.35	951.48

ABUT No4	TOP	BOTTOM
DS No1	989.85	965.06
DS No2	989.74	963.50
DS No3	989.35	964.75
N WW	989.94	982.92
S WW	988.83	981.89

BRIDGE LAYOUT

LOOP 1604 EASTBOUND MAINLANE

BRIDGE AT HUESTA CREEK

ROADWAY "A"

SHEET 1 OF 1 SHEETS

DRAWN JUB	FED. RD. DIV. NO.	STATE	PROJ. NO.					HIGHWAY NO.
CHECKED GAB	6	TEXAS						LP1604
TRACED WJS	STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.		
CHECKED CFS	15	BEXAR	2452	02	023	158		

ETC.

SUMMARY OF ESTIMATED QUANTITIES

ITEM / DESCRIPTION	DRILLED SHAFTS 18"φ L.F.	DRILLED SHAFTS 30"φ L.F.	CLASS "C" CONCRETE ABUT. C.Y.	CLASS "C" CONCRETE BENT C.Y.	REINF. CONCRETE SLAB S.F.	PRESTR. CONC. BEAM (TYPE C) L.F.	CONCRETE SURFACE TREATM'T S.Y.	RIPRAP (CONC) (CL. B) C.Y.	SEALED EXP. JT. (3 IN.) L.F.	RAILING TY T-501 L.F.
ABUTMENT 1 & 4	50	111	46.8					293		36.0
BENT 2 & 3		36		40.6						
DECK UNIT 1					6200	770.26	640		76	310.0
TOTAL	50	147	46.8	40.6	6200	770.26	640	293	76	346.0

BEARING SEAT ELEVATIONS

LOCATION		BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5
ABUT 1	(FWD)	995.9861	996.1562	996.3262	996.4961	996.6660
BENT 2	(BK)	994.7187	994.8887	995.0586	995.2285	995.3987
	(FWD)	994.6860	994.8562	995.0261	995.1960	995.3662
BENT 3	(BK)	993.1587	993.3286	993.4985	993.6687	993.8386
	(FWD)	993.1262	993.2961	993.4661	993.6362	993.8062
ABUT 4	(BK)	991.9885	992.1587	992.3286	992.4985	992.6687

Revised Bent Station
3-1-90 Craig F. Stong

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS

LOOP 1604 AT HUESTA CREEK
EASTBOUND MAINLANE

DATE:

STATE OF TEXAS
CRAIG FELIS STONG
54845
REGISTERED
PROFESSIONAL ENGINEER

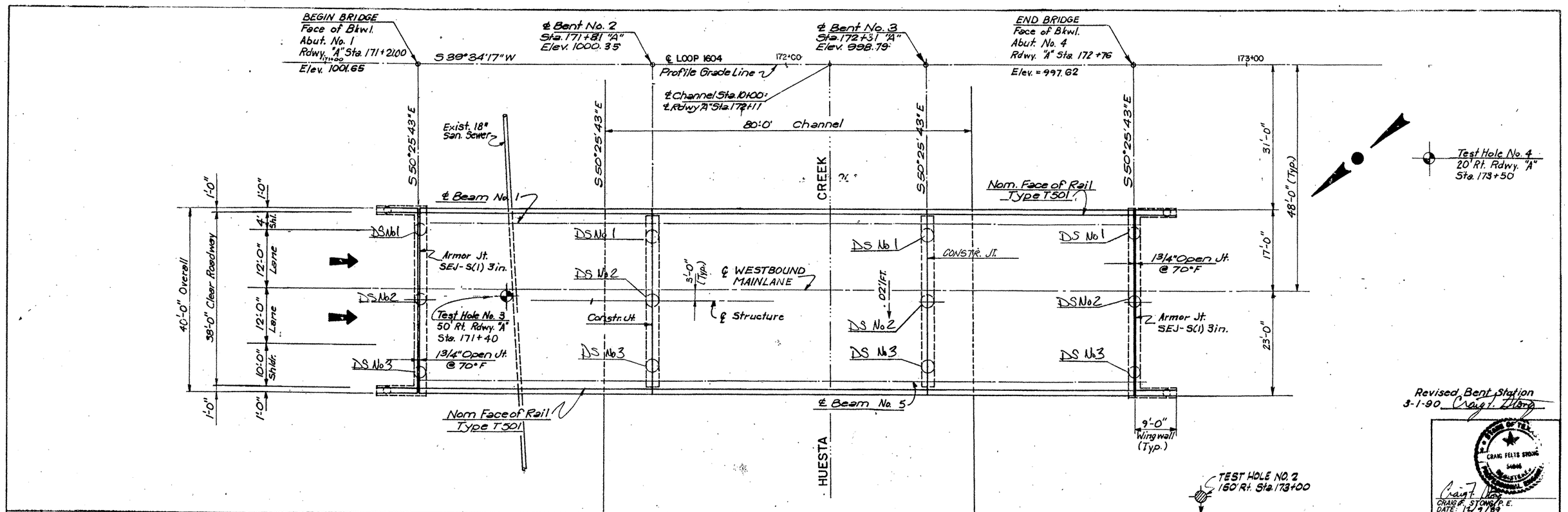
Craig F. Stong
CRAIG F. STONG P.E.
DATE: 12/9/89

ORIGINAL DRAWING DATE: DEC. 1989	
DN.: CFS	REVISIONS
CK.: KK	1 Rev. 3-1-90
DN.: MRM	- -
CK.: CFS	- -

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
15	6		159

COUNTY	CONTROL	SECTION	JOB	HIGHWAY
BEXAR	2542	02	023,	1604

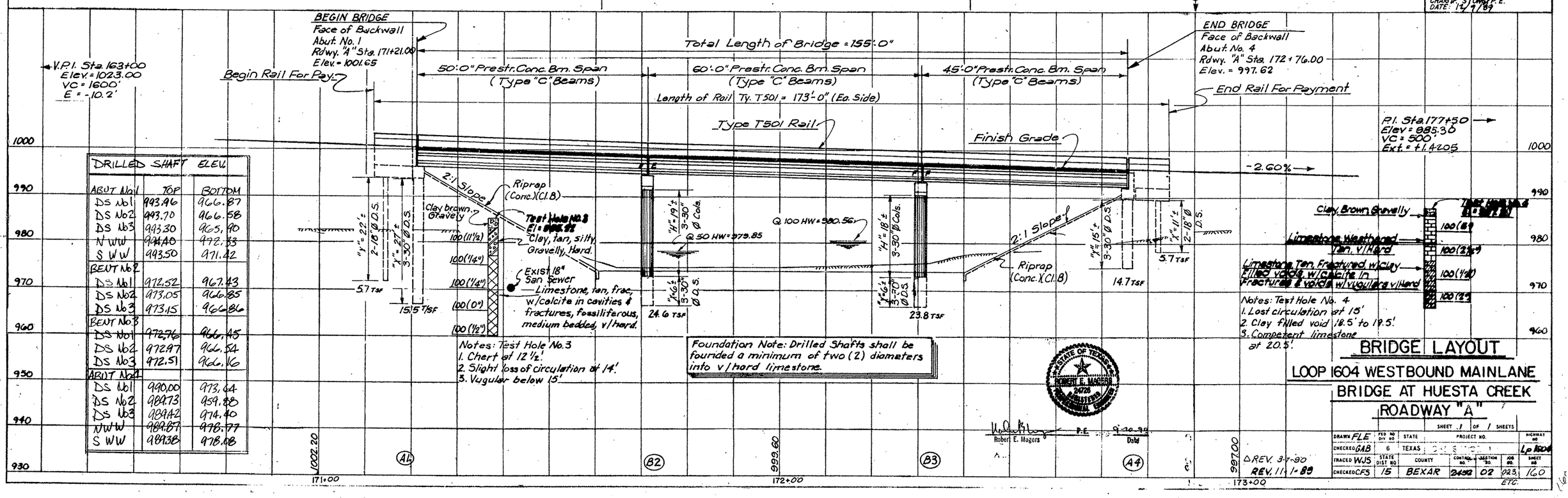
ETC. HUESTA.DGN



Revised Bent Station
3-1-90 Craig F. Stong

STATE OF TEXAS
CRAIG FELTS STONG
54806
LICENSED PROFESSIONAL ENGINEER

Craig F. Stong
CRAIG F. STONG, P.E.
DATE: 12/7/89



DRILLED SHAFT ELEV.		
ABUT No 1	TOP	BOTTOM
DS No 1	993.46	966.87
DS No 2	993.70	966.58
DS No 3	993.30	965.90
N WW	994.40	972.33
S WW	993.50	971.42
BENT No 2		
DS No 1	972.52	967.43
DS No 2	973.05	966.85
DS No 3	973.15	966.86
BENT No 3		
DS No 1	972.76	966.45
DS No 2	972.97	966.54
DS No 3	972.51	966.16
ABUT No 4		
DS No 1	990.00	973.64
DS No 2	989.73	959.88
DS No 3	989.42	974.40
N WW	989.87	978.77
S WW	989.38	978.08

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-20-90
Date

BRIDGE LAYOUT

LOOP 1604 WESTBOUND MAINLANE
BRIDGE AT HUESTA CREEK
ROADWAY "A"

SHEET 1 OF 1 SHEETS

DRAWN FLE	FED. RD. DIV. NO. 6	STATE TEXAS	PROJECT NO.			HIGHWAY NO. Lp 1604
CHECKED GAB						
TRACED WJS	STATE DIST. NO. 15	COUNTY BEXAR	CONTROL NO. 2452	SECTION NO. 02	JOB NO. 023	SHEET NO. 160
CHECKED CFS						ETC.

△REV. 3-7-90
REV. 11-1-89

SUMMARY OF ESTIMATED QUANTITIES

DESCRIPTION \ ITEM	DRILLED SHAFTS 18"φ	DRILLED SHAFTS 30"φ	CLASS "C" CONCRETE ABUT.	CLASS "C" CONCRETE BENT	REINF. CONCRETE SLAB	PRESTR. CONC. BEAM (TYPE C)	CONCRETE SURFACE TREATM'T	RIPRAP (CONC) (CL. B)	SEALED EXP. JT. (3 IN.)	RAILING TY T-501
	L.F.	L.F.	C.Y.	C.Y.	S.F.	L.F.	S.Y.	C.Y.	L.F.	L.F.
ABUTMENT 1 & 4	66	126	46.8					283		36.0
BENT 2 & 3		36		40.6						
DECK UNIT 1					6200	770.26	640		76	310.0
TOTAL	66	162	46.8	40.6	6200	770.26	640	283	76	346.0

BEARING SEAT ELEVATIONS

LOCATION		BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5
ABUT 1	(FWD)	996.6653	996.4958	996.3259	996.1558	995.9858
BENT 2	(BK)	995.3984	995.2283	995.0583	994.8884	994.7183
	(FWD)	995.3660	995.1958	995.0259	994.8560	994.6858
BENT 3	(BK)	993.8384	993.6685	993.4983	993.3284	993.1584
	(FWD)	993.8059	993.6360	993.4658	993.2959	993.1260
ABUT 4	(BK)	992.6685	992.4983	992.3284	992.1584	991.9883

△ Revised Bent Station
3-1-90 Craig F. Stong

DATE:

STATE OF TEXAS
CRAIG FELTS STONG
54845
REGISTERED
PROFESSIONAL ENGINEER

Craig F. Stong
CRAIG F. STONG P.E.
DATE: 12/9/89

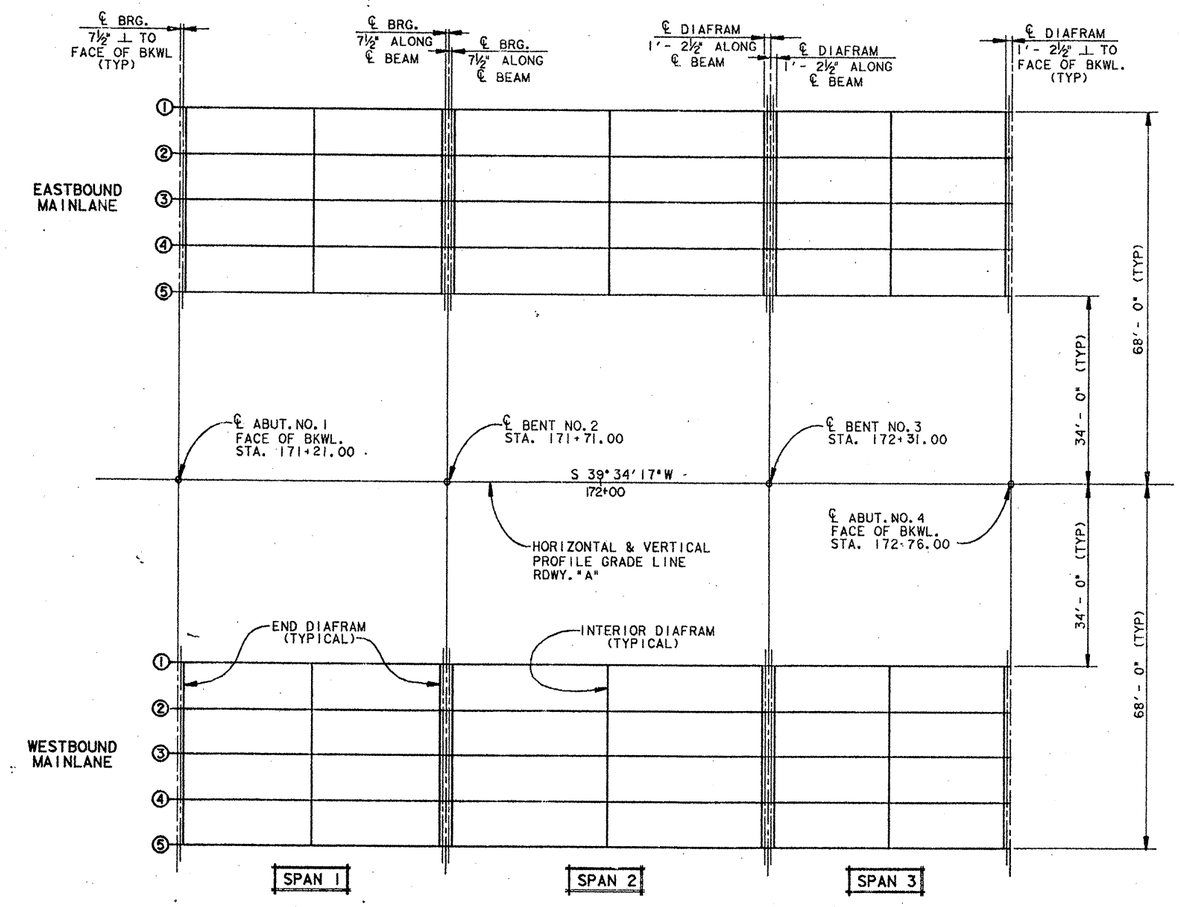
STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS

LOOP 1604 AT HUESTA CREEK
WESTBOUND MAINLANE

ORIGINAL DRAWING DATE: DEC. 1989		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #		SHEET
DN.: CFS	REVISIONS	15	6			161
CK.: KK	△ Rev. 3-1-90	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DN.: MRM	- -	BEXAR		2452	02	023	1604
CK.: CFS	- -						

ETC HUESTA.DGN



DIAFRAM LOCATIONS
EAST & WESTBOUND MAINLANE
SPAN 1
C.L. BENT TO C.L. BENT

BM. NO.	DISTANCE TO DIAPH.	DISTANCE TO BEAM END	DISTANCE TO DIAPH.	DISTANCE TO BEAM END
1	25.0000	25.0000	25.0000	50.0000
2	25.0000	25.0000	25.0000	50.0000
3	25.0000	25.0000	25.0000	50.0000
4	25.0000	25.0000	25.0000	50.0000
5	25.0000	25.0000	25.0000	50.0000

DIAFRAM LOCATIONS
EAST & WESTBOUND MAINLANE
SPAN 2
C.L. BENT TO C.L. BENT

BM. NO.	DISTANCE TO DIAPH.	DISTANCE TO BEAM END	DISTANCE TO DIAPH.	DISTANCE TO BEAM END
1	30.0000	30.0000	30.0000	60.0000
2	30.0000	30.0000	30.0000	60.0000
3	30.0000	30.0000	30.0000	60.0000
4	30.0000	30.0000	30.0000	60.0000
5	30.0000	30.0000	30.0000	60.0000

DIAFRAM LOCATIONS
EAST & WESTBOUND MAINLANE
SPAN 3
C.L. BENT TO C.L. BENT

BM. NO.	DISTANCE TO DIAPH.	DISTANCE TO BEAM END	DISTANCE TO DIAPH.	DISTANCE TO BEAM END
1	22.5000	22.5000	22.5000	45.0000
2	22.5000	22.5000	22.5000	45.0000
3	22.5000	22.5000	22.5000	45.0000
4	22.5000	22.5000	22.5000	45.0000
5	22.5000	22.5000	22.5000	45.0000

BENT REPORT
EAST & WESTBOUND MAINLANE
SPAN 1-3 (BK) & (FWD)

BEAM NO.	BEAM SPAC. (C.L. BENT)	BEAM ANGLE
1	0.0000	90°00'00"
2	8.5000	90°00'00"
3	8.5000	90°00'00"
4	8.5000	90°00'00"
5	8.5000	90°00'00"
TOTAL	34.0000	———

NOTE: DISTANCE BETWEEN PROFILE GRADE LINE & EASTBOUND MAINLANE BEAM NO. 1 = 68.0000' (L)
DISTANCE BETWEEN PROFILE GRADE LINE & WESTBOUND MAINLANE BEAM NO. 1 = 34.0000' (R)

INT. DIAFRAM
EAST & WESTBOUND MAINLANE
SPAN 1 - 3

BEAMS	LENGTH
1 - 2	8.5000
2 - 3	8.5000
3 - 4	8.5000
4 - 5	8.5000

BEAM REPORT - EASTBOUND & WESTBOUND MAINLANE

BM. NO.	SPAN 1 HORIZ. DIST. C-C BENT	SPAN 1 TRUE DIST. BOT. BM. FLANGE	SPAN 1 BEAM SLOPE	SPAN 1 BEAM BEARINGS	SPAN 2 HORIZ. DIST. C-C BENT	SPAN 2 TRUE DIST. BOT. BM. FLANGE	SPAN 2 BEAM SLOPE	SPAN 2 BEAM BEARINGS	SPAN 3 HORIZ. DIST. C-C BENT	SPAN 3 TRUE DIST. BOT. BM. FLANGE	SPAN 3 BEAM SLOPE	SPAN 3 BEAM BEARINGS
1	50.0000	49.6835	-0.02600	S 39°34'17.00"W	60.0000	59.6868	-0.02600	S 39°34'17.00"W	45.0000	44.6818	-0.02600	S 39°34'17.00"W
2	50.0000	49.6835	-0.02600	S 39°34'17.00"W	60.0000	59.6868	-0.02600	S 39°34'17.00"W	45.0000	44.6818	-0.02600	S 39°34'17.00"W
3	50.0000	49.6835	-0.02600	S 39°34'17.00"W	60.0000	59.6868	-0.02600	S 39°34'17.00"W	45.0000	44.6818	-0.02600	S 39°34'17.00"W
4	50.0000	49.6835	-0.02600	S 39°34'17.00"W	60.0000	59.6868	-0.02600	S 39°34'17.00"W	45.0000	44.6818	-0.02600	S 39°34'17.00"W
5	50.0000	49.6835	-0.02600	S 39°34'17.00"W	60.0000	59.6868	-0.02600	S 39°34'17.00"W	45.0000	44.6818	-0.02600	S 39°34'17.00"W

GENERAL NOTES:

1) ALL BENTS, ABUTMENTS AND DIAFRAMS ARE ON A BEARING OF S 50°25'43"E.
2) ALL BEAMS ARE ON A BEARING OF S 39°34'17"W.
3) ALL DISTANCES SHOWN ARE IN A HORIZONTAL PLANE.
4) ALL DISTANCES SHOWN ARE FROM FACE OF ABUTMENT BACKWALL TO ℄ INTERIOR DIAFRAM TO ℄ INTERIOR BENT.
5) ALL DIAFRAM LENGTHS ARE FROM ℄ TO ℄ OF BEAMS.

Revised Bent Station 3-1-90 Craig F. Stong

DATE:

STATE OF TEXAS CRAIG FELIX STONG 54645 REGISTERED PROFESSIONAL ENGINEER

Craig F. Stong
CRAIG F. STONG P.E.
DATE: 12/9/89

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

BEAM & DIAFRAM LAYOUT

LOOP 1604 EAST & WESTBOUND MAINLANES AT HUESTA CREEK

ORIGINAL DRAWING DATE: NOV. 1989

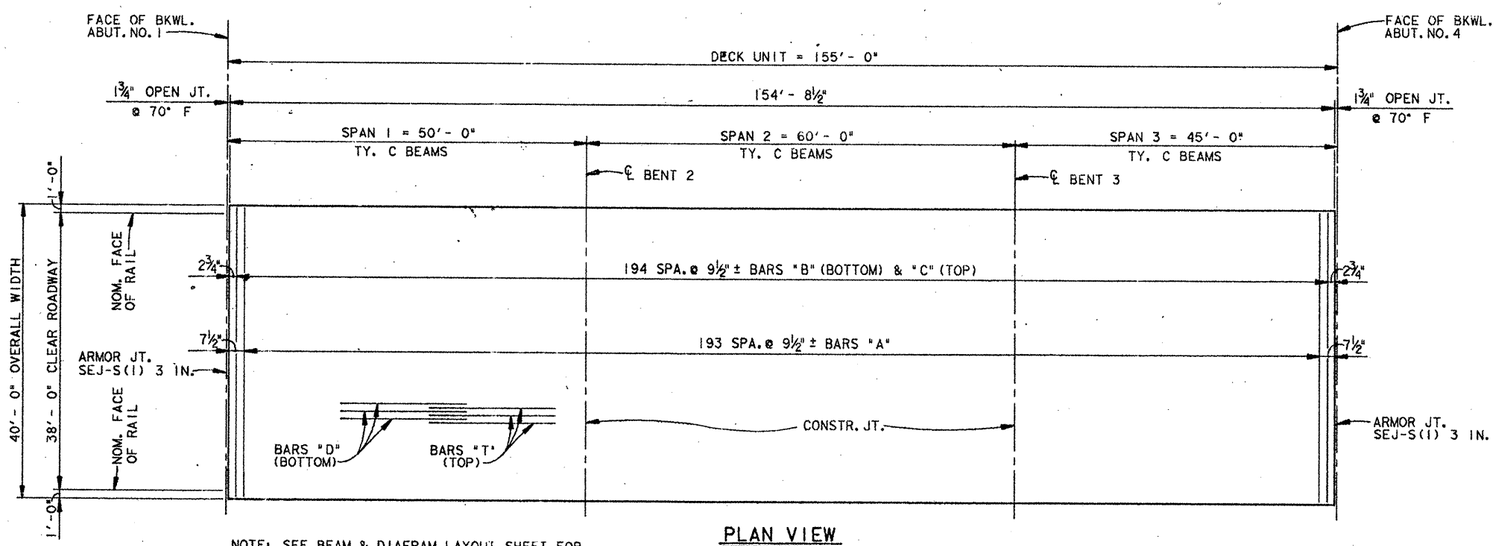
DN.: CFS
CK.: KK
DN.: MRM
CK.: CFS

REVISIONS
△ Rev. 3-1-90

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
15	6		162

COUNTY	CONTROL	SECTION	JOB	HIGHWAY
BEXAR	2452	02	023	L1604

ETC. HUESTA.DGN

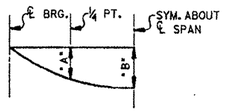


NOTE: SEE BEAM & DIAFRAM LAYOUT SHEET FOR ACTUAL BEAM LENGTHS, SPACING, SLOPE, BEARINGS & DIAFRAM LOCATIONS & LENGTHS.

PLAN VIEW
EASTBOUND MAINLANE

SECTION DEPTH TABLE				
SPAN NO.	BEAM NO.	@ ℄ BRG. "X"	@ MID SPAN "Y" ✱	@ ℄ BRG. "Z"
1	1-5	9"	8½"	4'- 1"
2	1-5	9"	8 1/16"	4'- 1"
3	1-5	9"	8 9/16"	4'- 1"

✱THEORETICAL DIMENSION



SPAN	BM.	"A"	"B"
1	1-5	0.0181	0.0254
2	1-5	0.0382	0.0536
3	1-5	0.0117	0.0165

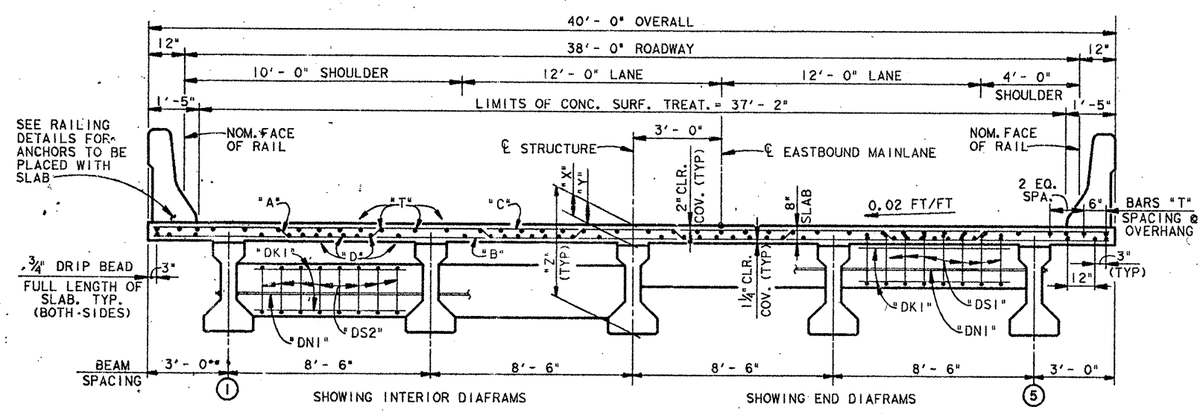
DEAD LOAD DEFLECTION DIAGRAM

NOTE: DEFLECTIONS SHOWN ARE DUE TO CAST-IN-PLACE CONCRETE. (E = 5 X 10^6 psi)

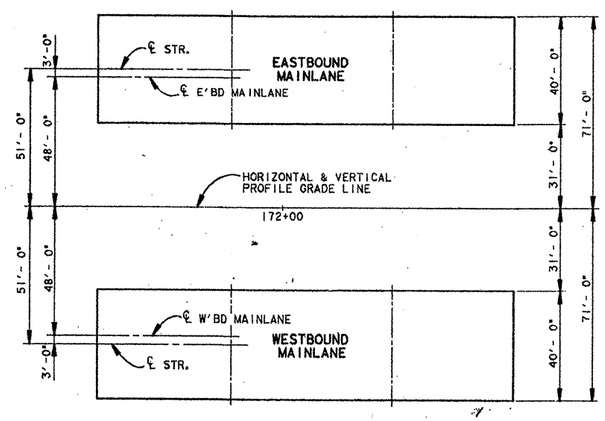
ESTIMATED QUANTITIES
(FOR ONE MAINLANE UNIT ONLY)

BAR	NO.	SIZE	SPA.	LENGTH	WEIGHT
A	194	#5	9½"±	40'-11"	8279
B	195	#4	9½"±	39'-9"	5178
C	195	#5	9½"±	39'-9"	8085
⊙ D	42	#5	SHN	157'-4"	6892
DK1	144	#5	~	7'-0"	1051
DN1	9	#8	~	34'-11"	839
DS1	192	#4	12"±	4'-10"	620
DS2	96	#4	12"±	4'-6"	289
▲ T	40	#4	SHN	156'-10"	4191
REINF. STEEL ✱				LBS.	35424
CL "S" CONC. (SLAB) ✱				C.Y.	166.1
REINF. CONC. SLAB				S.F.	6200
PRESTR. CONC. BM. (TY.C)				L.F.	770.26
CONC. SURF. TREAT.				S.Y.	640
SEALED EXP. JT. (3 IN.)				L.F.	76

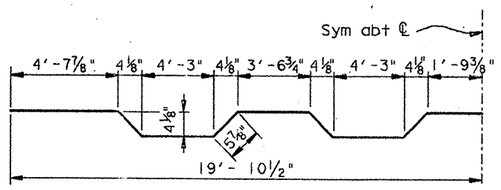
✱ FOR CONTRACTORS INFO ONLY.
▲ INCLUDES 2 ~ 1'- 2" MIN. LAPS
⊙ INCLUDES 2 ~ 1'- 5" MIN. LAPS



TRANSVERSE SECTION
(LOOKING STATIONWISE)



MAINLANE LAYOUT



BARS A

GENERAL NOTES:

DESIGN: HS-20 LOADING IN ACCORDANCE WITH A.A.S.H.T.O. 1983 STANDARD SPEC'S AND INTERIM REVISIONS THERETO.
ALL CONCRETE SHALL BE CLASS "S".
DESIGN fc = 1200 P.S.I.
AVERAGE CALCULATED LOAD =
CHAMFER ALL EXPOSED EDGES ¾" UNLESS NOTED OTHERWISE.

DATE:

STATE OF TEXAS — CRAIG FELIX STONG — 54046 — REGISTERED PROFESSIONAL ENGINEER

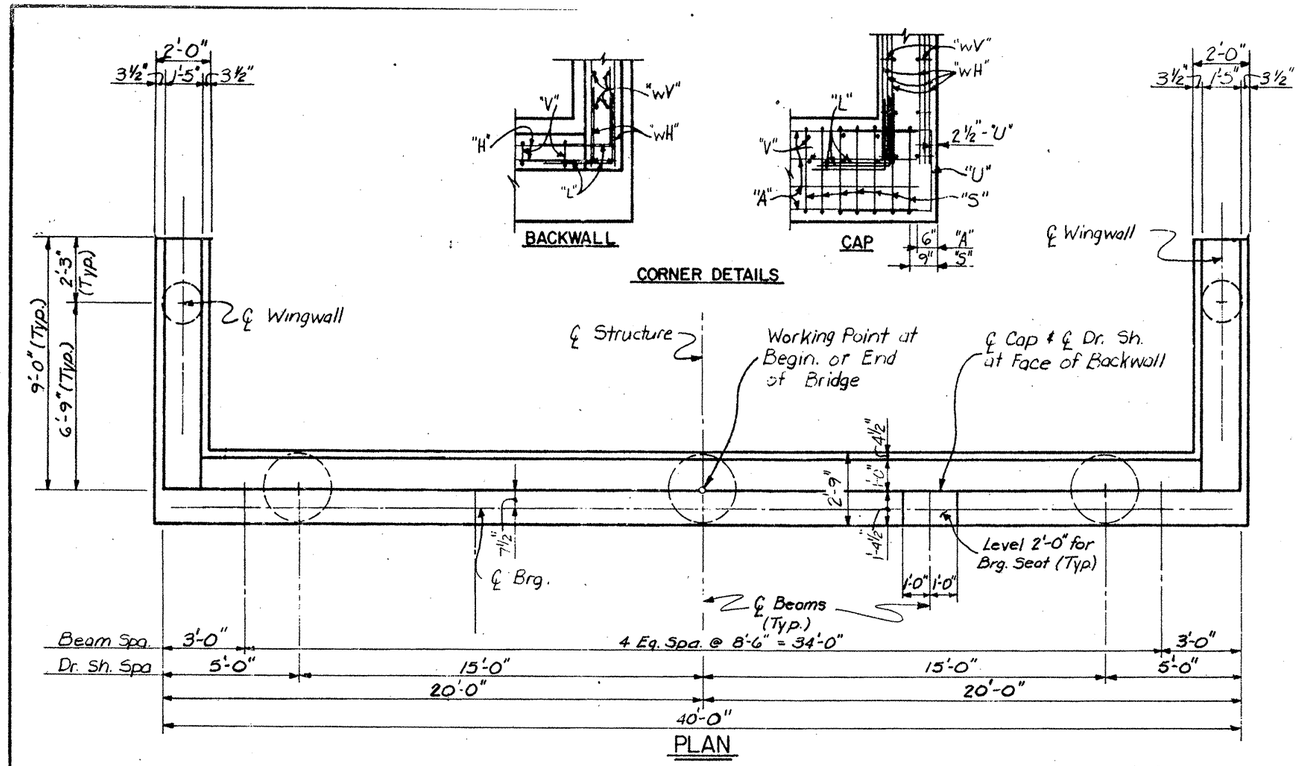
CRAIG F. STONG P.E.
DATE:

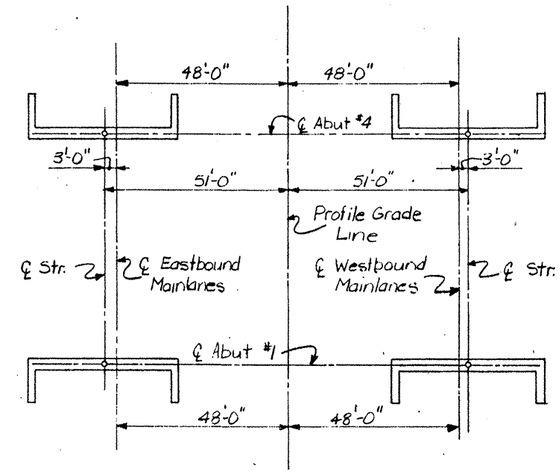
STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

DECK DETAILS
LOOP 1604 AT HUESTA CREEK
EASTBOUND & WESTBOUND MAINLANES

ORIGINAL DRAWING DATE: NOV. 1989		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #	SHEET
DN.: CFS	REVISIONS	15	6		143
CK.: KK	- -	COUNTY	CONTROL	SECTION / JOB	HIGHWAY
DN.: MRM	- -	BEXAR	2452	02 / 023	L1604
CK.: CFS	- -				

HUESTA.DGN

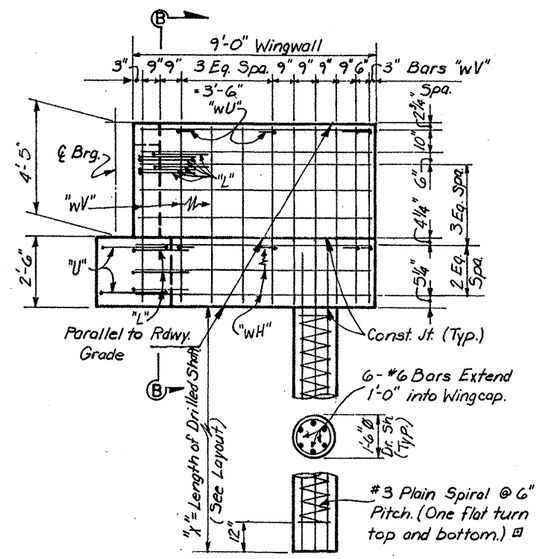




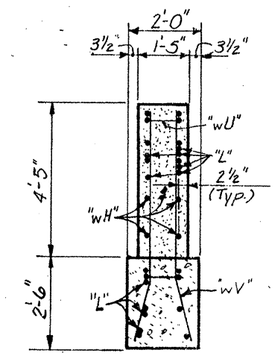
ABUTMENT LAYOUT

ESTIMATED QUANTITIES (FOR ONE ABUTMENT)				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	8	#11	39'-0"	1658
H	10	#5	39'-9"	415
L	18	#6	4'-0"	108
S	44	#5	9'-8"	444
Tbk	1	#5	39'-0"	41
U	4	#6	7'-4"	44
V	38	#5	11'-4"	449
wH	32	#6	8'-9"	421
wU	16	#4	2'-0"	21
wV	40	#5	6'-5"	268
REINF. STEEL			* LBS	3869
CL. C CONC. (Abut.)			C.Y.	23.4

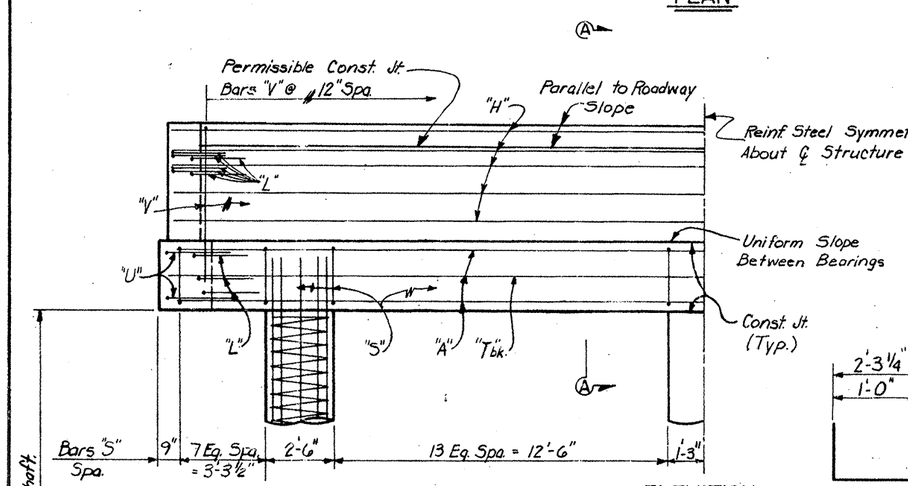
* For Contractor's Information Only.



WINGWALL ELEVATION

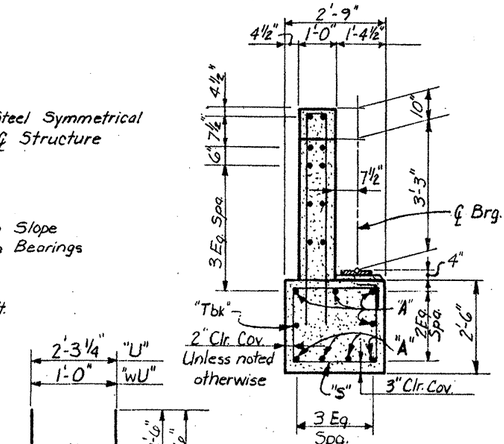


SEC. B-B

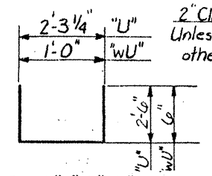


ELEVATION

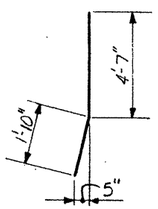
▣ Included in Price Bid for Drilled Shafts.



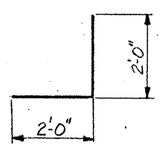
SEC. A-A



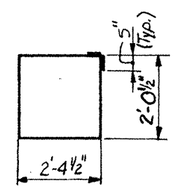
BARS "U" & "wU"



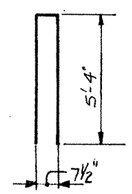
BARS "wV"



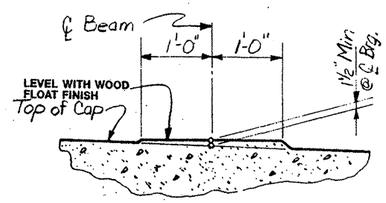
BARS "L"



BARS "S"



BARS "V"



BEARING SEAT DETAIL

BEARING SURFACE SHALL BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.

GENERAL NOTES:

Design: HS-20 Loading in accordance with AASHTO 1983 Standard Spec's and interim revisions thereto.
All concrete for Cap, Bkwall & Wings shall be Cl. C.
All reinf. steel for Cap, Bkwall & Wings shall be Gr. 60.
All concrete for Drilled Shafts shall be Cl A.
All reinf. steel for Drilled Shafts shall be Gr. 40
Design f'c = 1440 p.s.i.
Chamfer all exposed edges ¾" unless noted otherwise.
Avg. Calc. Load (Abut. 1) = 76 TONS/p.s.
Avg. Calc. Load (Abut. 4) = 72 TONS/p.s.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

ABUTMENT DETAILS

ABUTMENT Nos. 1 & 4

LOOP 1604 AT HUESTA CREEK

EASTBOUND & WESTBOUND MAINLANES

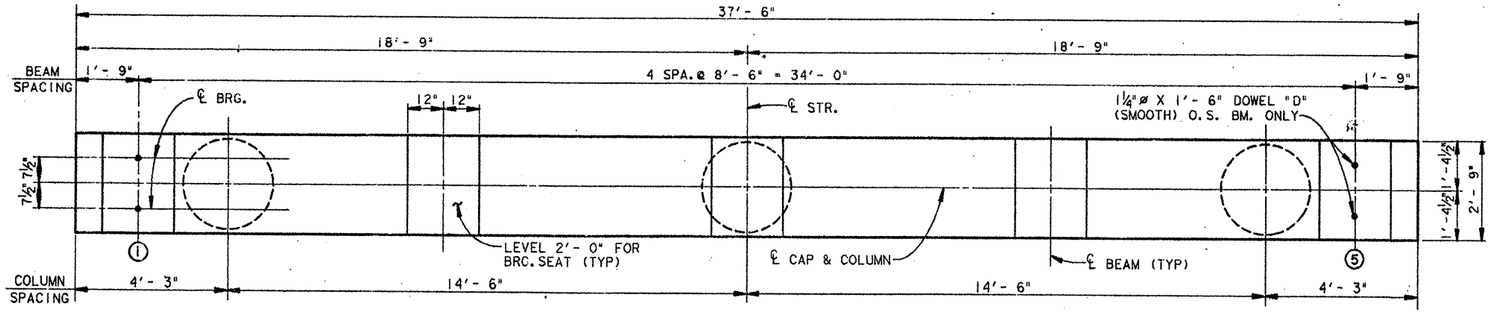
DATE:

STATE OF TEXAS — CRAIG FELTS STONG — 54845 — REGISTERED PROFESSIONAL ENGINEER

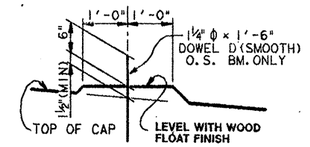
Craig F. Stong
CRAIG F. STONG, P.E.
DATE:

Des. JCS	Drawing ORIGINAL	Date JUNE 1989	Fed. Road Div. No. 6	State TEXAS	Federal Aid Project No.	Sheet 164
Ck. Des. KK						
Dwn. WLS						
Ck. Dwn. CFS						
Ck. Tr.			District	County		
Ck. Tr.			15	BEXAR	2402 02 023	

ETC.



PLAN VIEW
(LOOKING STATIONWISE)



BEARING SEAT DETAIL

BEARING SURFACE SHALL BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.

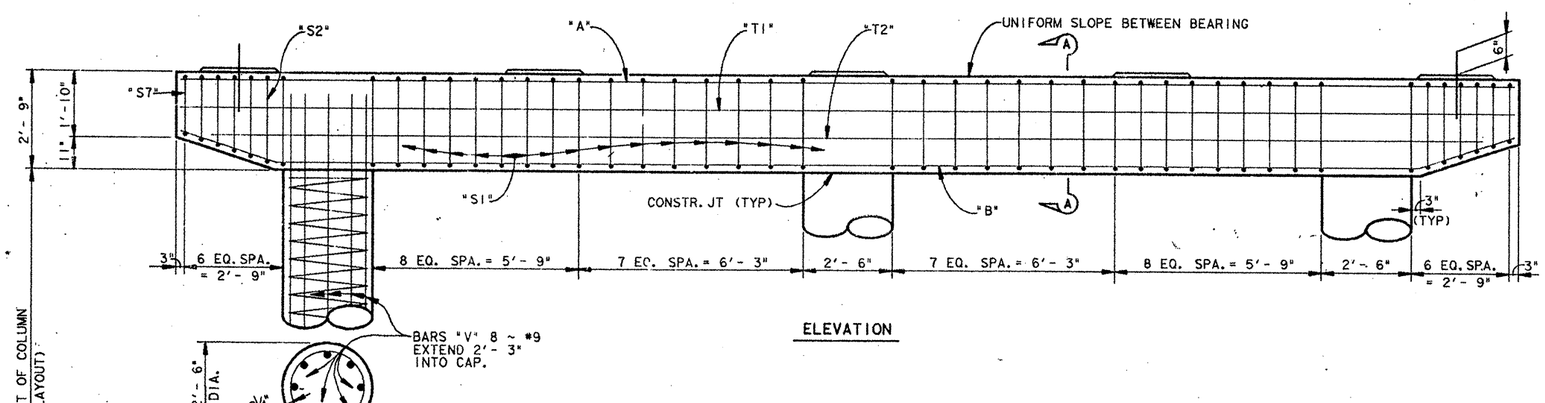
ESTIMATED QUANTITIES
(FOR ONE INTERIOR BENT CAP)

BAR	NO.	SIZE	SPA.	LENGTH	WEIGHT
A	4	#11	SHN	37'-3"	792
B	4	#11	SHN	37'-7"	799
S1	34	#5	SHN	10'-4"	366
S2-7	12	#5	SHN	9'-5"	118
T1	2	#5	SHN	37'-3"	78
T2	2	#5	SHN	35'-6"	74
D	4	1¼"ø	SHN	1'-6"	25
REINF. STEEL *				LBS.	2252
CL "C" CONC. (BENT)				C.Y.	10.2

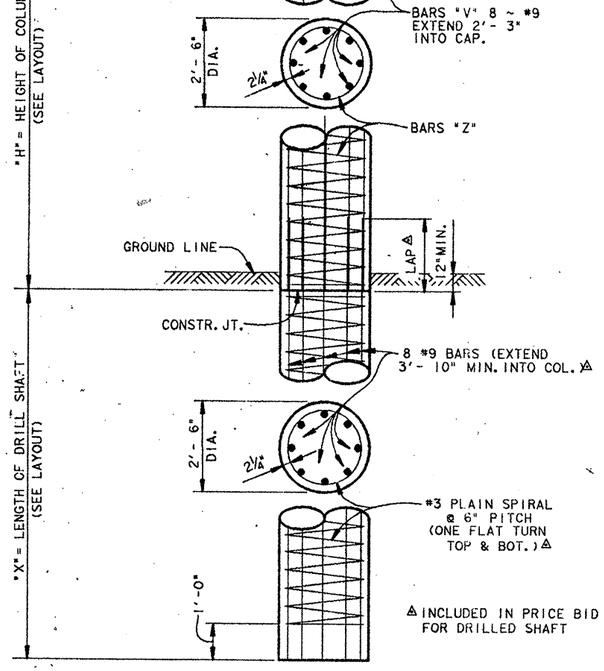
*FOR CONTRACTORS INFO ONLY

VARIABLE QUANTITIES
(FOR 3 - 30"ø COLUMNS)

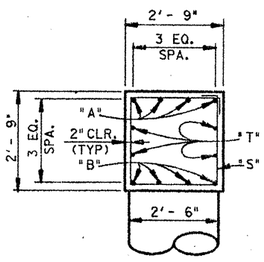
"H"	BARS "Z" 3 - #3		BARS "V" 24 - #9		REINF. STEEL*	CONC. CL "C" (BENT)
BARS	LENGTH	WEIGHT	LENGTH	WEIGHT	LBS.	C.Y.
15	207	233	17'-3"	1408	1641	8.18
16	221	249	18'-3"	1489	1738	8.73
17	234	264	19'-3"	1571	1835	9.27
18	248	280	20'-3"	1652	1932	9.82
19	261	294	21'-3"	1734	2028	10.36
20	274	309	22'-3"	1816	2125	10.91
21	288	325	23'-3"	1897	2222	11.46
22	301	340	24'-3"	1979	2319	12.00



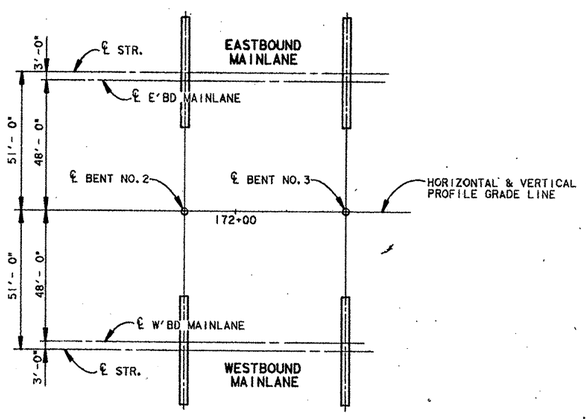
ELEVATION



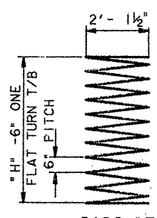
TYP. COL. & DR. SHAFT ELEV.



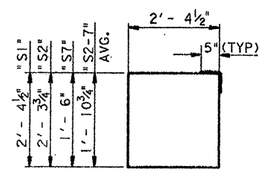
SEC. A-A



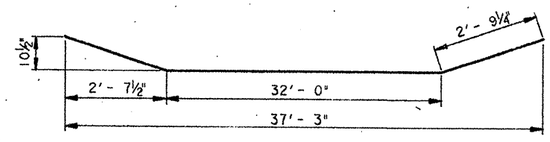
BENT LAYOUT



BARS "Z"



BARS "S"



BARS "B"

GENERAL NOTES:

DESIGN: HS-20 LOADING IN ACCORDANCE WITH A.A.S.H.T.O. 1983 STANDARD SPEC'S AND INTERIM REVISIONS THERETO.
ALL CONCRETE FOR CAP & COLUMNS SHALL BE CLASS "C"
ALL REINF. STEEL FOR CAP & COLUMNS SHALL BE GRADE 60
ALL CONCRETE FOR DRILLED SHAFTS SHALL BE CLASS "A".
DESIGN fc = 1440 P.S.I.
AVERAGE CALCULATED LOAD (BENT NO. 2) = 121 TONS/D.S.
AVERAGE CALCULATED LOAD (BENT NO. 3) = 117 TONS/D.S.
CHAMFER ALL EXPOSED EDGES ¾" UNLESS NOTED OTHERWISE.

DATE:

STATE OF TEXAS CRAIG FELIX STONG 54045 PROFESSIONAL ENGINEER

CRAIG F. STONG P.E.
DATE:

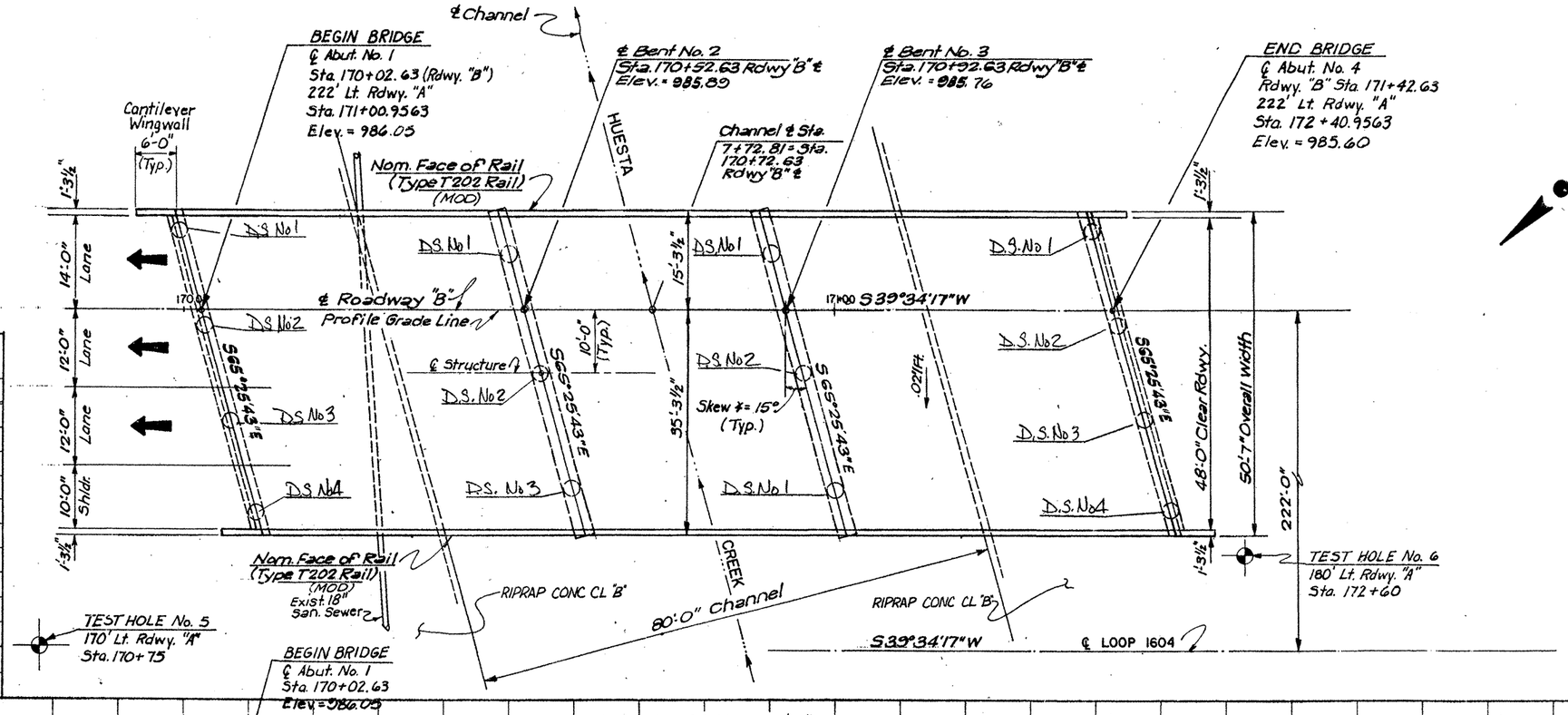
STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

INTERIOR BENT DETAILS

BENT NO. 2 & 3
LOOP 1604 AT HUESTA CREEK
EAST & WESTBOUND MAINLANES

ORIGINAL DRAWING DATE: DEC. 1989	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #			SHEET
DN.: CFS / CK.: KK / DN.: MRM / CK.: CFS — REVISIONS	15	6				165
	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
	BEXAR		2452	02	023	L1604

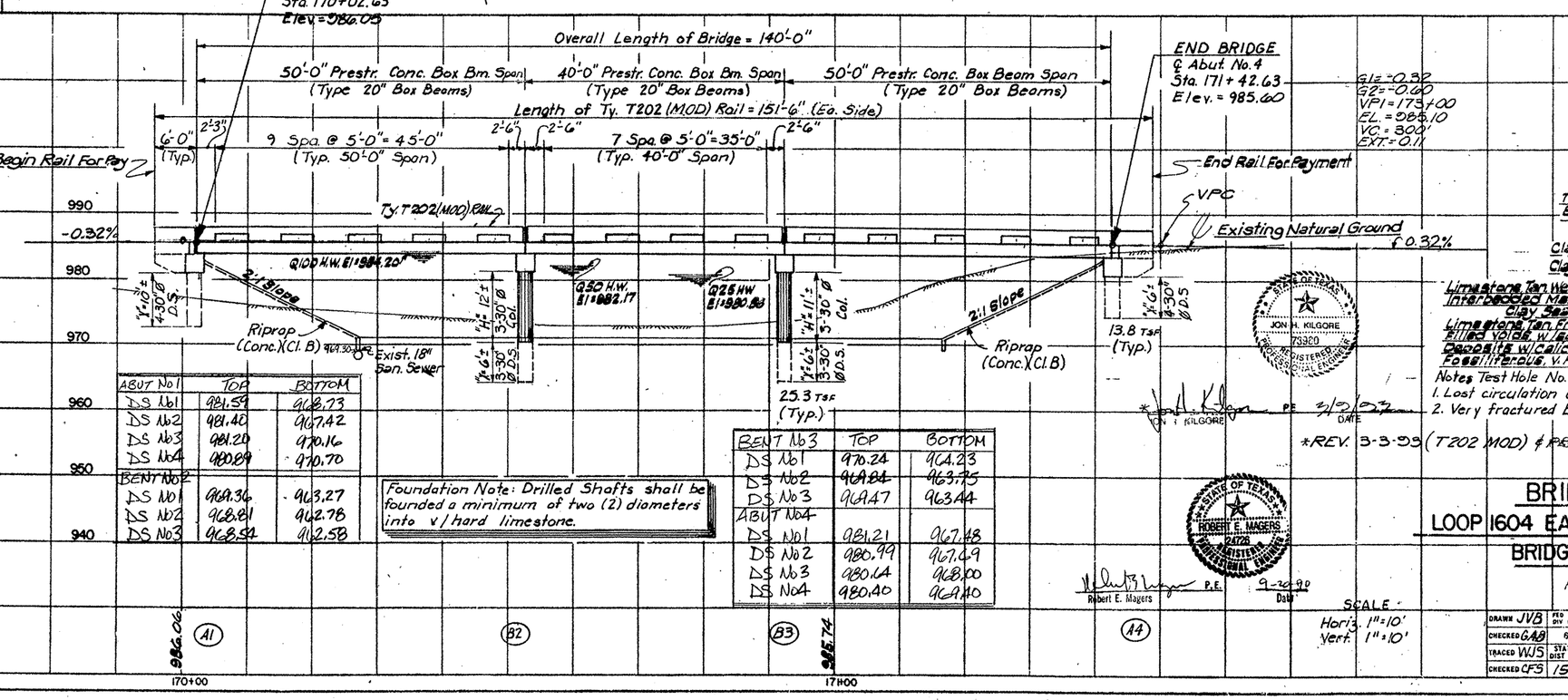
ETC HUESTA.DGN



ESTIMATE QUANTITIES

ITEM	UNIT	QUANT.
DRILL SHAFT (30in)	L.F.	100
CL. C CONC. (BENT)	C.Y.	46.6
CL. C CONC. (ABUT)	C.Y.	39.2
CL. C CONC. (SHEAR KEY)	C.Y.	30.8
PRESTR. CONC. BOX BEAM (5I20)	L.F.	1107.49
PRESTR. CONC. BOX BEAM (5E20)	L.F.	276.88
RIPRAP (CONC.)(CL. B)	C.Y.	62
RAIL (TY. T202) (MOD)	L.F.	303.0
BAT EXCLUDER JOINT SEALER	L.F.	1246

STATE OF TEXAS
CRAIG FELTS STONG
54845
REGISTERED PROFESSIONAL ENGINEER
Craig F. Stong
CRAIG F. STONG, P.E.
DATE: 12/19/89



ABUT No 1	TOP	BOTTOM
DS No 1	981.59	968.73
DS No 2	981.40	967.42
DS No 3	981.20	970.16
DS No 4	980.89	970.70
BENT No 2		
DS No 1	969.36	963.27
DS No 2	968.81	962.78
DS No 3	968.54	962.58

BENT No 3	TOP	BOTTOM
DS No 1	970.24	964.23
DS No 2	969.84	963.75
DS No 3	969.47	963.44
ABUT No 4		
DS No 1	981.21	967.48
DS No 2	980.99	967.69
DS No 3	980.64	968.00
DS No 4	980.40	969.40

Foundation Note: Drilled Shafts shall be founded a minimum of two (2) diameters into v/hard limestone.

STATE OF TEXAS
JON H. KILGORE
73920
REGISTERED PROFESSIONAL ENGINEER
Jon H. Kilgore P.E. 3/13/03
JON H. KILGORE DATE

*REV. 3-3-93 (T202 MOD) & PROFILE

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER
Robert E. Magers P.E. 9-20-90
Robert E. Magers Date

SCALE
Horiz. 1" = 10'
Vert. 1" = 10'

BRIDGE LAYOUT
LOOP 1604 EASTBOUND FRTG. RD.
BRIDGE AT HUESTA CREEK

REV. 11-1-89

SHEET 1 OF 1 SHEETS

DRAWN JVB	FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CHECKED GAB	6	TEXAS					Lp 1604
TRACED WJS	STATE DIST. NO.	COUNTY	CONTRAC. NO.	SECTION NO.	JOB NO.	SHEET NO.	
CHECKED CFS	15	BEXAR	2452	02	023	166	

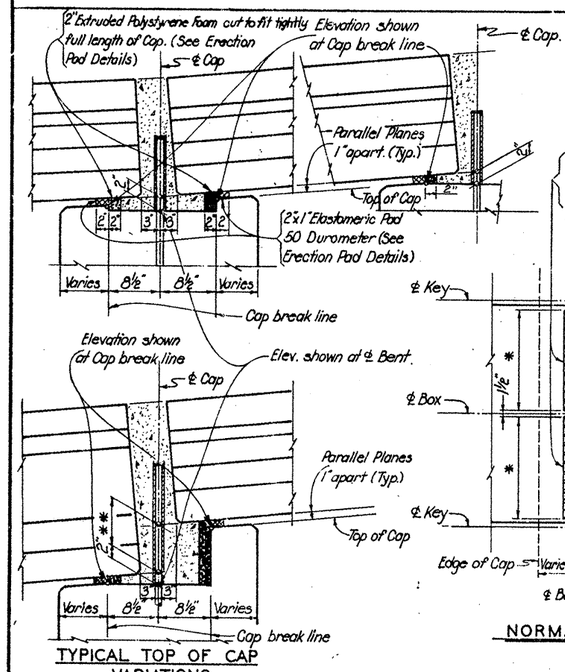
ETC.

TOP OF CAP ELEVATIONS

STRUCTURE	BENT NO.	SKEW	DIMENSIONS A	B	C	D	E	F	ELEVATIONS IN FEET 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
LOOP 1604 AT HUESTA CREEK EASTBOUND FRONTAGE ROAD	A1	15° Rt. Fwd	15'-3½"	35'-3½"										984.371		984.052		983.315	984.451		984.133		983.396						
	B2	15° Rt. Fwd.	15'-3½"	35'-3½"					984.296		983.977		983.241	984.210		983.892		983.156	984.292		983.972		983.236						
	B3	15° Rt. Fwd.	15'-3½"	35'-3½"					984.168		983.849		983.113	984.083		983.764		983.028	984.163		983.844		983.108						
	A4	15° Rt. Fwd	15'-3½"	35'-3½"					984.008		983.689		982.953	983.923		983.604		982.867											

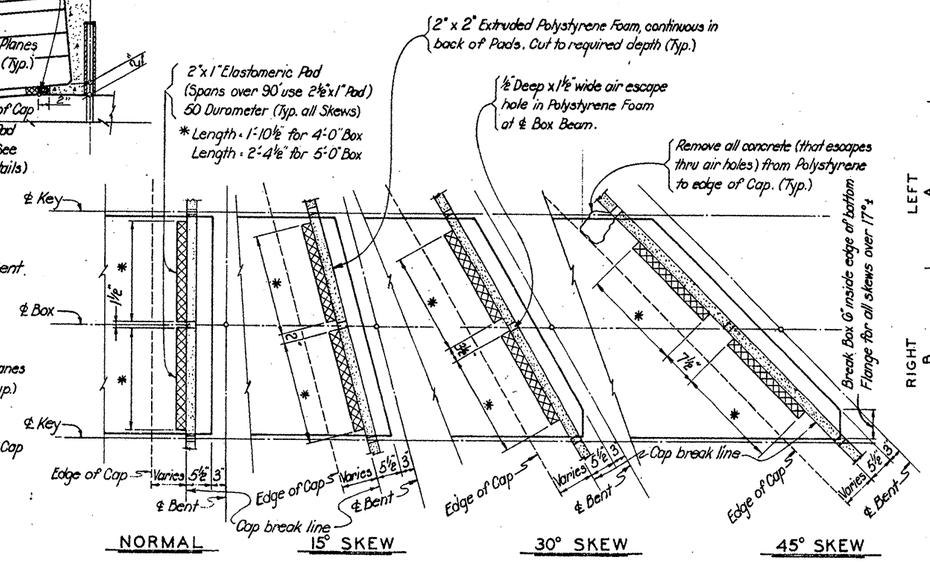
Slope = .02 %

BEAM SLOPE ALONG RDWY. = 0.0
ALL BOXES
ALL SPANS



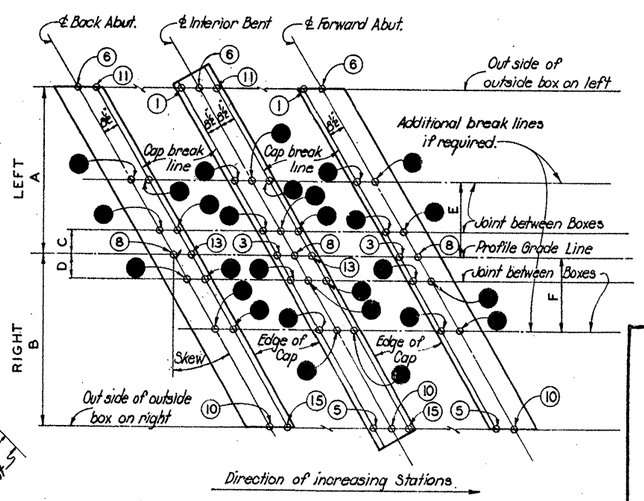
TYPICAL TOP OF CAP VARIATIONS

** Difference in depth of Boxes



NORMAL 15° SKEW 30° SKEW 45° SKEW

ERECTION PAD DETAILS



PART PLAN

Note: ℄ Cap and Cap break line to be a uniform slope between the elevation shown. That portion of adjacent bents from Cap break line to edge of Cap shall have the same slope and shall form a parallel plane to bottom of Box Beam approx. 1" below bottom of Box.

NOTES:

STATE OF TEXAS
JON H. KILGORE
73980
REGISTERED PROFESSIONAL ENGINEER

* JON H. KILGORE P.E. 3/10/93 DATE

STATE OF TEXAS
CRAIG F. STONG, P.E.
DATE: 12/9/89

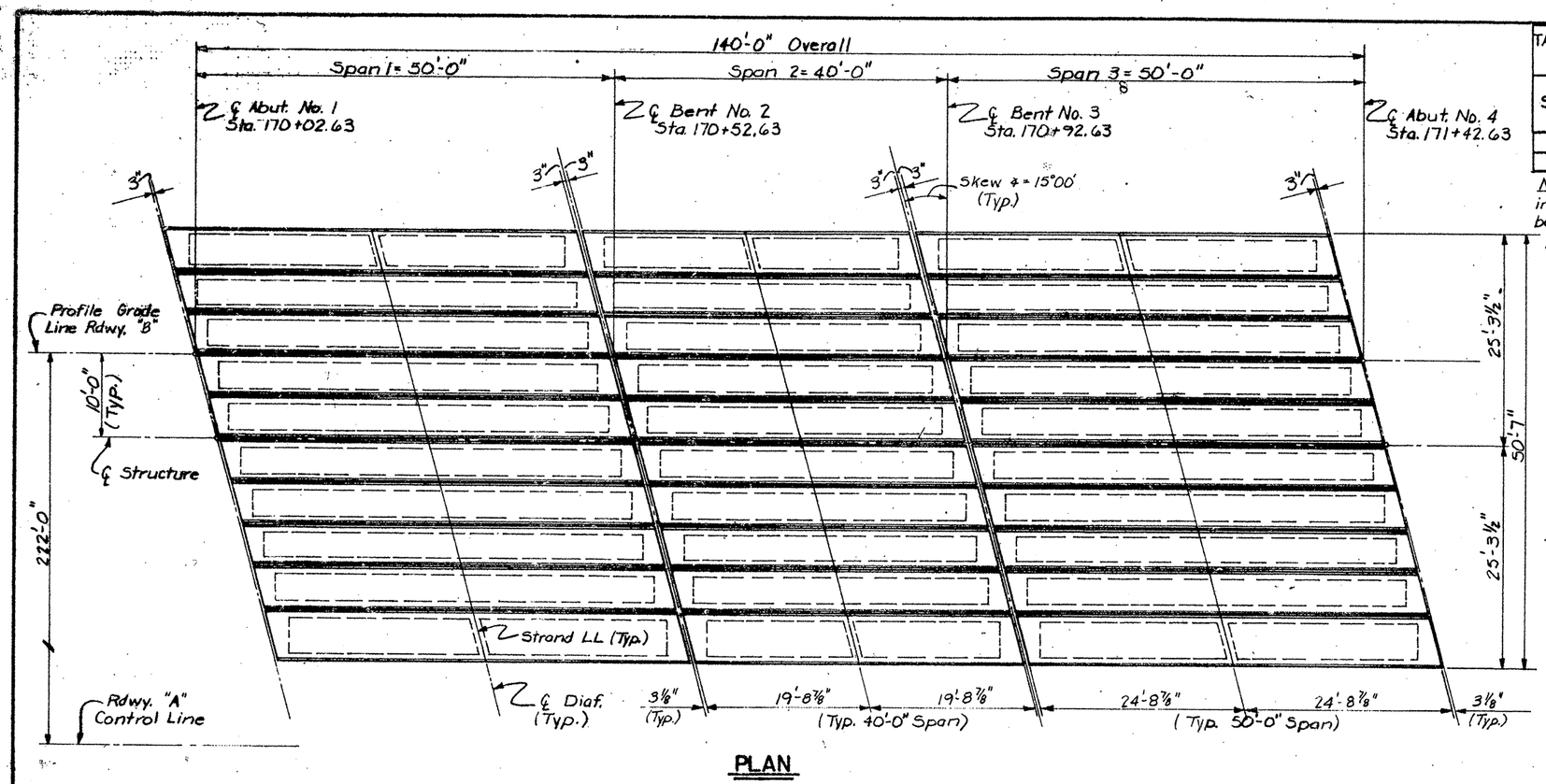
TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

TOP OF CAP ELEVATIONS & ERECTION PAD DETAILS

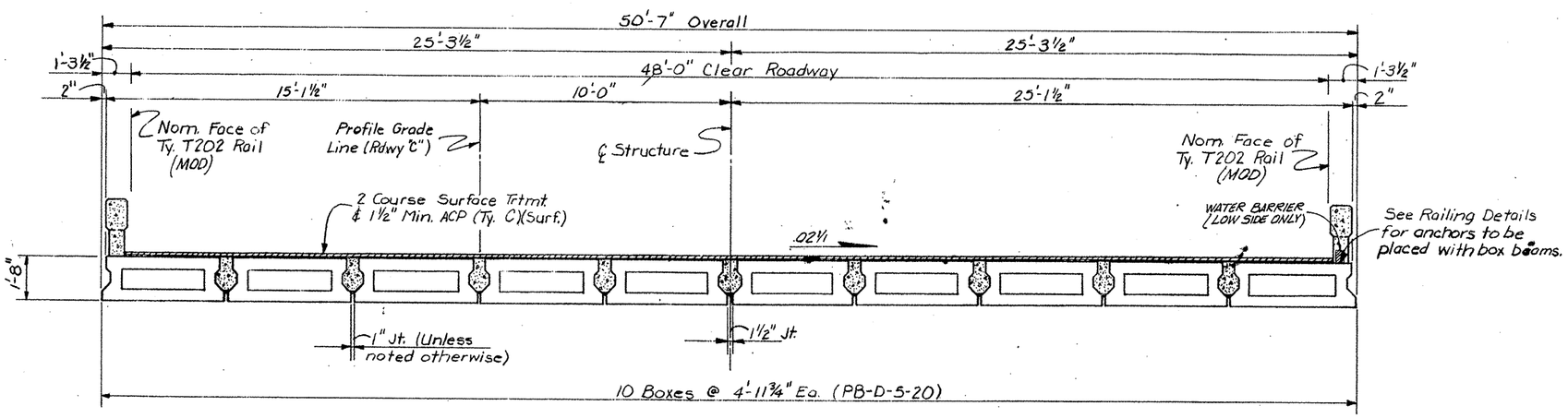
PB-ED

ORIGINAL DRAWING DATE: MAR. 1975		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.: -CWC	REVISIONS	15	6		167
CK.: -	Rev. 10-81				
DW.: -AS	REV. 3-3-93 PROF. GRADE	COUNTY	CONTROL	SECTION	JOB
CK.: -CWC		BEXAR	2452	02	023 L.p1604

ETC.



PLAN



TYPICAL SECTION

TABLE OF ESTIMATED QUANTITIES FOR ONE INTERIOR BOX BEAM

SPAN	BOX LENGTH LIN. FT.	REINF. STEEL * Lb	Cl. H. CONC. * CY.	½"ø S.R. STRANDS Lbs/' of Box
40'-0"	39.479	1177	7.7	8.400
50'-0"	49.479	1496	9.5	12.600

Note: Quantities shown are for one interior box without diaframs. For exterior box add .1 CY conc. and 6 lbs (4-#4 bars E) per diafram.

ESTIMATED QUANTITIES (FOR ONE 40'-0" SPAN)

PRESTR. CONC. BOX BEAM (5120)		LF	315.83
PRESTR. CONC. BOX BEAM (5E20)		LF	78.96
CL. C CONC. (Shear Key)		CY	8.8
REINF. STEEL	*	LBS	11,782
CL. H CONC.	*	CY	77.2

ESTIMATED QUANTITIES (FOR ONE 50'-0" SPAN)

PRESTR. CONC. BOX BEAM (5120)		LF	395.83
PRESTR. CONC. BOX BEAM (5E20)		LF	98.96
CL. C CONC (Shear Key)		CY	11.0
REINF. STEEL	*	LBS	14,972
CL. H CONC.	*	CY	95.2

*For Contractor's Information Only.

	40'-0" SPAN				50'-0" SPAN			
Bar	No.	Size	Lgth.	Wt.	No.	Size	Lgth.	Wt.
A	36	#4	6'-10"	164	46	#4	6'-10"	210
B	37	#4	4'-5"	109	47	#4	4'-5"	139
C	37	#4	5'-5"	134	47	#4	5'-5"	170
D1	4	#6	44'-2"	265	4	#6	54'-2"	325
D2	4	#6	38'-11"	234	4	#6	48'-11"	294
M2	2	#4	4'-7"	6	10	#4	4'-7"	31
N	8	#3	2'-5"	7	12	#4	2'-5"	19
U1	4	#4	6'-9"	18	4	#4	6'-9"	18
U2	2	#4	6'-11"	9	2	#4	6'-11"	9
U3	2	#4	3'-2"	4	2	#4	3'-2"	4
U4	2	#4	5'-2"	7	2	#4	5'-2"	7
Y1	40	#4	7'-5"	198	50	#4	7'-5"	248
Y2	2	#4	7'-7"	10	2	#4	7'-7"	10
Y3	2	#4	3'-6"	5	2	#4	3'-6"	5
Y4	2	#4	5'-6"	7	2	#4	5'-6"	7

GENERAL NOTES:

Design: HS-20 Loading in accordance with A.A.S.H.T.O. 1977 Standard and interim revisions thereto.
All concrete for boxes shall be class "H".
All concrete for shear keys shall be class "C".
All reinf. steel for boxes shall be Gr. 60.
Chamfer all exposed edges ¾" unless noted otherwise.
See PB-RD sheet for details of shear keys, strand LL etc.
See PB-D-5 for details of reinf. steel in boxes.

DATE:

STATE OF TEXAS — CRAIG FELTS STONG — 54845 — REGISTERED PROFESSIONAL ENGINEER

CRAIG F. STONG, P.E.
DATE: 12/19/89

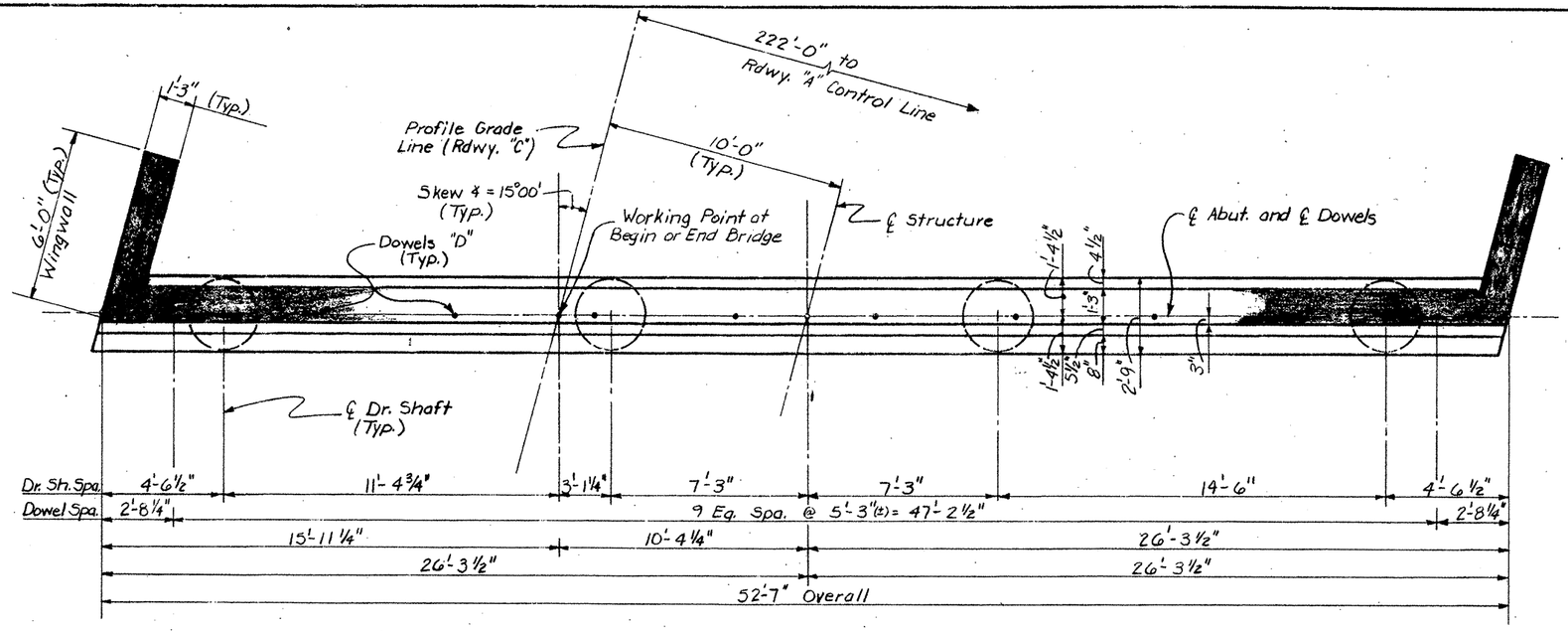
STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

P. C. BOX BEAM RDWY. PLAN, REINF. & QUANTITY TABLES

LOOP 1604 EASTBOUND FRTG. ROAD AT HUESTA CREEK

DN. CFS / CK. DN. SG	DRAWING ORIG.	DATE NOV. 1989	FED. ROAD DIV. NO. 6	STATE TEXAS	FEDERAL AID PROJECT NO.		SHEET NO. 168
DW. WJS / CK. DW. CFS	REV. 3-8-93 T202 RAIL (MOD)						
TR. / CK. TR.			STATE DIST. NO. 15	COUNTY BEXAR	CONTROL SEC. NO. 2452	SECTION NO. 02	JOB NO. 0823-L-D	HIGHWAY NO. 1604

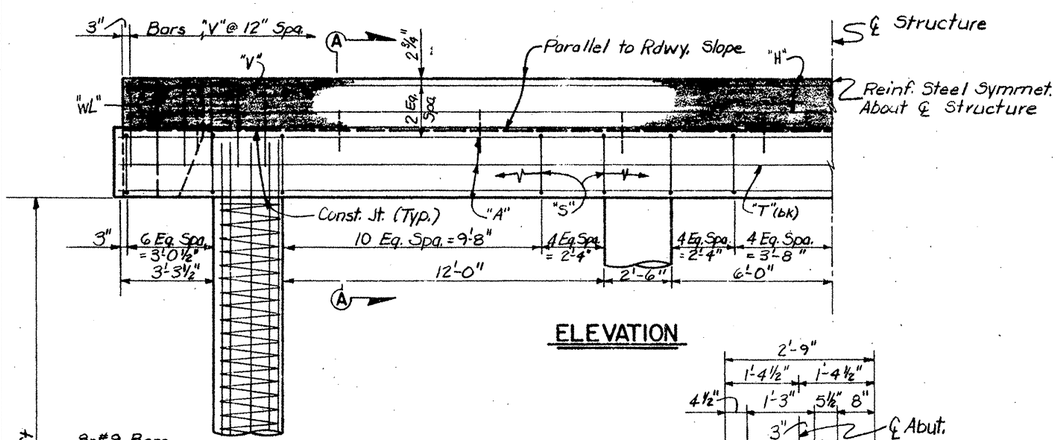
ETR



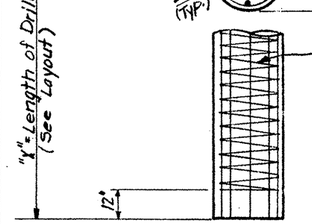
PLAN

(LOOKING STATIONWISE - ABUT. 4)
(LOOKING BACKSTATION - ABUT. 1)(SIMILAR TO ABOVE)

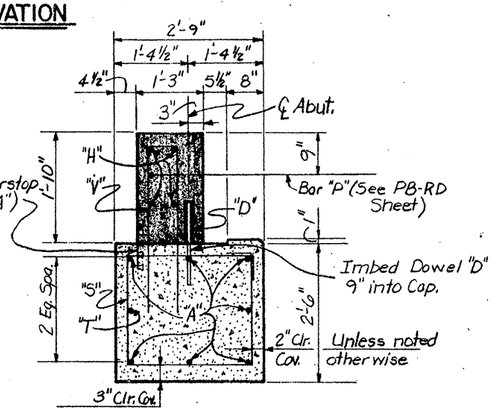
NOTE: Shaded areas indicate limits of concrete (Cl. C) to be placed after boxes are set in place.



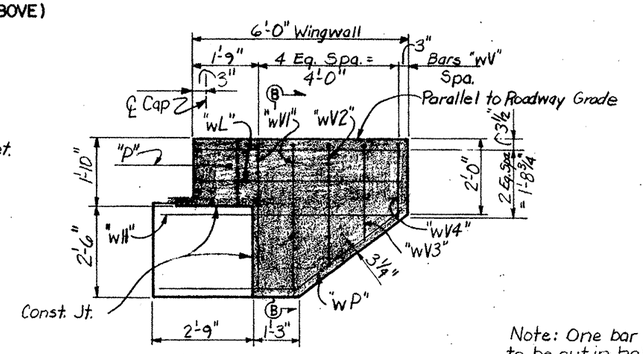
ELEVATION



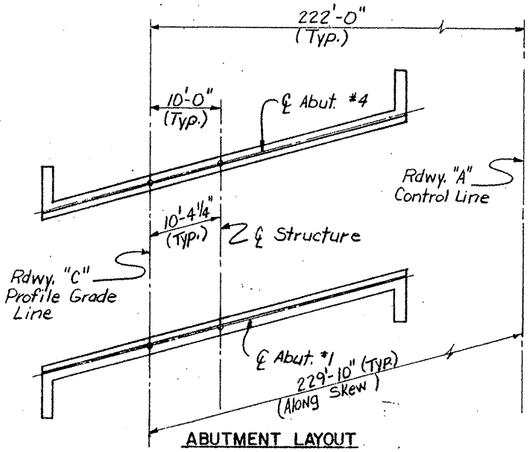
⊡ Included in Price Bid for Drilled Shafts.



SEC. A-A

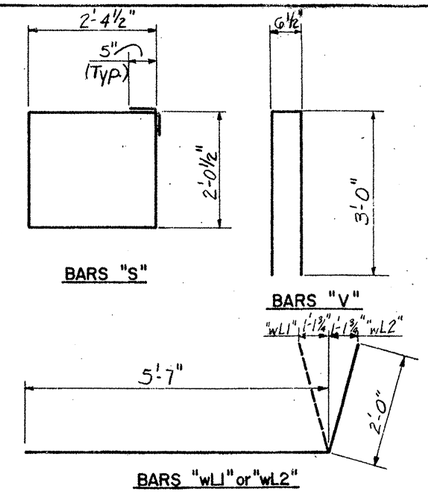


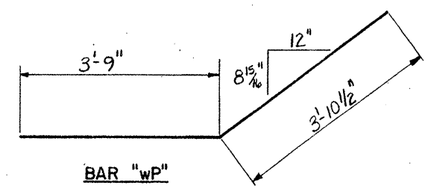
WINGWALL ELEVATION

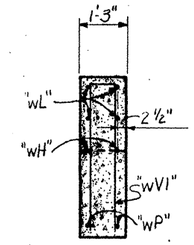


ABUTMENT LAYOUT

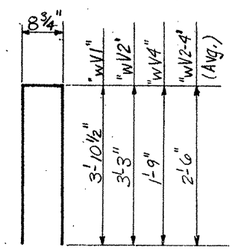
Note: One bar "P" to be cut in half for use on exterior boxes.



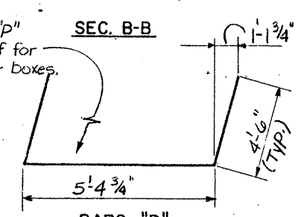




SEC. B-B



BARS "WV"



BARS "P"

ESTIMATED QUANTITY
(FOR ONE COMPLETE ABUTMENT)

BAR	NO.	SIZE	LENGTH	WEIGHT
A	7	#11	51'-7"	1918
D	10	#9	1'-6"	51
H	4	#5	52'-4"	218
P	9	#9	14'-5"	441
S	61	#5	9'-8"	615
T	1	#5	51'-7"	54
V	53	#4	6'-7"	233
wH	4	#6	6'-7"	40
wL1	4	#6	7'-7"	46
wL2	4	#6	7'-7"	46
wP	4	#4	7'-8"	20
wV1	4	#4	8'-6"	23
wV2-4	6	#4	▲ 5'-9"	23
REINF. STEEL			* LBS	3728
CL. C CONC. (Abut.)			C.Y.	19.6

* For Contractors Information Only.
▲ Average Length of bars.

GENERAL NOTES:

Design: HS-20 Loading in accordance with A.A.S.H.T.O. 1983 Standard Spec's and interim revisions thereto.
All concrete for Cap, Bkwall & Wings shall be Cl. C.
All reinf. steel for Cap, Bkwall & Wings shall be Gr. 60.
All concrete for Drilled Shafts shall be Cl. A. Design f'c = 1440 p.s.i. Avg. calc. load = 68 Tons/ft.
Chamfer all exposed edges ¾" unless otherwise noted.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

ABUTMENT DETAILS

ABUTMENT Nos. 1 & 4

LOOP 1604 EASTBOUND FRTG. ROAD AT HUESTA CREEK

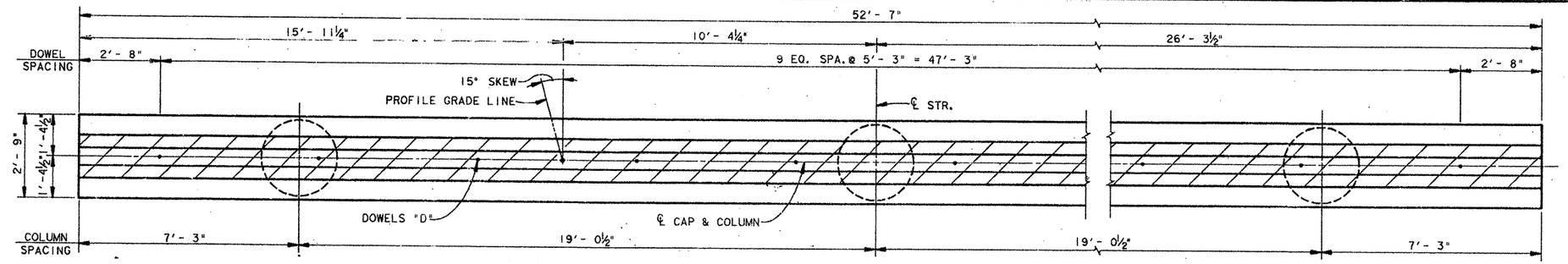
DATE:

STATE OF TEXAS — CRAIG E. STONG — 54845 — PROFESSIONAL ENGINEER

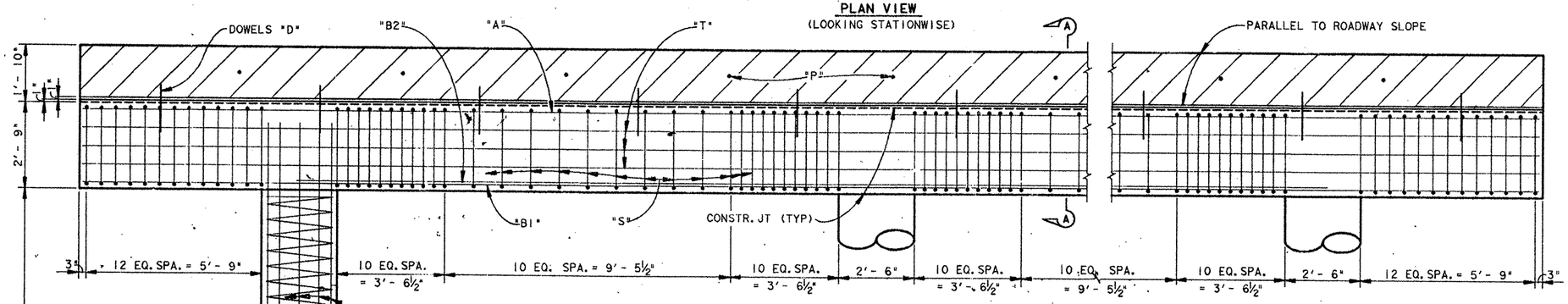
CRAIG E. STONG, P.E.
DATE: 12/9/89

Dn. CFS	Drawing ORIG	Date DEC 1989	Fed. Road Div. No. 6	State TEXAS	Federal Aid Project No.	Sheet No. 163
Ck. Dn. SG						
Dw. WJG						
Ck. Dw. CFS						
Tr.						
Ck. Tr.			15	County BEXAR		

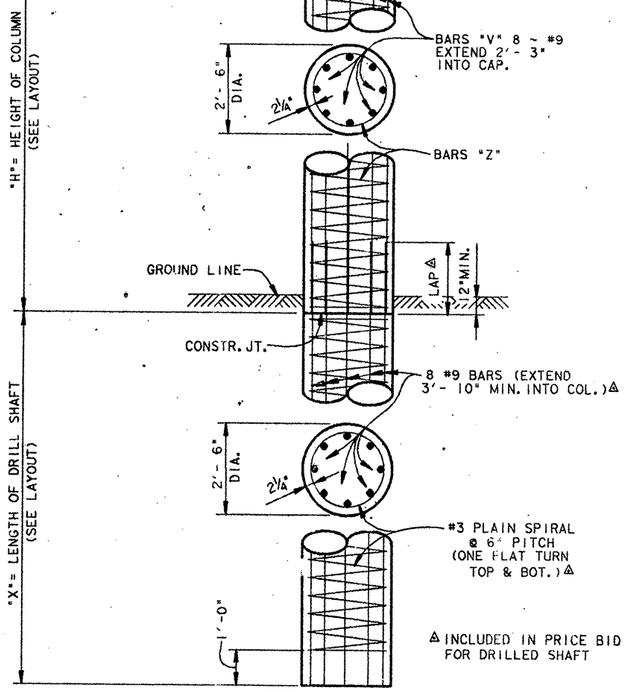
ETC.



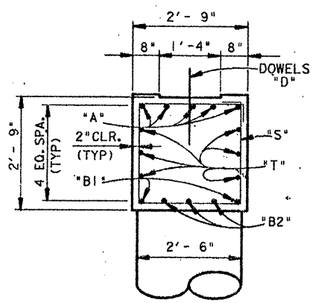
PLAN VIEW
(LOOKING STATIONWISE)



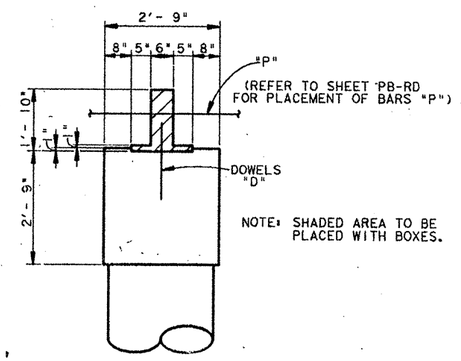
ELEVATION



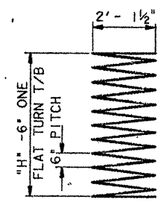
TYP. COL. & DR. SHAFT ELEV.



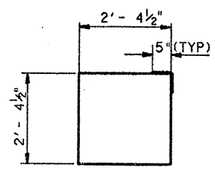
SEC. A-A



SECTION THRU BENT CAP



BARS "Z"



BARS "S"

ESTIMATED QUANTITIES
(FOR ONE INTERIOR BENT CAP)

BAR	NO.	SIZE	SPA.	LENGTH	WEIGHT
A	5	#11	SHN	52'-4"	1390
B1	2	#11	SHN	52'-4"	556
B2	3	#11	SHN	38'-1"	607
S	88	#5	SHN	10'-4"	948
T	6	#5	SHN	52'-4"	328
D	10	#9	SHN	1'-6"	51
P	9	#9	SHN	8'-6"	260
REINF. STEEL ✱				LBS.	4140
CL "C" CONC. (BENT)				C.Y.	17.0

✱FOR CONTRACTORS INFO ONLY

VARIABLE QUANTITIES
(FOR 3 - 30"Ø COLUMNS)

"H"	BARS "Z" 3 - #3		BARS "V" 24 ~ #9		REINF. STEEL✱	CONC. CL "C" (BENT)
BARS	LENGTH	WEIGHT	LENGTH	WEIGHT	LBS.	C.Y.
8	114	129	10'-3"	836	965	4.36
9	127	143	11'-3"	918	1061	4.91
10	141	159	12'-3"	1000	1159	5.46
11	154	174	13'-3"	1081	1255	6.00
12	167	188	14'-3"	1163	1351	6.55
13	181	204	15'-3"	1244	1448	7.09
14	194	219	16'-3"	1326	1545	7.64
15	207	233	17'-3"	1408	1641	8.18

GENERAL NOTES:

DESIGN: HS-20 LOADING IN ACCORDANCE WITH A.A.S.H.T.O. 1983 STANDARD SPEC'S. AND INTERIM REVISIONS THERETO.
ALL CONCRETE FOR CAP & COLUMNS SHALL BE CLASS "C"
ALL REINF. STEEL FOR CAP & COLUMNS SHALL BE GRADE 60
ALL CONCRETE FOR DRILLED SHAFTS SHALL BE CLASS "A".
DESIGN fc = 1440 P.S.I.
AVERAGE CALCULATED LOAD = 124 TONS/D.S.
CHAMFER ALL EXPOSED EDGES ¾" UNLESS NOTED OTHERWISE.

DATE:

STATE OF TEXAS
CRAIG FELIX STONG
64045
REGISTERED
PROFESSIONAL ENGINEER

Craig F. Stong
CRAIG F. STONG, P.E.
DATE: 12/9/89

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

INTERIOR BENT DETAILS

BENT NO. 2 & 3
LOOP 1604 AT HUESTA CREEK
EASTBOUND FRONTAGE RD.

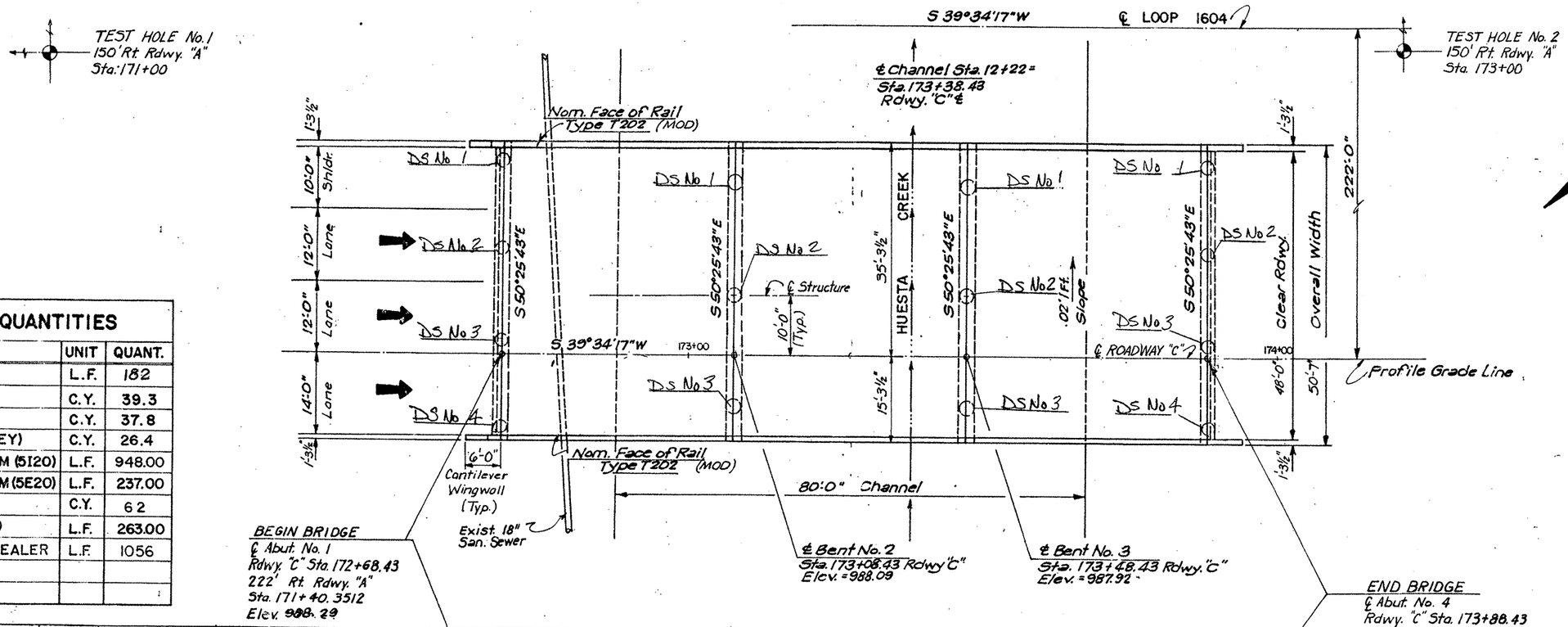
ORIGINAL DRAWING DATE: DEC. 1989

DN.: CFS	REVISIONS
CK.: SG	- -
DW.: MRM	- -
CK.: CFS	- -

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
15	6		170

COUNTY	CONTROL	SECTION	JOB	HIGHWAY
BEXAR	2452	02	023	L1604

FTC

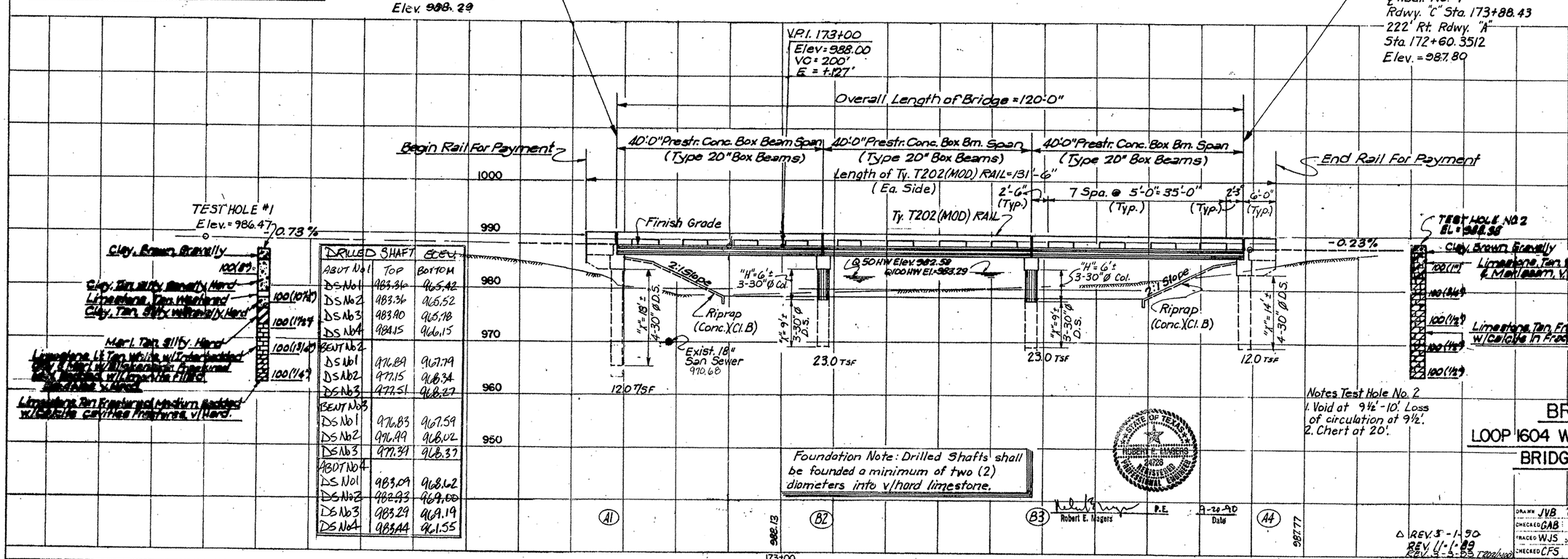


△ Revised Bent Stations 3-1-90 Craig F. Stong

CRAIG F. STONG, P.E.
DATE: 12/9/89

ESTIMATED QUANTITIES

ITEM	UNIT	QUANT.
DRILL SHAFT (30in)	L.F.	182
CL. C CONC. (BENT)	C.Y.	39.3
CL. C CONC. (ABUT)	C.Y.	37.8
CL. C CONC. (SHEAR KEY)	C.Y.	26.4
PRESTR. CONC. BOX BEAM (5I20)	L.F.	948.00
PRESTR. CONC. BOX BEAM (5E20)	L.F.	237.00
RIPRAP (Conc.)(Cl. B)	C.Y.	62
RAIL (Ty. T202) (MOD)	L.F.	263.00
BAT EXCLUDER JOINT SEALER	L.F.	1056



DRILLED SHAFT	ELEV. TOP	ELEV. BOTTOM
ABUT No 1	983.36	965.42
DS No 1	983.36	965.52
DS No 2	983.40	965.78
DS No 3	984.15	966.15
BENT No 2		
DS No 1	976.89	967.79
DS No 2	977.15	968.34
DS No 3	977.51	968.77
BENT No 3		
DS No 1	976.83	967.59
DS No 2	976.99	968.02
DS No 3	977.31	968.37
ABUT No 4		
DS No 1	983.09	968.62
DS No 2	~~982.93~~	~~969.00~~
DS No 3	983.29	969.19
DS No 4	983.44	969.55

Foundation Note: Drilled Shafts shall be founded a minimum of two (2) diameters into v/hard limestone.

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-28-90 Date

Notes Test Hole No. 2
1. Void at 9½'-10'. Loss of circulation at 9½'.
2. Chert at 20'.

△ REV. 3-1-90
REV. 11-1-89
REV. 5-5-88 (T202/MOD)

BRIDGE LAYOUT
LOOP 1604 WESTBOUND FRTG. RD.
BRIDGE AT HUESTA CREEK

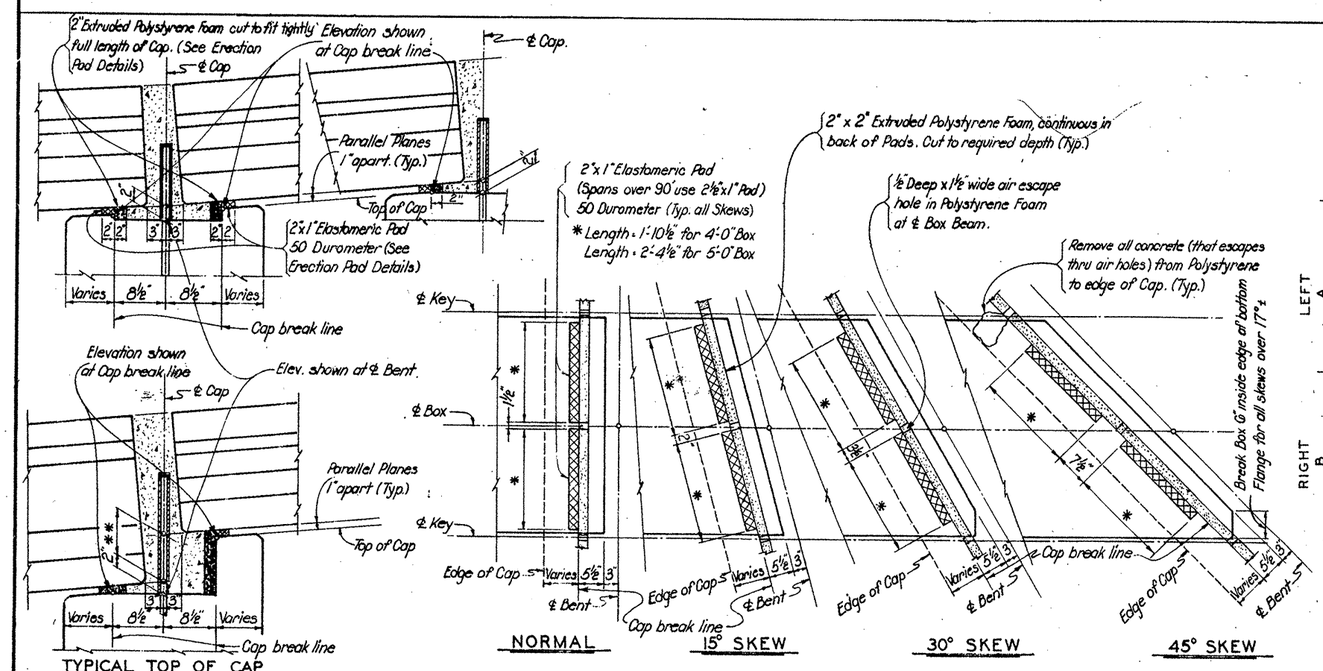
DRAWN JVB	FED. RD. DIV. NO.	STATE	PROJECT NO.	SHEET	OF SHEETS
CHECKED GAB	6	TEXAS			Lp 1604
TRACED WJS	STATE DIST. NO.	COUNTY			
CHECKED CFS	15	BEXAR	2452	02	023, 171 ETC.

△TOP OF CAP ELEVATIONS

STRUCTURE	BENT NO.	SKEW	DIMENSIONS A	B	C	D	E	F	ELEVATIONS IN FEET 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
LOOP 1604 AT HUESTA CREEK WESTBOUND FRONTAGE ROAD	A1		35'-3½"	15'-3½"										985.5852		986.2935		986.5969	985.6641		986.3721		986.6758						
	B2		35'-3½"	15'-3½"					985.4687		986.1768		986.4802	985.3818		986.0898		986.3933	985.4614		986.1697		986.4731						
	B3		35'-3½"	15'-3½"					985.3052		986.0132		986.3167	985.2190		985.9272		986.2307	985.2996		986.0076		986.3110						
	A4		35'-3½"	15'-3½"					985.1821		985.8904		986.1938	985.0969		985.8052		986.1086											

Slope = .02'/1

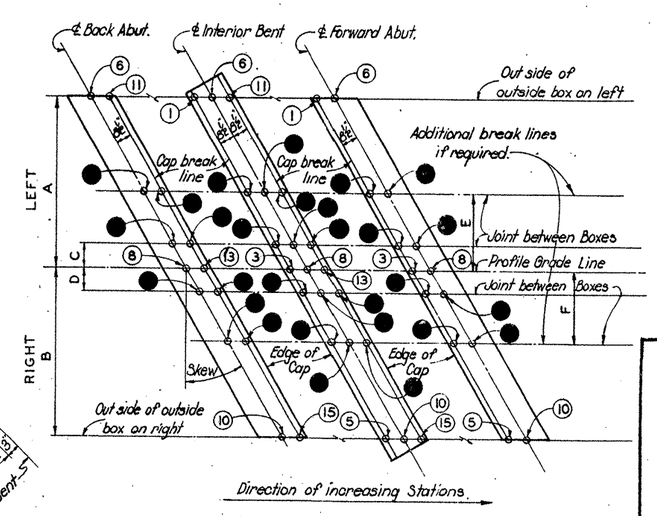
△ BEAM SLOPE ALONG RDWY. ALL BOXES
SPAN 1 = -.00508
SPAN 2 = -.00407
SPAN 3 = -.00305



TYPICAL TOP OF CAP VARIATIONS

** Difference in depth of Boxes

ERECTION PAD DETAILS



PART PLAN

Note: ℄ Cap and Cap break line to be a uniform slope between the elevation shown. That portion of adjacent bents from Cap break line to edge of Cap shall have the same slope and shall form a parallel plane to bottom of Box Beam approx. 1" below bottom of Box.

NOTES:

Revised Top of Cap Elev & Beam Slope For New Bent Sta.
3/90 Craig F. Stong

CRAIG F. STONG, P.E.
DATE: 13/4/89

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

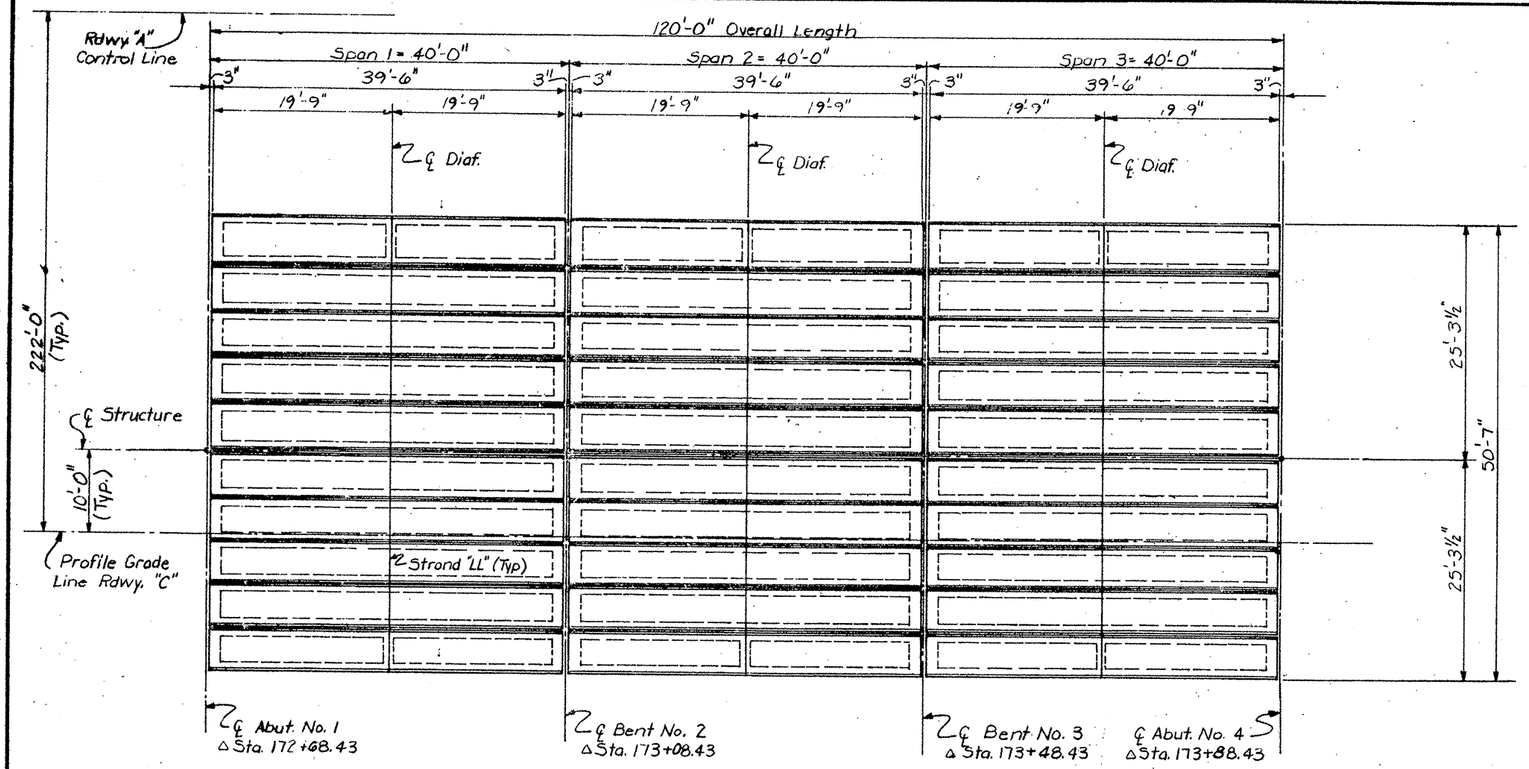
TOP OF CAP ELEVATIONS & ERECTION PAD DETAILS

PB-ED

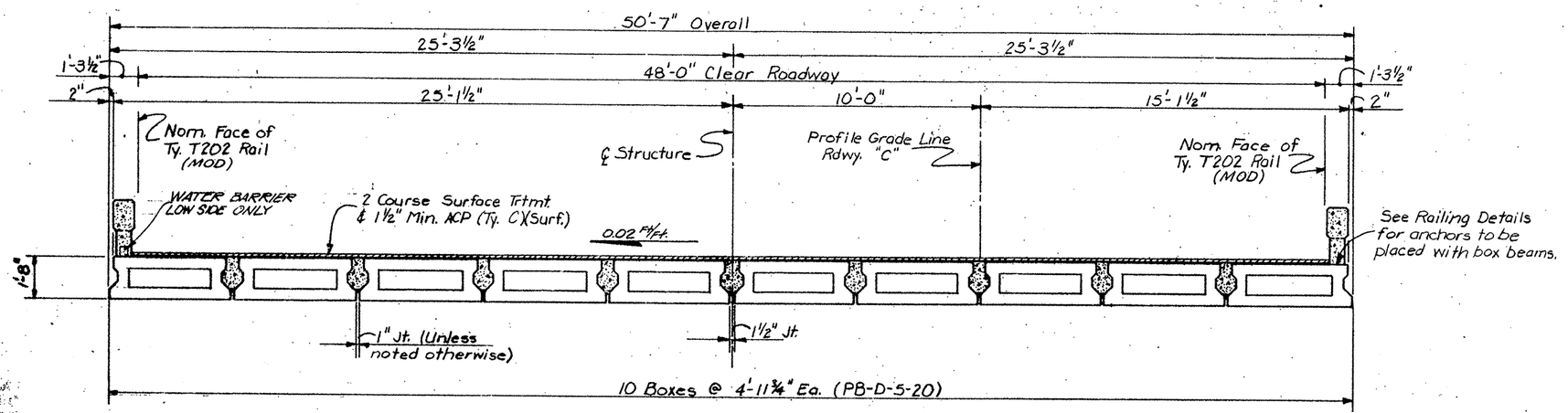
ORIGINAL DRAWING DATE: MAR. 1975	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.: CWC / CK.: Rev. 10-61 / DW.: AS / CK.: CWC — REVISIONS Rev. 3-1-90△	15	6		172
	COUNTY	CONTROL	SECTION	JOB
	BEXAR	2452	02	023

Lp1604

ETC



PLAN



TYPICAL SECTION

△ Revised Bent Stations 3/90 Craig F. Stong

40'-0" SPAN				
Bar	No.	Size	Lgth.	Wt.
A	37	#4	6'-10"	169
B	38	#4	4'-5"	112
C	38	#4	5'-5"	137
D1	4	#6	44'-2"	265
D2	4	#6	38'-11"	234
M1	2	#4	4'-6"	6
N	8	#3	2'-5"	7
U1	6	#4	6'-9"	27
Y1	43	#4	7'-5"	213

ESTIMATED QUANTITIES
(FOR ONE COMPLETE SPAN)

PRESTR. CONC. BOX BEAM (5120)	LF	316.00'
PRESTR. CONC. BOX BEAM (5E20)	LF	79.00'
CL. C CONC. (Shear Key)	CY	8.8
REINF. STEEL *	LBS	11,712
CL. H CONC. *	CY	76.2

* For Contractors Information Only.

TABLE OF ESTIMATED QUANTITIES
(For One Interior Box Beam Only)

BOX TYPE	LENGTH SPAN	LENGTH BOX	REINF. STEEL *	CL. "H" CONC. *	1/2" Ø S. R. STRANDS*
	LF	LF	LBS	CY	LBS
5I20	40'-0"	39.50'	1170	7.6	332

NOTE: Quantities shown are for one interior box without diaframs. For exterior box add .1 C.Y. Conc. and 6 lbs. reinforcing steel (4-#4 bars "E") per diafram.

GENERAL NOTES:

Design: HS-20 Loading in accordance with A.A.S.H.T.O. 1977 Standard Spec's and interim revisions thereto.
All concrete for boxes shall be class "H".
All concrete for shear keys shall be class "C".
Chamfer all exposed edges ¾" unless noted otherwise.
See PB-RD sheet for details of shear keys, strands LL, etc.
See PB-D-5-20 for details of reinforcing steel in boxes.
All reinf. steel for boxes shall be Gr. 60.

DATE:

STATE OF TEXAS — CRAIG FELTS STONG 54845 — REGISTERED PROFESSIONAL ENGINEER

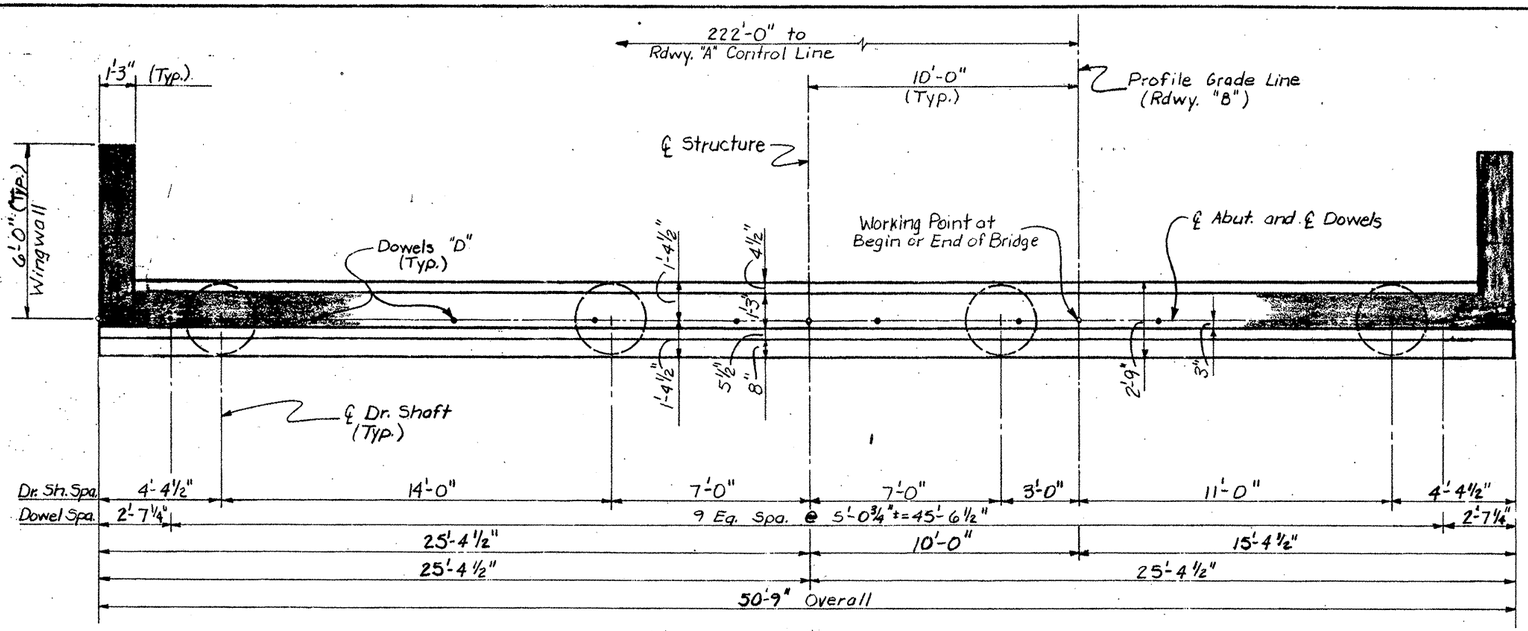
Craig F. Stong
CRAIG F. STONG, P.E.
DATE: 12/9/89

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

P.C. BOX BEAM RDWY. PLAN, REINF. & QUANTITY TABLES

LOOP 1604 WESTBOUND FRTG. ROAD AT HUESTA CREEK

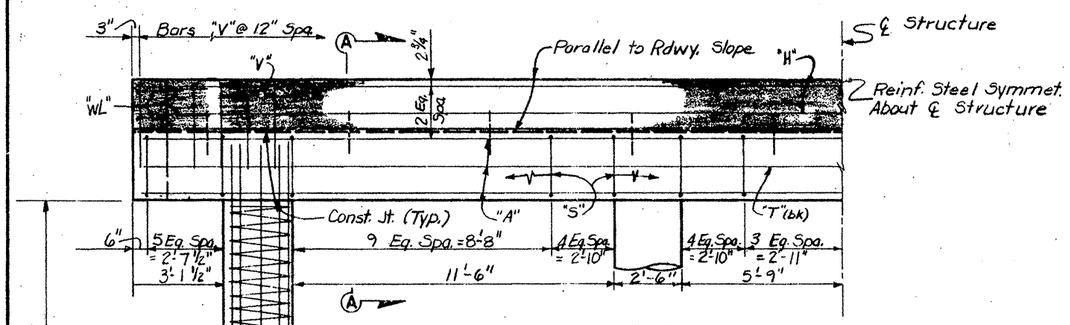
Dn. CFS	Drawing	Date	Fed. Road Div. No.	State	Federal Aid Project No.	Sheet No.
Ck. Dw. SG	ORIG.	NOV. 89	6	TEXAS		173
Dw. WJS	△ REV. 3-1-90		State Dist. No.	County	Control No. / Section No. / Job No. / Highway No.	
Ck. Dw. CFS	REV. 3-5-93 T202(MOD)		15	BEXAR	2453 / 02 / 023	Loop 1604



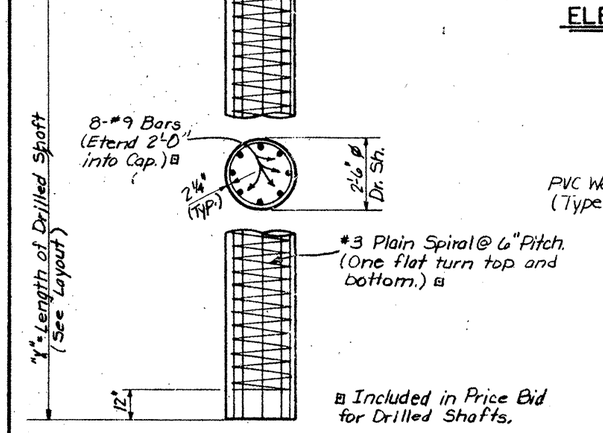
PLAN

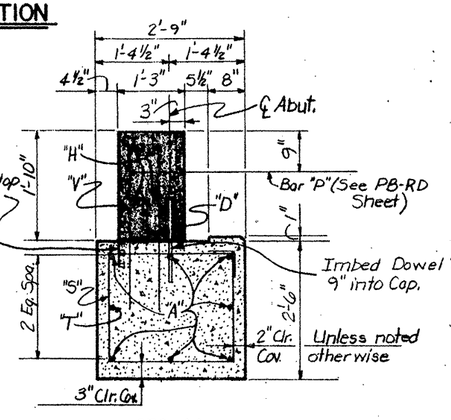
(LOOKING STATIONWISE - ABUT. 4)
(LOOKING BACKSTATION - ABUT. 1)(SIMILAR TO ABOVE)

NOTE: Shaded areas indicate limits of concrete (Cl. C) to be placed after boxes are set in place.

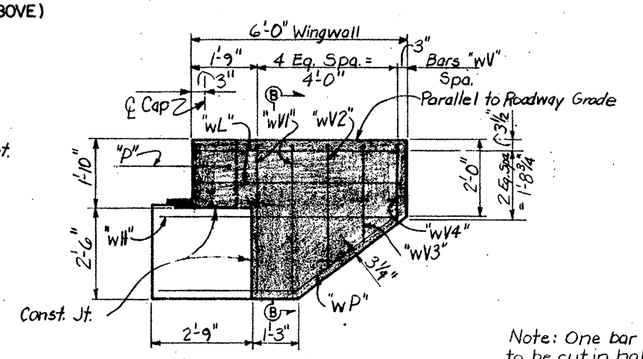


ELEVATION

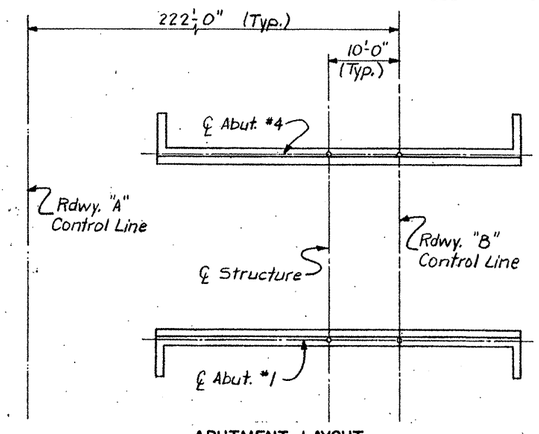




SEC. A-A

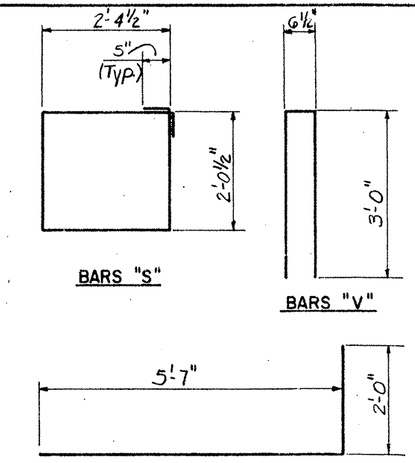


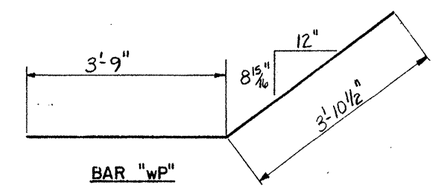
WINGWALL ELEVATION

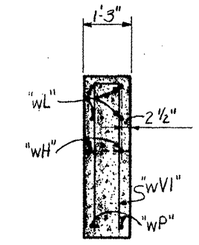


ABUTMENT LAYOUT

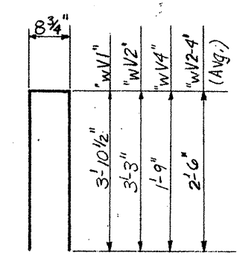
Note: One bar "P" to be cut in half for use on exterior boxes.



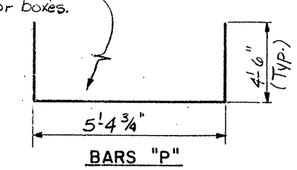




SEC. B-B



BARS "WV"



BARS "P"

ESTIMATED QUANTITY
(FOR ONE COMPLETE ABUTMENT)

BAR	NO.	SIZE	LENGTH	WEIGHT
A	7	#11	49'-9"	1850
D	10	#9	1'-6"	51
H	4	#5	50'-6"	211
P	9	#9	14'-5"	441
S	55	#5	9'-8"	555
T	1	#5	49'-9"	52
V	51	#4	6'-7"	224
WH	4	#6	6'-7"	40
WL	8	#6	7'-7"	91
WP	4	#4	7'-8"	20
WVI	4	#4	8'-6"	23
WV2-4	6	#4	Δ 5'-9"	23
REINF. STEEL			* LBS	3581
CL. C CONC. (Abut.)			C.Y.	18.9

* For Contractors Information Only.
Δ Average Length of bars.

GENERAL NOTES:

Design: HS-20 Loading in accordance with A.A.S.H.T.O. 1983 Standard Spec's and interim revisions thereto.
All concrete for Cap, Bkwall & Wings shall be Cl. C.
All reinf. steel for Cap, Bkwall & Wings shall be Gr. 60.
All concrete for Drilled Shafts shall be Cl. A.
Design f'c. = 1440 p.s.i. Avg. calc. load = 59 Tons/ft.
Chamfer all exposed edges ¾" unless otherwise noted.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

ABUTMENT DETAILS

ABUTMENT Nos. 1 & 4

LOOP 1604 WESTBOUND FRTG. ROAD
AT HUESTA CREEK

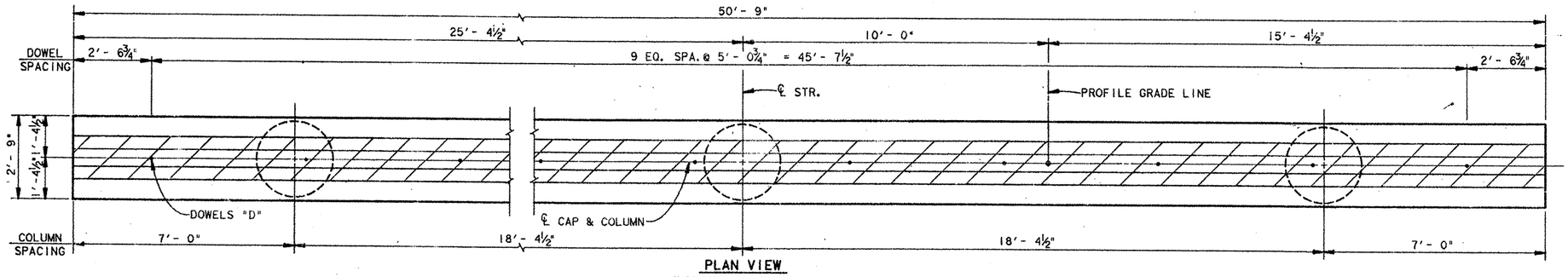
DATE:

STATE OF TEXAS — CRAIG F. STONG — REGISTERED PROFESSIONAL ENGINEER

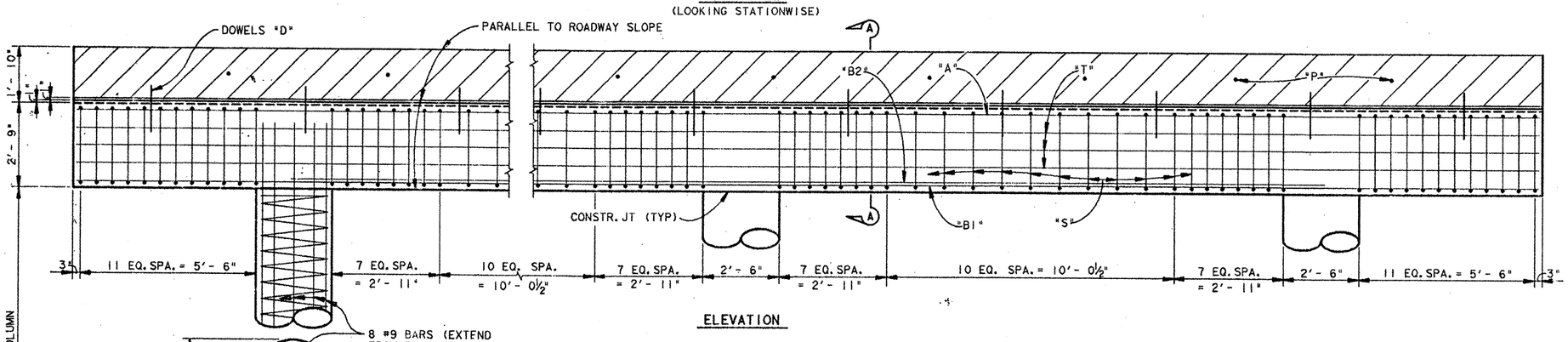
CRAIG F. STONG, P.E.
DATE: 12/9/89

Dn. - CFS	Drawing	Date	Fed. Road Div. No.	State	Federal Aid Project No.		Sheet No.
Ck. Dim. - SG	ORIG	DEC 1989	6	TEXAS	[illegible]		174
Dw. - WJS			District	County	Sec.	No.	Sheet No.
Ck. Dw. - CFS			15	BEXAR	2.4.5.12	0.13	[illegible]
Tr. -							
Ck. Tr. -							

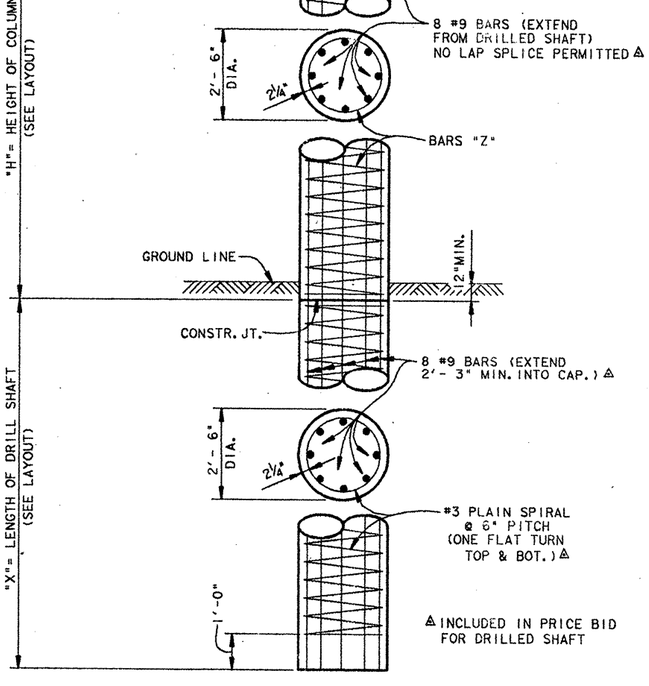
ETC.



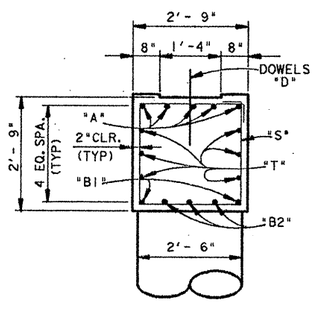
PLAN VIEW
(LOOKING STATIONWISE)



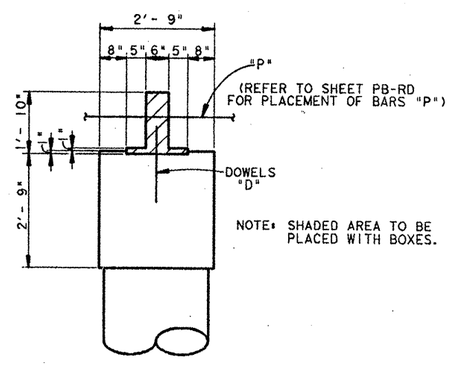
ELEVATION



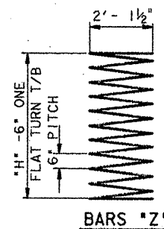
TYP. COL. & DR. SHAFT ELEV.



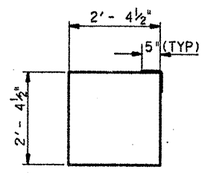
SEC. A-A



SECTION THRU BENT CAP



BARS "Z"



BARS "S"

ESTIMATED QUANTITIES
(FOR ONE INTERIOR BENT CAP)

BAR	NO.	SIZE	SPA.	LENGTH	WEIGHT
A	5	#11	SHN	50'-6"	1342
B1	2	#11	SHN	50'-6"	537
B2	3	#11	SHN	36'-9"	586
S	74	#5	SHN	10'-4"	798
T	6	#5	SHN	50'-6"	316
D	10	#9	SHN	1'-6"	51
P	9	#9	SHN	8'-6"	260
REINF. STEEL *				LBS.	3890
CL "C" CONC. (BENT)				C.Y.	16.4

*FOR CONTRACTORS INFO ONLY

VARIABLE QUANTITIES
(FOR 3 - 30"Ø COLUMNS)

"H"	BARS "Z" 3 - #3		REINF. STEEL*	CONC. CL "C" (BENT)
BARS	LENGTH	WEIGHT	LBS.	C.Y.
4	60	68	68	2.18
5	74	83	83	2.73
6	87	98	98	3.27
7	100	113	113	3.82
8	114	129	129	4.36
9	127	143	143	4.91

GENERAL NOTES:

DESIGN: HS-20 LOADING IN ACCORDANCE WITH A.A.S.H.T.O. 1983 STANDARD SPEC'S AND INTERIM REVISIONS THERETO.
ALL CONCRETE FOR CAP & COLUMNS SHALL BE CLASS "C"
ALL REINF. STEEL FOR CAP & COLUMNS SHALL BE GRADE 60
ALL CONCRETE FOR DRILLED SHAFTS SHALL BE CLASS "A".
DESIGN fc = 1440 P.S.I.
AVERAGE CALCULATED LOAD = 113 TONS/D.S.
CHAMFER ALL EXPOSED EDGES ¾" UNLESS NOTED OTHERWISE.

DATE:

STATE OF TEXAS
CRAIG FELTS STONG
54045
REGISTERED
PROFESSIONAL ENGINEER

Craig F. Stong
CRAIG F. STONG P.E.
DATE: 12/9/89

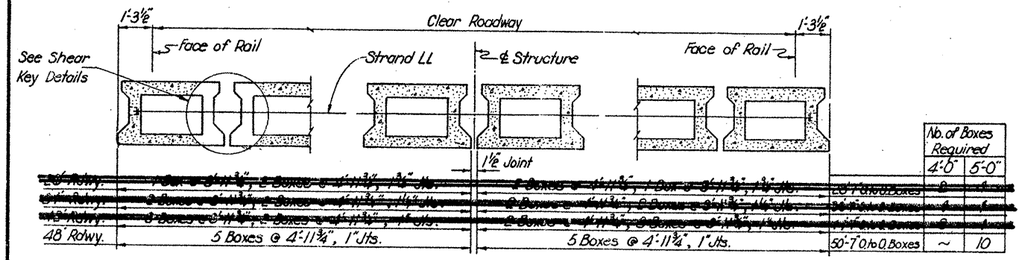
STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

INTERIOR BENT DETAILS

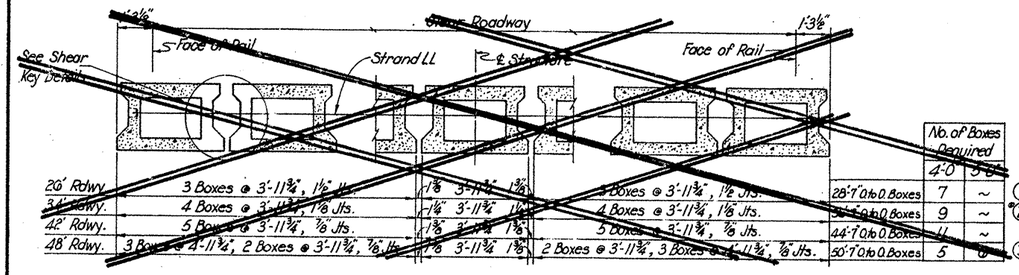
BENT NO. 2 & 3
LOOP 1604 AT HUESTA CREEK
WESTBOUND FRONTAGE RD.

ORIGINAL DRAWING DATE: DEC. 1989		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #			SHEET
DN.: CFS	REVISIONS	15	6				175
CK.: KK	- -	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DW.: MRM	- -	BEXAR		2452	02	023	L1604
CK.: CFS	- -						

ETC

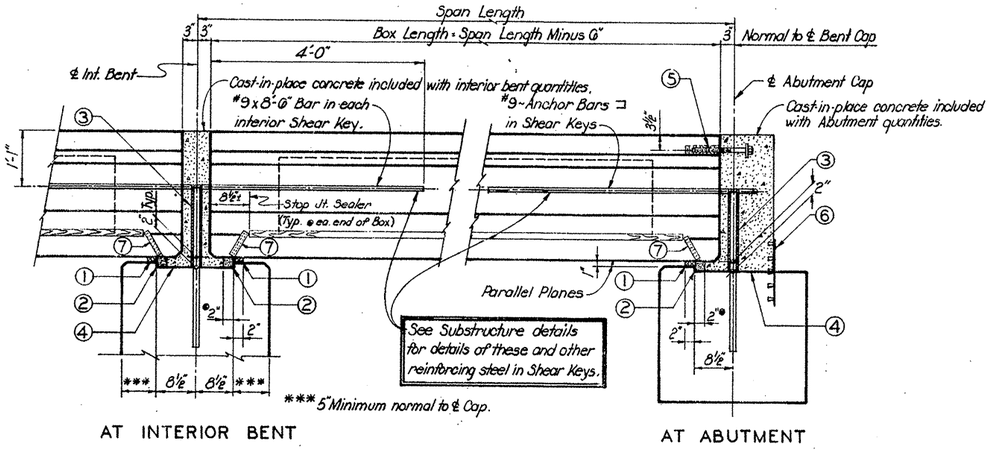


ROADWAYS WITH JOINT ON ℄ STRUCTURE



~~ROADWAYS WITH NO JOINT ON ℄ STRUCTURE~~

ROADWAY CROSS SECTION DETAILS



AT INTERIOR BENT

AT ABUTMENT

BOX BEAM ELEVATION

① 2"x1"x1'-10½"* Elastomeric Pad (50 Durometer)
② 2"x2" Extruded Polystyrene Foam, continuous full Length of cap. (Cut to tight fit.) Provide ½" deep x 1½" wide air holes at ℄ of Beams.
③ 1¼" I.D. x ⅜" wall thickness Neoprene tube (Closed cell) over #9 Dowel bar. Bond to bar not required. (Close top)

* 2"x1"x2'-4½" Elastomeric Pad for 5'-0" wide Boxes. For Spans over 90' use 2½"x1" Pad.

** Minimum 1.7#/cu. ft. Density. Avg. compressive strength of 40#/□" (Density and compressive strength are approx. values only.)

④ Paint top of Cap with heavy coat of asphalt to break bond.
⑤ Structural concrete insert for ⅞"ϕ bolt. (Minimum pullout strength = 15,000 p.s.i.)
⑥ P.V.C. Waterstop Type A. (Notch as required to clear Cap steel.)
⑦ 1" Thick Extruded Polystyrene Foam between each Box Beam.

Notes:
Reinforcing steel and transverse key concrete are included in substructure quantities.
For other bearing seat details see sheet PB-ED

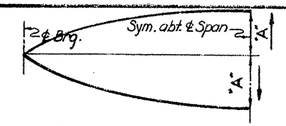
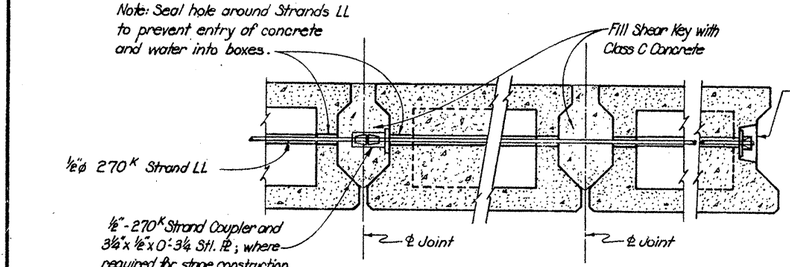
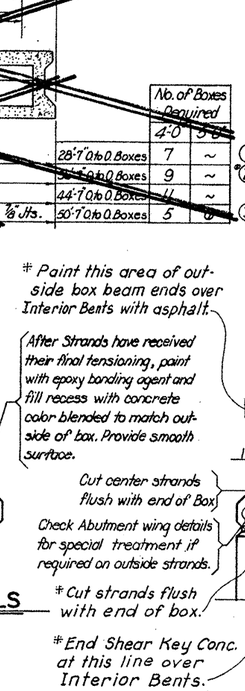


TABLE OF CAMBER & DEFLECTIONS
(DIMENSION "A" IN FEET)

	SPAN	INITIAL CAMBER ↑	DEAD LOAD KEYS ↓	DEAD LOAD WEARING SURF ↓	SUMMATION ↑
4120	~~40'-0"~~	~~0.058~~	~~0.003~~	~~0.003~~	~~0.052~~
	~~45'-0"~~	~~0.085~~	~~0.004~~	~~0.004~~	~~0.077~~
	~~50'-0"~~	~~0.115~~	~~0.006~~	~~0.006~~	~~0.103~~
	~~55'-0"~~	~~0.143~~	~~0.008~~	~~0.008~~	~~0.127~~
	~~60'-0"~~	~~0.189~~	~~0.013~~	~~0.013~~	~~0.163~~
5120	40'-0"	0.051	0.002	0.003	0.046
	~~45'-0"~~	~~0.078~~	~~0.003~~	~~0.004~~	~~0.071~~
	50'-0"	0.110	0.005	0.006	0.099
	~~55'-0"~~	~~0.145~~	~~0.008~~	~~0.009~~	~~0.128~~
	~~60'-0"~~	~~0.192~~	~~0.012~~	~~0.012~~	~~0.168~~
4128	~~40'-0"~~	~~0.035~~	~~0.003~~	~~0.001~~	~~0.032~~
	~~45'-0"~~	~~0.036~~	~~0.003~~	~~0.002~~	~~0.031~~
	~~50'-0"~~	~~0.049~~	~~0.005~~	~~0.002~~	~~0.042~~
	~~55'-0"~~	~~0.072~~	~~0.008~~	~~0.004~~	~~0.060~~
	~~60'-0"~~	~~0.097~~	~~0.011~~	~~0.005~~	~~0.081~~
	~~65'-0"~~	~~0.116~~	~~0.015~~	~~0.007~~	~~0.094~~
	~~70'-0"~~	~~0.154~~	~~0.021~~	~~0.009~~	~~0.124~~
	~~75'-0"~~	~~0.186~~	~~0.027~~	~~0.012~~	~~0.147~~
	~~80'-0"~~	~~0.200~~	~~0.036~~	~~0.016~~	~~0.157~~
5128	~~40'-0"~~	~~0.035~~	~~0.003~~	~~0.001~~	~~0.032~~
	~~45'-0"~~	~~0.035~~	~~0.003~~	~~0.002~~	~~0.030~~
	~~60'-0"~~	~~0.052~~	~~0.004~~	~~0.002~~	~~0.047~~
	~~55'-0"~~	~~0.070~~	~~0.006~~	~~0.004~~	~~0.060~~
	~~60'-0"~~	~~0.094~~	~~0.009~~	~~0.005~~	~~0.080~~
	~~65'-0"~~	~~0.115~~	~~0.012~~	~~0.007~~	~~0.096~~
	~~70'-0"~~	~~0.143~~	~~0.017~~	~~0.010~~	~~0.122~~
	~~75'-0"~~	~~0.173~~	~~0.022~~	~~0.013~~	~~0.141~~
	~~80'-0"~~	~~0.213~~	~~0.028~~	~~0.016~~	~~0.169~~
4134	~~70'-0"~~	~~0.105~~	~~0.012~~	~~0.006~~	~~0.087~~
	~~75'-0"~~	~~0.117~~	~~0.016~~	~~0.007~~	~~0.094~~
	~~80'-0"~~	~~0.143~~	~~0.021~~	~~0.009~~	~~0.113~~
	~~85'-0"~~	~~0.166~~	~~0.027~~	~~0.012~~	~~0.127~~
	~~90'-0"~~	~~0.182~~	~~0.034~~	~~0.015~~	~~0.133~~
	~~95'-0"~~	~~0.203~~	~~0.042~~	~~0.018~~	~~0.142~~
	~~100'-0"~~	~~0.207~~	~~0.052~~	~~0.024~~	~~0.131~~
5134	~~70'-0"~~	~~0.090~~	~~0.018~~	~~0.006~~	~~0.074~~
	~~75'-0"~~	~~0.118~~	~~0.015~~	~~0.008~~	~~0.097~~
	~~80'-0"~~	~~0.142~~	~~0.017~~	~~0.010~~	~~0.115~~
	~~85'-0"~~	~~0.162~~	~~0.022~~	~~0.013~~	~~0.127~~
	~~90'-0"~~	~~0.178~~	~~0.028~~	~~0.016~~	~~0.134~~
	~~95'-0"~~	~~0.198~~	~~0.034~~	~~0.020~~	~~0.144~~
	~~100'-0"~~	~~0.205~~	~~0.042~~	~~0.024~~	~~0.139~~

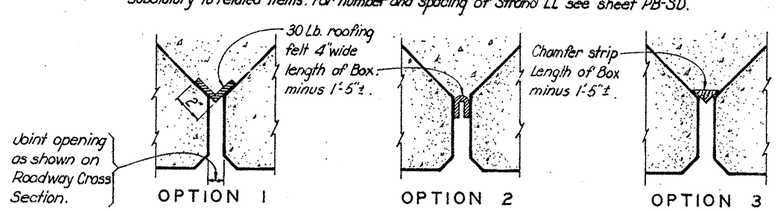


SHEAR KEY & STRAND LL DETAILS



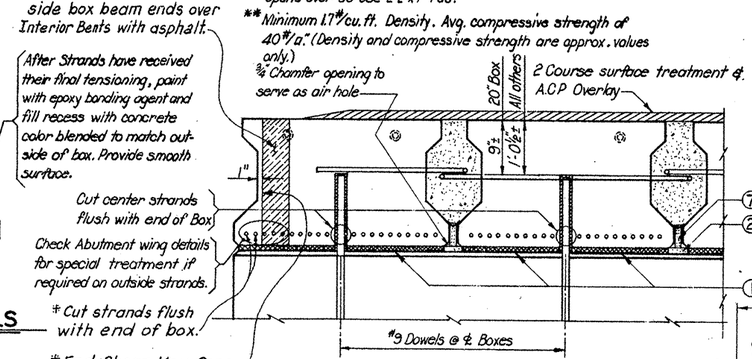
STRANDS LL

Note: Strand shall be coated to break bond with shear key concrete and to prevent corrosion. Before shear key concrete is poured, strand shall be tensioned sufficiently to make taut. After shear key concrete has reached a minimum age of 3 days, strand shall be tensioned to 28.9 Kips.
No direct payment shall be made for furnishing and installing Strands LL. Cost to be considered as subsidiary to related items. For number and spacing of Strand LL see sheet PB-SD.

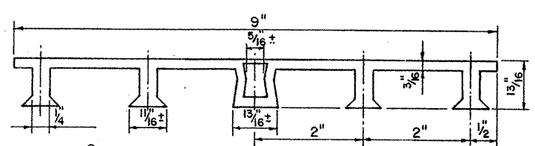


JOINT DETAILS

Other type Joint sealer may be used if approved by the Engineer

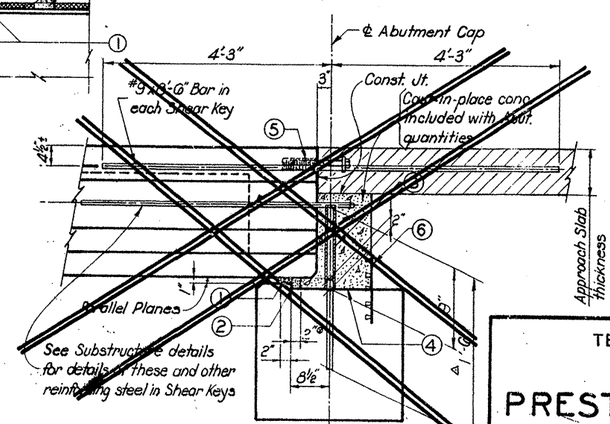


BOX END DETAILS



℄ PVC WATERSTOP TYPE "A"

NOTE: Dimensions and shapes of Waterstop may vary slightly depending on Manufacturer.



~~ELEVATION AT ABUTMENT WITH APPROACH SLAB~~

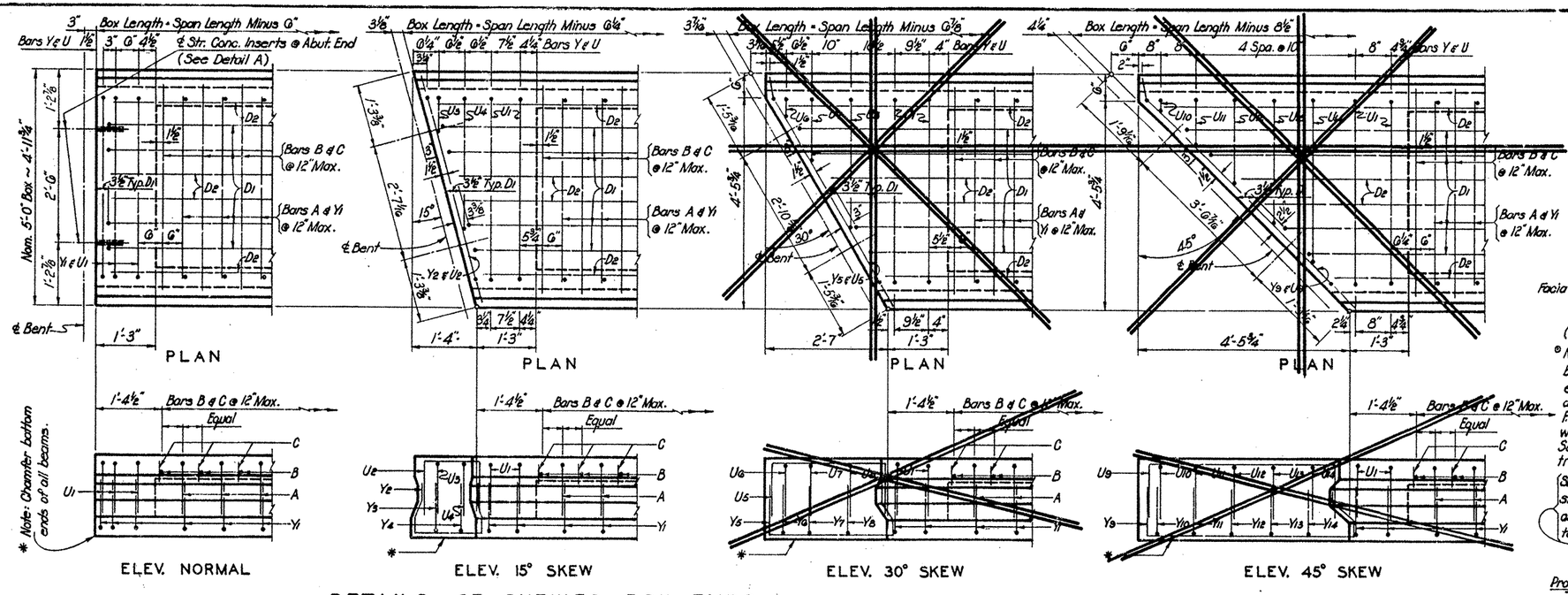
TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

PRESTRESSED CONCRETE BOX BEAM DETAILS

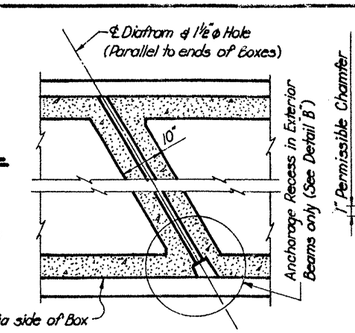
PB-RD

ORIGINAL DRAWING DATE: MAR. 1975		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
DN.:-CWC	REVISIONS	15	6				176
CK.:-	△ Rev. 8-76 Rev. 10-81 ⊕ Rev. 1-85	COUNTY		CONTROL	SECTION	JOB	
DW.:-AS	5-77 Rev. Camber ± 10-82	BEXAR		2452	02	023	
CK.:-CWC	Rev. 2-80 ⊖						

ETC.



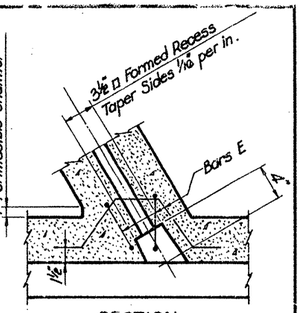
DETAILS OF SKEWED BOX ENDS



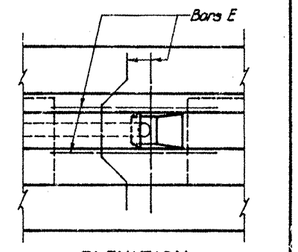
PLAN OF DIAFRAMS
(Shown for 30° skew ~ other skews similar)

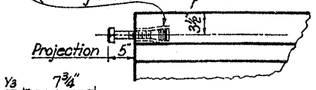
⊕ Note: 10" Diaframs are required only in exterior beams and in interior beams that will serve as exterior beams during stage construction. If diaframs are omitted from interior beams, 1½" ϕ P.V.C. pipe shall be used to form the holes in the webs and shell be continuous through the void. See Bridge Plan for number and spacing of transverse strands.

Struct. Conc. Insert and ⅞" ϕ bolt. Minimum pull out strength = 7000#. Type insert shall be as shown and approved on the shop drawings. Acceptance testing will not be required.



Note: In lieu of using formed recess commercial anchorage devices for ½" strand may be cast in beam.

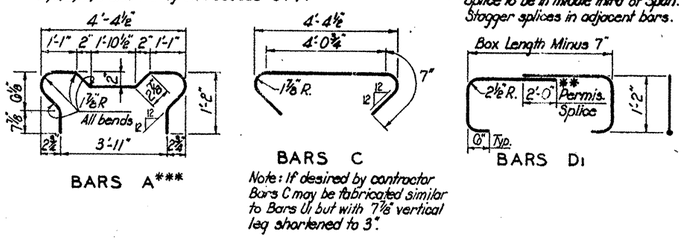




DETAIL "A"

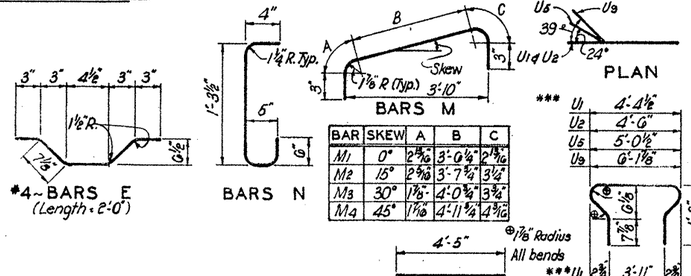
DETAIL "B"

Note: If required for clearance, radius on #4 Bars A, C, E, M, U and Y may be reduced to 1¼".



** Splice to be in middle third of Span. Stagger splices in adjacent bars.

Note: If desired by contractor Bars C may be fabricated similar to Bars U1 but with 7⅞" vertical leg shortened to 3".



BAR	SKEW	A	B	C
M1	0°	2 5/16"	3'-0 1/4"	2 15/16"
M2	15°	2 5/16"	3'-7 3/4"	3 1/4"
M3	30°	1 7/8"	4'-0 3/4"	3 3/4"
M4	45°	1 7/8"	4'-11 1/4"	4 3/16"

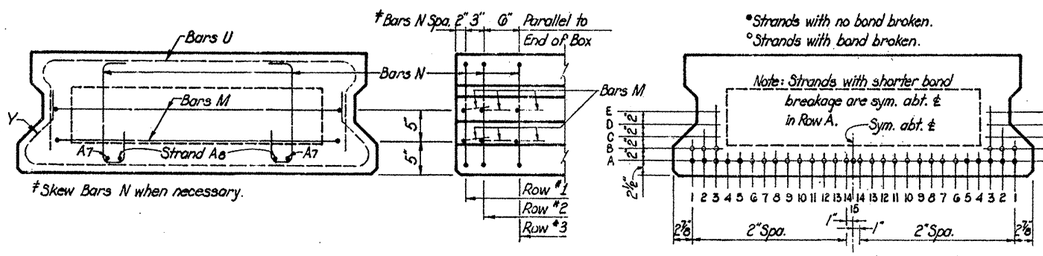
Note: Extend strands 6" past ends of beams at abutments, except at wingwalls cut flush with beam. Strands may extend a maximum of 2" at interior bents. Epoxy coating of strands will not be required in either case.

END MAT REINFORCING						
SPAN	ROW #1		ROW #2		ROW #3	
	M	N	M	N	M	N
40'-0"	1~#4	2~#3	—	2~#3	—	—
45'-0"	2~#4	2~#4	1~#4	2~#4	—	2~#4
50'-0"	2~#4	2~#4	2~#4	2~#4	1~#4	2~#4
55'-0"	2~#4	2~#4	2~#4	2~#4	2~#4	2~#4
60'-0"	2~#4	2~#4	2~#4	2~#4	2~#4	2~#4

STRAND PATTERNS				
No. ½"ϕ Strands	Bond Breakage	Location of Strand	Conc. Strength @ Release	Conc. Strength @ 28 days
16	4ê2', 2ê4'	A1 thru A4, A6, A8, A10, A12	4000	5000
20	6ê2', 4ê4'	A1 thru A8, A10, A12	4000	5000
24	6ê2', 8ê4'	A1 thru A12	4000	5000
28	8ê2', 6ê4', 4ê6'	A1 thru A14	4000	5000
34	8ê2', 8ê4', 2ê6, 6ê6'	A1 thru A14 ; B1 thru B3	4850	5650

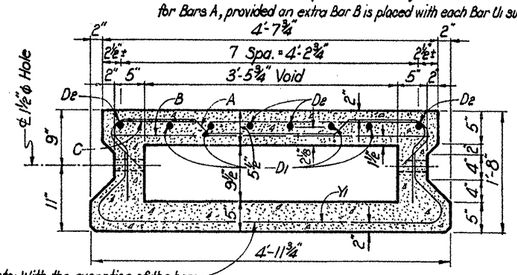
Note: Letter over "ê" symbol indicates row location of strands.

*** Note: At contractor's option, Bars U1 may be substituted for Bars A, provided an extra Bar B is placed with each Bar U1 substituted.



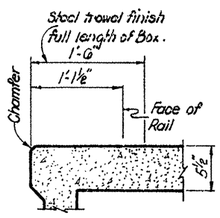
• Strands with no bond broken.
° Strands with bond broken.

Note: Strands with shorter bond breakage are sym. abt. ℄ in Row A.



Note: With the exception of the bars in the end block, Bars Y may be spliced with a 1'-3" lap in bottom slab.

SECTION



RAIL ANCHORAGE

Note: See Railing Details for anchorage devices to be cast in exterior box beams. Omit steel trowel finish if parapet type rail is used.

END MAT REINFORCEMENT & STRAND PATTERNS

GENERAL NOTES:

Box Beam design is adequate for HS-20 Loading. The same design is intended for use in H-15 structures.

The Prestressed Box Beam Fabricator shall prepare and submit for approval shop drawings for the structure sufficient in detail to enable correct fabrication and inspection with out reference to this sheet.

The bottom corners of all beams shall be chamfered ¾" or rounded to a ¾" radius. Tops of all boxes shall have a rough wood float finish, except that the portion under railing on exterior boxes shall have a smooth steel trowel finish.

Boxes shall be supported by the solid end block area during handling, storage, hauling and erection.

All reinforcing steel to be grade 60.

The stressing procedure will be such that no cracks will develop during manufacture of the beam. In general, cracking will be anticipated whenever the calculated tensile stress at any stage exceeds 500 p.s.i.

All Prestressing strand to be ½"ϕ 270ᵏ, initial pretension = 28.9 kips.

All concrete to be Class H. Strength to be as shown in table at left.

If cardboard forms are used for voids, they shall be waterproofed.

Strands with bond breakage shall be tightly wrapped with a waterproof adhesive tape or plastic tubing may be used provided both ends and the seam of the tube are sealed with a waterproof tape.

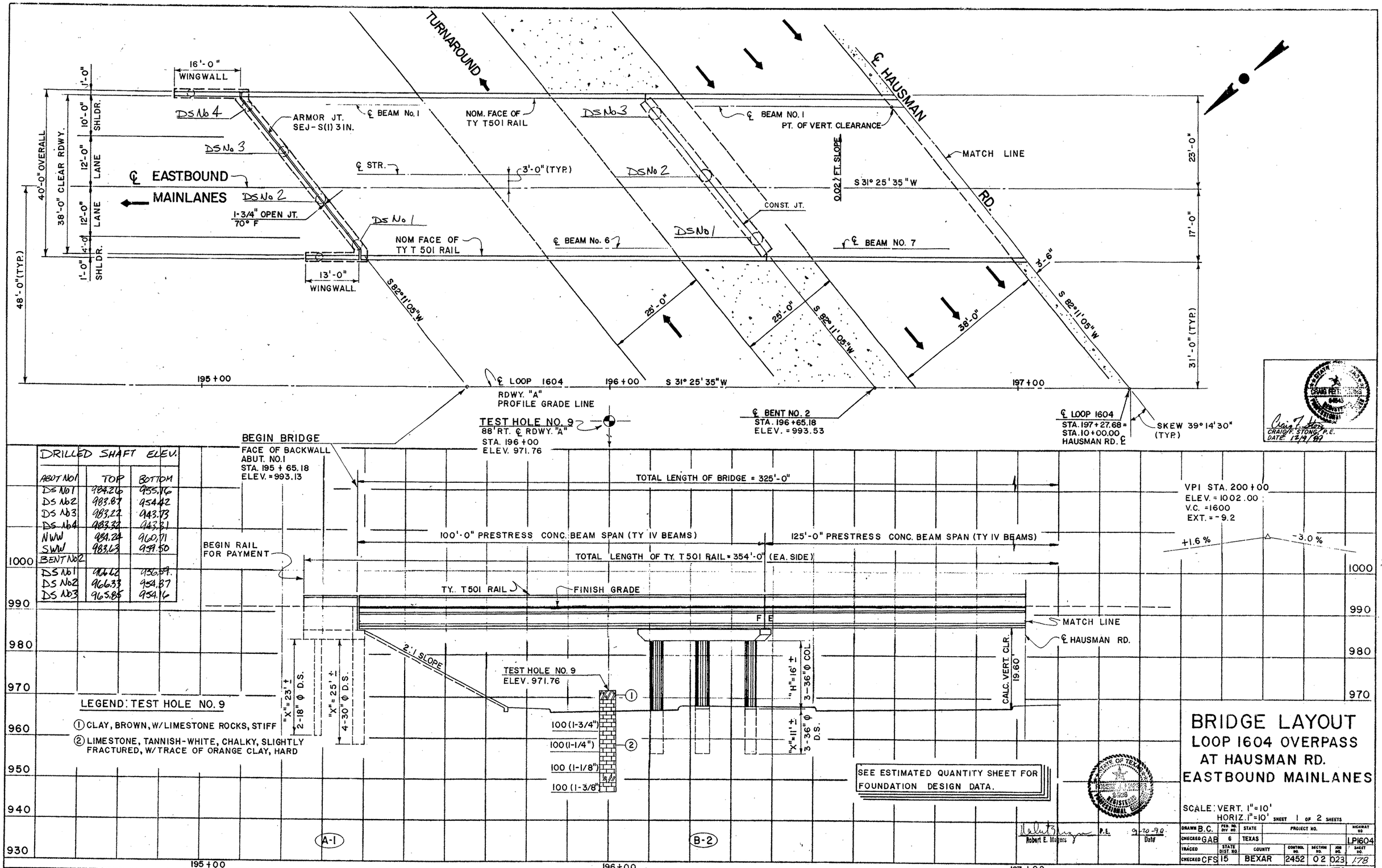
TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

PRESTRESSED CONCRETE BOX BEAMS

PB-D-5-20

ORIGINAL DRAWING DATE: MAR. 1975		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
DN.:-CWC	REVISIONS	15	6			177
CK.:-	8-76 Rev. Bar details	COUNTY		CONTROL	SECTION	JOB
DW.:-AS	⊕ Rev. 10-85	BEXAR		2452	02	023
CK.:-CWC						

ETC.



DRILLED SHAFT ELEV.		
ABUT No 1	TOP	BOTTOM
DS No 1	984.26	955.16
DS No 2	983.87	954.42
DS No 3	983.22	943.73
DS No 4	983.32	943.31
NWW	984.24	960.71
SWW	983.63	959.50
BENT No 2		
DS No 1	966.62	956.59
DS No 2	966.33	954.87
DS No 3	965.85	954.16

LEGEND: TEST HOLE NO. 9

① CLAY, BROWN, W/LIMESTONE ROCKS, STIFF

② LIMESTONE, TANNISH-WHITE, CHALKY, SLIGHTLY FRACTURED, W/TRACE OF ORANGE CLAY, HARD

SEE ESTIMATED QUANTITY SHEET FOR FOUNDATION DESIGN DATA.

Robert E. Mayers P.E. 9-20-90 Date

BRIDGE LAYOUT
LOOP 1604 OVERPASS AT HAUSMAN RD. EASTBOUND MAINLANES

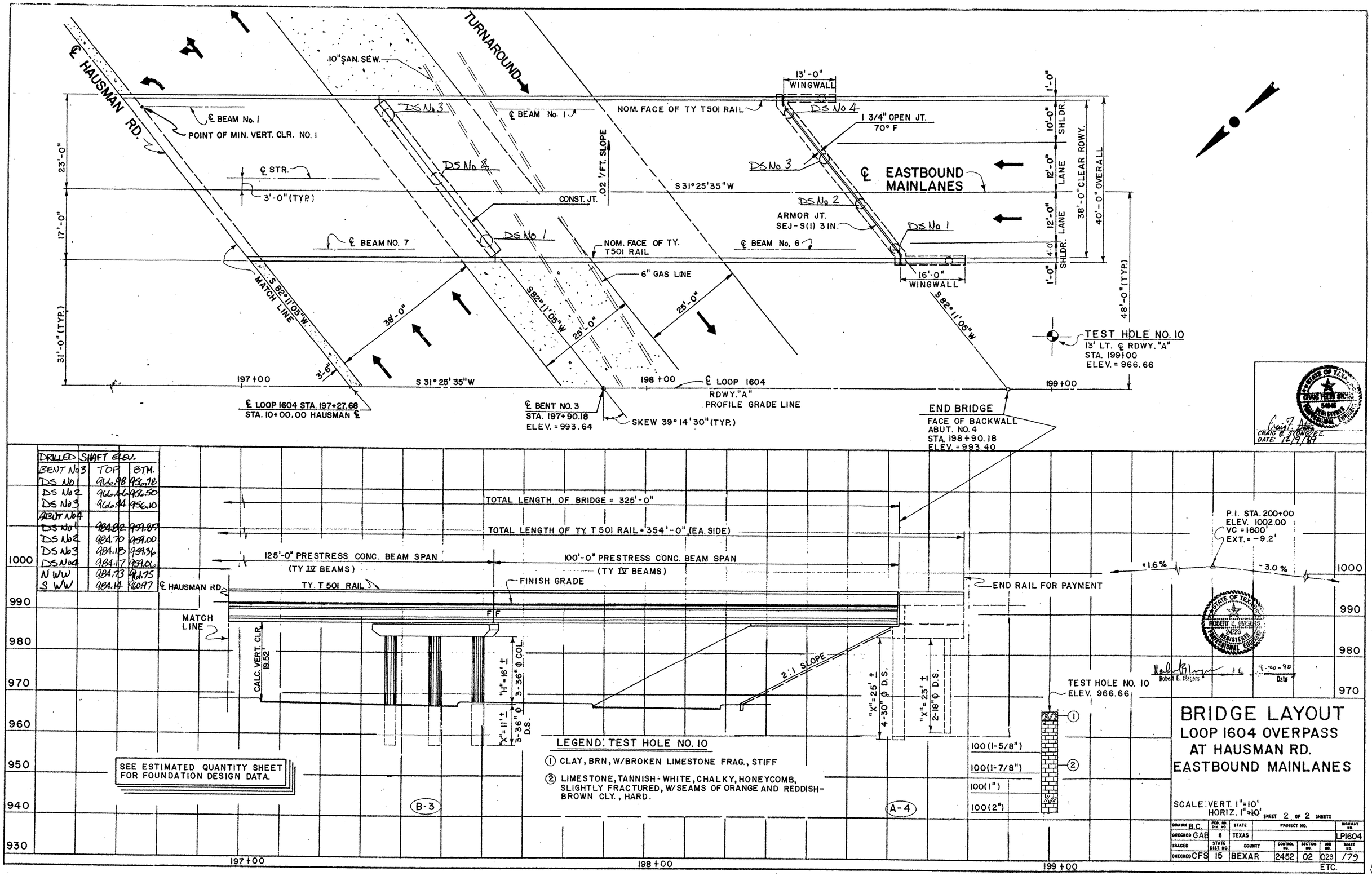
SCALE: VERT. 1" = 10'
HORIZ. 1" = 10'

SHEET 1 OF 2 SHEETS

DRAWN B.C.	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CHECKED GAB	6	TEXAS				LP1604
TRACED	STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CHECKED CFS	15	BEXAR	2452	02	023	178

ETC.

CRAIG F. STONG, P.E.
DATE: 12/9/89



SEE ESTIMATED QUANTITY SHEET FOR FOUNDATION DESIGN DATA.

LEGEND: TEST HOLE NO. 10

① CLAY, BRN, W/BROKEN LIMESTONE FRAG., STIFF

② LIMESTONE, TANNISH-WHITE, CHALKY, HONEYCOMB, SLIGHTLY FRACTURED, W/SEAMS OF ORANGE AND REDDISH-BROWN CLY., HARD.

BRIDGE LAYOUT
LOOP 1604 OVERPASS AT HAUSMAN RD. EASTBOUND MAINLANES

SCALE: VERT. 1" = 10'
HORIZ. 1" = 10'

SHEET 2 OF 2 SHEETS

DRAWN B.C.	FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CHECKED GAB	6	TEXAS					LP1604
TRACED	STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.	
CHECKED CFS	15	BEXAR	2452	02	023	179	

ETC.

SUMMARY OF ESTIMATED QUANTITIES

ITEM / DESCRIPTION	DRILLED SHAFTS 18"φ	DRILLED SHAFTS 30"φ	DRILLED SHAFTS 36φ	CLASS "C" CONCRETE ABUT.	CLASS "C" CONCRETE BENT	REINF. CONCRETE SLAB	PRESTR. CONC. BEAM (TYPE IV)	CONCRETE SURFACE TREATM'T	SEALED EXP. JT. (3IN.)	RAILING TY T501	RIPRAP (CONC) (CL. B)
	L.F.	L.F.	L.F.	C.Y.	C.Y.	S.F.	L.F.	S.Y.	LF.	L.F.	C.Y.
ABUT. 1 & 4	92	200		76.8						58.0	318
BENT 2 & 3			66		65.5						
DECK UNIT 1						13000	2068.68	1342	96.	650.0	
TOTAL	92	200	66	76.8	65.5	13000	2068.68	1342	96.	708.0	318

BEARING SEAT ELELATIONS

LOCATION		BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5	BEAM 6	BEAM 7
ABUT 1	⊕ (FWD)	985.9941	986.1692	986.3430	986.5161	986.6882	986.8596	——
BENT 2	⊕ (BK)	986.5520	986.7109	986.8691	987.0266	987.1831	987.3386	——
	▽ (FWD)	986.5298	986.6624	986.7942	986.9255	987.0562	987.1860	987.3154
BENT 3	▽ (BK)	986.8301	986.9460	987.0615	987.1763	987.2905	987.4041	987.5168
	⊕ (FWD)	986.8582	986.9971	987.1353	987.2725	987.4087	987.5442	——
ABUT 4	⊕ (BK)	986.7788	986.9019	987.0244	987.1458	987.2664	987.3860	——

⊕ BEAMS LOWERED 1⅛" DUE TO EXCESS CAMBER.
▽ BEAMS LOWERED 1½" DUE TO EXCESS CAMBER.

FOUNDATION DESIGN TABLE △

LOCATION	REF. ELEV.	LOAD (TONS)	SHAFT DIA. (IN.)	ALLOWABLE (TONS/SF) PT. BEARING	ALLOWABLE (TONS/SF) FRICTION	CALCULATED PT. BEARING (TONS)	CALCULATED FRICTION (TONS/FT)	CALCULATED MIN. PENETRATION (FT.)
ABUT 1	963	106	30	31.0	3.25	106	--	5
BENT 2	963	276	36	31.0	3.25	219	30.6	6
BENT 3	963	276	36	31.0	3.25	219	30.6	6
ABUT 4	963	106	30	31.0	3.25	106	--	5
WW	963	10	18	31.0	3.25	10	--	3

△ NO BELLS REQUIRED.

DATE:

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS

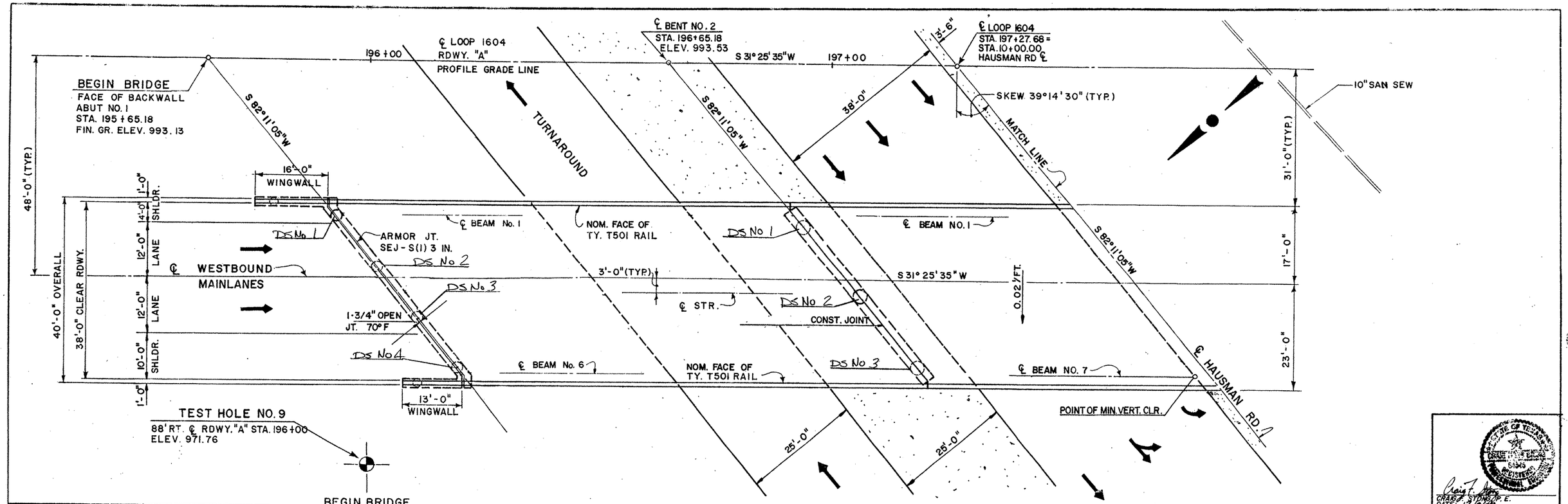
LOOP 1604 OVERPASS AT HAUSMAN ROAD EASTBOUND MAINLANE

ORIGINAL DRAWING DATE: JULY 1989

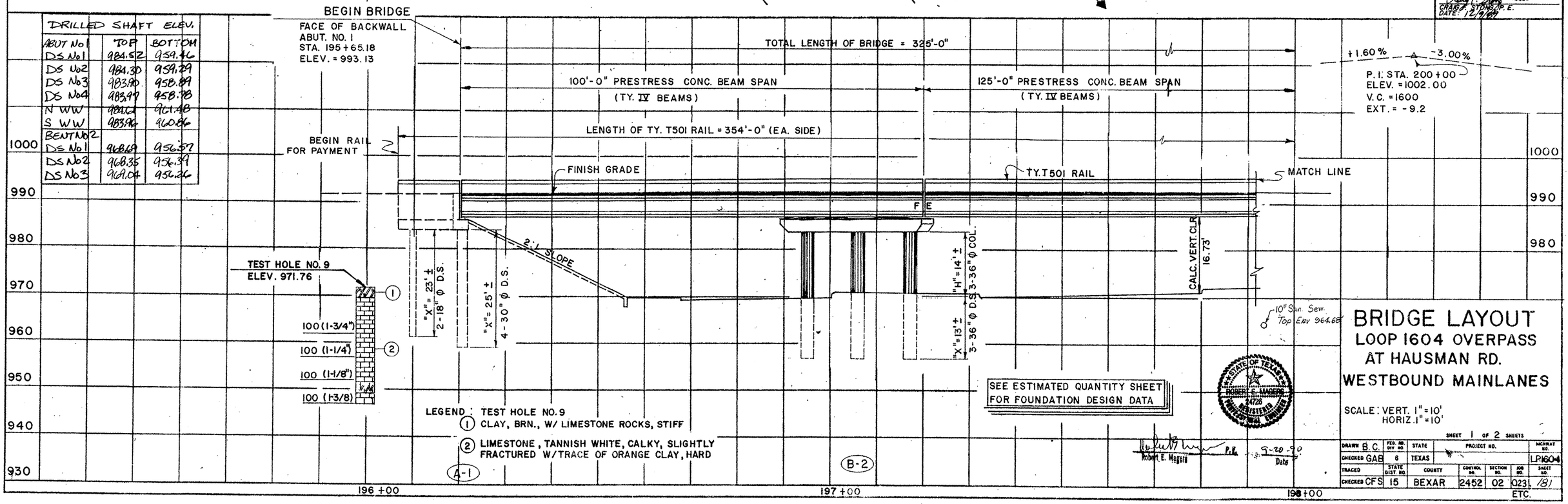
DN.: CFS	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
CK.: KK		15	6			180
DW.: MRM		COUNTY	CONTROL	SECTION	JOB	HIGHWAY
CK.: CFS		BEXAR	2452	02	023	1604

Craig F. Stong
CRAIG F. STONG P.E.
DATE: 12/9/89

ETC.



DRILLED SHAFT ELEV.		
ABUT No 1	TOP	BOTTOM
DS No 1	984.52	959.46
DS No 2	984.30	959.29
DS No 3	983.90	958.89
DS No 4	983.97	958.78
N WW	984.61	961.48
S WW	983.96	960.86
BENT No 2		
DS No 1	968.69	956.57
DS No 2	968.35	956.39
DS No 3	969.04	956.26



SEE ESTIMATED QUANTITY SHEET FOR FOUNDATION DESIGN DATA

LEGEND: TEST HOLE NO. 9
(1) CLAY, BRN., W/ LIMESTONE ROCKS, STIFF
(2) LIMESTONE, TANNISH WHITE, CALKY, SLIGHTLY FRACTURED W/TRACE OF ORANGE CLAY, HARD

A-1

B-2

BRIDGE LAYOUT
LOOP 1604 OVERPASS AT HAUSMAN RD. WESTBOUND MAINLANES

SCALE: VERT. 1" = 10'
HORIZ. 1" = 10'

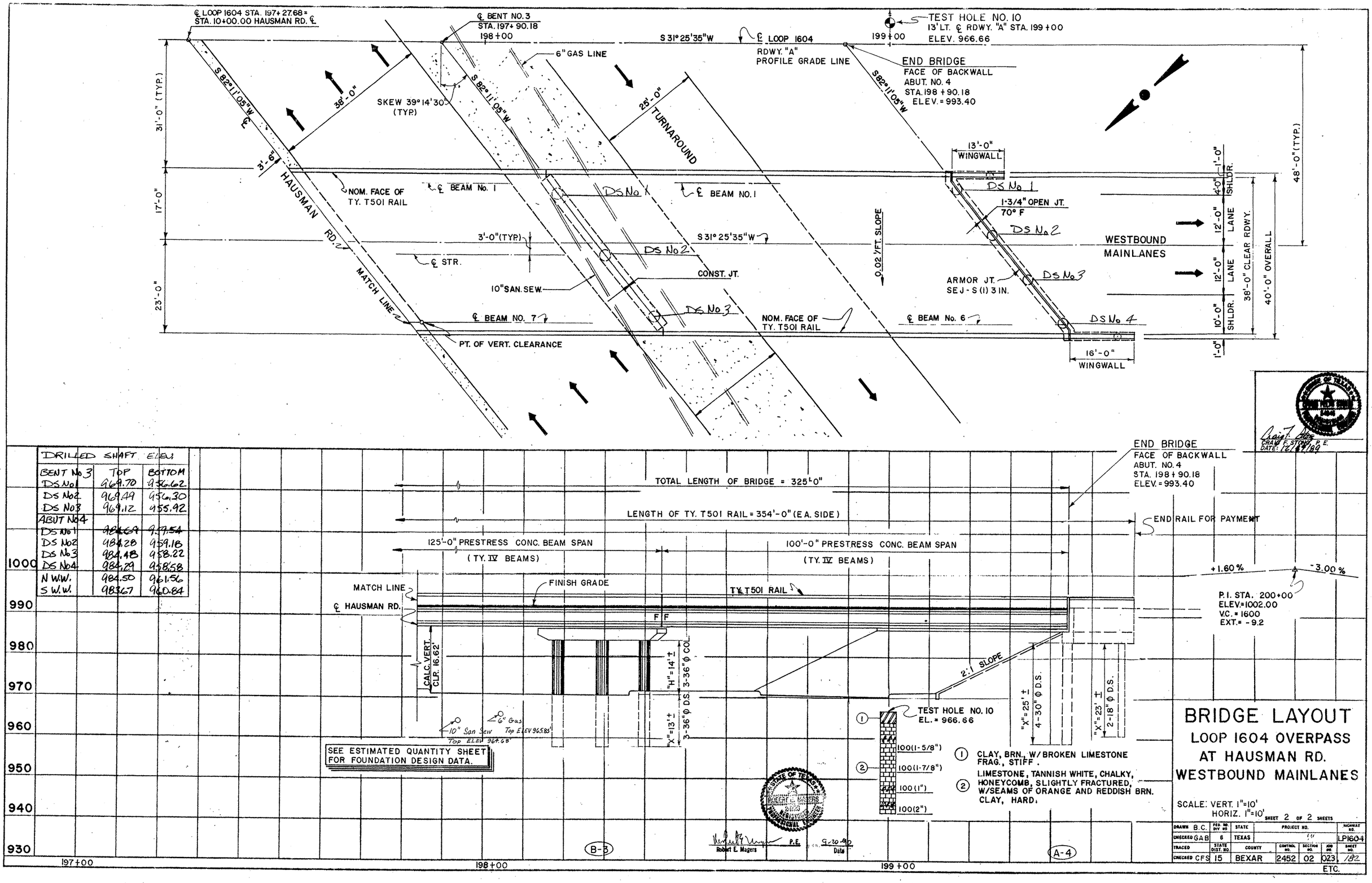
SHEET 1 OF 2 SHEETS

DRAWN B.C.	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CHECKED GAB	6	TEXAS				LP1604
TRACED	STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CHECKED CFS	15	BEXAR	2452	02	023	181

ETC.

Robert E. Magers P.E. 9-20-90 Date

CRAIG F. STONG, P.E.
DATE: 12/9/89



DRILLED SHAFT ELEV.		
BENT No 3	TOP	BOTTOM
DS No1	969.70	956.62
DS No2	969.49	956.30
DS No3	969.12	955.92
ABUT No4		
DS No1	~~984.69~~	~~959.54~~
DS No2	984.28	959.18
DS No3	984.48	958.22
DS No4	984.29	958.58
N W.W.	984.50	961.56
S W.W.	983.67	960.84

SEE ESTIMATED QUANTITY SHEET FOR FOUNDATION DESIGN DATA.

STATE OF TEXAS
ROBERT E. MAGERS
PROFESSIONAL ENGINEER

Robert E. Magers P.E.
Robert E. Magers

9-20-90
Date

STATE OF TEXAS
DEPARTMENT OF HIGHWAYS & PUBLIC TRANSPORTATION

Craig F. Stone P.E.
CRAIG F. STONE P.E.
DATE: 12/19/89

BRIDGE LAYOUT
LOOP 1604 OVERPASS AT HAUSMAN RD. WESTBOUND MAINLANES

SCALE: VERT. 1"=10'
HORIZ. 1"=10'

SHEET 2 OF 2 SHEETS

DRAWN B.C.	FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CHECKED GAB	6	TEXAS					LP1604
TRACED	STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CHECKED CFS	15	BEXAR	2452	02	023		182

ETC.

SUMMARY OF ESTIMATED QUANTITIES

DESCRIPTION \ ITEM	DRILLED SHAFTS 18"ϕ	DRILLED SHAFTS 30"ϕ	DRILLED SHAFTS 36 ϕ	CLASS "C" CONCRETE ABUT.	CLASS "C" CONCRETE BENT	REINF. CONCRETE SLAB	PRESTR. CONC. BEAM (TYPE IV)	CONCRETE SURFACE TREATM'T	SEALED EXP. JT. (3 IN.)	RAILING TY T501	RIPRAP (CONC) (CL. B)
	L.F.	L.F.	L.F.	C.Y.	C.Y.	S.F.	L.F.	S.Y.	LF.	L.F.	C.Y.
ABUT. 1 & 4	92	200		76.8						58.0	250
BENT 2 & 3			78		62.4						
DECK UNIT 1						13000	2068.68	1342	96.	650.0	
TOTAL	92	200	78	76.8	62.4	13000	2068.68	1342	96.	708.0	250

BEARING SEAT ELEVATIONS

LOCATION		BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5	BEAM 6	BEAM 7
ABUT. 1	(FWD) ⊘	987.1638	987.0535	986.9421	986.8298	986.7168	986.6028	——
BENT 2	(BK) ⊘	987.4854	987.3591	987.2322	987.1042	986.9753	986.8457	——
	(FWD) ▽	987.4604	987.3552	987.2493	987.1428	987.0356	986.9280	986.8196
BENT 3	(BK) ▽	987.4641	987.3425	987.2202	987.0972	986.9736	986.8494	986.7246
	(FWD) ⊘	987.4893	987.3430	987.1958	987.0476	986.8987	986.7488	——
ABUT. 4	(BK) ⊘	987.1738	987.0117	986.8489	986.6848	986.5200	986.3545	——

⊘ BEAMS LOWERED 1⅛" DUE TO EXCESS CAMBER.
▽ BEAMS LOWERED 1½" DUE TO EXCESS CAMBER.

FOUNDATION DESIGN TABLE △

LOCATION	REF. ELEV.	LOAD (TONS)	SHAFT DIA. (IN.)	ALLOWABLE (TONS/SF) PT BEARING	ALLOWABLE (TONS/SF) FRICTION	CALCULATED PT. BEARING (TONS)	CALCULATED FRICTION (TONS/FT)	CALCULATED MIN. PENETRATION (FT.)
ABUT 1	963	106	30	31.0	3.25	106	--	5
BENT 2	963	276	36	31.0	3.25	219	30.6	6
BENT 3	963	276	36	31.0	3.25	219	30.6	6
ABUT 4	963	106	30	31.0	3.25	106	--	5
WW	963	10	18	31.0	3.25	10	--	3

△ NO BELLS REQUIRED.

DATE:

STATE OF TEXAS
CRAIG FELTS STONG
54845
REGISTERED
PROFESSIONAL ENGINEER

Craig F. Stong
CRAIG F. STONG P.E.
DATE: 12/9/89

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS

LOOP 1604 OVERPASS AT HAUSMAN ROAD
WESTBOUND MAINLANE

ORIGINAL DRAWING DATE: JULY 1989

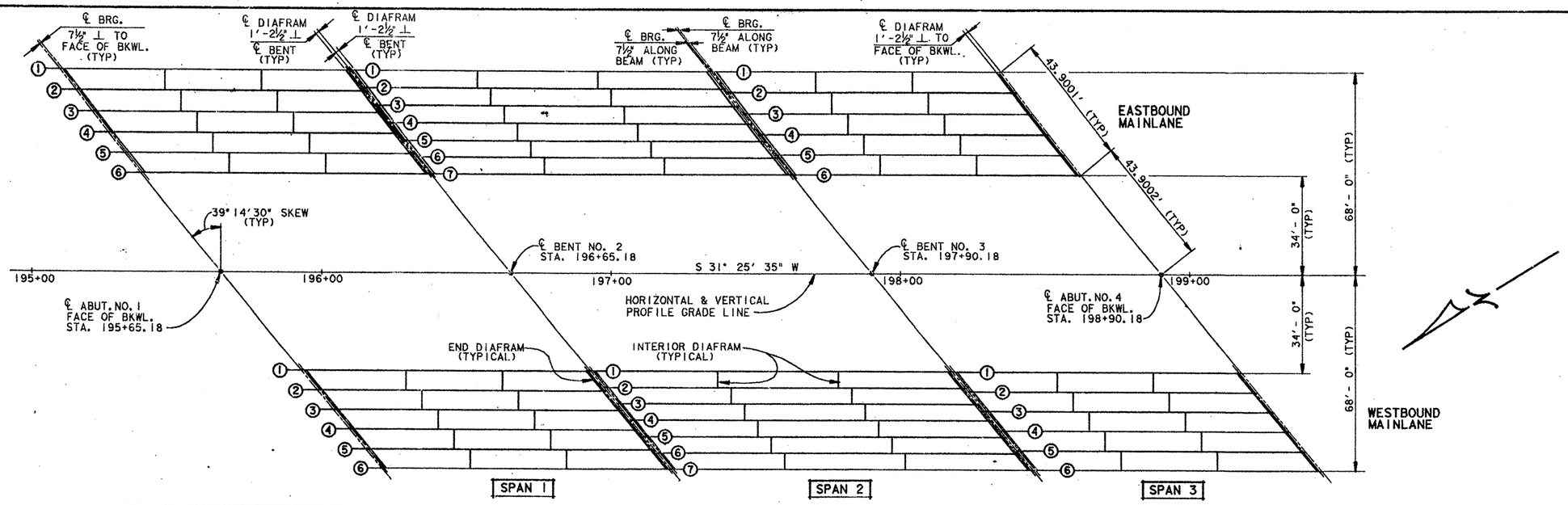
DN.: CFS
CK.: KK
DW.: MRM
CK.: CFS

REVISIONS

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #	SHEET
15	6		183

COUNTY	CONTROL	SECTION	JOB	HIGHWAY
BEXAR	2452	02	023	L1604

ETC. HAUSMAN.DGN



INT. DIAFRAM EASTBOUND AND WESTBOUND MAINLANES SPAN 1 & 3	
BEAMS	LENGTH
1 - 2	6.8000
2 - 3	6.8000
3 - 4	6.8000
4 - 5	6.8000
5 - 6	6.8000

INT. DIAFRAM EASTBOUND AND WESTBOUND MAINLANES SPAN 2	
BEAMS	LENGTH
1 - 2	5.6667
2 - 3	5.6667
3 - 4	5.6667
4 - 5	5.6667
5 - 6	5.6667
6 - 7	5.6667

BENT REPORT
EASTBOUND & WESTBOUND MAINLANES
SPAN 1 & 3 (BK) & (FWD)

BEAM NO.	BEAM SPAC. (C.L. BENT)	BEAM ANGLE
1	0.0000	50° 45' 30.00"
2	8.7800	50° 45' 30.00"
3	8.7800	50° 45' 30.00"
4	8.7800	50° 45' 30.00"
5	8.7800	50° 45' 30.00"
6	8.7800	50° 45' 30.00"
TOTAL	43.9001	——

NOTE: SKEWED DISTANCE BETWEEN PROFILE GRADE LINE & EASTBOUND MAINLANE BEAM NO. 1 = 87.8003' (L).
SKEWED DISTANCE BETWEEN PROFILE GRADE LINE & WESTBOUND MAINLANE BEAM NO. 1 = 43.9002' (R).

BENT REPORT
EASTBOUND & WESTBOUND MAINLANES
SPAN 2 (BK) & (FWD)

BEAM NO.	BEAM SPAC. (C.L. BENT)	BEAM ANGLE
1	0.0000	50° 45' 30.00"
2	7.3167	50° 45' 30.00"
3	7.3167	50° 45' 30.00"
4	7.3167	50° 45' 30.00"
5	7.3167	50° 45' 30.00"
6	7.3167	50° 45' 30.00"
7	7.3167	50° 45' 30.00"
TOTAL	43.9001	——

NOTE: SKEWED DISTANCE BETWEEN PROFILE GRADE LINE & EASTBOUND MAINLANE BEAM NO. 1 = 87.8003' (L).
SKEWED DISTANCE BETWEEN PROFILE GRADE LINE & WESTBOUND MAINLANE BEAM NO. 1 = 43.9002' (R).

DIAFRAM LOCATIONS
EASTBOUND AND WESTBOUND MAINLANES
SPAN 1 & 3
C.L. BENT TO C.L. BENT

BM. NO.	DISTANCE TO DIAPH.	DISTANCE TO BEAM END	DISTANCE TO DIAPH.	DISTANCE TO BEAM END	DISTANCE TO DIAPH.	DISTANCE TO BEAM END	DISTANCE TO DIAPH.	DISTANCE TO BEAM END	DISTANCE TO DIAPH.	DISTANCE TO BEAM END
1	36.1104	36.1104	33.3333	69.4437	30.5563	100.0000	——	——	——	——
2	30.5562	30.5562	5.5542	36.1104	27.7791	63.8895	5.5542	69.4437	30.5563	100.0000
3	30.5562	30.5562	5.5542	36.1104	27.7791	63.8895	5.5542	69.4437	30.5563	100.0000
4	30.5562	30.5562	5.5542	36.1104	27.7791	63.8895	5.5542	69.4437	30.5563	100.0000
5	30.5562	30.5562	5.5542	36.1104	27.7791	63.8895	5.5542	69.4437	30.5563	100.0000
6	30.5562	30.5562	33.3333	63.8895	36.1105	100.0000	——	——	——	——

DIAFRAM LOCATIONS
EASTBOUND AND WESTBOUND MAINLANES
SPAN 2
C.L. BENT TO C.L. BENT

BM. NO.	DISTANCE TO DIAPH.	DISTANCE TO BEAM END	DISTANCE TO DIAPH.	DISTANCE TO BEAM END	DISTANCE TO DIAPH.	DISTANCE TO BEAM END	DISTANCE TO DIAPH.	DISTANCE TO BEAM END	DISTANCE TO DIAPH.	DISTANCE TO BEAM END
1	43.9809	43.9809	41.6667	85.6476	39.3524	125.0000	——	——	——	——
2	39.3523	39.3523	4.6285	43.9809	37.0382	81.0190	4.6285	85.6476	39.3524	125.0000
3	39.3523	39.3523	4.6285	43.9809	37.0382	81.0190	4.6285	85.6476	39.3524	125.0000
4	39.3523	39.3523	4.6285	43.9809	37.0382	81.0190	4.6285	85.6476	39.3524	125.0000
5	39.3523	39.3523	4.6285	43.9809	37.0382	81.0190	4.6285	85.6476	39.3524	125.0000
6	39.3523	39.3523	4.6285	43.9809	37.0382	81.0190	4.6285	85.6476	39.3524	125.0000
7	39.3523	39.3523	41.6667	81.0190	43.9810	125.0000	——	——	——	——

BEAM REPORT - EASTBOUND MAINLANE

BM. NO.	SPAN 1 HORIZ. DIST. C-C BENT	SPAN 1 TRUE DIST. BOT. BM. FLANGE	SPAN 1 BEAM SLOPE	SPAN 1 BEAM BEARINGS	SPAN 2 HORIZ. DIST. C-C BENT	SPAN 2 TRUE DIST. BOT. BM. FLANGE	SPAN 2 BEAM SLOPE	SPAN 2 BEAM BEARINGS	SPAN 3 HORIZ. DIST. C-C BENT	SPAN 3 TRUE DIST. BOT. BM. FLANGE	SPAN 3 BEAM SLOPE	SPAN 3 BEAM BEARINGS
1	100.0000	99.6683	0.00566	S 31°25'35.00"W	125.0000	124.6670	0.00243	S 31°25'35.00"W	100.0000	99.6667	-0.00080	S 31°25'35.00"W
2	100.0000	99.6682	0.00550	S 31°25'35.00"W	125.0000	124.6670	0.00229	S 31°25'35.00"W	100.0000	99.6667	-0.00097	S 31°25'35.00"W
3	100.0000	99.6681	0.00534	S 31°25'35.00"W	125.0000	124.6670	0.00216	S 31°25'35.00"W	100.0000	99.6667	-0.00112	S 31°25'35.00"W
4	100.0000	99.6680	0.00518	S 31°25'35.00"W	125.0000	124.6669	0.00203	S 31°25'35.00"W	100.0000	99.6667	-0.00129	S 31°25'35.00"W
5	100.0000	99.6679	0.00502	S 31°25'35.00"W	125.0000	124.6669	0.00189	S 31°25'35.00"W	100.0000	99.6668	-0.00144	S 31°25'35.00"W
6	100.0000	99.6678	0.00486	S 31°25'35.00"W	125.0000	124.6669	0.00176	S 31°25'35.00"W	100.0000	99.6668	-0.00161	S 31°25'35.00"W
7	——	——	——	——	125.0000	124.6668	0.00163	S 31°25'35.00"W	——	——	——	——

BEAM REPORT - WESTBOUND MAINLANE

BM. NO.	SPAN 1 HORIZ. DIST. C-C BENT	SPAN 1 TRUE DIST. BOT. BM. FLANGE	SPAN 1 BEAM SLOPE	SPAN 1 BEAM BEARINGS	SPAN 2 HORIZ. DIST. C-C BENT	SPAN 2 TRUE DIST. BOT. BM. FLANGE	SPAN 2 BEAM SLOPE	SPAN 2 BEAM BEARINGS	SPAN 3 HORIZ. DIST. C-C BENT	SPAN 3 TRUE DIST. BOT. BM. FLANGE	SPAN 3 BEAM SLOPE	SPAN 3 BEAM BEARINGS
1	100.0000	99.6672	0.00326	S 31°25'35.00"W	125.0000	124.6667	0.00003	S 31°25'35.00"W	100.0000	99.6672	-0.00320	S 31°25'35.00"W
2	100.0000	99.6671	0.00310	S 31°25'35.00"W	125.0000	124.6667	-0.00010	S 31°25'35.00"W	100.0000	99.6672	-0.00336	S 31°25'35.00"W
3	100.0000	99.6671	0.00294	S 31°25'35.00"W	125.0000	124.6667	-0.00023	S 31°25'35.00"W	100.0000	99.6673	-0.00352	S 31°25'35.00"W
4	100.0000	99.6671	0.00278	S 31°25'35.00"W	125.0000	124.6667	-0.00037	S 31°25'35.00"W	100.0000	99.6673	-0.00368	S 31°25'35.00"W
5	100.0000	99.6670	0.00262	S 31°25'35.00"W	125.0000	124.6667	-0.00050	S 31°25'35.00"W	100.0000	99.6674	-0.00384	S 31°25'35.00"W
6	100.0000	99.6670	0.00246	S 31°25'35.00"W	125.0000	124.6667	-0.00064	S 31°25'35.00"W	100.0000	99.6675	-0.00400	S 31°25'35.00"W
7	——	——	——	——	125.0000	124.6667	-0.00077	S 31°25'35.00"W	——	——	——	——

NOTE: TRUE DISTANCE BOTTOM BEAM FLANGE ARE ACTUAL BOTTOM FLANGE LENGTH WITH ADJUSTMENT MADE FOR BEAM SLOPE.

GENERAL NOTES:

1) ALL BENTS, ABUTMENTS AND DIAFRAM ARE ON A BEARING OF S 82°11'05" W
2) ALL DISTANCES SHOWN ARE IN A HORIZONTAL PLANE.
3) ALL DISTANCES SHOWN ARE FROM FACE OF ABUTMENTS BACKWALL TO ℄ INTERIOR DIAFRAM TO ℄ INTERIOR BENT.
4) ALL DIAFRAM LENGTH ARE FROM ℄ TO ℄ OF BEAMS.

DATE:

CRAIG F. STONG
CRAIG F. STONG P.E.
DATE: 12/9/89

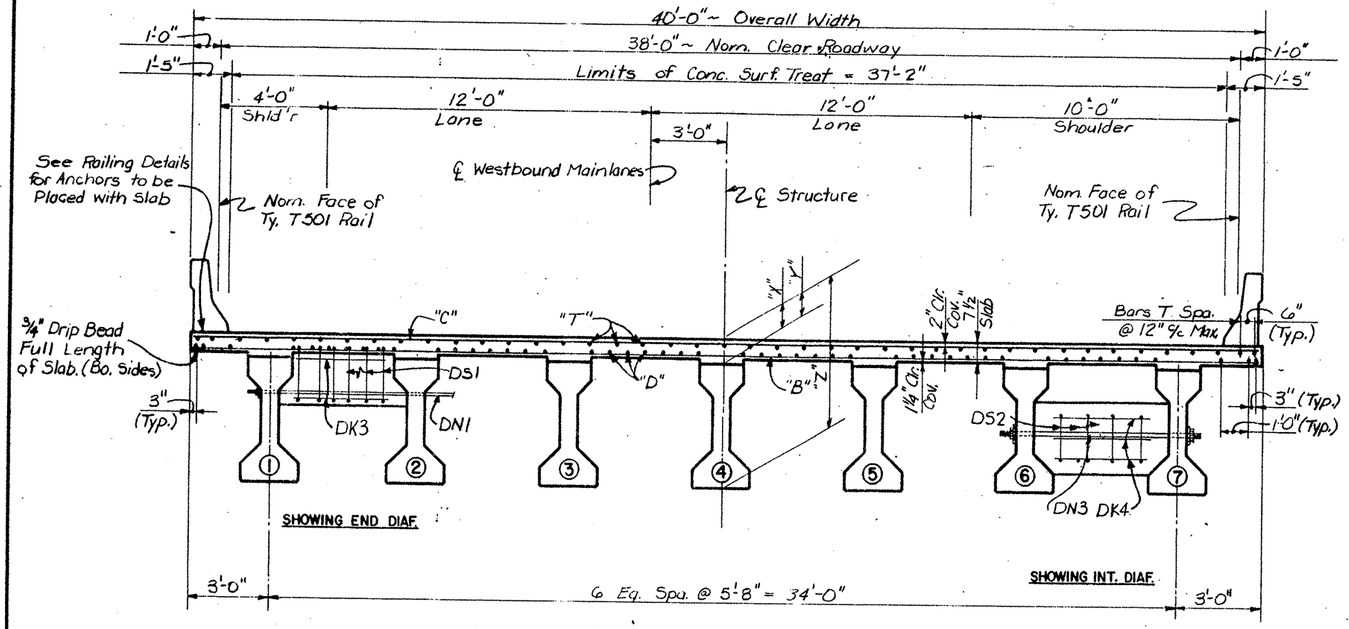
STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

BEAM & DIAFRAM LAYOUT

LOOP 1604 OVERPASS AT HAUSMAN ROAD
EASTBOUND & WESTBOUND MAINLANES

ORIGINAL DRAWING DATE: JUNE 1989							
DN.: CFS	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #			SHEET
CK.: KK	- -	15	6				184
DM.: MRM	- -	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
CK.: CFS	- -	BEXAR		2452	02	023	L1604

ETC

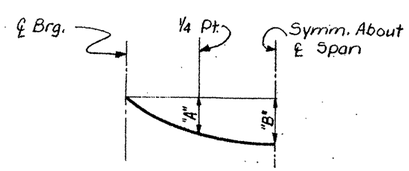


TRANSVERSE SECTION

SPAN No. 2
(LOOKING STATIONWISE)

SECTION DEPTH TABLE				
SPAN NO.	BEAM NO.	AT ℄ BRG. "X"	AT MID SPAN "Y" ✧	AT C BRG. "Z"
2	1-7	9"	8"	5'-3"

✧ Theoretical Dimension



SPAN	"A"	"B"
2	.1183	.1660

DEAD LOAD DEFLECTION DIAGRAM

NOTE: Deflection shown are due to cast-in-place concrete only. ($E = 5 \times 10^6$ psi.)

ESTIMATED QUANTITIES
(ONE MAINLANE UNIT ONLY)

BAR	NO.	SIZE	LENGTH	WEIGHT
B	675	#5	39'-9"	27,985
C	675	#5	39'-9"	27,985
AA	22	#5	5'-0"	115
BB1-60	120	#5	21'-7" ⌗	2701
CC1-60	120	#5	21'-7" ⌗	2701
D	41	#5	331'-7" †	14,179
DK1	80	#5	6'-3"	522
DK2	120	#5	4'-10"	605
DK3	48	#5	4'-10"	242
DK4	72	#5	3'-8"	275
DN1	6	#8	45'-2"	724
DN2	20	#8	7'-10"	418
DN3	12	#8	6'-7"	211
DS1	212	#4	5'-4	755
DS2	148	#4	6'-0"	593
G	2	#5	46'-6"	97
T	43	#4	330'-4" ⊙	9488
REINF. STEEL			✳ LBS	89,596
CL. S CONC. (Slab)			✳ CY	331.4
REINF. CONC. SLAB			SF	13,000
PRESTR. CONC. BM. (Ty. IV)			LF	2068.68
CONC. SURF. TREAT			SY	1342
SEALED EXP. JT. (3in)			LF	96

✳ For Contractor's Information Only.
† Includes (5) 1'-5" Min. Lap
⊙ Includes (5) 1'-2" Min. Lap
⌗ Average Length

GENERAL NOTES:

Design: HS 20 Loading in accordance with A.A.S.H.T.O. 1983 Std. Spec's. and interim revisions.
All concrete shall be class "S".
Design fc = 1200 p.s.i.
Chamfer all exposed edges 3/4" unless otherwise noted.

SHEET 2 of 2

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

DECK DETAILS

LOOP 1604 OVERPASS AT HAUSMAN RD.

EASTBOUND & WESTBOUND M'LANES

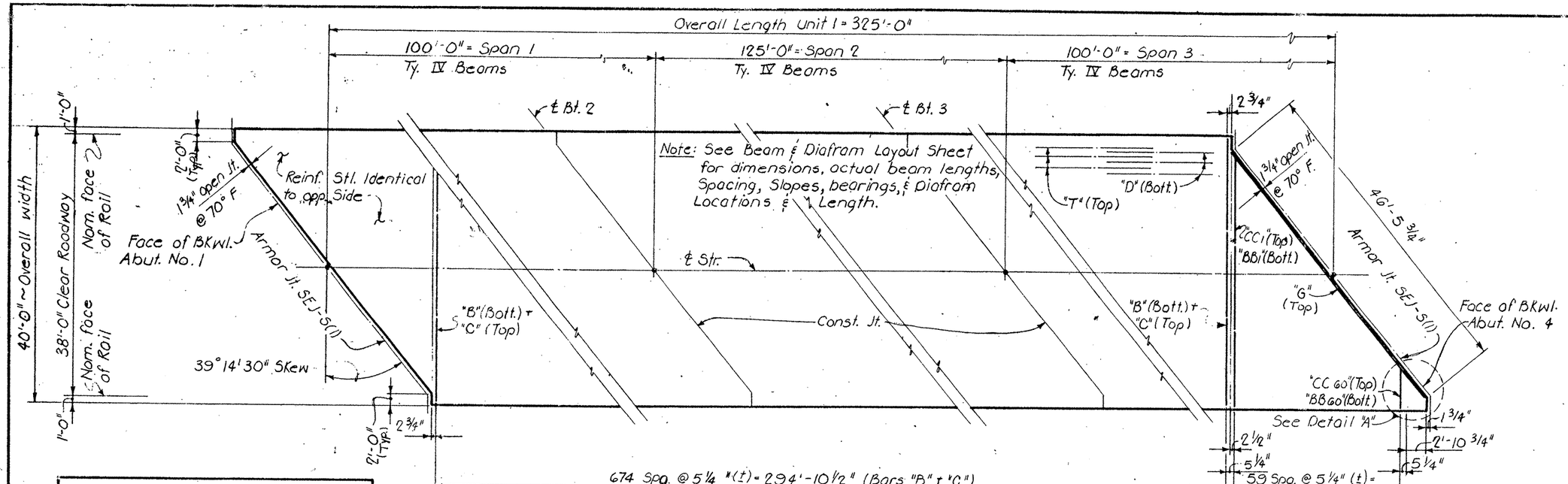
DATE:

CRAIG F. STONG, P.E.
DATE: 12/9/89

DN. CFS	DRAWING ORIG	DATE OCT. 1989	STATE TEXAS	FEDERAL AID PROJECT NO.	
CK. DN. KK					
DW. WJS					
CK. DW. CFS					
TR.					
CK. TR.					

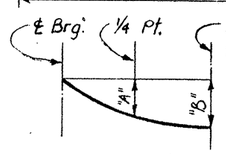
STATE	COUNTY			
15	BEXAR	2402	02	023

ETC



SECTION DEPTH TABLE				
SPAN NO.	BEAM NO.	AT ℄ BRG. "X"	AT MID SPAN "Y" ✥	AT ℄ BRG. "Z"
1 & 3	1-6	8 5/8"	8"	5'-2 5/8"

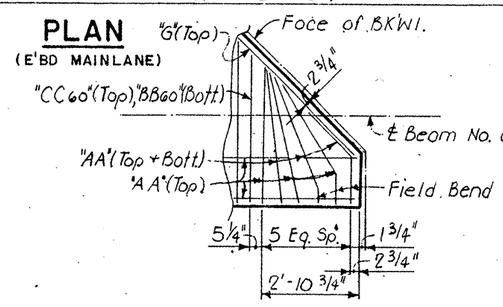
✥ Theoretical Dimensions



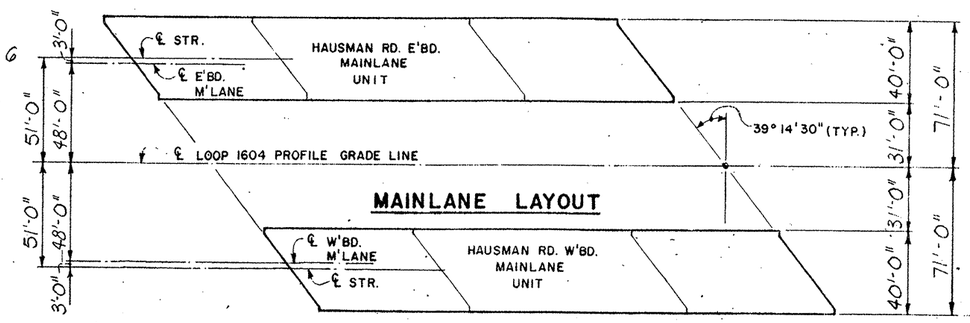
SPAN	"A"	"B"
1 & 3	0.0720'	0.1011'

DEAD LOAD DEFLECTION DIAGRAM
Note: Deflections Shown are due to Cast-in-place Concrete only. ($E = 5 \times 10^6$ psi)

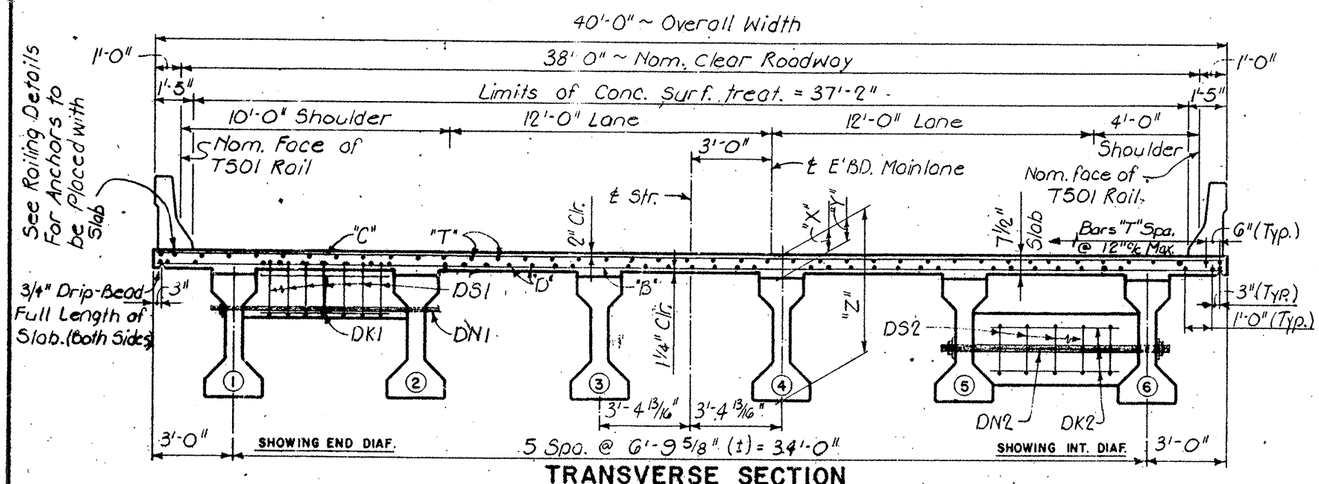
PLAN
(E'BD MAINLANE)



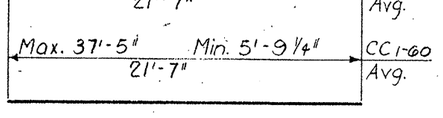
DETAIL "A"



SEE SHEET 2 of 2 FOR GENERAL NOTES.



TRANSVERSE SECTION
SPANS 1 & 3
(LOOKING STATIONWISE)



BARS "BB" & "CC"

SHEET 1 of 2.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

DECK DETAILS

LOOP 1604 OVERPASS AT HAUSMAN RD.

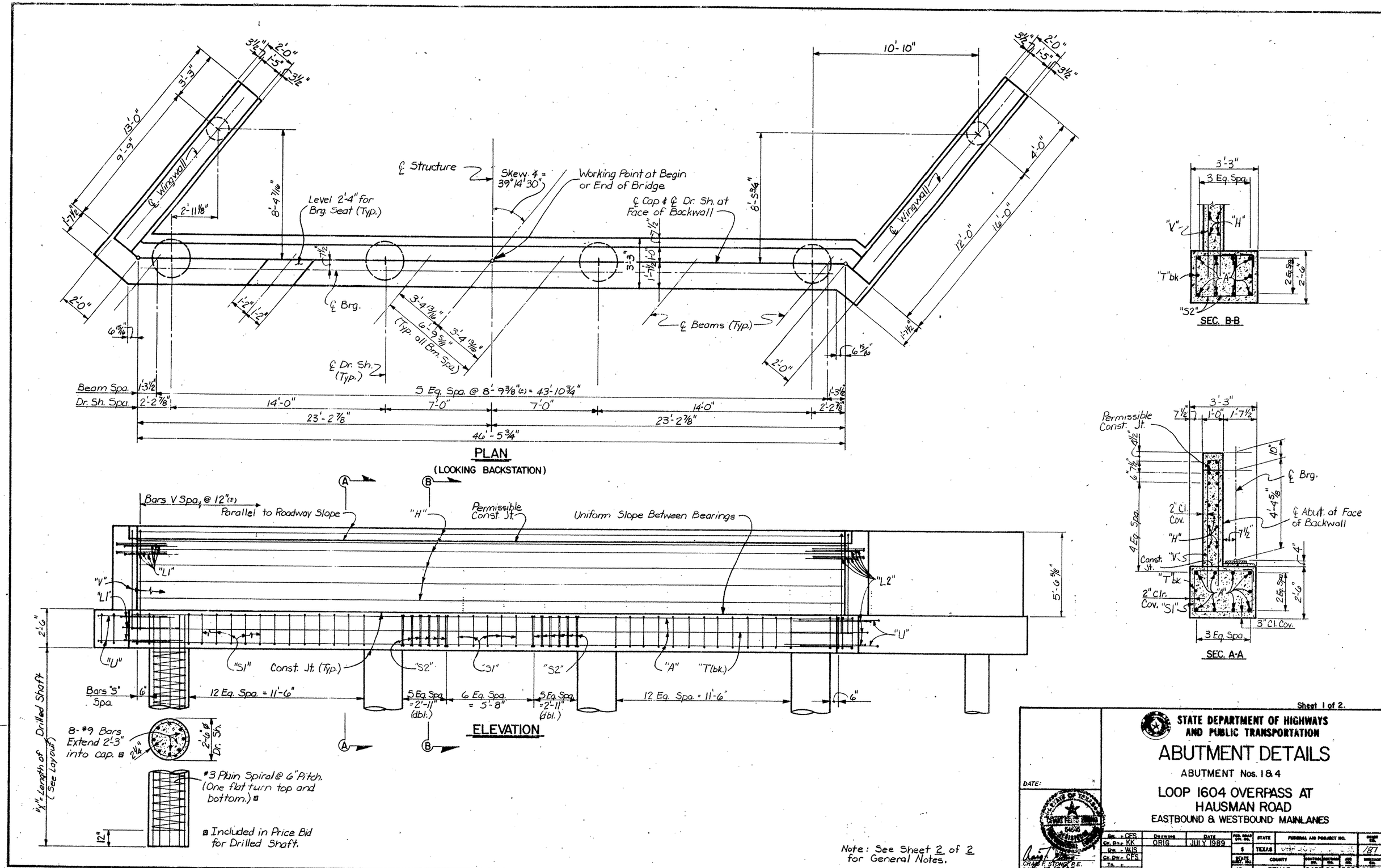
EASTBOUND & WESTBOUND M'LANES

DATE:

STATE OF TEXAS — CRAIG F. STONG — 54845 — REGISTERED PROFESSIONAL ENGINEER

CRAIG F. STONG P.E.
DATE: 12/9/89

DRAWING	DATE	FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
ORIGINAL	June 89	6	TEXAS	CRI, 90(192), M, ETC.	186
		STATE	COUNTY		
		15	BEXAR	1458 02 023	ETC.



Sheet 1 of 2.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

ABUTMENT DETAILS

ABUTMENT Nos. 1 & 4

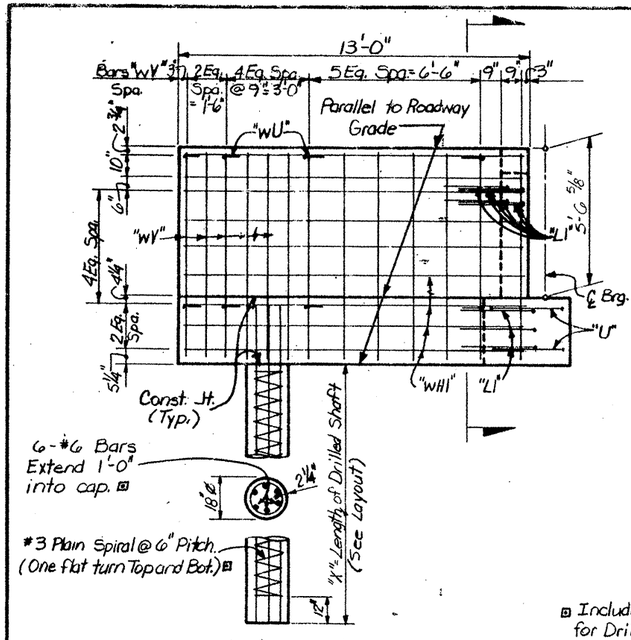
LOOP 1604 OVERPASS AT HAUSMAN ROAD

EASTBOUND & WESTBOUND MAINLANES

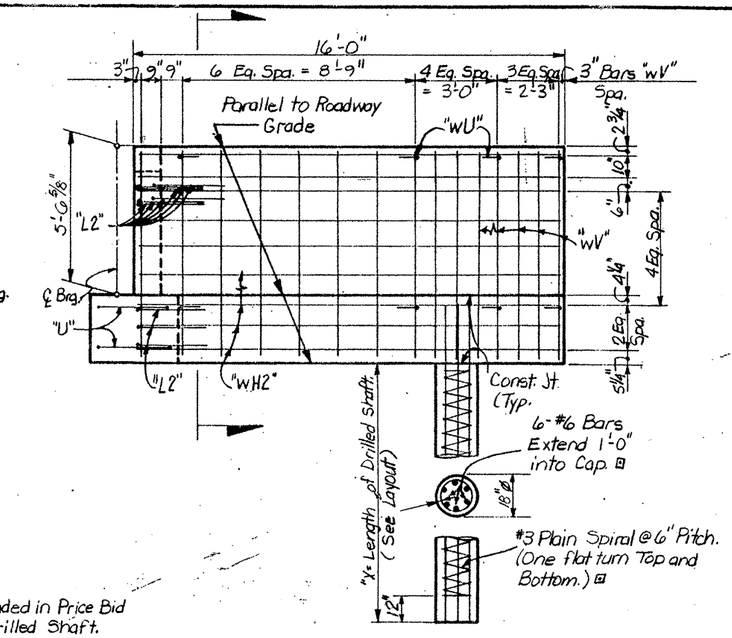
DATE:

CRAIG F. STONG P.E.
DATE: 12/9/89

DN. - CFS	DRAWING	DATE	FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
CK. DN. - KK	ORIG	JULY 1989	6	TEXAS		1/87
DW. - WJS						
CK. DW. - CFS			STATE DIST. NO.	COUNTY	CONTROL NO. / SECTION NO. / JOB NO.	HIGHWAY NO.
TR. -			15	BEXAR	2452 / 02 / 023	LP1604
CK. TR. -						

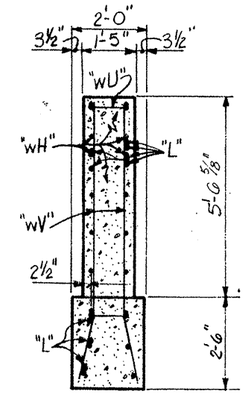


13'-0" WINGWALL ELEVATION

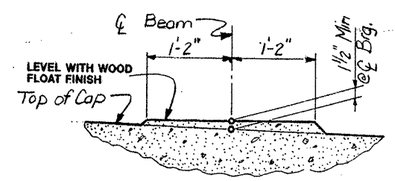


16'-0" WINGWALL ELEVATION

▣ Included in Price Bid for Drilled Shaft.



SECTION THRU WINGWALLS



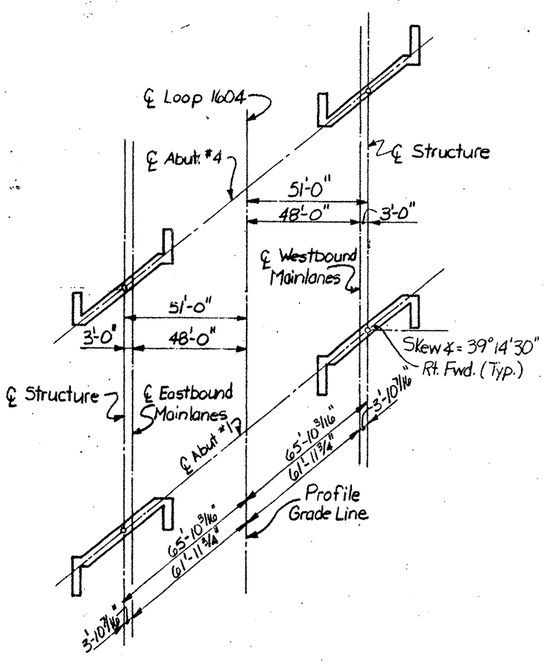
BEARING SEAT DETAIL

BEARING SURFACE SHALL BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.

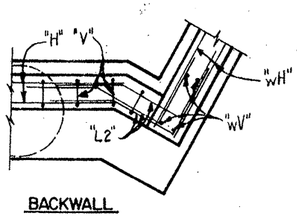
ESTIMATED QUANTITIES
(FOR ONE ABUTMENT)

BAR	NO.	SIZE	LENGTH	WEIGHT
A	9	#11	46'-6"	2223
H	12	#5	46'-6"	582
L1	9	#6	5'-9"	78
L2	9	#6	5'-11"	80
S1	39	#5	10'-8"	434
S2	24	#5	8'-10"	221
T(bk)	1	#5	46'-6"	48
U	4	#6	12'-1"	73
V	49	#5	13'-8"	698
wH1	18	#6	12'-9"	345
wH2	18	#6	15'-9"	426
wU	16	#4	2'-0"	21
wV	56	#5	7'-7"	443
REINF. STEEL			* LBS	5672
CL. C CONC. (Abut.)			CY	38.4

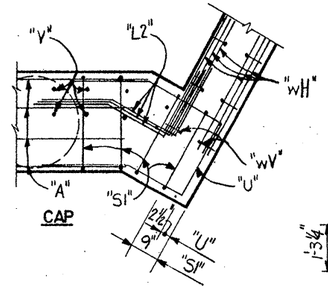
* For Contractor's Information Only.



ABUTMENT LAYOUT

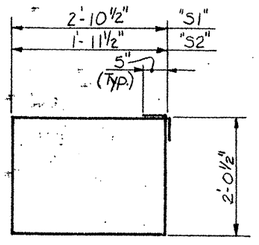


BACKWALL



CAP

CORNER DETAILS



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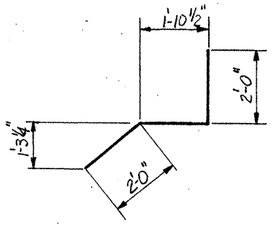

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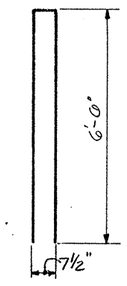
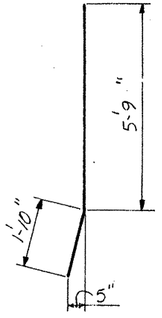
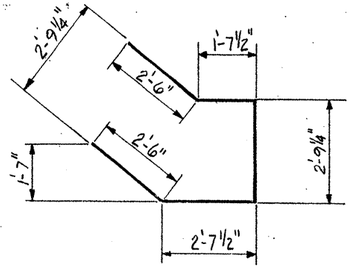


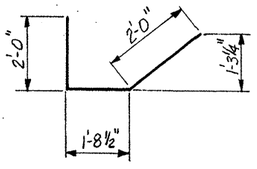
BARS "V"



BARS "wV"



BARS "U"



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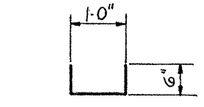


BARS "wU"

GENERAL NOTES:

Design: HS-20 Loading in accordance with A.A.S.H.T.O. 1983 Standard Spec's. and interim revisions thereto.
All concrete for Cap, Bkwl., and Wings shall be class "C".
All reinf. steel for Cap, Bkwl, and Wings shall be Gr. 60.
All concrete for Drilled Shafts shall be Cl. "A".
All reinf. steel for Drilled Shafts shall be Gr. 40.
Chamfer all exposed edges ¾" unless noted otherwise.
Avg. Calc. Load = 106 Tons/p.s.

Sheet 2 of 2.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

ABUTMENT DETAILS

ABUTMENT Nos. 1 & 4

LOOP 1604 OVERPASS AT HAUSMAN ROAD

EASTBOUND & WESTBOUND MAINLANES

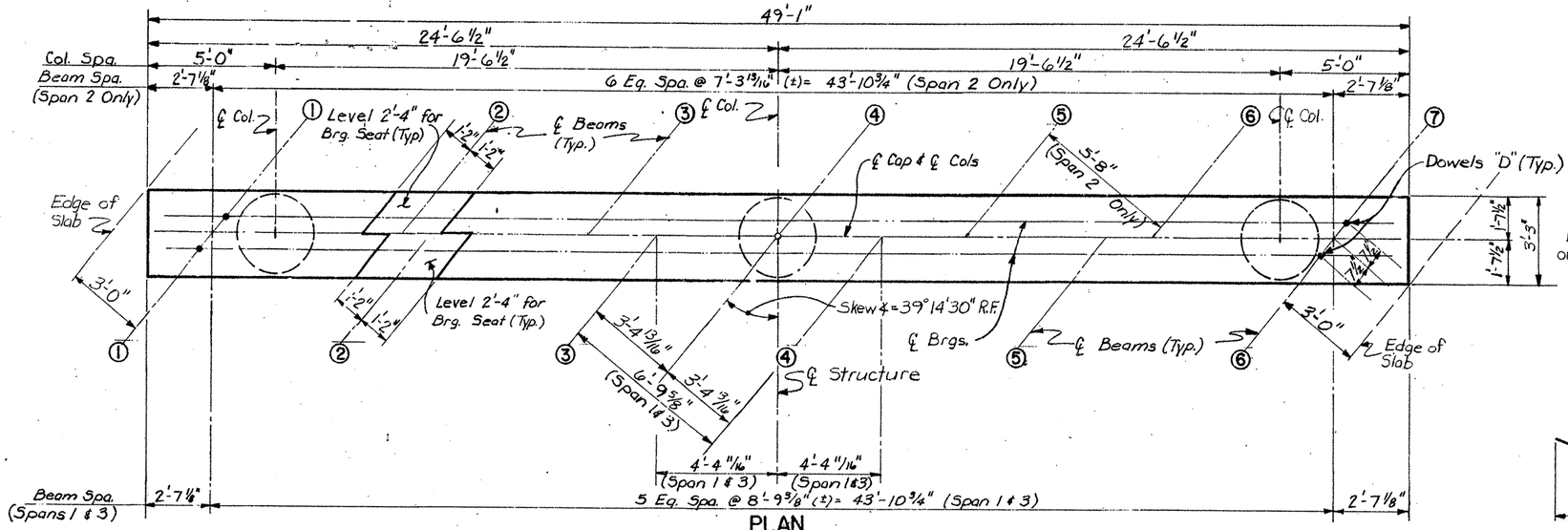
DATE:

STATE OF TEXAS — CRAIG FELLS STONE — 54848 — REGISTERED PROFESSIONAL ENGINEER

Craig F. Stone
CRAIG F. STONE, P.E.
DATE: 12/9/89

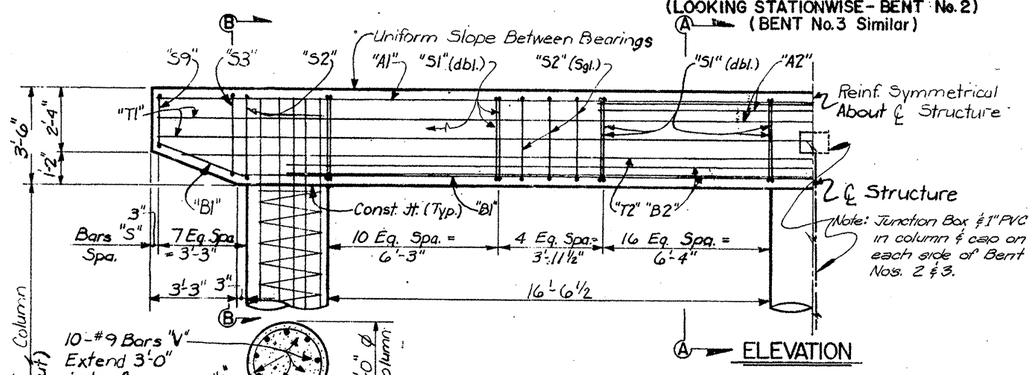
Dn. : CFS	DRAWING	DATE	FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
Ck. Dw.: KK	ORIG.	JULY 1989	6	TEXAS		198
Dw. : W.J.S			STATE DIST. NO.	COUNTY		
Ck. Dw.: CFS			15	BEXAR	2452 02 023	FM 1604
Tr. :						
Ck. Tr.:						

ETC.

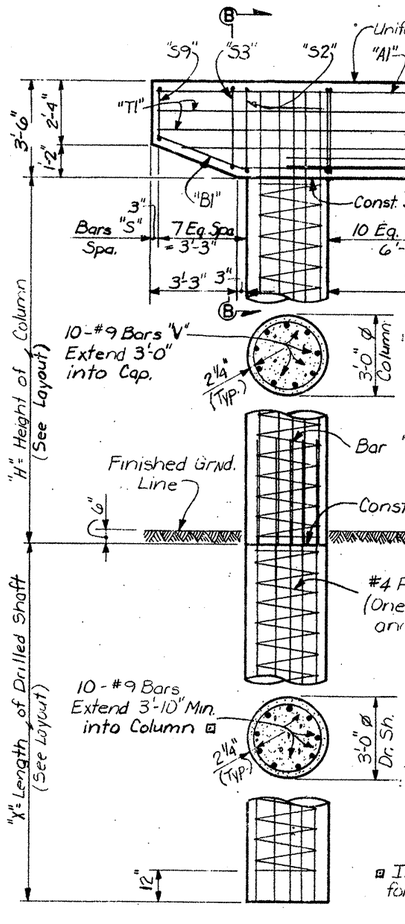


PLAN

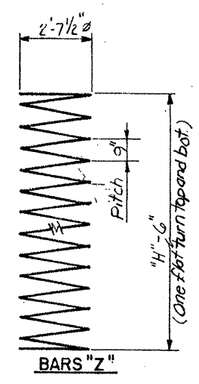
(LOOKING STATIONWISE - BENT No. 2)
(BENT No. 3 Similar)



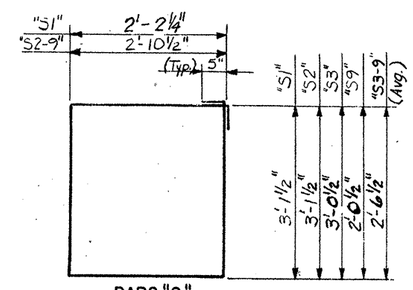
ELEVATION



◻ Included in Price Bid for Drilled Shaft.



BARS "Z"



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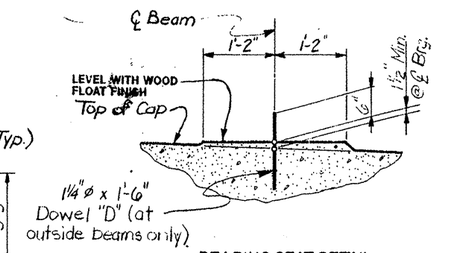
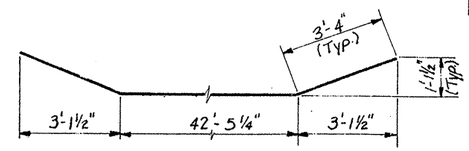


BEARING SEAT DETAIL

BEARING SURFACE SHALL BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.



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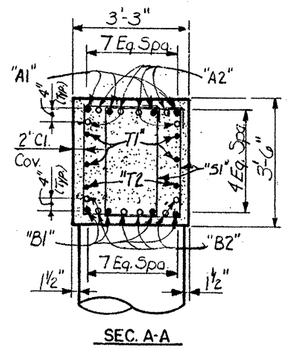
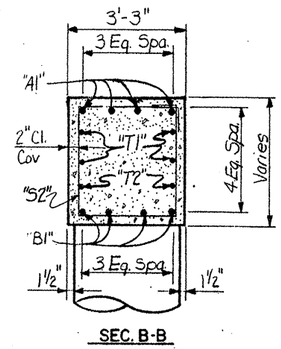
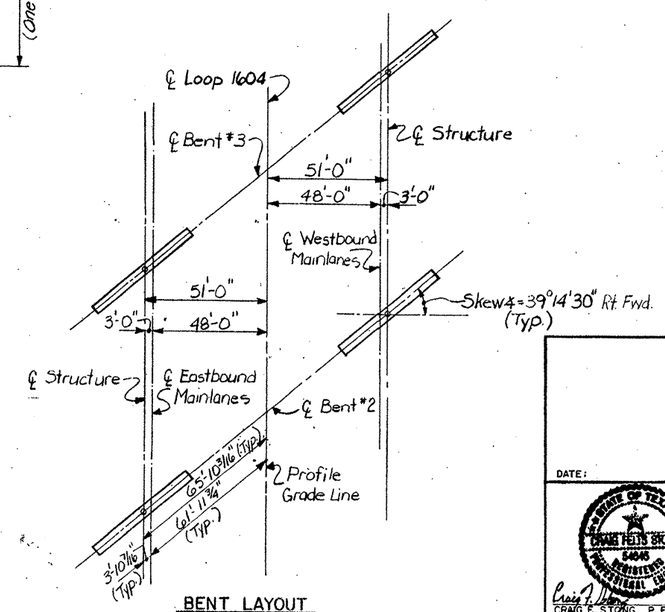


SEC. A-A



SEC. B-B



BENT LAYOUT

ESTIMATED QUANTITIES

(FOR ONE INTERIOR BENT CAP)

BAR	NO.	SIZE	LENGTH	WEIGHT
A1	4	#11	48'-10"	1038
A2	6	#11	16'-0"	510
B1	4	#11	49'-2"	1045
B2	6	#11	39'-1"	1246
D	4	1 1/4" ø	1'-6"	25
S1	112	#5	11'-6"	1343
S2	8	#5	12'-10"	107
S3-9	14	#5	✦ 11'-8"	170
T1	4	#5	48'-10"	204
T2	2	#5	47'-9"	100
REINF. STEEL			✱ LBS	5788
CL. C CONC. (Bent)			CY	20.2

✱ For Contractor's Information Only.
✦ Average Length of Bars

VARIABLE QUANTITIES

(FOR 3-36 Ø ROUND COLUMNS)

"H"	BARS "Z" 3-#4 PLAIN SPIRAL		BARS "V" 30-#9 BARS		REINF. STEEL TOTAL	CL. C CONC. (BENT)
Ft.	Length	Wt. ✱	Length	Wt. ✱	Lbs. ✱	C.Y.
14	166'	333	17'-0"	1734	2067	11.00
15	177'	355	18'-0"	1836	2191	11.78
16	188'	377	19'-0"	1938	2315	12.57
17	199'	399	20'-0"	2040	2439	13.35
18	210'	421	21'-0"	2142	2563	14.14
19	221'	443	22'-0"	2244	2687	14.92
20	232'	465	23'-0"	2346	2811	15.71

GENERAL NOTES:

Design: HS-20 Loading in accordance with A.A.S.H.T.O. 1983 Standard Specs and interim revisions thereto.
All concrete for Cap and Columns shall be Cl. "C".
All reinf. steel for Cap and Columns shall be Gr. 60.
All concrete for drilled shafts shall be Cl. "A".

Design fc = 1440 p.s.i. Avg. Calc. load = 276 Tons/p.s.
Chamfer all exposed edges 3/4" unless noted otherwise.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

INTERIOR BENT DETAILS

BENT Nos. 2 & 3

LOOP 1604 OVERPASS AT HAUSMAN ROAD

EASTBOUND & WESTBOUND MAINLANES

DATE:

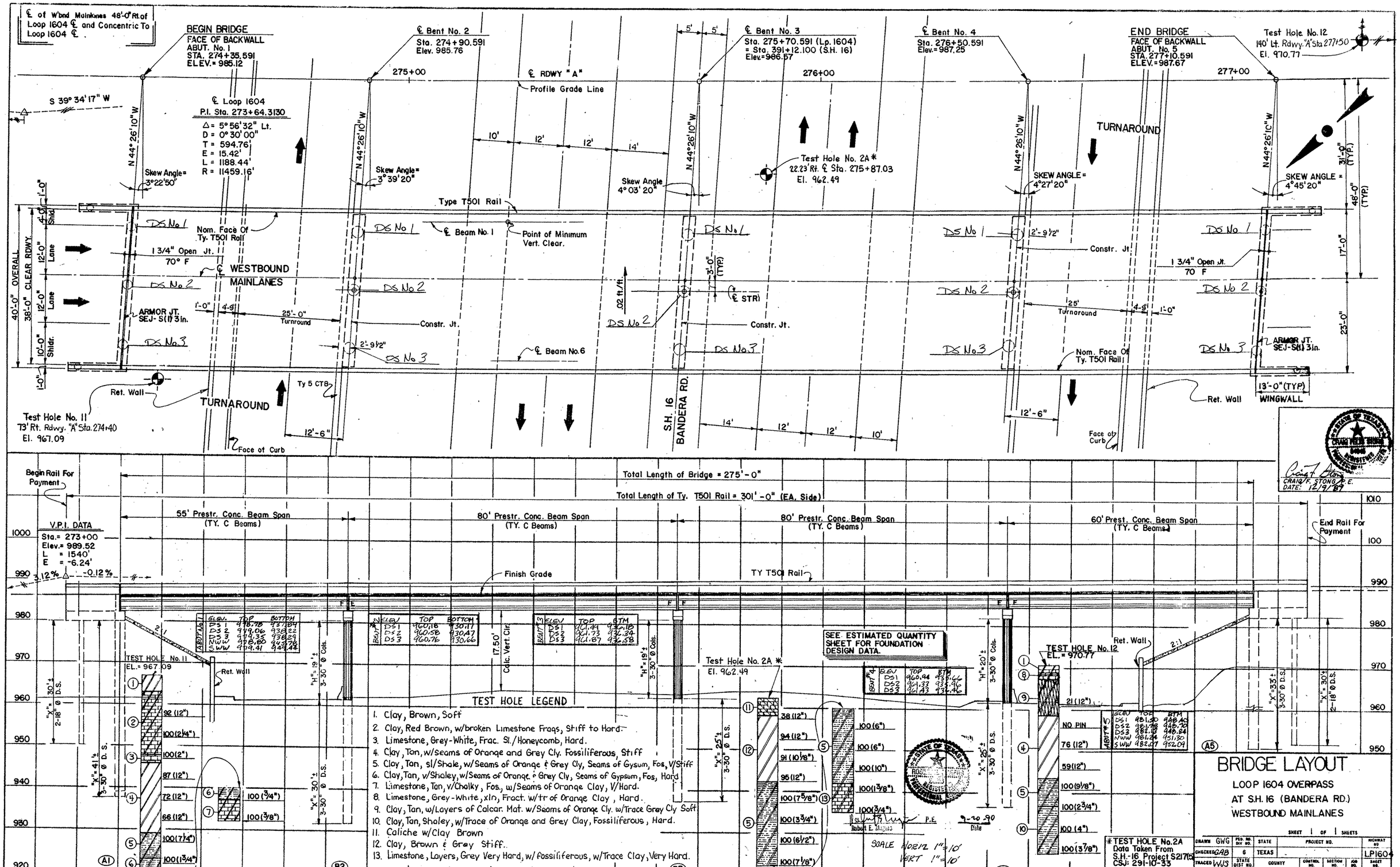
STATE OF TEXAS — CRAIG FELTS STONG — 54045 — REGISTERED PROFESSIONAL ENGINEER

Craig F. Stong
CRAIG F. STONG, P.E.
DATE: 12/9/89

Dn. = CFS	Drawing	Date	Fed. Road Div. No.	State	Federal Aid Project No.	Sheet No.
Ck. Dn. = KK	ORIGINAL	MAY 1989	6	TEXAS		189
Dw. = WJS						
Ck. Dw. = CFS						
Tr. =						
Ck. Tr. =						

State Cont. No.	County	Control No.	Section No.	Job No.	Highway No.
15	BEXAR	2452	02	023	LP1604

ETC.


℄ of W'bnd Mainlanes 48'-0" Rt. of Loop 1604 ℄ and Concentric To Loop 1604 ℄.
BEGIN BRIDGE
FACE OF BACKWALL
ABUT. No. 1
STA. 274+35.591
ELEV.= 985.12
℄ Bent No. 2
Sta. 274+90.591
Elev. 985.76
℄ Bent No. 3
Sta. 275+70.591 (Lp. 1604)
= Sta. 391+12.100 (S.H. 16)
Elev.= 986.57
℄ Bent No. 4
Sta. 276+50.591
Elev.= 987.25
END BRIDGE
FACE OF BACKWALL
ABUT. No. 5
STA. 277+10.591
ELEV.= 987.67
Test Hole No. 12
140' Lt. Rdwy. "A" Sta 277+50
El. 970.77
275+00
276+00
277+00
℄ RDWY "A"
Profile Grade Line
S 39° 34' 17" W
℄ Loop 1604
P.I. Sta. 273+64.3130
Δ = 5° 56' 32" Lt.
D = 0° 30' 00"
T = 594.76'
E = 15.42'
L = 1188.44'
R = 11459.16'
N 44° 26' 10" W
Skew Angle = 3° 22' 50"
Skew Angle = 3° 39' 20"
Skew Angle 4° 03' 20"
SKEW ANGLE = 4° 27' 20"
SKEW ANGLE = 4° 45' 20"
Test Hole No. 2A *
22.23' Rt. ℄ Sta. 275+87.03
El. 962.49
TURNAROUND
Type T501 Rail
Nom. Face Of Ty. T501 Rail
℄ Beam No. 1
Point of Minimum Vert. Clear.
℄ Beam No. 6
℄ STR
1 3/4" Open Jt. 70° F
℄ WESTBOUND MAINLANES
ARMOR JT. SEJ-S(I) 3 in.
Constr. Jt.
25'-0" Turnaround
25' Turnaround
12'-9 1/2"
2'-9 1/2"
12'-6"
Ty 5 CTB
Ret. Wall
Face of Curb
Test Hole No. 11
73' Rt. Rdwy. "A" Sta. 274+40
El. 967.09
S.H. 16 BANDERA RD.
.02 ft./ft.
3'-0" (TYP)
31'-0" (TYP.)
48'-0" (TYP)
17'-0"
23'-0"
13'-0" (TYP)
WINGWALL
OVERALL
CLEAR RDWY.
40'-0"
38'-0"
12'-0" Lane
10'-0" Shldr.
4'-0" Shldr.
1'-0"
DS No 1
DS No 2
DS No 3
Begin Rail For Payment
End Rail For Payment
Total Length of Bridge = 275'-0"
Total Length of Ty. T501 Rail = 301'-0" (EA. Side)
55' Prestr. Conc. Beam Span (TY. C Beams)
80' Prestr. Conc. Beam Span (TY. C Beams)
80' Prestr. Conc. Beam Span (TY. C Beams)
60' Prest. Conc. Beam Span (TY. C Beams)
V.P.I. DATA
Sta.= 273+00
Elev.= 989.52
L = 1540'
E = -6.24'
3.12% -0.12%
Finish Grade
TY T501 Rail
1000
990
980
970
960
950
940
930
920
1010
100
ABUT. No. 1
ELEV. TOP BOTTOM
DS1 978.78 937.84
DS2 979.06 938.22
DS3 979.35 938.29
NWW 978.80 937.78
SWW 979.41 937.44
ABUT. No. 3
ELEV. TOP BOTTOM
DS1 960.18 930.17
DS2 960.58 930.47
DS3 960.76 930.66
ABUT. No. 4
ELEV. TOP BTM
DS1 961.44 932.18
DS2 961.73 932.54
DS3 961.87 932.58
17.50' Calc. Vert. Clr.
"H" = 19' ±
"H" = 20' ±
3-30" Ø Cols.
"X" = 30' ±
"X" = 41' ±
"X" = 25' ±
"X" = 20' ±
"X" = 33' ±
2-18" Ø D.S.
3-30" Ø D.S.
TEST HOLE No. 11
EL.= 967.09
Ret. Wall
TEST HOLE LEGEND
1. Clay, Brown, Soft
2. Clay, Red Brown, w/broken Limestone Frags, Stiff to Hard.
3. Limestone, Grey-White, Frac. Sl./Honeycomb, Hard.
4. Clay, Tan, w/Seams of Orange and Grey Cly. Fossiliferous, Stiff
5. Clay, Tan, sl/Shale, w/Seams of Orange & Grey Cly, Seams of Gysum, Fos, V/Stiff
6. Clay, Tan, w/Shaley, w/Seams of Orange & Grey Cly, Seams of Gypsum, Fos, Hard
7. Limestone, Tan, v/Chalky, Fos., w/Seams of Orange Clay, V/Hard.
8. Limestone, Grey-White, xln, Fract. w/tr of Orange Clay, Hard.
9. Clay, Tan, w/Layers of Calcar. Mat. w/Seams of Orange Cly. w/Trace Grey Cly Soft
10. Clay, Tan, Shaley, w/Trace of Orange and Grey Clay, Fossiliferous, Hard.
11. Caliche w/Clay Brown
12. Clay, Brown & Grey Stiff.
13. Limestone, Layers, Grey Very Hard, w/ Fossiliferous, w/Trace Clay, Very Hard.
92 (12")
100 (2 1/4")
100 (2")
87 (12")
72 (12")
66 (12")
100 (7 1/4")
100 (1 3/4")
100 (3/4")
100 (3/8")
A1
B2
B3
B4
A5
Test Hole No. 2A *
El. 962.49
38 (12")
94 (12")
91 (10 1/8")
95 (12")
100 (7 5/8")
100 (3 3/4")
100 (6 1/2")
100 (7 1/8")
100 (6")
100 (6")
100 (10")
100 (1 3/8")
100 (3/4")
SEE ESTIMATED QUANTITY SHEET FOR FOUNDATION DESIGN DATA.
ABUT. No. 4
ELEV. TOP BTM
DS1 960.94 931.66
DS2 961.33 932.46
DS3 961.43 932.46
TEST HOLE No. 12
EL.= 970.77
21 (12")
NO PIN
76 (12")
59 (12")
100 (9 1/8")
100 (2 3/4")
100 (4")
100 (3 7/8")
ABUT. No. 5
ELEV. TOP BTM
DS1 981.50 948.40
DS2 981.78 948.70
DS3 982.13 949.04
NWW 981.24 951.30
SWW 982.07 952.09
Robert E. Magats P.E.
9-20-90
Date
SCALE HORIZ 1" = 10'
VERT 1" = 10'
CRAIG F. STONG P.E.
DATE: 12/9/87
BRIDGE LAYOUT
LOOP 1604 OVERPASS
AT S.H. 16 (BANDERA RD.)
WESTBOUND MAINLANES
*TEST HOLE No. 2A
Data Taken From
S.H.-16 Project S217(5)
CSJ: 291-10-33
SHEET 1 OF 1 SHEETS
DRAWN GWG
CHECKED GAB
TRACED WJS
CHECKED CFS
FED. RD. DIV. NO. 6
STATE TEXAS
STATE DIST. NO. 15
COUNTY BEXAR
PROJECT NO.
CONTROL NO. 2452
SECTION NO. 02
JOB NO. 023
HIGHWAY NO. LP1604
SHEET NO. 190
275+00
276+00
277+00
ETC.

SUMMARY OF ESTIMATED QUANTITIES

DESCRIPTION \ ITEM	DRILLED SHAFTS 18"φ	DRILLED SHAFTS 30"φ	CLASS "C" CONCRETE ABUT.	CLASS "C" CONCRETE BENT	REINF. CONCRETE SLAB	PRESTR. CONC. BEAM (TYPE C)	CONCRETE SURFACE TREATM'T	RIPRAP (CONC) (CL. B)	SEALED EXP. JT. (3 IN.)	RAILING TY T-501
	L.F.	L.F.	C.Y.	C.Y.	S.F.	L.F.	S.Y.	C.Y.	L.F.	L.F.
ABUTMENT 1 & 5	120	222	53.6					260		52.0
BENT 2, 3, & 4		240		62.3						
DECK UNIT 1					11000	1642.03	1136		75	550.0
TOTAL	120	462	53.6	62.3	11000	1642.03	1136	260	75	602.0

BEARING SEAT ELEVATIONS

LOCATION		BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5	BEAM 6
ABUT 1	(FWD) ⊕	981.5053	981.6364	981.7675	981.8989	982.0300	982.1611
BENT 2	(BK) ⊕	982.1274	982.2588	982.3899	982.5212	982.6523	982.7837
	(FWD) ▽	982.0894	982.2205	982.3518	982.4829	982.6143	982.7454
BENT 3	(BK) ▽	982.8899	983.0215	983.1528	983.2844	983.4158	983.5474
	(FWD) ▽	982.9014	983.0330	983.1646	983.2959	983.4275	983.5591
BENT 4	(BK) ▽	983.5703	983.7024	983.8342	983.9661	984.0981	984.2300
	(FWD) ⊕	983.6318	983.7639	983.8958	984.0278	984.1597	984.2917
ABUT 5	(BK) ⊕	984.0451	984.1774	984.3098	984.4421	984.5747	984.7070

⊕ BEAMS LOWERED 1⅜" DUE TO EXCESS CAMBER & RDWY. PROFILE

▽ BEAMS LOWERED 2" DUE TO EXCESS CAMBER & RDWY. PROFILE

FOUNDATION DESIGN TABLE △

LOCATION	REF. ELEV.	LOAD (TONS)	SHAFT DIA. (IN.)	ALLOWABLE (TONS/SF) PT. BEARING	ALLOWABLE (TONS/SF) FRICTION	CALCULATED PT. BEARING (TONS)	CALCULATED FRICTION (TONS/FT)	CALCULATED MIN. PENETRATION (FT.)
ABUT 1	946	80	30	4.1	1.1	20.1	8.6	7
BENT 2	946	140	30	4.1	1.1	20.1	8.6	14
BENT 3	958	158	30	4.1	1.1	20.1	8.6	16
BENT 4	958	144	30	4.1	1.1	20.1	8.6	15
ABUT 5	958	84	30	4.1	1.1	20.1	8.6	8
WING WALL	—	10	18	—	—	—	—	—

△ NO BELLS REQUIRED.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS

LOOP 1604 OVERPASS AT S.H. 16 (BANDERA RD.) WESTBOUND MAINLANE ONLY

DATE:

STATE OF TEXAS — CRAIG FELTS STONG — 64845 — REGISTERED PROFESSIONAL ENGINEER

Craig F. Stong

CRAIG F. STONG P.E.
DATE: 12/9/89

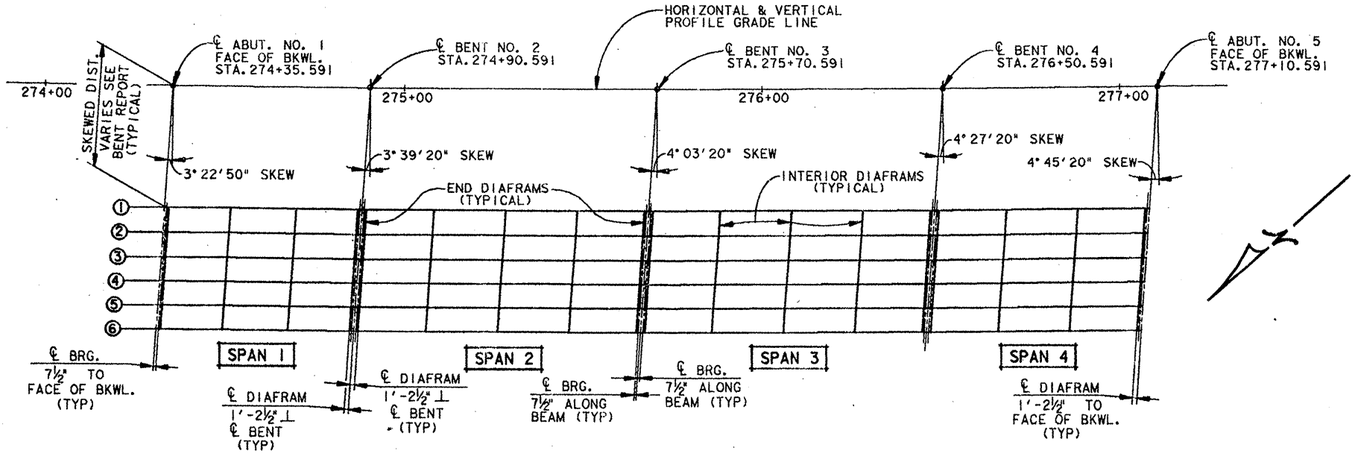
ORIGINAL DRAWING DATE: JULY 1989

		REVISIONS
DN.: CFS		
CK.: KK		
DW.: MRM		
CK.: CFS		

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #	SHEET
15	6		191

COUNTY	CONTROL	SECTION	JOB	HIGHWAY
BEXAR	2452	02	023	1604

ETC.



BENT REPORT
WESTBOUND MAINLANE
SPAN 1 (BK)

BEAM NO.	BEAM SPAC. (C.L. BENT)	BEAM ANGLE
1	0.0000	86° 29' 32.91"
2	6.8117	86° 29' 40.37"
3	6.8117	86° 29' 47.83"
4	6.8117	86° 29' 55.28"
5	6.8117	86° 30' 2.74"
6	6.8117	86° 30' 10.20"
TOTAL	34.0587	——

NOTE: SKEWED DISTANCE BETWEEN PROFILE GRADE LINE & WESTBOUND MAINLANE BEAM NO. 1 = 34.0591' (R)

BENT REPORT
WESTBOUND MAINLANE
SPAN 1 (FWD)

BEAM NO.	BEAM SPAC. (C.L. BENT)	BEAM ANGLE
1	0.0000	86 29 32.91
2	6.8137	86° 29' 40.37"
3	6.8137	86° 29' 47.83"
4	6.8137	86° 29' 55.28"
5	6.8137	86° 30' 2.74"
6	6.8137	86° 30' 10.20"
TOTAL	34.0687	——

NOTE: SKEWED DISTANCE BETWEEN PROFILE GRADE LINE & WESTBOUND MAINLANE BEAM NO. 1 = 34.0691' (R)

BENT REPORT
WESTBOUND MAINLANE
SPAN 2 (BK)

BEAM NO.	BEAM SPAC. (C.L. BENT)	BEAM ANGLE
1	0.0000	86° 9' 21.52"
2	6.8137	86° 9' 29.70"
3	6.8137	86° 9' 37.87"
4	6.8137	86° 9' 46.05"
5	6.8137	86° 9' 54.22"
6	6.8137	86° 10' 2.40"
TOTAL	34.0687	——

NOTE: SKEWED DISTANCE BETWEEN PROFILE GRADE LINE & WESTBOUND MAINLANE BEAM NO. 1 = 34.0691' (R)

BENT REPORT
WESTBOUND MAINLANE
SPAN 2 (FWD)

BEAM NO.	BEAM SPAC. (C.L. BENT)	BEAM ANGLE
1	0.0000	86° 9' 21.52"
2	6.8169	86° 9' 29.70"
3	6.8169	86° 9' 37.87"
4	6.8169	86° 9' 46.05"
5	6.8169	86° 9' 54.22"
6	6.8169	86° 10' 2.40"
TOTAL	34.0846	——

NOTE: SKEWED DISTANCE BETWEEN PROFILE GRADE LINE & WESTBOUND MAINLANE BEAM NO. 1 = 34.0851' (R)

BENT REPORT
WESTBOUND MAINLANE
SPAN 3 (BK)

BEAM NO.	BEAM SPAC. (C.L. BENT)	BEAM ANGLE
1	0.0000	85° 45' 25.80"
2	6.8169	85° 45' 34.83"
3	6.8169	85° 45' 43.85"
4	6.8169	85° 45' 52.88"
5	6.8169	85° 46' 1.91"
6	6.8169	85° 46' 10.94"
TOTAL	34.0846	——

NOTE: SKEWED DISTANCE BETWEEN PROFILE GRADE LINE & WESTBOUND MAINLANE BEAM NO. 1 = 34.0851' (R)

BENT REPORT
WESTBOUND MAINLANE
SPAN 3 (FWD)

BEAM NO.	BEAM SPAC. (C.L. BENT)	BEAM ANGLE
1	0.0000	85° 45' 25.80"
2	6.8204	85° 45' 34.83"
3	6.8204	85° 45' 43.85"
4	6.8204	85° 45' 52.88"
5	6.8204	85° 46' 1.91"
6	6.8204	85° 46' 10.94"
TOTAL	34.1022	——

NOTE: SKEWED DISTANCE BETWEEN PROFILE GRADE LINE & WESTBOUND MAINLANE BEAM NO. 1 = 34.1028' (R)

BENT REPORT
WESTBOUND MAINLANE
SPAN 4 (BK)

BEAM NO.	BEAM SPAC. (C.L. BENT)	BEAM ANGLE
1	0.0000	85° 24' 29.55"
2	6.8204	85° 24' 39.32"
3	6.8204	85° 24' 49.10"
4	6.8204	85° 24' 58.87"
5	6.8204	85° 25' 8.64"
6	6.8204	85° 25' 18.41"
TOTAL	34.1021	——

NOTE: SKEWED DISTANCE BETWEEN PROFILE GRADE LINE & WESTBOUND MAINLANE BEAM NO. 1 = 34.1028' (R)

BENT REPORT
WESTBOUND MAINLANE
SPAN 4 (FWD)

BEAM NO.	BEAM SPAC. (C.L. BENT)	BEAM ANGLE
1	0.0000	85° 24' 29.55"
2	6.8233	85° 24' 39.32"
3	6.8233	85° 24' 49.10"
4	6.8233	85° 24' 58.87"
5	6.8233	85° 25' 8.64"
6	6.8233	85° 25' 18.41"
TOTAL	34.1164	——

NOTE: SKEWED DISTANCE BETWEEN PROFILE GRADE LINE & WESTBOUND MAINLANE BEAM NO. 1 = 34.1171' (R)

DIAFRAM LOCATIONS
WESTBOUND MAINLANE
SPAN 1
C.L. BENT TO C.L. BENT

BM. NO.	DISTANCE TO		DISTANCE TO		DISTANCE TO	
	DIAPH.	BEAM END	DIAPH.	BEAM END	DIAPH.	BEAM END
1	18.3346	18.3346	18.3338	36.6684	18.3310	54.9993
2	18.3345	18.3345	18.3338	36.6683	18.3309	54.9992
3	18.3345	18.3345	18.3337	36.6682	18.3309	54.9991
4	18.3345	18.3345	18.3337	36.6681	18.3308	54.9990
5	18.3344	18.3344	18.3336	36.6680	18.3308	54.9988
6	18.3344	18.3344	18.3336	36.6680	18.3308	54.9987

DIAFRAM LOCATIONS
WESTBOUND MAINLANE
SPAN 2
C.L. BENT TO C.L. BENT

BM. NO.	DISTANCE TO		DISTANCE TO		DISTANCE TO		DISTANCE TO	
	DIAPH.	BEAM END	DIAPH.	BEAM END	DIAPH.	BEAM END	DIAPH.	BEAM END
1	20.0032	20.0032	20.0009	40.0041	19.9985	60.0026	19.9961	79.9988
2	20.0031	20.0031	20.0008	40.0040	19.9985	60.0025	19.9961	79.9986
3	20.0031	20.0031	20.0008	40.0039	19.9984	60.0023	19.9960	79.9983
4	20.0030	20.0030	20.0007	40.0038	19.9984	60.0022	19.9960	79.9981
5	20.0030	20.0030	20.0007	40.0037	19.9983	60.0020	19.9959	79.9979
6	20.0029	20.0029	20.0006	40.0036	19.9983	60.0018	19.9959	79.9977

DIAFRAM LOCATIONS
WESTBOUND MAINLANE
SPAN 3
C.L. BENT TO C.L. BENT

BM. NO.	DISTANCE TO		DISTANCE TO		DISTANCE TO		DISTANCE TO	
	DIAPH.	BEAM END	DIAPH.	BEAM END	DIAPH.	BEAM END	DIAPH.	BEAM END
1	20.0035	20.0035	20.0010	40.0045	19.9984	60.0028	19.9957	79.9985
2	20.0034	20.0034	20.0009	40.0043	19.9983	60.0026	19.9956	79.9983
3	20.0034	20.0034	20.0008	40.0042	19.9982	60.0024	19.9956	79.9980
4	20.0033	20.0033	20.0008	40.0041	19.9982	60.0022	19.9955	79.9978
5	20.0032	20.0032	20.0007	40.0039	19.9981	60.0020	19.9954	79.9975
6	20.0032	20.0032	20.0006	40.0038	19.9980	60.0019	19.9954	79.9972

DIAFRAM LOCATIONS
WESTBOUND MAINLANE
SPAN 4
C.L. BENT TO C.L. BENT

BM. NO.	DISTANCE TO		DISTANCE TO		DISTANCE TO	
	DIAPH.	BEAM END	DIAPH.	BEAM END	DIAPH.	BEAM END
1	20.0024	20.0024	19.9996	40.0020	19.9968	59.9988
2	20.0023	20.0023	19.9995	40.0019	19.9967	59.9986
3	20.0022	20.0022	19.9995	40.0017	19.9966	59.9983
4	20.0022	20.0022	19.9994	40.0016	19.9965	59.9981
5	20.0021	20.0021	19.9993	40.0014	19.9965	59.9979
6	20.0020	20.0020	19.9992	40.0012	19.9964	59.9976

BEAM REPORT - WESTBOUND MAINLANE

BM. NO.	SPAN 1				SPAN 2			
	HORIZ. DIST. C-C BENT	TRUE DIST. BOT. BM. FLANGE	BEAM SLOPE	BEAM BEARINGS	HORIZ. DIST. C-C BENT	TRUE DIST. BOT. BM. FLANGE	BEAM SLOPE	BEAM BEARINGS
1	54.9993	54.6697	0.01158	S 42° 3' 22.91" W	79.9988	79.6695	0.01017	S 41° 43' 11.52" W
2	54.9992	54.6695	0.01158	S 42° 3' 30.37" W	79.9986	79.6693	0.01017	S 41° 43' 19.70" W
3	54.9991	54.6694	0.01158	S 42° 3' 37.83" W	79.9983	79.6691	0.01017	S 41° 43' 27.87" W
4	54.9990	54.6693	0.01158	S 42° 3' 45.28" W	79.9981	79.6689	0.01018	S 41° 43' 36.05" W
5	54.9988	54.6692	0.01158	S 42° 3' 52.74" W	79.9979	79.6687	0.01018	S 41° 43' 44.22" W
6	54.9987	54.6691	0.01159	S 42° 4' 0.20" W	79.9977	79.6685	0.01018	S 41° 43' 52.40" W

BM. NO.	SPAN 3				SPAN 4			
	HORIZ. DIST. C-C BENT	TRUE DIST. BOT. BM. FLANGE	BEAM SLOPE	BEAM BEARINGS	HORIZ. DIST. C-C BENT	TRUE DIST. BOT. BM. FLANGE	BEAM SLOPE	BEAM BEARINGS
1	79.9985	79.6681	0.00849	S 41° 19' 15.80" W	59.9988	59.6669	0.00703	S 40° 58' 19.55" W
2	79.9983	79.6678	0.00850	S 41° 19' 24.83" W	59.9986	59.6667	0.00704	S 40° 58' 29.32" W
3	79.9980	79.6676	0.00850	S 41° 19' 33.85" W	59.9983	59.6665	0.00704	S 40° 58' 39.10" W
4	79.9978	79.6673	0.00851	S 41° 19' 42.88" W	59.9981	59.6662	0.00705	S 40° 58' 48.87" W
5	79.9975	79.6670	0.00852	S 41° 19' 51.91" W	59.9979	59.6660	0.00706	S 40° 58' 58.64" W
6	79.9972	79.6668	0.00852	S 41° 20' 0.94" W	59.9976	59.6658	0.00707	S 40° 59' 8.41" W

NOTE: TRUE DISTANCE BOTTOM BEAM FLANGE ARE ACTUAL BOTTOM FLANGE LENGTH WITH ADJUSTMENT MADE FOR BEAM SLOPE

INT. DIAFRAM
WESTBOUND MAINLANE
SPAN 1

BEAMS	LENGTH DIAFRAM 1	LENGTH DIAFRAM 2
1 - 2	6.8124	6.8131
2 - 3	6.8124	6.8131
3 - 4	6.8124	6.8131
4 - 5	6.8124	6.8131
5 - 6	6.8124	6.8131

INT. DIAFRAM
WESTBOUND MAINLANE
SPAN 2

BEAMS	LENGTH DIAFRAM 1	LENGTH DIAFRAM 2	LENGTH DIAFRAM 3
1 - 2	6.8145	6.8153	6.8161
2 - 3	6.8145	6.8153	6.8161
3 - 4	6.8145	6.8153	6.8161
4 - 5	6.8145	6.8153	6.8161
5 - 6	6.8145	6.8153	6.8161

INT. DIAFRAM
WESTBOUND MAINLANE
SPAN 3

BEAMS	LENGTH DIAFRAM 1	LENGTH DIAFRAM 2	LENGTH DIAFRAM 3
1 - 2	6.8178	6.8187	6.8196
2 - 3	6.8178	6.8187	6.8196
3 - 4	6.8178	6.8187	6.8196
4 - 5	6.8178	6.8187	6.8196
5 - 6	6.8178	6.8187	6.8196

INT. DIAFRAM
WESTBOUND MAINLANE
SPAN 4

BEAMS	LENGTH DIAFRAM 1	LENGTH DIAFRAM 2
1 - 2	6.8214	6.8223
2 - 3	6.8214	6.8223
3 - 4	6.8214	6.8223
4 - 5	6.8214	6.8223
5 - 6	6.8214	6.8223

GENERAL NOTES:

1) ALL BENTS, ABUTMENTS AND DIAFRAMS ARE ON A BEARING OF N 44° 26' 10" W.
2) ALL DISTANCES SHOWN ARE IN A HORIZONTAL PLANE.
3) ALL DISTANCES SHOWN ARE FROM FACE OF ABUTMENT BACKWALL TO ℄ INTERIOR DIAFRAM TO ℄ INTERIOR BENT.
4) ALL DIAFRAM LENGTH ARE FROM ℄ TO ℄ OF BEAMS.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

BEAM & DIAFRAM LAYOUT

LOOP 1604 OVERPASS AT S.H. 16 (BANDERA RD.) WESTBOUND MAINLANE ONLY

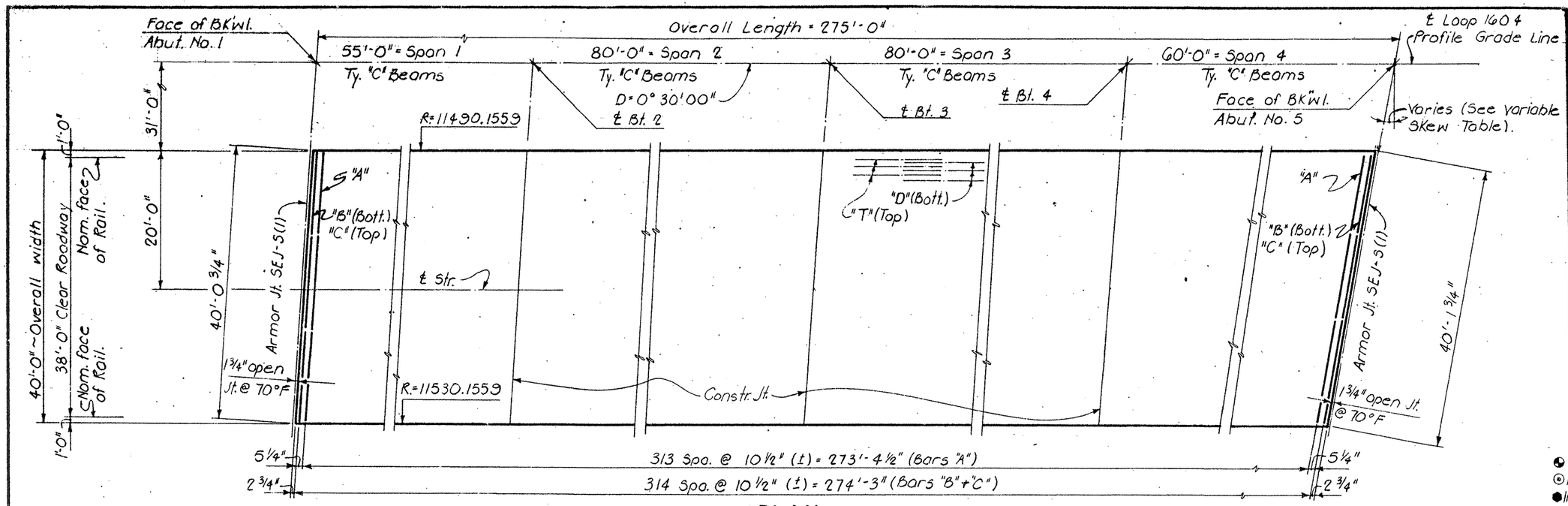
DATE:

STATE OF TEXAS — CRAIG FELTS STONG 54845 — REGISTERED PROFESSIONAL ENGINEER

CRAIG F. STONG P.E.
DATE: 12/9/89

ORIGINAL DRAWING DATE: JUNE 1989			STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #			SHEET
DN.: CFS	REVISIONS		15	6				192
CK.: KK	- -		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DW.: MRM	- -		BEXAR		2452	02	023	L1604
CK.: CFS	- -							

ETC BANDERA.DGN

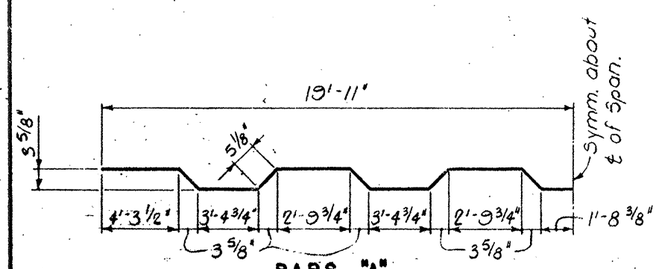


PLAN

(W'BD. MAINLANE)

ESTIMATED QUANTITIES (ONE MAINLANE UNIT ONLY)					
BAR	NO.	SIZE	SPA.	LENGTH	
A	314	#5	Shn.	41'-1"	12,903
B	315	#4	Shn.	39'-10"	8,379
C	315	#5	Shn.	39'-10"	13,031
D	41	#5	Shn.	280'-2" ⊙	11,501
DK1	160	#5	Shn.	5'-4"	890
DK2	200	#5	Shn.	5'-4"	1,113
DN	18	#8	Shn.	35'-0"	1,682
DS1	240	#4	Shn.	4'-10"	775
DS2	300	#4	Shn.	4'-6"	902
T	43	#4	Shn.	279'-2" ●	8019
REINFORCING STEEL				◐ LBS.	60,280
CL. "C" CONC. (SLAB)				◐ C.Y.	283.9
REINF. CONC. SLAB				S.F.	11,000
PRESTR. CONC. BM. (TY. C)				L.F.	1,642.03
CONC. SURF. TREAT.				S.Y.	1,136
SEALED EXP. JT. (3 IN.)				L.F.	75.4

◐ For Contractors info. only.
⊙ Includes (4) Four 1'-5" Min. Lap.
● Includes (4) Four 1'-2" Min. Lap.



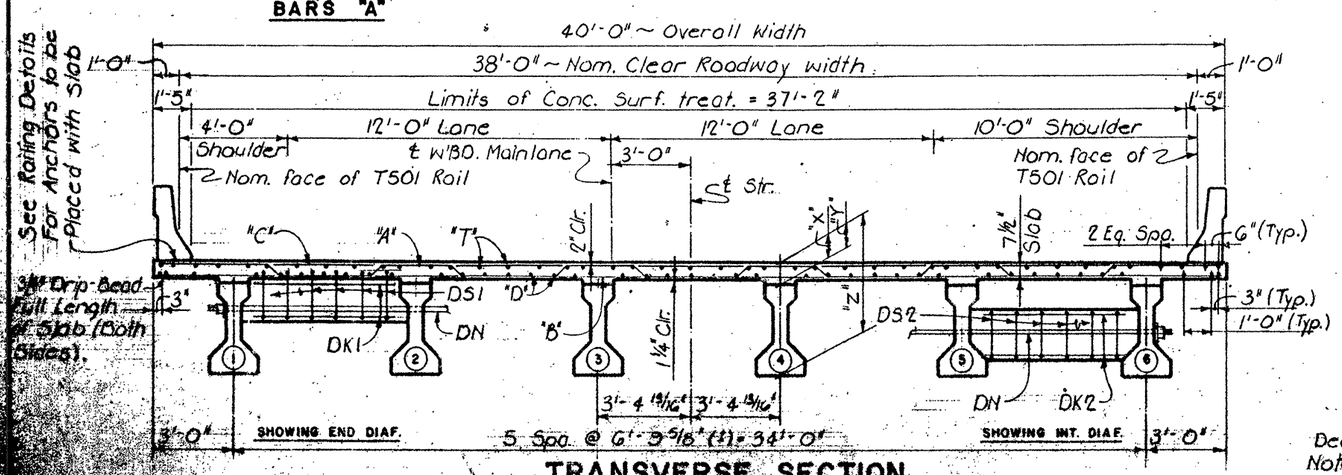
BARS "A"

SECTION DEPTH TABLE				
SPAN NO.	BEAM NO.	AT ℄ BRG. "X"	AT MID SPAN "Y" ✥	AT ℄ BRG. "Z"
1 + 4	1-6	8 7/8"	8"	4'-0 7/8"
2 + 3	1-6	9 1/2"	8"	4'-1 1/2"

✥ Theoretical Dimensions

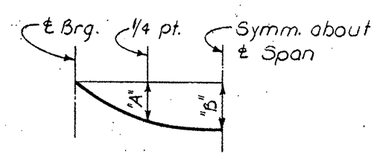
VARIABLE SKEW	
LOCATION	SKEW
Abut. 1	3° 22' 49.61"
Bent 2	3° 39' 19.61"
Bent 3	4° 03' 19.61"
Bent 4	4° 27' 19.61"
Abut. 5	4° 45' 19.61"

Note: See Beam & Diafram Layout Sheet for dimensions, actual beam lengths, spacing, Slopes, bearings, Diafram Locations, & Length.



TRANSVERSE SECTION

WESTBOUND MAINLANE
(LOOKING STATIONWISE)



SPAN	"A"	"B"
1	.0201	.0282
2 + 3	.0843	.1183
4	.0287	.0402

Dead Load Deflection Diagram
Note: Deflections shown are due to Cast-in-place Concrete only. ($E = 5 \times 10^6$ p.s.i.).

GENERAL NOTES

Design: HS 20 Loading in accordance with A.A.S.H.T.O. 1983 Std. Spec's. and interim Revisions.
All Concrete Shall be class "S."
Design: $f'c = 1{,}200$ P.S.I.
Chamfer all exposed edges 3/4" unless otherwise noted.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

DECK DETAIL

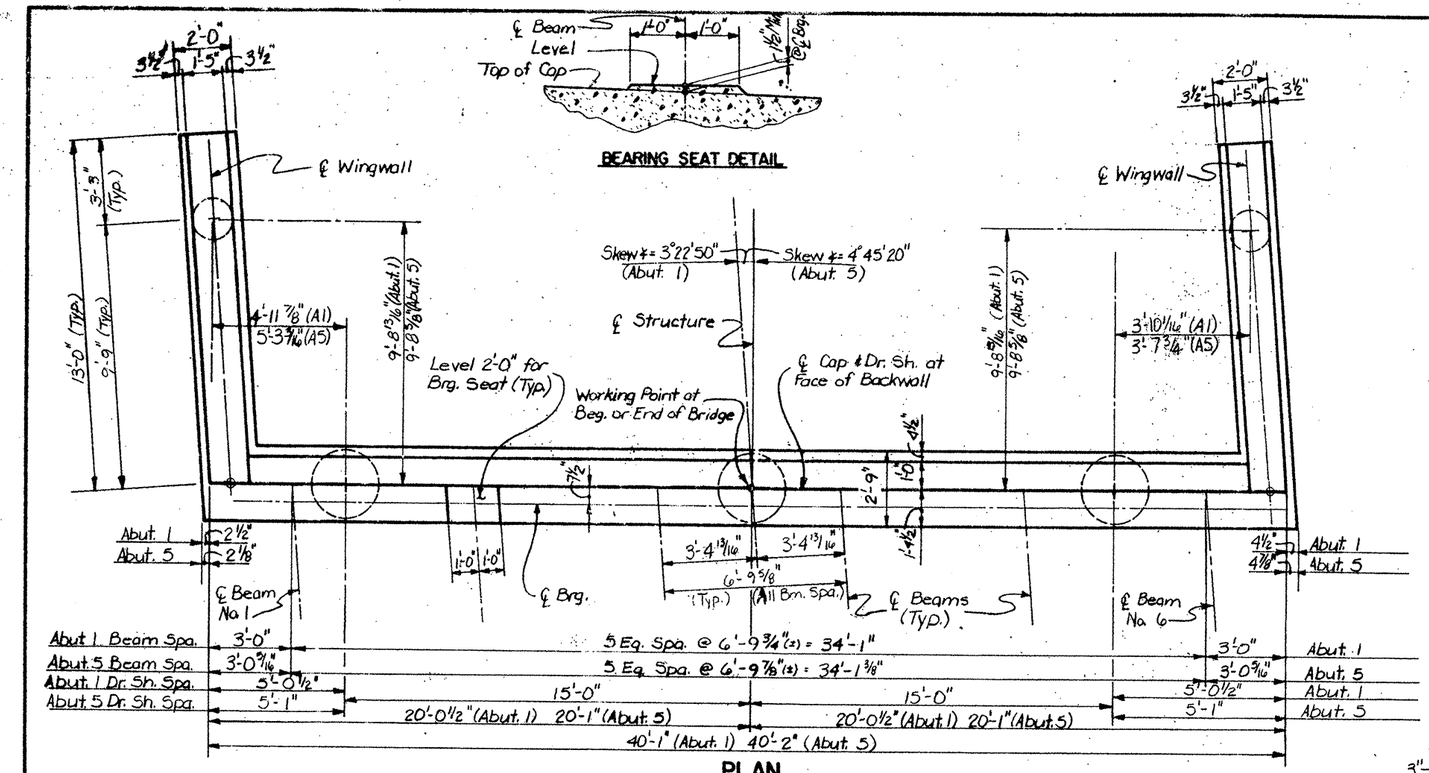
LOOP 1604 OVERPASS AT S.H. 16 (BANDERA RD.) WESTBOUND MAINLANES

DATE:

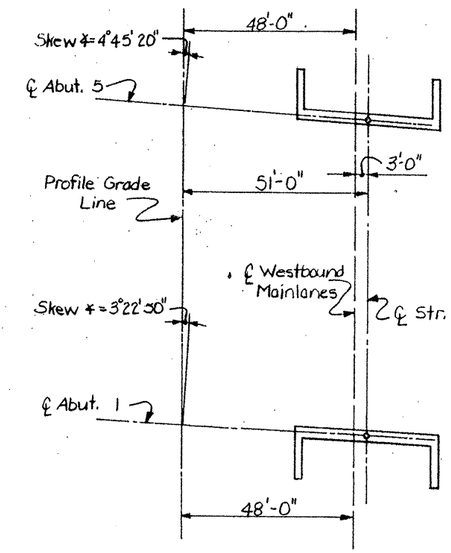
STATE OF TEXAS — CRAIG FELTS STONG 54845 — REGISTERED PROFESSIONAL ENGINEER

CRAIG F. STONG P.E.
DATE: 12/9/89

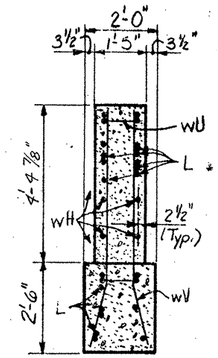
025



PLAN
(LOOKING STATIONWISE - ABUT. 5)
(LOOKING BACKSTATION - ABUT. 1)



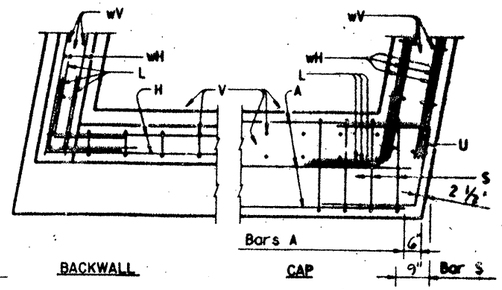
ABUTMENT LAYOUT



SEC. B-B

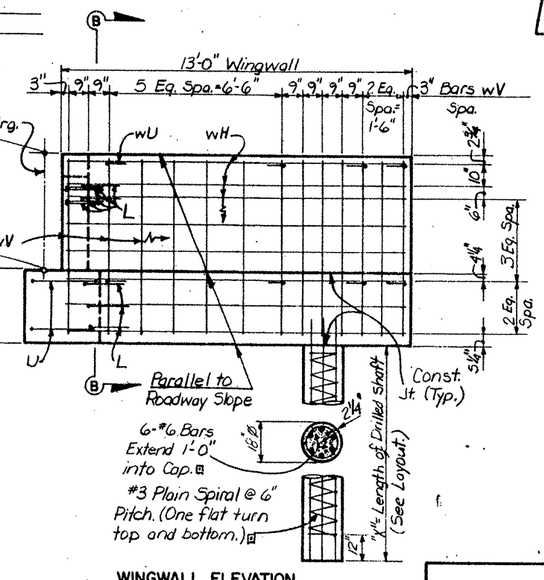
ESTIMATED QUANTITIES (FOR ONE ABUTMENT)				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	7	#11	39'-2"	1457
H	10	#5	39'-10"	415
L	18	#6	4'-0"	108
S	50	#5	9'-8"	504
T	1	#5	39'-2"	41
U	4	#6	7'-8"	46
V	38	#5	11'-7"	459
wH	32	#6	12'-9"	613
wU	16	#4	2'-0"	21
wV	52	#5	6'-6"	353
REINF. STEEL			* LBS	4017
CL. C CONC. (Abut.)			C.Y.	26.8

* For Contractor's Information Only.

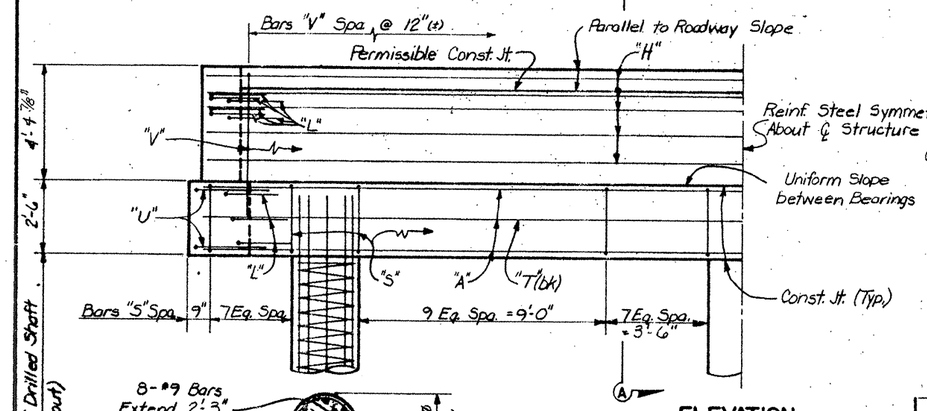


BACKWALL CAP

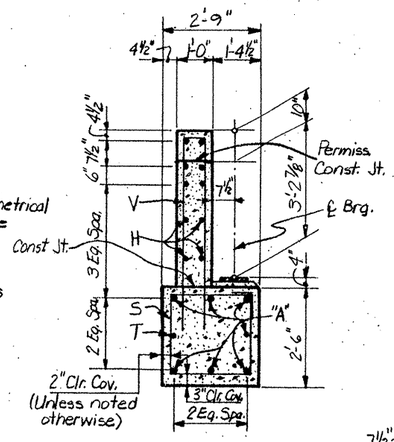
CORNER DETAILS



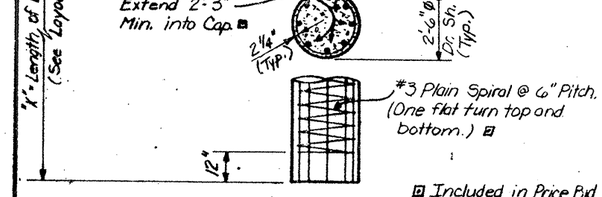
WINGWALL ELEVATION



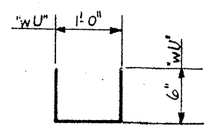
ELEVATION



SEC. A-A



Included in Price Bid for Drilled Shafts.



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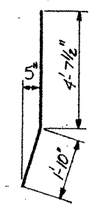

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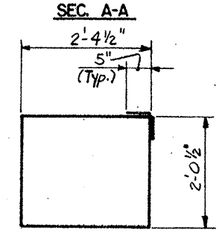

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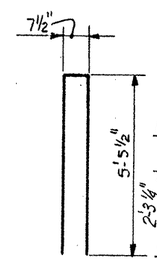

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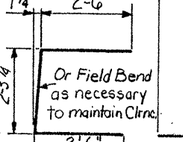

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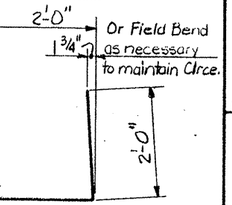


BARS "L"

DATE:

STATE OF TEXAS
CRAIG FELTS STONG
54845
REGISTERED PROFESSIONAL ENGINEER

Craig F. Stong
CRAIG F. STONG, P.E.
DATE: 12/9/89

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

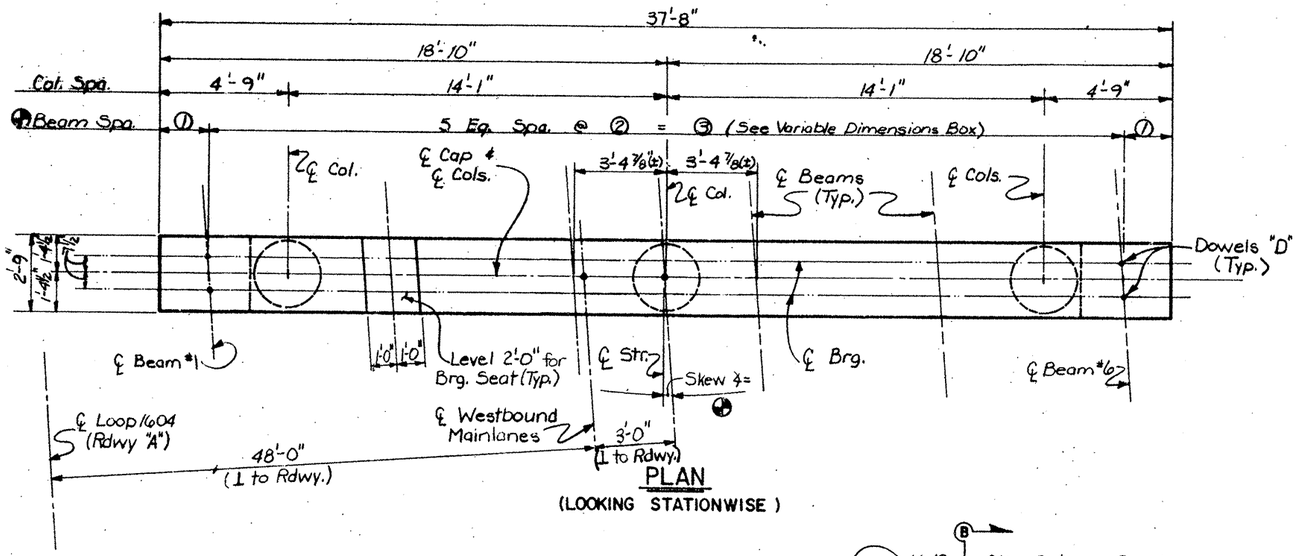
ABUTMENT DETAILS

ABUTMENT Nos. 1 & 5

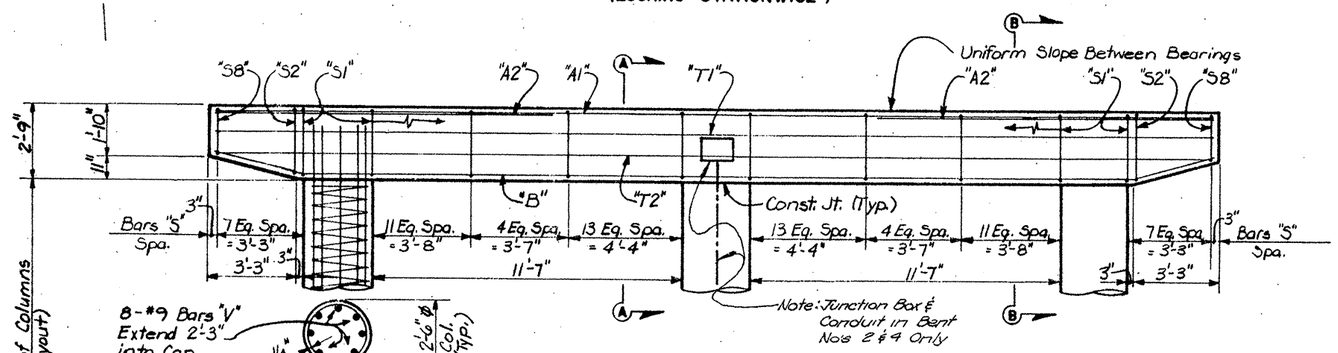
LOOP 1604 OVERPASS AT S.H. 16 (BANDERA RD.)

WESTBOUND MAINLANES

DR. CFS	DRAWING	DATE	FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
CK. DR. KK	ORIG.	SEPT. 1989	6	TEXAS		169
DW. WJS						
CK. DW. CFS			STATE DIST. NO.	COUNTY	CONTROL NO. / SECTION NO. / JOB NO.	HIGHWAY NO.
TR.			15	BEXAR	2452 / 02 / 023	LP1604
CK. TR.						

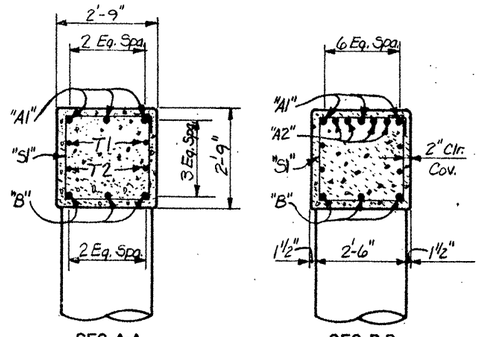


PLAN
(LOOKING STATIONWISE)



■ Included in Price Bid for Drilled Shaft.

ELEVATION

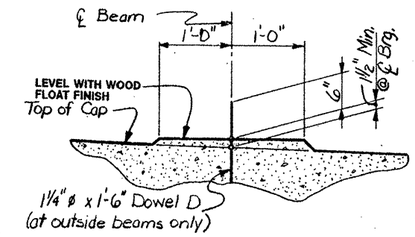


SEC A-A

SEC B-B

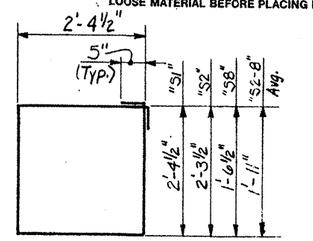
VARIABLE DIMENSIONS ◕

LOCATION	SKEW	①	②	③
BENT 2	3° 39' 20"	1'-9 5/8"	6'-9 3/4"(±)	34'-0 3/4"
BENT 3	4° 03' 20"	1'-9 1/2"	6'-9 13/16"(±)	34'-1"
BENT 4	4° 27' 20"	1'-9 5/16"	6'-9 7/8"(±)	34'-1 3/8"

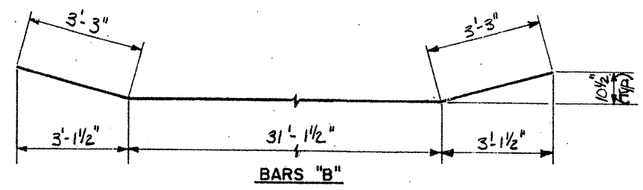


BEARING SEAT DETAIL

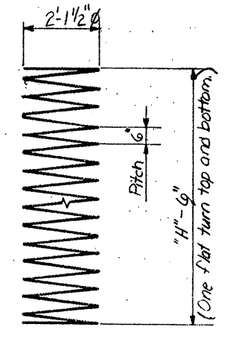
BEARING SURFACE SHALL BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.



BARS "S"



BARS "B"



BARS "Z"

ESTIMATED QUANTITIES
(FOR ONE INTERIOR BENT CAP)

BAR	NO.	SIZE	LENGTH	WEIGHT
A1	3	#11	37'-5"	596
A2	8	#10	12'-6"	430
B	3	#11	37'-8"	600
D	4	1 1/4" ø	1'-6"	25
S1	60	#5	10'-4"	647
S2-8	14	#5	9'-5" ◕	138
T1	2	#5	37'-5"	78
T2	2	#5	37'-5"	78
REINF. STEEL			* LBS	2592
CL. C CONC. (Bent)			CY	10.2

* For Contractor's Information Only.
◕ Average Length of Bars.

VARIABLE QUANTITIES
(FOR 3-30" ø ROUND COLUMNS)

"H"	BARS "Z" 3-#3 PLAIN SPIRAL		BARS "V" 24-#9 BARS		REINF. STEEL TOTAL	CL. C CONC. (BENT)
Ft.	Length	Weight *	Length	Weight *	Lbs. *	C.Y.
18	248'	280	20'-3"	1652	1932	9.8
19	261'	294	21'-3"	1734	2028	10.4
20	274'	309	22'-3"	1816	2125	10.9
21	288'	325	23'-3"	1897	2222	11.5
22	301'	340	24'-3"	1979	2319	12.0
23	315'	355	25'-3"	2060	2415	12.5

GENERAL NOTES:

Design: HS-20 Loading in accordance with A.A.S.H.T.O. 1983 Standard Spec's and interim revisions thereto.
All concrete for Cap and Columns shall be class "C".
All reinf. steel for Cap and Columns shall be Gr. 60.
All concrete for Drilled Shafts shall be class "A."
All reinf. steel for Drilled Shafts shall be Gr. 40.
Design fc = 1440 p.s.i.
Chamfer all exposed edges 3/4" unless noted otherwise.
Avg. Calc. Load Bent 2 = 140 Tons/ps.
Avg. Calc. Load Bent 3 = 158 Tons/p.s.
Avg. Calc. Load Bent 4 = 144 Tons/ps.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

INTERIOR BENT DETAILS
BENT No. 2, 3 & 4

LOOP 1604 OVERPASS AT S.H. 16 (Bandera Rd.)

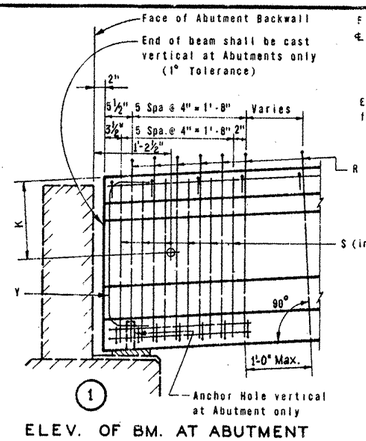
WESTBOUND MAINLANES

DATE:

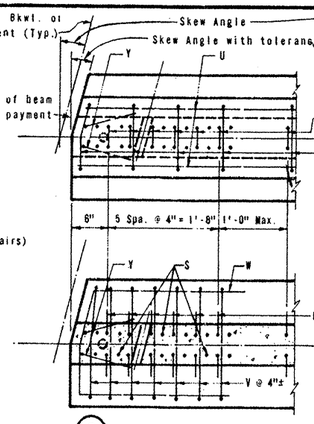
STATE OF TEXAS — CRAIG FELTS STONG 54845 — PROFESSIONAL ENGINEER

Craig F. Stong
CRAIG F. STONG, P.E.
DATE: 12/9/89

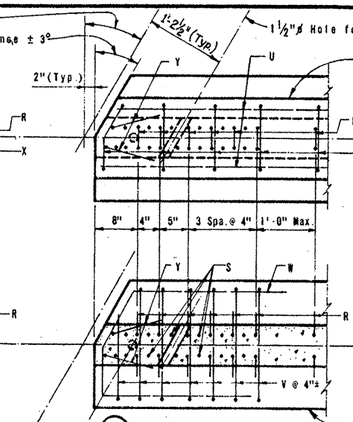
DSN. : CFS	DRAWN: ORIGINAL	DATE: AUG. 1989	FED. ROAD DIV. NO. 6	STATE TEXAS	ROADWAY AND PROJECT NO.	SHEET NO. 19
CK. DSN.: KK						
RDW. : MJS						
CK. DW.: CFS						
TR. :			HIGHWAY NO. 15	COUNTY BEXAR		
CK. TR. :						



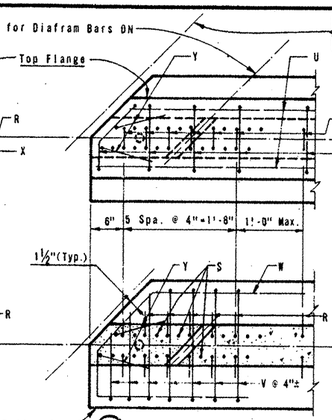
1 ELEV. OF BM. AT ABUTMENT



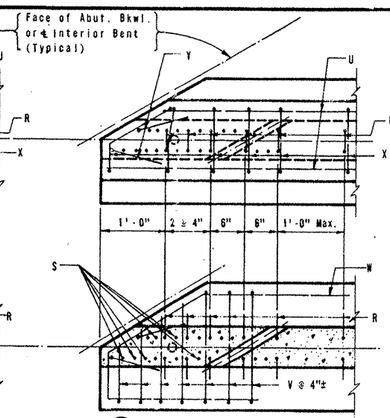
2 PLAN - 15° SKEW



3 PLAN - 30° SKEW



4 PLAN - 45° SKEW

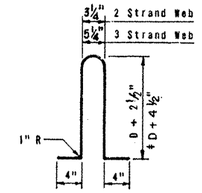


5 PLAN - 60° SKEW

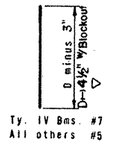
NOTE:
Reinforcing patterns shown above are to be used as guides in determining the reinforcement for the actual beam type and skew angle used. In general, the distances between consecutive Bars R and or S shall be 2". This spacing may be varied in order to avoid diafram holes, however, a minimum cross sectional area equivalent to that of Bars R and S in square beam end shall be provided.

DETAILS OF SKEWED BEAM ENDS

NOTE:
It is permissible for bars or strands to come in contact with materials used in forming anchor and diafram holes.

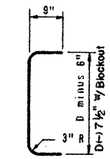


BARS R ~ #3



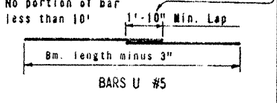
Ty. IV Bms. #7
All others #5

BARS S

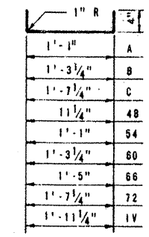


BARS Y ~ #8

Splices permitted (40' Min. C C Splices)
No portion of bar less than 10'

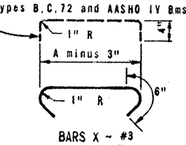


BARS U #5

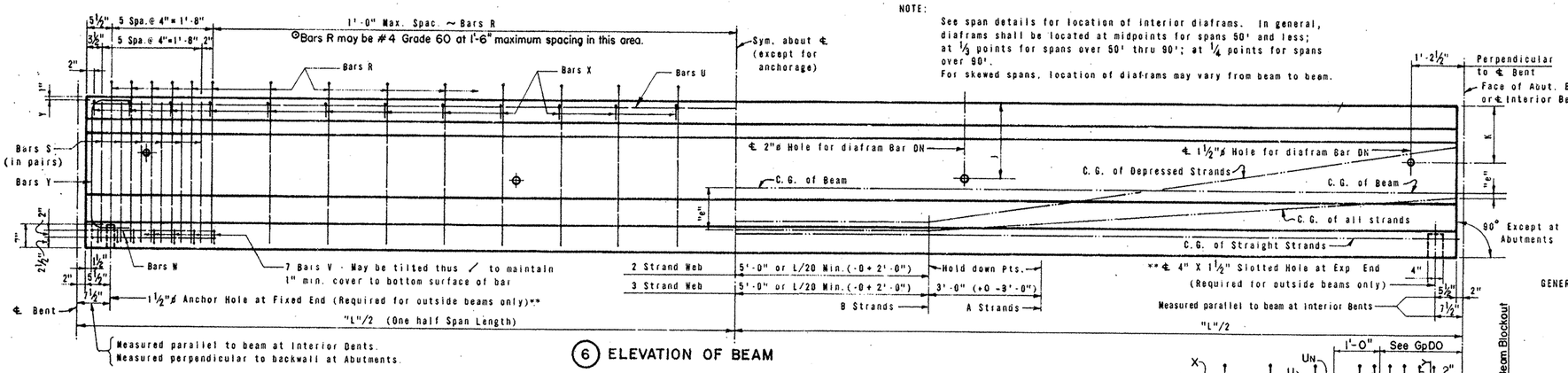


BARS V ~ #3

Optional fabrication (Applies to Types B,C,72 and AASHO IV Bms. only)



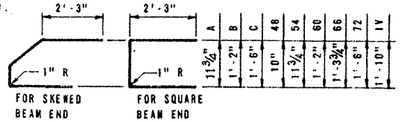
BARS X ~ #3



6 ELEVATION OF BEAM

NOTE:
See span details for location of interior diaframs. In general, diaframs shall be located at midpoints for spans 50' and less; at ⅓ points for spans over 50' thru 90'; at ¼ points for spans over 90'.
For skewed spans, location of diaframs may vary from beam to beam.

NOTE: Width tolerance for Bars V = ±1/4"



BARS W ~ #5

NOTE: All reinforcing bars for beams shall be ASTM Grade 60 steel.

GENERAL NOTES:

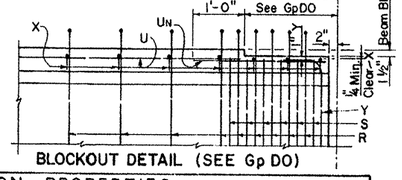
Designed in accordance with current A.A.S.H.O. Specifications.

All concrete shall be Class H.

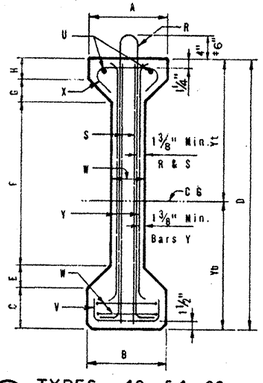
Bottom corners of all beam flanges and outside corners of exterior beam ends shall be chamfered ¾" or rounded to a ¾" radius.

The use of diafram holes for lifting purposes will not be permitted.

** NOTE: Anchorage holes may be tapered (4¾" x 1⅝" Exp End) (1⅝" Fixed End) at base. If holes are formed with sheet metal, forms may be left in place. Holes at fixed end may extend full depth of beam. Plug top or fill with asphalt mastic. At the option of the Fabricator, inside beams may be furnished with anchor holes.

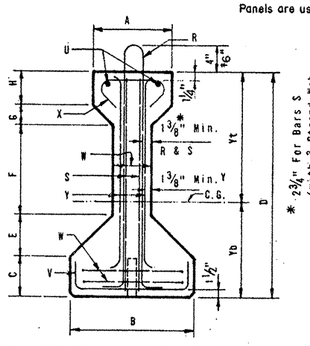


BLOCKOUT DETAIL (SEE Gp DO)



7 TYPES 48, 54, 60, 66 & 72 BEAMS

* If Prestressed Concrete Panels are used.



8 TYPES A, B, C, & A.A.S.H.O. IV BMS.

BEAM DIMENSIONS AND SECTION PROPERTIES

BEAM TYPE	A IN.	B IN.	C IN.	D IN.	E IN.	F IN.	G IN.	H IN.	J IN.	K IN.	W IN.	Yt IN.	Yb IN.	AREA IN.²	I IN.⁴	WT. P.L.F. LB.
A	12	16	5	28	5	11	3	4	13	15	6	15.39	12.61	275.4	22.658	287
B	12	18	6	34	5¾	14	2¾	5½	17	15	6½	19.07	14.93	360.3	43.177	375
C	14	22	7	40	7½	16	3½	6	21	15	7	22.91	17.09	494.9	82.602	516
48	14	14	7	48	4	29½	4	3½	31	15	6	25.13	22.87	403.4	101.950	420
54	16	16	8	54	5	32	5	4	35	15	6	28.47	25.53	493.4	164.022	514
60	18	18	9	60	5½	35½	5½	4½	39	15	7	31.59	28.41	628.4	255.319	655
66	20	20	10	66	6½	38	6½	5	43	15	7	34.93	31.07	740.9	374.688	772
72	22	22	11	72	7½	40½	7½	5½	47	15	7	38.27	33.73	863.4	532.060	899
IV	20	26	8	54	9	23	6	8	33	18	8	29.25	24.75	788.4	260.403	821

Tolerance for Dimensions J & K = (+½"; -1")
(Same tolerance to be applied to all holes for a given diafram Bar DN)

*Rev. 2-86

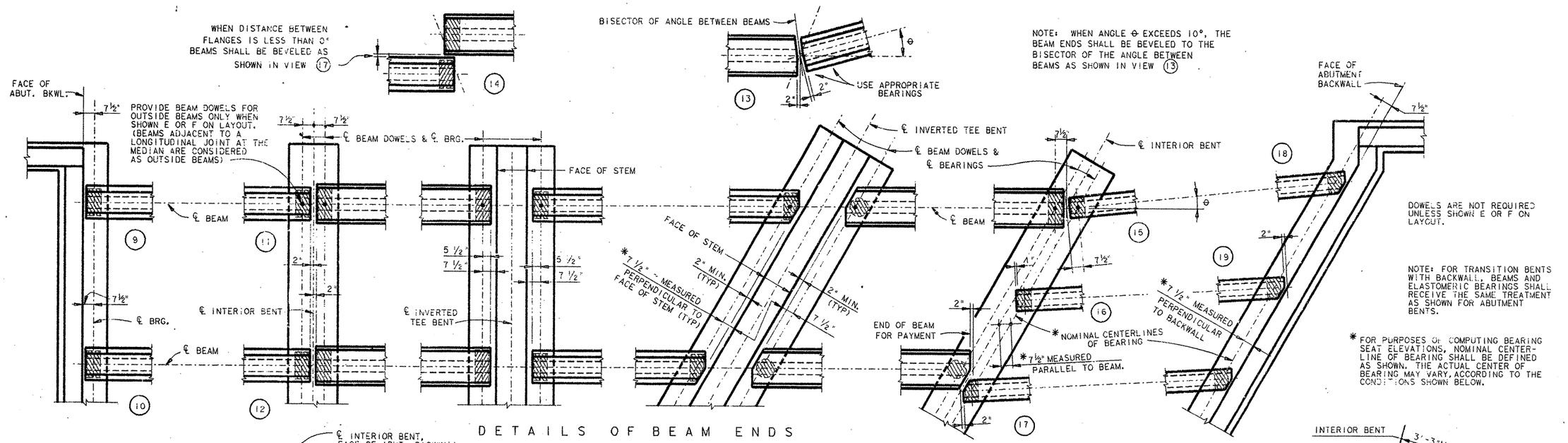
TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

PRESTRESSED CONCRETE BEAMS

BEAM DETAILS

GpA

ORIGINAL DRAWING DATE: April 1971	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.:- THD ⊙ REVISIONS	15	6		196
CK.:- THD 12-21-78 Bars R.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DW.:- RNS 4-30-82 Added Blockout Detail	BEXAR	2452	02	023	L1604
CK.:- HJD ▽BARS S(4½" W/Blockout)					



NOTE: BASIC BEARINGS ARE TO BE USED FOR SQUARE BEAM ENDS AND FOR MODERATELY SKEWED BEAM ENDS AS COVERED IN CONDITION (20). HOLES IN BEARINGS FOR SQUARE BEAMS SHALL BE CENTERED IN PAD.

DETAILS OF ELASTOMERIC BEARINGS

BASIC BEARINGS

BM. TYPE	SIZE, THICKNESS "T" & DESCRIPTION	
A	8" X 14" X 2½"	LAMINATED
B	8" X 16" X 2½"	LAMINATED
C	9" X 19" X 2½"	LAMINATED
54	9" X 14" X 2½"	LAMINATED
72	9" X 20" X 2½"	LAMINATED
IV	9" X 22" X 2½"	LAMINATED

BEARINGS FOR BEVELED BEAM ENDS

BM. TYPE	CONDITION (20)	CONDITION (21)	CONDITION (22)	CONDITION (23)	CONDITION (24)
A	0° THRU 20°	20°+ THRU 30°	OVER 30°	N/A	N/A
B	0° THRU 15°	15°+ THRU 30°	30°+ THRU 55°	OVER 55°	N/A
C	0° THRU 10°	10°+ THRU 20°	20°+ THRU 50°	OVER 50°	N/A
54	0° THRU 10°	10°+ THRU 25°	OVER 25°	N/A	N/A
72	0° THRU 10°	N/A	N/A	N/A	OVER 10°
IV	0° THRU 8°	N/A	N/A	N/A	OVER 8°

SKEW ANGLE OF BEAM END

The seal appearing on this document was authorized by Jerome A. Quintero, P.E. 49648, on 9/4/91

STATE OF TEXAS — JEROME A. QUINTERO — 49648 — REGISTERED PROFESSIONAL ENGINEER

GENERAL NOTES:

BEAMS SHALL BE SEATED ON ELASTOMERIC BEARINGS OF THE DIMENSIONS SHOWN.

BEARINGS SHALL BE FURNISHED WITH THEIR THICKNESS VARYING IN ONE DIRECTION DEPENDING ON THE SLOPE OF THE ERECTED BEAM.

CONSTANT THICKNESS BEARINGS MAY BE USED FOR MODERATE BEAM SLOPES IF THE VARIATION IS WITHIN THE ALLOWABLE DIMENSIONAL TOLERANCES GIVEN IN THE SPECIFICATIONS.

COST OF FURNISHING AND INSTALLING ELASTOMERIC BEARINGS SHALL BE INCLUDED IN UNIT PRICE BID FOR "PRESTRESSED CONCRETE BEAMS".

HS 20 LOADING

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

PRESTRESSED CONCRETE BEAMS

BEAM ENDS AND BEARINGS

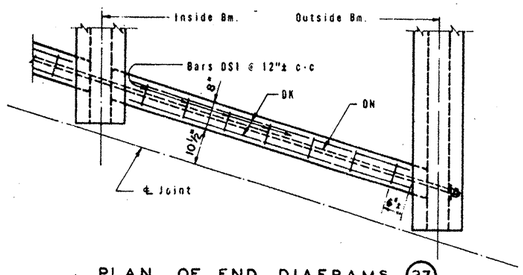
GpB-3 (MOD)

D15785A: QSA5: C3171703GPB-3.DGN

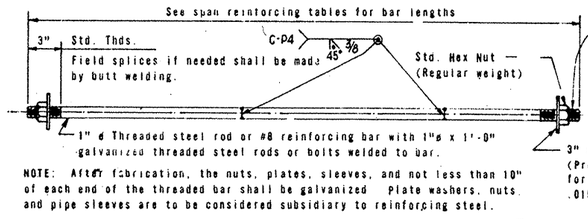
ORIGINAL DRAWING DATE: AUG 1991	REVISIONS: MOD. DIST. ℄ BRGS. = 7½" BY L.A.S. 8-20-91	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
DN:- THD		15	6			197
CK:- THD		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DW:- AS / DRG		BEXAR		2452	02	023	LP:604
CK:- RLR/ JCC							

PREPARED BY AND FOR USE OF TEXAS SDH&PT

ETC

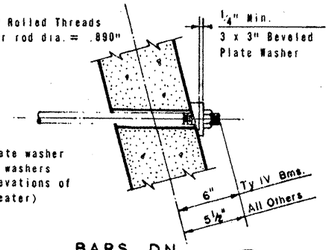


PLAN OF END DIAFRAMS (27)



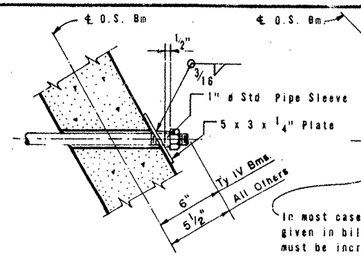
NOTE: After fabrication, the nuts, plates, sleeves, and not less than 10" of each end of the threaded bar shall be galvanized. Plate washers, nuts, and pipe sleeves are to be considered subsidiary to reinforcing steel.

BARS DN (FOR NORMAL DIAFRAMS) (32)

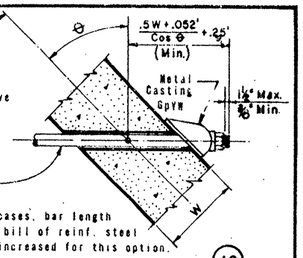


BARS DN (SKEWS THRU. 15°) (33)

NOTE: See span details for skew angles of diaframs to beams.



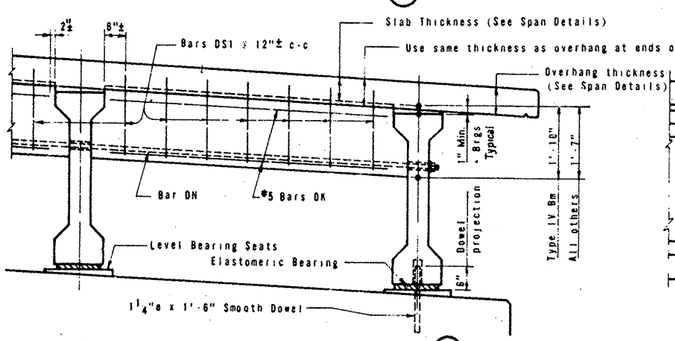
BARS DN (SKEWS OVER 15°) (34)



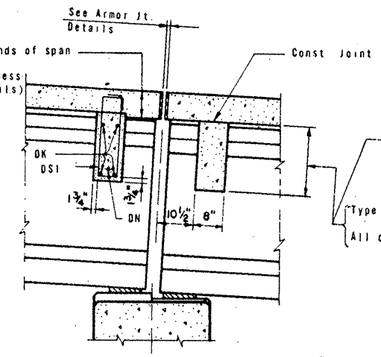
In most cases, bar length given in bill of reinf. steel must be increased for this option.

BARS DN WITH OPTIONAL CASTING FOR ALL SKEWS (40)

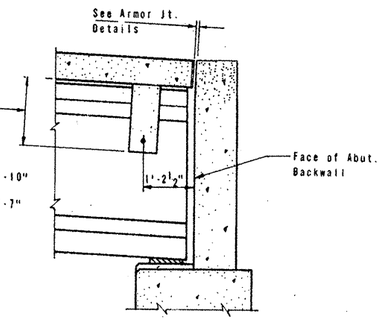
NOTE: Details of metal casting Gp YW are available upon request from the Texas Highway Department. No additional payment will be made for castings or extra bar length furnished under this option. Castings are to be considered subsidiary to reinforcing steel.



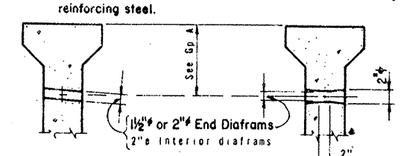
ELEVATION ~ END DIAFRAMS (28)



SEC. THRU. END DIAFRAMS (29)

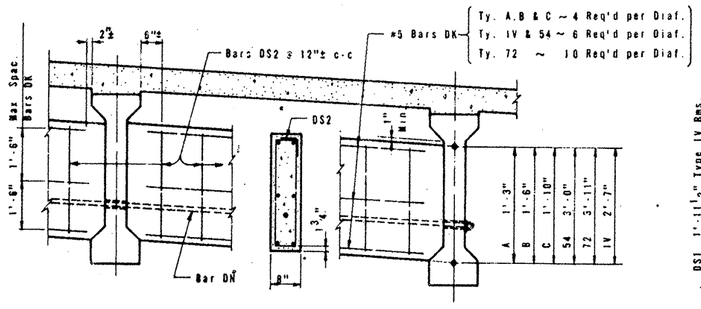


SEC. THRU. STRUCTURE AT ABUTMENT (36)

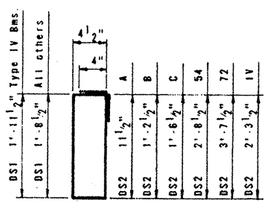


Form holes parallel to roadway slope if superelevation is greater than .03 ft/ft for 1½"ø Holes or .06 ft/ft for 2"ø Holes.

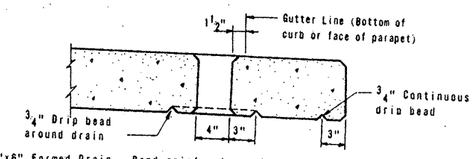
DIAFRAM HOLE DETAILS (35)



ELEV. ~ INTERIOR DIAFRAMS (30)

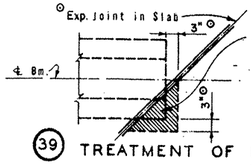


#4 BARS DS1 & DS2



4"x6" Formed Drain. Bend reinforcing steel to clear drain 1". Drains if any shall be located as directed by the Engineer. No drains shall be placed over railroad tracks or roadways.

DRAIN DETAILS (37)



NOTE: Where corners of beam flanges project under slab of adjacent span, care shall be taken to provide a minimum of ½" clearance between top of beam and bottom of adjacent slab. Polystyrene or other suitable compressible material may be used as a filler

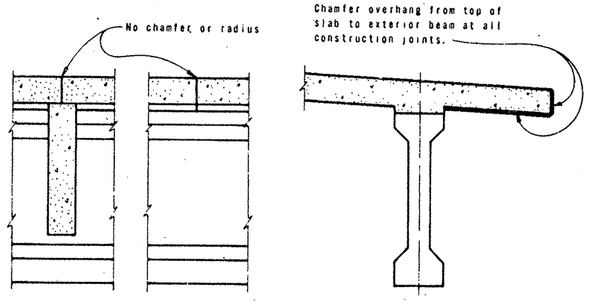
(39) TREATMENT OF BM. END FOR SKEWED SPANS

GENERAL NOTES:

Designed in accordance with current A.A.S.H.O. Specifications.

All cast in place concrete shall be Class C unless otherwise shown on span details.

No concrete shall be placed in the bridge slab until the diaframs are in place, the diafram concrete has reached a minimum flexural strength of 300 p.s.i. and the nuts of Bars DN have subsequently been firmly tightened.



CONSTRUCTION JOINT DETAIL (38)

To be located as shown on the Span details.

Jerome Anthony Quinton, P.E.
9/4/91

STATE OF TEXAS
JEROME ANTHONY QUINTON
46648
REGISTERED
PROFESSIONAL ENGINEER

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

PRESTRESSED CONCRETE BEAM SPAN DETAILS

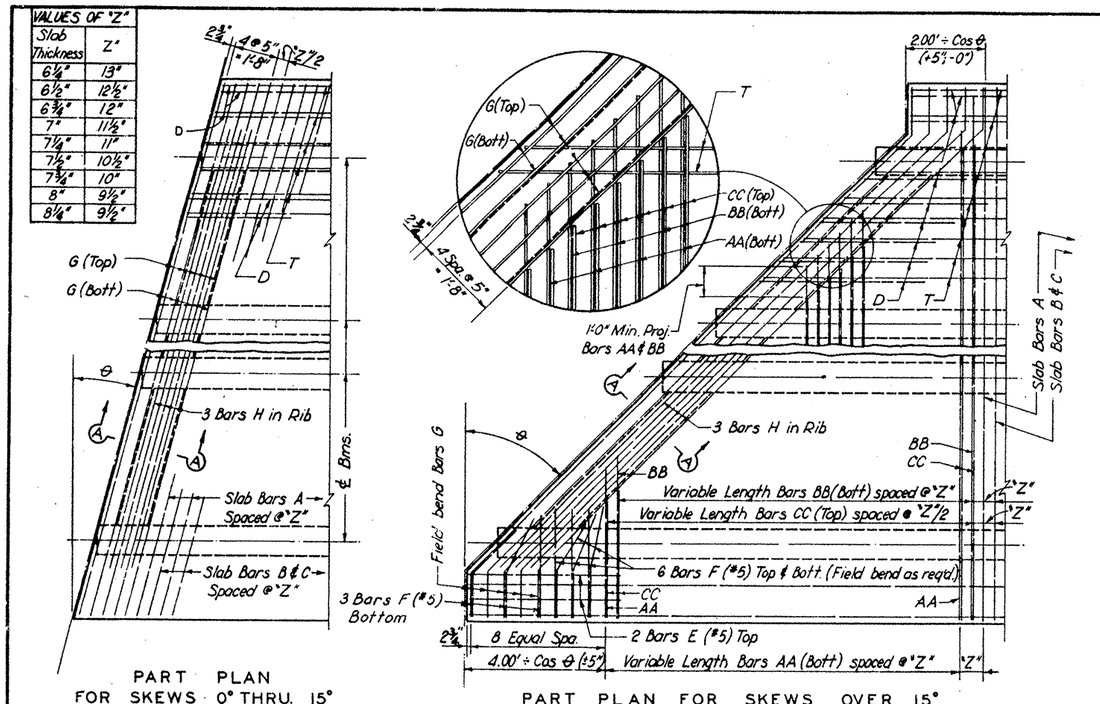
CONSTRUCTION DETAILS

Gp C (MOD)

ORIGINAL DRAWING DATE April 1971	STATE DISTRICT	FEDERAL AID DESIGN	FEDERAL AID PROJECT	SHEET
DN:-HJD REVISIONS Rev. 2-83 Rev. 5-75 Rev. 9-77 Rev. 4-78 Rev. 7-77 Revised Dec 2	15	6	CRP 90(19)M.	198
CK:-THD	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DW:-BNB	BEXAR		2452	02	023	IH 10
CK:-HJD						

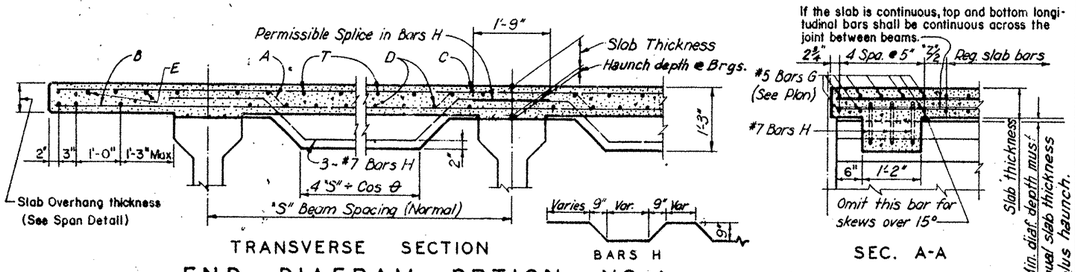
ETC.

VALUES OF "Z"	
Slab Thickness	"Z"
6¼"	13"
6½"	12½"
6¾"	12"
7"	11½"
7¼"	11"
7½"	10½"
7¾"	10"
8"	9½"
8¼"	9½"



PART PLAN FOR SKEWS 0° THRU. 15°

PART PLAN FOR SKEWS OVER 15°

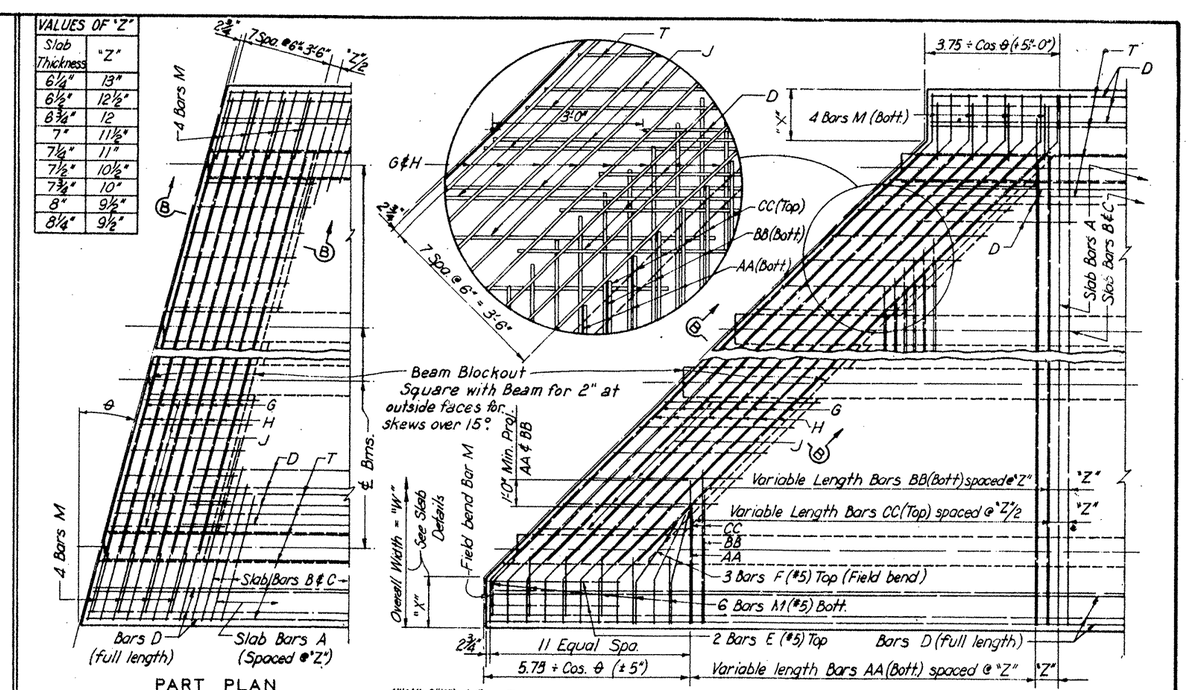


TRANSVERSE SECTION

SEC. A-A

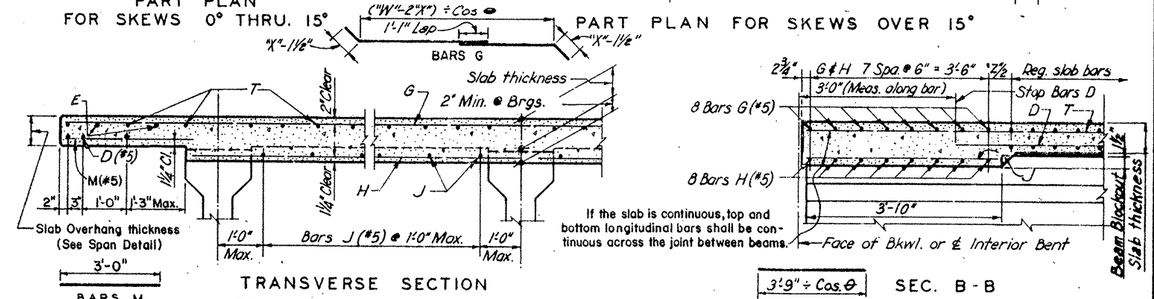
END DIAFRAM OPTION NO. 1

VALUES OF "Z"	
Slab Thickness	"Z"
6¼"	13"
6½"	12½"
6¾"	12
7"	11½"
7¼"	11"
7½"	10½"
7¾"	10"
8"	9½"
8¼"	9½"



PART PLAN FOR SKEWS 0° THRU. 15°

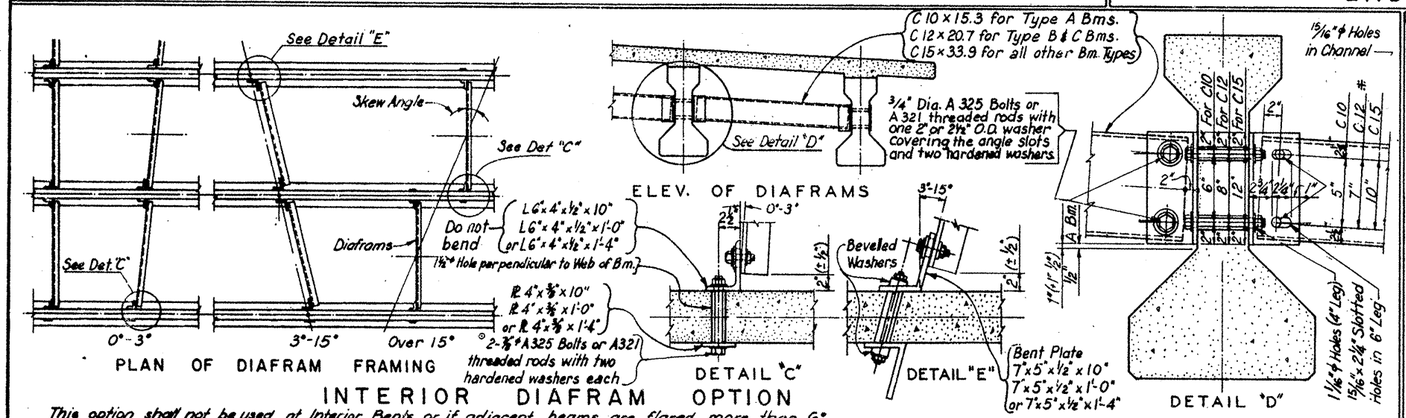
PART PLAN FOR SKEWS OVER 15°



TRANSVERSE SECTION

SEC. B-B

END DIAFRAM OPTION NO. 2 △



This option shall not be used at Interior Bents or if adjacent beams are flared more than 6°

INTERIOR DIAFRAM OPTION

△ GENERAL NOTES:

Diafram options hereon may be used in lieu of the diaframs show on Gp C.

Unless otherwise shown or noted hereon, all span details remain unchanged.

Contractor shall notify prestressed beam and steel fabricators as to which one he intends to use. Options selected shall be incorporated in shop drawings.

All parts of steel diaframs shall be galvanized after fabrication. After erection, all scratched or otherwise damaged galvanized parts shall be repaired in accordance with Item 450.5.

Prestressed Beam Modifications: For Interior Diafram Option, holes in beam shall be 1½" ϕ For End Diafram Options, holes in ends of beam shall be eliminated. For End Diafram Options the upper 1½" of the top flange of the beam shall be blocked out to provide the required concrete depth over the beam.

Payment for any diafram option used shall be included in the price bid for Reinforced Concrete Slab.

Rev. 11-86
Rev. 4-86
Rev. 10-85 (Remove blockout EDO1)

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

DIAFRAM OPTIONS FOR PRESTRESSED BEAM SPANS

Gp DO

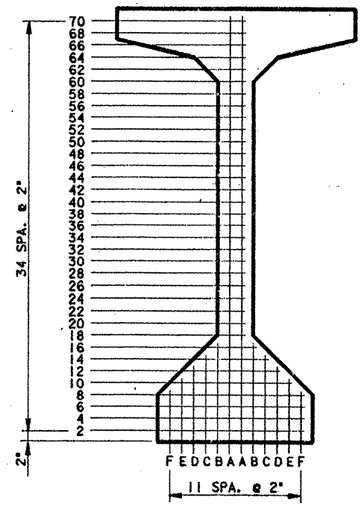
ORIGINAL DRAWING DATE: DEC. 1980		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.:-	REVISIONS △ Rev. 1-88 & 1-86 Rev. 11-84	15	6	CRP 90 (19:)M.	199
CK.:-					
DW.:-RNS	Rev. 11-82 Rev. 9-84 Rev. 11-85#	COUNTY		CONTROL / SECTION / JOB / HIGHWAY	
CK.:-THD	Rev. 10-83 (Channel Gage)	BEXAR		2452 02 023	1604

DESIGNED BEAMS (DEPRESSED STRANDS)

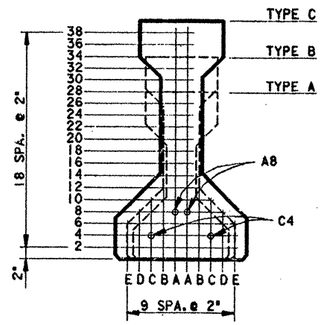
STRUCTURE / SPAN	BEAM NO.	SLAB THICK.	SPAN	BEAM ID NO.	BEAM TYPE	MAX. BEAM SPA.	PRESTRESSING STRANDS TOTAL NO.	SIZE	STRGTH.	"e" ℄ In.	"e" END In.	DEPRESSED NO.	TO	CONCRETE RELEASE STRGTH f'ci (psi)	MINIMUM 28 DAY COMP. STRGTH. f'c (psi)	OPTIONAL DESIGN DN. LOAD COMP. STRESS (TOP ℄) fct (psi)	DN. LOAD TENSILE STRESS (BOTT. ℄) fcb (psi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (Ft. Kips)
~~LOOP 1604 @ LEON CREEK TRIBUTARY CHANNEL E'BD & W'BD MAINLANES~~																		
1	1-6	7½"	83'-1½"	B1S7	C	6'-9⅝"	36	½"	270	12.42	7.09	8	A-32	5898	7011	3961	4155	3622
2-4	1-6	7½"	83'-9"	B1S8	C	6'-9⅝"	36	½"	270	12.42	7.09	8	A-32	5871	7160	4023	4210	3663
5	1-6	7½"	53'-1½"	B1S9	C	6'-9⅝"	14	½"	270	14.52	11.09	4	A-16	4000	5000	1665	1917	1831
~~LOOP 1604 WESTBOUND RAMP @ LEON CREEK TRIBUTARY CHANNEL~~																		
1	1-4	7½"	53'-3/16"	B1S4	C	6'-8"	16	½"	270	14.34	10.84	4	A-18	4000	5000	1972	2248	2107
2 & 3	1-4	7½"	73'-9"	B1S5	C	6'-8"	26	½"	270	13.40	7.40	6	A-32	4451	5053	3076	3366	3022
4	1-4	7½"	78'-3 3/16"	B1S6	C	6'-8"	30	½"	270	13.09	7.49	6	A-34	5050	5876	3479	3742	3309
~~LOOP 1604 OVERPASS @ BABCOCK ROAD E'BD & W'BD MAINLANES~~																		
1 & 3	1-6	7½"	83'-8 7/16"	B2S4	54	6'-9⅝"	24	½"	270	20.53	12.53	8	A-32	4525	5000	2567	3313	3679
2	1-6	7½"	118'-9"	B3S4	IV	6'-9⅝"	54	½"	270	19.12	11.34	10	A-52	5973	7824	4242	4406	6974
LOOP 1604 OVERPASS @ KYLE SEALE PKWY. E'BD & W'BD MAINLANES																		
1 & 3	1-6	7½"	73'-9"	B2S2	54	6'-9⅝"	18	½"	270	21.53	16.86	6	A-20	4000	5000	2029	2676	3039
2	1-6	7½"	106'-9"	B3S2	IV	6'-9⅝"	42	½"	270	20.18	11.80	8	A-52	4762	6004	3420	3634	5895
LOOP 1604 @ HUESTA CREEK E'BD & W'BD MAINLANES																		
1	1-5	8"	48'-9"	B1S14	C	8'-6"	14	½"	270	14.52	11.09	4	A-16	4000	5000	1608	1960	1960
2	1-5	8"	58'-9"	B1S15	C	8'-6"	20	½"	270	14.09	10.09	4	A-24	4000	5000	2290	2697	2616
3	1-5	8"	43'-9"	B1S13	C	8'-6"	12	½"	270	14.76	12.09	4	A-12	4000	5000	1310	1625	1650
LOOP 1604 OVERPASS @ HAUSMAN ROAD E'BD & W'BD MAINLANES																		
1 & 3	1-6	7½"	98'-6⅛"	B3S5	IV	6'-9⅝"	34	½"	270	20.87	12.75	6	A-52	4029	5000	2913	3150	5202
2	1-7	7½"	123'-9"	B3S6	IV	5'-8"	52	½"	270	19.23	11.21	10	A-52	5749	7948	4294	4340	6642
LOOP 1604 OVERPASS @ ~S.H. 16 (BANDERA RD.) WESTBOUND MAINLANE ONLY																		
1	1-6	7½"	53'-9"	B1S1	C	6'-9⅝"	14	½"	270	14.52	11.09	4	A-16	4000	5000	1702	1956	1864
2 & 3	1-6	7½"	78'-9"	B1S3	C	6'-9⅝"	30	½"	270	13.09	7.49	6	A-34	5031	6027	3539	3772	3338
4	1-6	7½"	58'-9"	B1S2	C	6'-9⅝"	16	½"	270	14.34	10.84	4	A-18	4000	5000	2011	2277	2138

NON-STANDARD STRAND PATTERNS

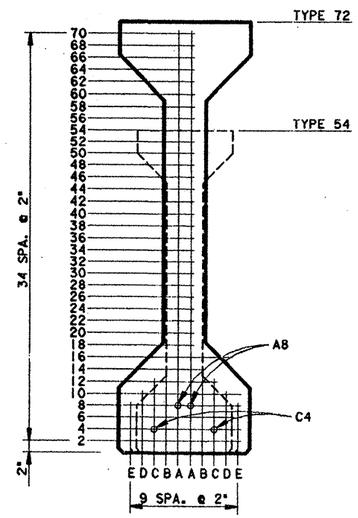
PATTERN	STRAND ARRANGEMENT AT ℄ OF BEAM



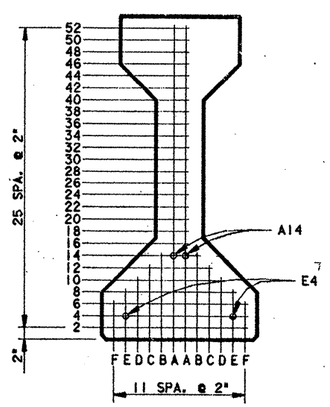
MOD. TY. VI



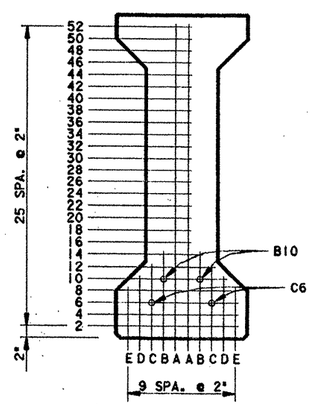
TYPES A, B, & C BMS.



TYPES 54 & 72 BMS.



AASHTO TYPE IV BM.



TYPE 54 (MOD) BM.

*5M DENOTES TYPE 54 (MOD) BEAM.

GENERAL NOTES:

Designed in accordance with current A.A.S.H.T.O. Specifications.

All concrete shall be Class H.

When shown on this sheet, the Fabricator has the option of furnishing either the designed depressed strand beam or an approved optional beam design using stress relieved or low relaxation strands. Optional designs for beams 120 foot or longer shall have a calculated residual camber equal to or greater than that of the designed beam.

Prestress losses for the designed beams have been calculated according to the current A.A.S.H.T.O. Standard and Interim Specifications for a relative humidity of 70 %. Optional designs shall likewise conform.

Certain beams with depressed strands are subject to cracking in the end of the beam. When such cracks occur, all subsequent beams of the same type and strand pattern shall have strands wrapped in the following manner:

1. Alternate rows of depressed strands shall be wrapped for 2 feet from each end of the beam.
2. One half of the straight strands, as nearly as possible, shall be wrapped for 4 feet from each end of the beam.
3. The wrapping pattern shall be symmetrical about the vertical axis of the beam for both depressed and straight strands.
4. Strands shall be wrapped so that the centers of gravity of the depressed strands and the straight strands will remain within 1 inch of their original location.
5. Strands shall be tightly wrapped with plastic tubing. Both ends and the seam of the tube shall be sealed with waterproof tape.
6. Revised shop drawings will not be required.

For depressed strand designed beams, strands shall be located as low as possible on the 2" grid system shown hereon unless a non-standard strand pattern is indicated. Fill row "2", then row "4", then row "6", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands in the "A" position shall be depressed, maintaining the 2" spacing so that the upper two strands are in the position shown in the table at the beam ends.

Initial pretension for 1/2" 270 K strands = 28.9 K for stress relieved strands or 31.0 K for low relaxation strands.

Design shown based on initial pretension of 31.0 K.

SHEET 1 OF 1

DATE:

STATE OF TEXAS CRAIG FELIX STONE 64245 REGISTERED PROFESSIONAL ENGINEER

CRAIG F. STONE P.E.
DATE: 12/9/89

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

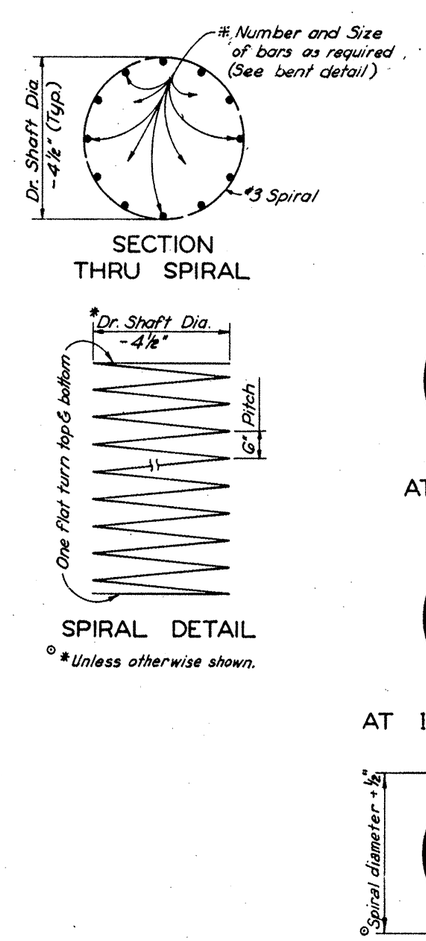
PRESTRESSED CONCRETE BEAMS

(NON-STANDARD SPANS)

Gp-NS-LR

D45: ZFA1: E355110JGPPSTD023.DGN		PREPARED BY AND FOR USE OF TEXAS SDHPT	
ORIGINAL DRAWING DATE: OCT. 1989	REVISIONS	STATE DISTRICT: 15	FEDERAL REGION: 6
DR.: CFS	Original prepared March 1988	FEDERAL AID PROJECT: CRP 90(19_)M	SHEET: 200
CK.: KK		COUNTY: BEXAR	CONTROL: 2452 SECTION: 02 JOB: 023 HIGHWAY: L1604
DN.: MRM			
CK.: CFS			

ETC



SECTION THRU SPIRAL

SPIRAL DETAIL

⊙ *Unless otherwise shown.

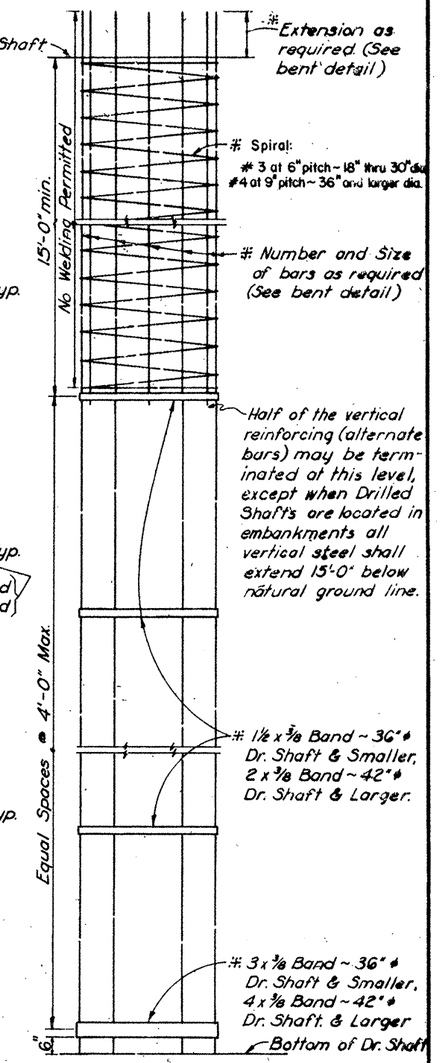
AT TOP BAND

AT INTERIOR BANDS

AT BOTTOM BAND

SECTIONS

Included in Unit price bid for Drilled Shaft.



For vertical drilled shafts constructed by the slurry displacement method only, all of the shaft reinforcing may be terminated at minimum levels as follows:

MINIMUM TERMINATION LEVEL

DRILLED SHAFT DIAMETER	ABUTMENTS Below natural Ground	INTERIOR BENTS Below top of Shaft
18" and 24"	12'	24'
30" and 36"	15'	30'
Over 36"	18'	36'
Spiral reinforcing, # 3 at 6" pitch for 18" thru 30" diameter and # 4 at 9" pitch for 36" diameter and larger.		

At the Contractor's option, any or all Drilled Shafts may be constructed using these details in lieu of the Drilled Shaft details shown elsewhere in the plans. Payment will be based on the unit price bid for Drilled Shafts regardless of the reinforcement detail elected.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

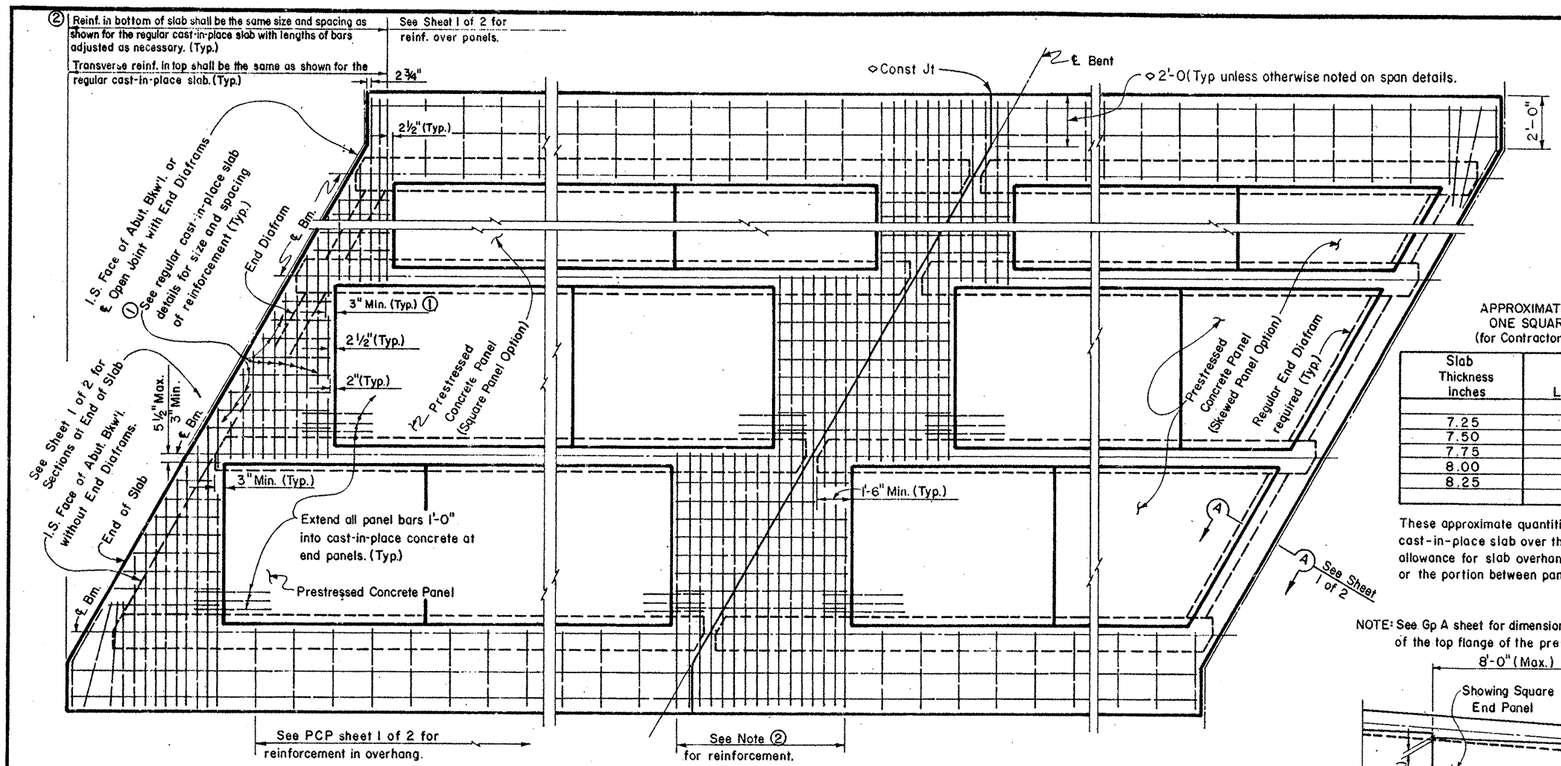
OPTIONAL DRILLED SHAFT REINFORCING

ODSR

ORIGINAL DRAWING DATE: DEC. 1980	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.: THD	15	6	CRP90(19)M	201
CK.: THD				
DW.: HWD	COUNTY			
CK.: LEC	BEXAR			

REVISIONS ⊙ Rev. 7-29-81

SUBMITTED	SECTION	JOB	SUBMITTED
2452	02	023	1 1004



END OF SLAB SQUARE PANEL OPTION AND SKEWS OVER 30°

CONTINUOUS SLAB OVER INTERIOR BENT

END OF SLAB SKEWED PANEL OPTION FOR SKEWS THRU 30°

PART PLAN

Note: Square panel option shall be used with end diafram options or other thickened slab end details, or when end diaframs are omitted, or skewed greater than 30°.

① For end diafram options, regular slab reinforcing is as shown on Gp DO and the minimum distance applies to the back edge of the deepest part of the diafram or other thickened slab edge.

APPROXIMATE QUANTITIES FOR ONE SQUARE FOOT OF SLAB
(for Contractor's information only)

Slab Thickness Inches	Reinf Steel Lb/SF	Class S Concrete CY/SF
7.25	2.98	0.0100
7.50	2.98	0.0108
7.75	2.98	0.0116
8.00	2.98	0.0123
8.25	2.98	0.0131

These approximate quantities are for a typical square foot of cast-in-place slab over the PCP. They do not include an allowance for slab overhangs, thickened ends or diaframs, or the portion between panels over the beams.

GENERAL NOTES:

Designed for HS 20 Loading in accordance with A.A.S.H.T.O. 1977 Standard and Interim Specifications.

All concrete for panels to be Class H. Release strength f'ci = 4000 p.s.i. Minimum 28 day strength f'c = 5000 p.s.i.

Prestressing strands to be 3/8"ø (270ᴷ) with an initial tension of 16.1 kips per strand. Larger strands may be used with the same spacing and initial tension.

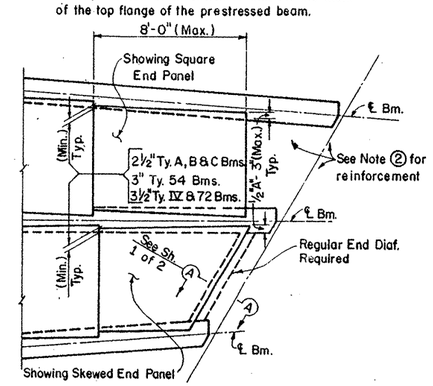
Suitable holes or anchorage devices for lifting panels may be cast in the panels provided they are shown on the shop plans and approved by the Engineer. Panel lengths shall be determined by the contractor and shown on the shop plans.

Erected panels shall bear uniformly on blocking strips of fiberboard placed along the outer edge of each beam and on the edge of end diaframs. A ¼" gap shall be left at 3'-0" intervals to permit escape of trapped air in the cast-in-place concrete. If additional blocking is needed, special grading details for supporting the panels and extra reinforcing between beam and slab will be required. The cost of this additional blocking will be considered subsidiary to deck construction.

Care must be taken to ensure proper cleaning of construction debris and consolidation of concrete mortar under the edges of the panels. It is also important that the fiberboard strips be placed at the edges of beams so that adequate space is provided for the mortar to flow a minimum of 1½" under the panel as the slab concrete is placed. Roadway cross slope reduces the opening required for proper entry of the mortar on the high side. Fiberboard blocking strips varying in thickness across the beam are therefore required. Tests have shown that careful vibration of deck concrete will allow the proper amount of mortar to flow through a ⅛" opening; however, a minimum opening of ¼" is desireable.

Standard detail Gp-C shall apply except as modified.

NOTE: See Gp A sheet for dimension "A" which is the width of the top flange of the prestressed beam.



FLARED BEAM SPANS PART PLAN

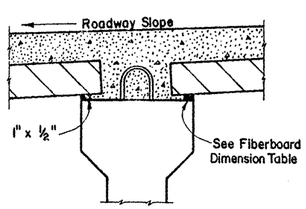
FIBERBOARD DIMENSIONS

MAX. ROADWAY SLOPE				BEAM
.08'/ft.	.06'/ft.	.04'/ft.	.02'/ft.	
1" x 1"	1" x 1"	1" x 1"	1" x ½"	A, B, C
1½" x 1½"	1" x 1"	1" x 1"	1" x ½"	54
1½" x 1½"	1½" x 1½"	1" x 1"	1" x ½"	IV, 72

③ Concrete blocks used for special grading shall be any convenient plan dimension with a minimum of 2 in. by 4 in. and a maximum of 4 in. by 8 in. Heights may be from 1.125 to 5.5 inches.

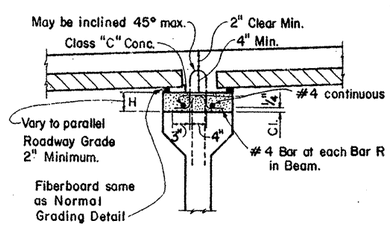
④ Concrete blocks from 1.125 in. high to 2.0 in. high may be used without the additional R bar extensions or longitudinal No. 4 bars.

⑤ For blocks up to 3.5 in. high, use 1 in. by 4 in. 20 gage galvanized sheet metal angle and for blocks 3.5 to 5.5 in. high, use 1 in. x 6 in. 16 gage galvanized sheet metal angle. Tie sheet metal thru holes in angle at 12 inch centers with 14 gage minimum galvanized wire. Sheet metal angles are to be overlapped at splices and left in place. Vent holes 0.375 inches in diameter are to be placed in angles within the upper 1 inch, spaced at 36 in. centers.



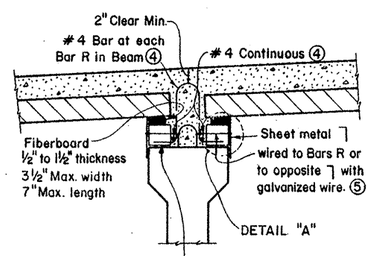
NORMAL GRADING DETAIL

Minimum fiberboard dimensions shall be as shown. Thicker strips may be used on one or both sides of the beam to reduce cast-in-place concrete thickness, within tolerances. The thicker strips shall be 1"x¾", 1"x1", 1½"x1¼" or 1½"x1½". No more than 1½" total may be used. The same thickness strip shall be used under any one panel edge and the maximum change in thickness between adjacent panels shall be ¼".

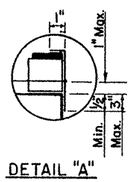


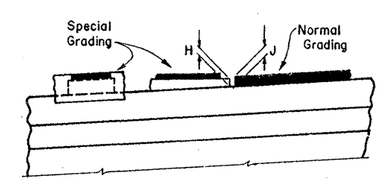
SPECIAL GRADING DETAILS

For use where the distance between top of beam and finished grade can not be achieved within tolerances on cast-in-place slab thickness and thickness of fiber board strips. An alternate method may be used provided it is approved by the Engineer.



Place concrete blocks (4"x8" Max.) at ¼ pts. of panel edges (±2" along beam). For panels 4 ft. and less the blocks may be at panel corners and common to two panels. Blocks not to be used with Types A and B beams.





At grading method changes along the beam, the special grading "H" dimension may be reduced to 1¾" and the normal grading "J" dimension may be increased to 2". Some cross-slope conditions may require further H and J adjustments as directed by the Engineer.

Rev. 5-91
Rev. 11-86 (Added sq. ft. quant's)

SHEET 2 OF 2

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

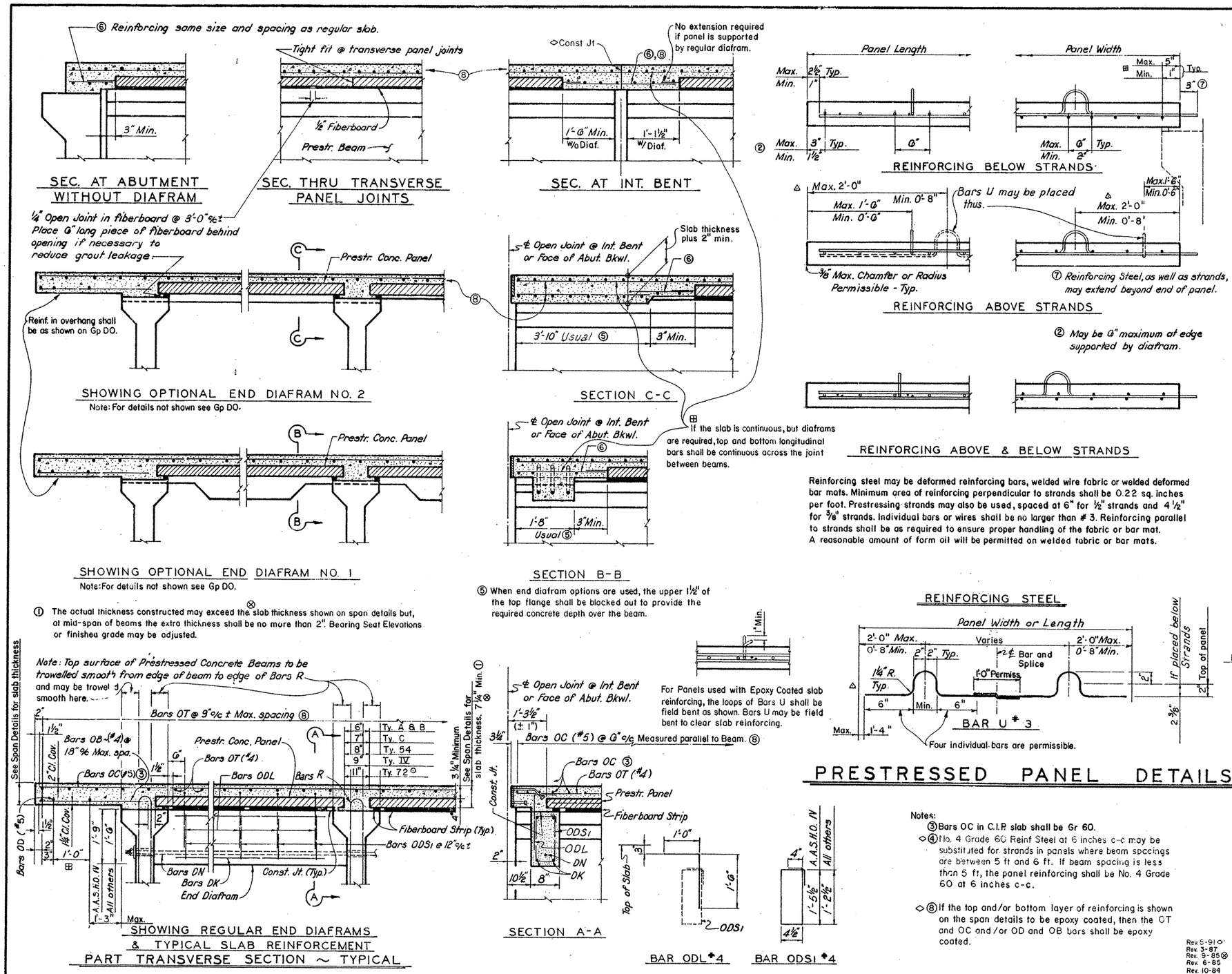
PRESTRESSED CONCRETE PANELS

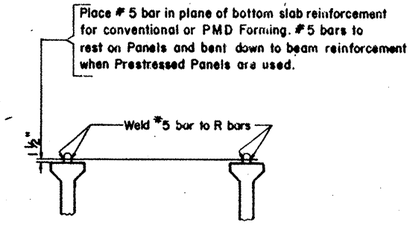
OPTIONAL DECK DETAILS

PREPARED BY AND FOR THE USE OF THE S.D.H. & P.T.

PCP

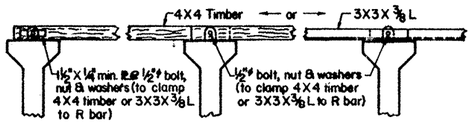
ORIGINAL DRAWING DATE: DEC. 1980	REVISIONS		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT ⊕	SHEET
DW:-RLR	Rev. 11-81	Rev. 8-83	-	6		202
CK:-MBP	Rev. 12-81	Rev. 8-84	-	COUNTY	CONTROL / SECTION / JOB	HIGHWAY
DW:-EDS	Rev. 10-82	Rev. 10-84				
CK:-JJP						


⑤ Reinforcing same size and spacing as regular slab.
3" Min.
SEC. AT ABUTMENT WITHOUT DIAFRAM
Tight fit @ transverse panel joints
1/2" Fiberboard
Prestr. Beam
SEC. THRU TRANSVERSE PANEL JOINTS
◇Const Jt
No extension required if panel is supported by regular diafram.
1'-6" Min. w/o Diaf.
1'-1 1/2" w/ Diaf.
SEC. AT INT. BENT
1/4" Open Joint in fiberboard @ 3'-0" ℄±
Place 6" long piece of fiberboard behind opening if necessary to reduce grout leakage.
Prestr. Conc. Panel
Reinf. in overhang shall be as shown on Gp DO.
SHOWING OPTIONAL END DIAFRAM NO. 2
Note: For details not shown see Gp DO.
℄ Open Joint @ Int. Bent or Face of Abut. Bkwl.
Slab thickness plus 2" min.
3'-10" Usual ⑤
3" Min.
SECTION C-C
Prestr. Conc. Panel
SHOWING OPTIONAL END DIAFRAM NO. 1
Note: For details not shown see Gp DO.
℄ Open Joint @ Int. Bent or Face of Abut. Bkwl.
1'-8"
3" Min.
Usual ⑤
SECTION B-B
⊞ If the slab is continuous, but diaframs are required, top and bottom longitudinal bars shall be continuous across the joint between beams.
Panel Length
Max. 2 1/2" Typ.
Min. 1"
Max. 3" Typ.
Min. 1 1/2"
6"
REINFORCING BELOW STRANDS
Panel Width
Max. 5"
Min. 1" Typ.
3" ⑦
Max. 6" Typ.
Min. 2"
Max. 2'-0"
Max. 1'-6"
Min. 0'-6"
Bars U may be placed thus.
Min. 0'-8"
3/8" Max. Chamfer or Radius Permissible - Typ.
⑦ Reinforcing Steel, as well as strands, may extend beyond end of panel.
REINFORCING ABOVE STRANDS
② May be 6" maximum at edge supported by diafram.
REINFORCING ABOVE & BELOW STRANDS
Panel may be cast square and sawed to skew.
Support from Diafram required under skewed end.
Bars wires or strands
Strands
Bars U
℄ Beam
PLAN ~ SKEWS THRU 30°
OPTIONAL END PANEL
Note: See Sheet 2 of 2 for end panel treatment
Strand to project out of panel 3" (Typ.)
Except extend 1'-0" past end of panel or provide #3 x 2'-0" dowels @ 6" c.c., extending 1'-0" at connection with C.I.P. Slab if panel is not resting on diafram.
Bar U
Strands
Broom finish top surface (Typ.)
Bars, wires or strands
Bar U
Panel Length = "L" (Max. = 8'-0")
Panel Length = "L" (Min. = 2'-10")
PLAN ~ NORMAL
Beam Spacing ④
Equal Spaces (6" Max.)
Panel width (Varies with beam type)
Bars U
℄ Strands ④
℄ Beam
Panel Thickness
TYPICAL SECTION
Reinforcing steel may be deformed reinforcing bars, welded wire fabric or welded deformed bar mats. Minimum area of reinforcing perpendicular to strands shall be 0.22 sq. inches per foot. Prestressing strands may also be used, spaced at 6" for 1/2" strands and 4 1/2" for 3/8" strands. Individual bars or wires shall be no larger than # 3. Reinforcing parallel to strands shall be as required to ensure proper handling of the fabric or bar mat. A reasonable amount of form oil will be permitted on welded fabric or bar mats.
① The actual thickness constructed may exceed the ⊗ slab thickness shown on span details but, at mid-span of beams the extra thickness shall be no more than 2". Bearing Seat Elevations or finished grade may be adjusted.
⑤ When end diafram options are used, the upper 1 1/2" of the top flange shall be blocked out to provide the required concrete depth over the beam.
Note: Top surface of Prestressed Concrete Beams to be trowelled smooth from edge of beam to edge of Bars R and may be trowel d smooth here.
Bars OT @ 9" c/c ± Max. spacing ⑧
Bars OB (#4) @ 18" c/c Max. spac.
Prestr. Conc. Panel
Bars OT (#4)
Bars OC (#5) ③
Bars ODL
Bars R
Ty. A & B
Ty. C
Ty. 54
Ty. IV
Ty. 72 ⊙
3 1/4" Minimum See Span Details for slab thickness. 7 1/4" Min. ⊗ ①
See Span Details for slab thickness
Fiberboard Strip (Typ.)
Bars ODS1 @ 12" c/c ±
Bars DN
Bars DK
End Diafram
Const. Jt. (Typ.)
Bars OD (#5)
A.A.S.H.O. IV
All others
Max.
SHOWING REGULAR END DIAFRAMS & TYPICAL SLAB REINFORCEMENT
PART TRANSVERSE SECTION ~ TYPICAL
℄ Open Joint @ Int. Bent or Face of Abut. Bkwl.
1'-3 1/2" (± 1")
Bars OC (#5) @ 6" c/c Measured parallel to Beam. ⑧
Bars OC ③
Bars OT (#4)
Prestr. Panel
Fiberboard Strip
ODS1
ODL
DN
DK
Const. Jt.
Top of Slab
SECTION A-A
1" Min.
For Panels used with Epoxy Coated slab reinforcing, the loops of Bars U shall be field bent as shown. Bars U may be field bent to clear slab reinforcing.
1'-0"
1'-6"
ODS1
BAR ODL #4
4"
A.A.S.H.O. IV
All others
1'-5 1/2"
1'-2 1/2"
4 1/2"
BAR ODS1 #4
REINFORCING STEEL
Panel Width or Length
2'-0" Max.
Varies
2'-0" Max.
0'-8" Min.
2" 2" Typ.
℄ Bar and Splice
1'-0" Permiss.
1 1/4" R. Typ.
6"
Min.
6"
Max. 1'-4"
BAR U #3
Four individual bars are permissible.
If placed below Strands
Top of panel
2 3/8"
Notes:
③ Bars OC in C.I.P. slab shall be Gr 60.
◇④ No. 4 Grade 60 Reinf Steel at 6 inches c-c may be substituted for strands in panels where beam spacings are between 5 ft and 6 ft. If beam spacing is less than 5 ft, the panel reinforcing shall be No. 4 Grade 60 at 6 inches c-c.
◇⑧ If the top and/or bottom layer of reinforcing is shown on the span details to be epoxy coated, then the OT and OC and/or OD and OB bars shall be epoxy coated.
Rev. 5-91 ⊙
Rev. 3-87
Rev. 9-85 ⊗
Rev. 6-85
Rev. 10-84
Rev. 9-84
Rev. 8-84
PRESTRESSED PANEL DETAILS
SHEET 1 OF 2
TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION
PRESTRESSED CONCRETE PANELS
OPTIONAL DECK DETAILS
PREPARED BY AND FOR THE USE OF THE SDH & PT.
PCP
ORIGINAL DRAWING DATE: DEC. 1980
DN.:-RLR
CK.:-MCB
DW.:-AS
CK.:-MDP
REVISIONS
Rev. 11-81 Bars U
Rev. 12-81
Rev. 2-82 △
Rev. 6-83
Rev. 6-83 ⊙
Rev. 1-82 ⊞
STATE DISTRICT
FEDERAL REGION
6
FEDERAL AID PROJECT ⊕
SHEET
203
COUNTY
CONTROL
SECTION
JOB
HIGHWAY

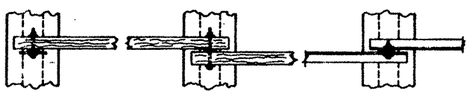


PERMANENT TOP BRACING

⑤



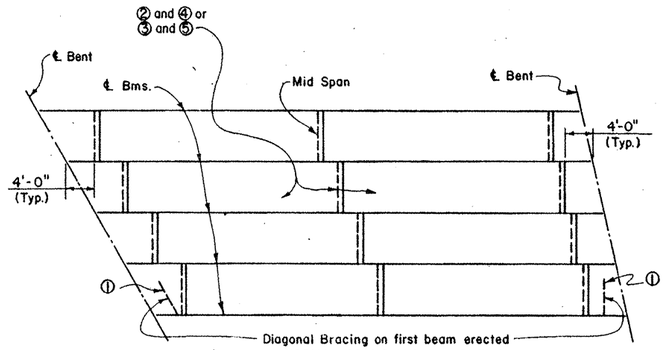
ELEVATION



PLAN

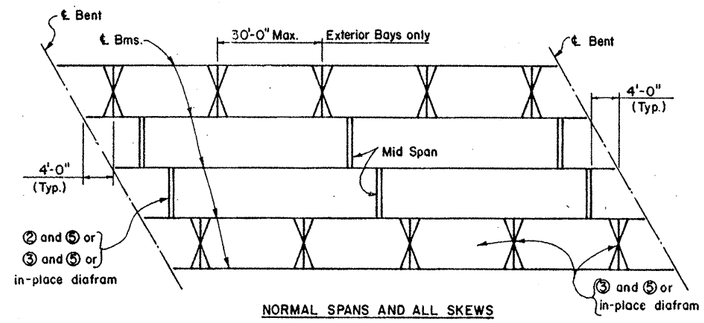
TEMPORARY TOP BRACING

④



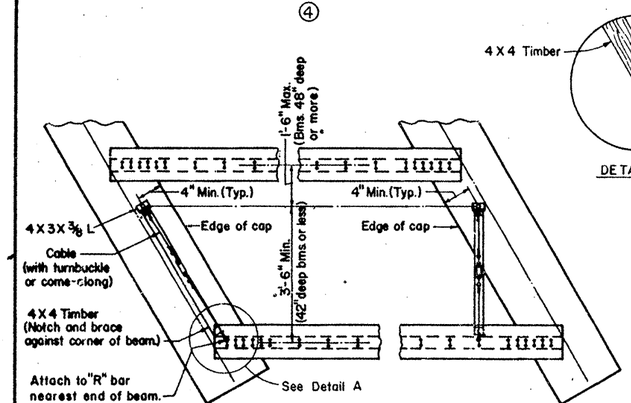
NORMAL SPANS AND ALL SKEWS

ERECTION BRACING

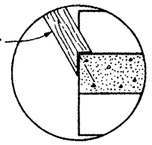


NORMAL SPANS AND ALL SKEWS

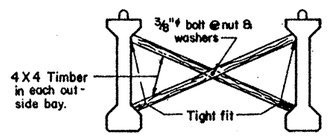
SLAB PLACEMENT BRACING



PLAN

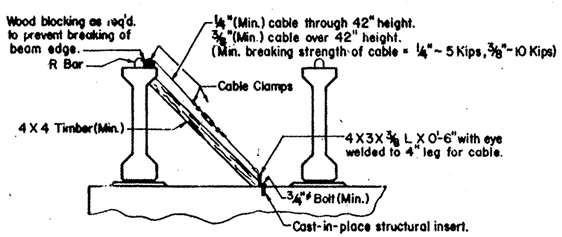


DETAIL A



"X" BRACING

③

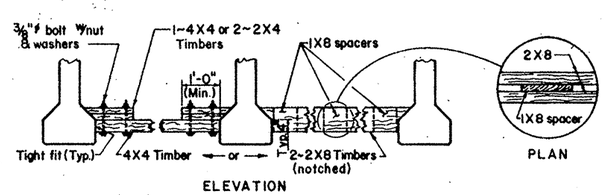


END VIEW

DIAGONAL BRACING DETAILS

(To be used on both ends of the first beam erected in the span.)

①



ELEVATION

PLAN

BOTTOM FLANGE BRACING DETAILS

②

Indicates Diagonal Bracing ①

Indicates Bottom Bracing ② with Temporary Top Bracing ④ or "X" Bracing ③ with Permanent Top Bracing ⑤.

Indicates Permanent Top Bracing ⑤

Indicates Bottom Bracing ② or "X" Bracing ③, either one with Permanent Top Bracing ⑤ or an in-place diafram only.

Indicates "X" Bracing ③ & Permanent Top Bracing ⑤ or an in-place diafram only.

GENERAL NOTES:

ERECTION BRACING:

Erection bracing details are considered minimum for fulfilling the requirements of Specification Item 425 (Article 425.5), and Special Provisions thereto, for bracing Types A, B, C, III, IV and V prestressed concrete beams erected in the span over a traveled way or railroad, and in those spans generally parallel to a traveled way or railroad and within a distance equal to the difference in elevation between the top of cap upon which the beams are being erected and the traveled way, or 30 feet, whichever is greater.

Required erection bracing shall be placed immediately after erection of each beam and remain in place until diafram bars DN are tightened or additional bracing as required for slab placement is in place.

SLAB PLACEMENT BRACING:

The details for slab placement bracing are considered minimum for fulfilling the requirements of Specification Item 420, Article 420.9 (4) and special provisions thereto.

Required slab placement bracing shall remain in place until the slab concrete has attained a flexural strength of 500 p.s.i.

GENERAL:

Bracing details for closely spaced beams (as on ramps or railroad structures) are not included herein. The Contractor shall submit his proposed bracing details for such conditions to the Engineer for approval prior to erection.

Systems equal to or better than those shown may be used provided details of such systems are submitted to and approved by the Engineer prior to erection.

Use of these systems and/or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the safety of the structure.

Removal of bracing for short periods of time to align beams is permissible.

Bottom flange bracing at beam ends may be omitted when all beams are fixed with dowel bars or when erection is on steel caps or floor beams containing bearing seats which restrict lateral movement.

All turn-buckles, come-alongs and other connections shall be capable of developing the full strength of the cable shown hereon.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

PRESTRESSED CONCRETE BEAMS

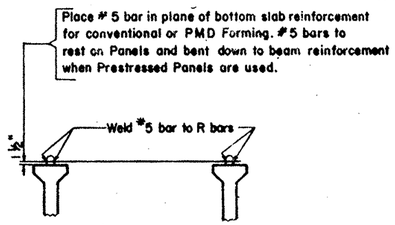
TYPES A, B, C, III, IV & V

MINIMUM ERECTION AND BRACING REQUIREMENTS

PCB-MEBR (1)

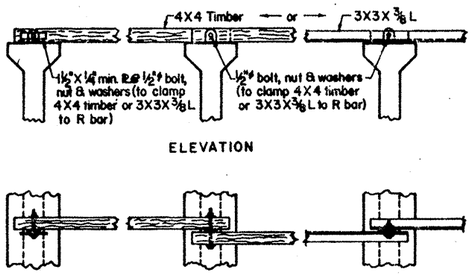
ORIGINAL DRAWING DATE: DEC 1980		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #	SHEET
DN:-THD	REVISIONS	15	6	CRP 90(19.)M.	207
CK:-THD		COUNTY		CONTROL / SECTION / JOB	HIGHWAY
DW:-EDS		BEXAR		2452 / 02 / 023	1604
CK:-THD					

ETC.



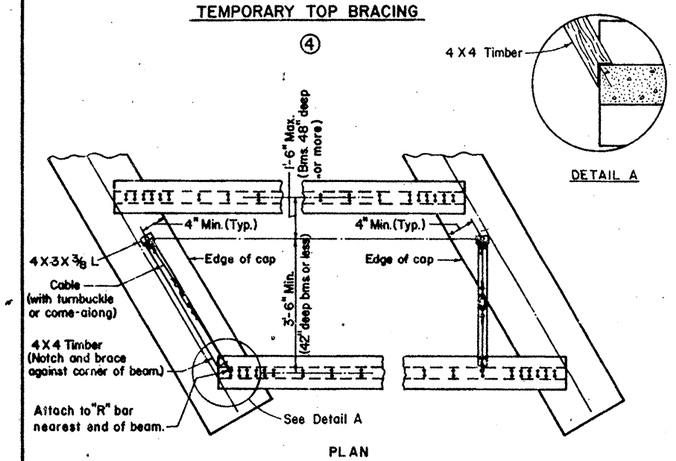
PERMANENT TOP BRACING

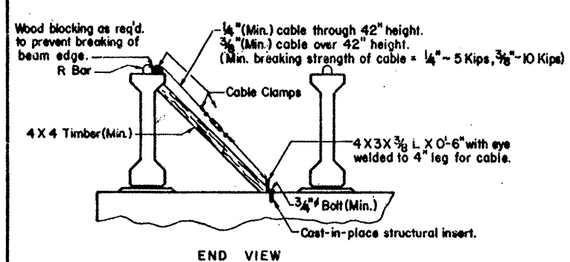
⑤



TEMPORARY TOP BRACING

④

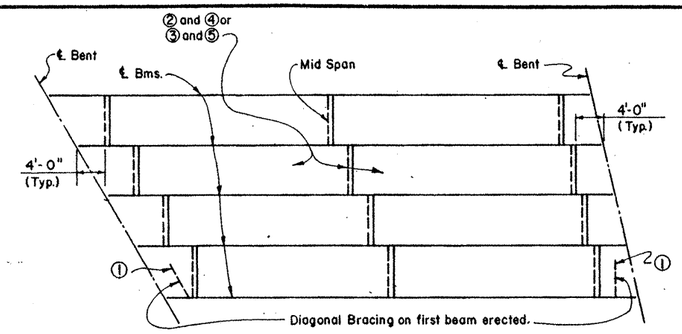




DIAGONAL BRACING DETAILS

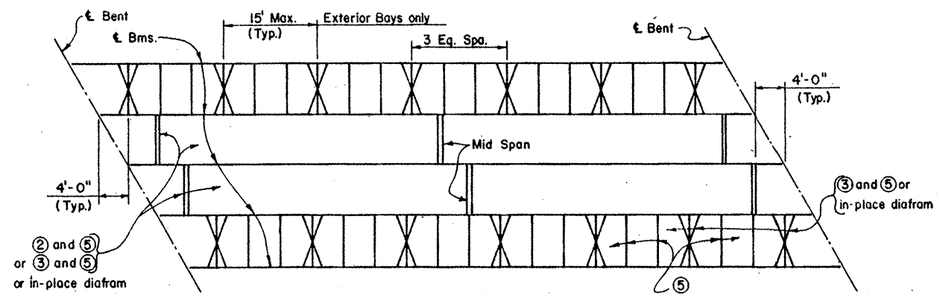
(To be used on both ends of the first beam erected in the span.)

①



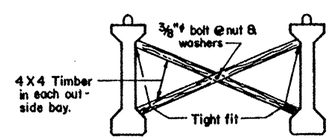
NORMAL SPANS AND ALL SKEWS

ERECTION BRACING



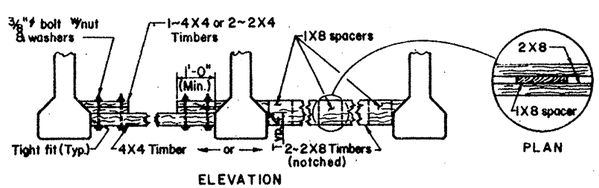
NORMAL SPANS AND ALL SKEWS

SLAB PLACEMENT BRACING



"X" BRACING

③



BOTTOM FLANGE BRACING DETAILS

②

Indicates Diagonal Bracing ①

Indicates Bottom Bracing ② with Temporary Top Bracing ④ or "X" Bracing ③ with Permanent Top Bracing ⑤.

Indicates Permanent Top Bracing ⑤

Indicates Bottom Bracing ② or "X" Bracing ③, either one with Permanent Top Bracing ⑤ or an in-place diafram only.

Indicates "X" Bracing ③ & Permanent Top Bracing ⑤ or an in-place diafram only.

GENERAL NOTES:

HAULING & ERECTION:

The Contractor's attention is directed to the possible lateral instability of Type 48 thru 72 prestressed concrete beams, especially during hauling and erection. The use of the following methods of improving the stability of these beams is encouraged and shall be used when required: Location of lifting devices at the maximum practical distance from the beam ends; use of external lateral stiffening devices during hauling and erection; lifting with vertical lines using two machines and care in handling to minimize inertial and impact forces. External adjustable stiffening devices (hog rods) will be required for any beam in excess of the following actual beam lengths.

Type 48	87'	Type 66	113'
Type 54	96'	Type 72	122'
Type 60	104'	Type 54 Mod. (12" Web)	113'

These devices shall remain on the beam during hauling from the casting yard and during erection until the required bracing is installed.

ERECTION BRACING:

Erection bracing details are considered minimum for bracing Types 48, 54, 60, 66, 72 & 54 Mod. (12" Web) prestressed concrete beams regardless of where erected.

Required erection bracing shall be placed immediately after erection of each beam and remain in place until diafram bars DN are tightened or additional bracing as required for slab placement is in place.

SLAB PLACEMENT BRACING:

The details for slab placement bracing are considered minimum for fulfilling the requirements of Specification Item 420, Article 420.9 (4) and special provisions thereto.

Required bracing for slab placement shall remain in place until the slab concrete has attained a flexural strength of 500 p.s.i.

GENERAL:

Bracing details for closely spaced beams (as on ramps or railroad structures) are not included herein. The Contractor shall submit his proposed bracing details for such conditions to the Engineer for approval prior to erection.

Systems equal to or better than those shown may be used provided details of such systems are submitted to and approved by the Engineer prior to erection.

Use of these systems and/or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the safety of the structure.

Removal of bracing for short periods of time to align beams is permissible.

Bottom flange bracing at beam ends may be omitted when all beams are fixed with dowel bars or when erection is on steel caps or floor beams containing bearing seats which restrict lateral movement.

All turn-buckles, come-alongs and other connections shall be capable of developing the full strength of the cable shown hereon.

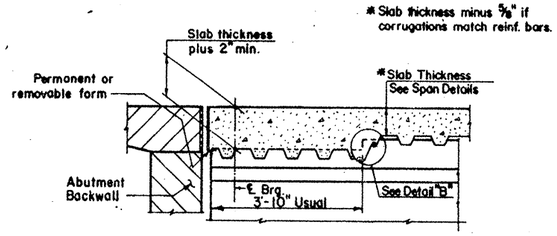
STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

PRESTRESSED CONCRETE BEAMS

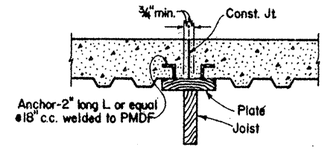
TYPES 48, 54, 60, 66 & 72
MINIMUM ERECTION AND BRACING REQUIREMENTS

PCB-MEBR (2)

ORIGINAL DRAWING DATE: DEC. 1980	STATE DISTRICT	FEDERAL AID PROJECT			SHEET
DN.:-THD	REVISIONS	15	6	CRP 90(19_)M, ETC	225
CK.:-THD		COUNTY			
DW.:-EDS		BEXAR	2452	02	023
CK.:-THD					



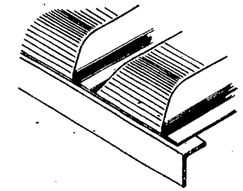
THICKENED SLAB END AT ABUTMENT OR INTERIOR BENT



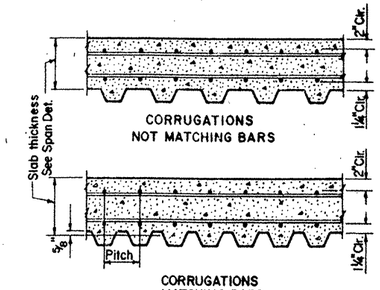
AT CONSTRUCTION JOINT

Note: In spans where PMD forms are used, timber forms shall be used at construction joints.

Adequate provision shall be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

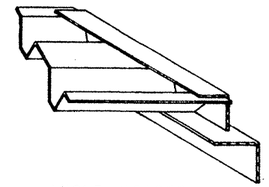


PRECLOSED



The Contractor has the option of furnishing either system if practical.

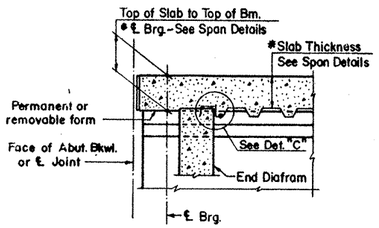
TYP. LONGITUDINAL SLAB SECTIONS



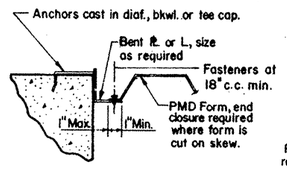
ANGLE HEADER

Note: This type to be used for skewed ends only.

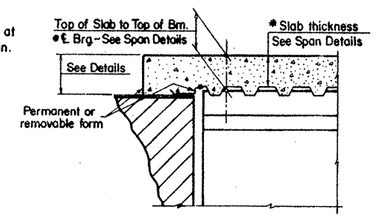
TYPES OF END CLOSURES



USUAL SLAB END AT ABUTMENT OR AT INTERIOR BENT

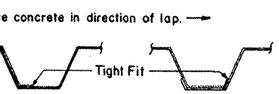


DETAIL "C"

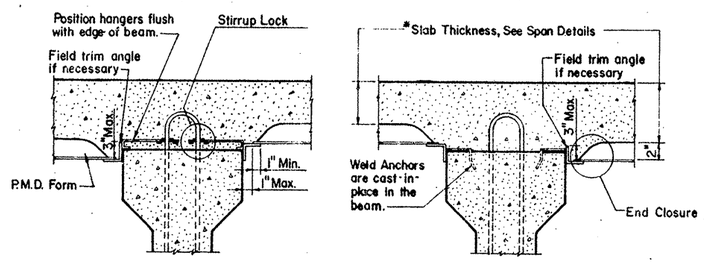


SLAB EXTENDED OVER ABUT. BKWL. OR INVERTED TEE CAP

DETAILS AT BEAM ENDS

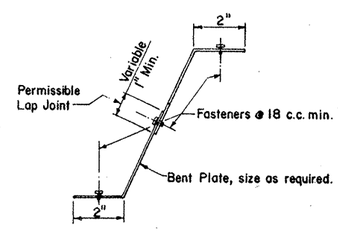


SIDE LAP DETAILS

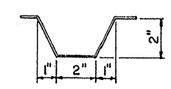


TYPICAL TRANSVERSE SECTIONS

(SHOWING VARIOUS METHODS OF ATTACHING FORMS TO BEAMS)



DETAIL "B"



TYPICAL CORRUGATION

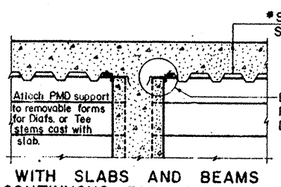
GENERAL NOTES:

Permanent Metal Deck Forms (P.M.D. Forms) shall be designed for the dead load of form, reinforcement and concrete plus 50 pounds per square foot for construction loads. The following allowable stresses shall be used in the design.

ASTM A446, Grade	Yield (psi)	Allowable Stress (psi)
A	33,000	23,900
B	37,000	26,800
C	40,000	29,000
D	50,000	36,000
E	80,000	36,000
Weld Metal		12,400

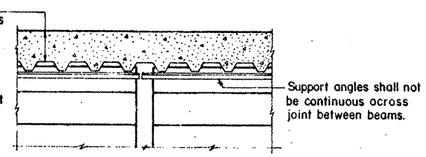
Maximum deflection under the weight of forms, reinforcement and concrete, or a minimum of 120 pounds per square foot shall not exceed 1/180 of the form span or 1/2 inch whichever is less. The design span for forms shall be clear distance between beam flanges measured parallel to the form flutes minus 2 inches. The minimum thickness of the form shall be 22 gage and that of the support angles shall be 14 gage. All forms shall be securely fastened to supports.

This Standard shall be used as a guide in the preparation of shop detail drawings.



WITH SLABS AND BEAMS CONTINUOUS FOR LIVE LOAD

(AT INTERIOR BEARING DIAFRAM)



WITH SLAB CONTINUOUS ACROSS SIMPLE BEAM ENDS

APPROXIMATE QUANTITIES FOR ONE SQUARE FOOT OF SLAB

(for Contractor's information only)

Slab Thickness inches	Reinf Steel Lb/SF	Class S Concrete CY/SF
7.25	4.81	0.0255
7.50	4.93	0.0262
7.75	5.06	0.0270
8.00	5.27	0.0278
8.25	5.67	0.0285

These approximate quantities are for a typical square foot of cast-in-place slab over the average PMDF with corrugations not matching bars. Truss bars are assumed in the slab. The quantities do not include an allowance for slab overhangs, thickened ends or diaframs, or possible haunch over beams.

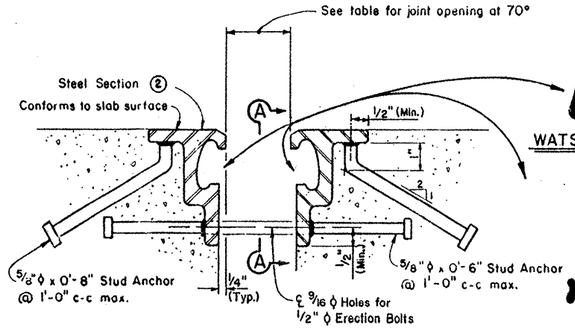
STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

PERMANENT METAL DECK FORMS (CONCRETE)

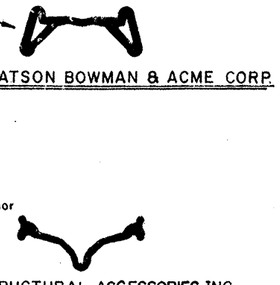
PMDF (C)

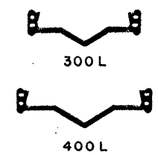
ORIGINAL DRAWING DATE: MARCH 1986		STATE DISTRICT 15	FEDERAL REGION 6	FEDERAL AID PROJECT	SHEET 206
REVISIONS: Rev 11-86 (Added sq. ft quant's) Rev 3-87					
DR.:- EDS	DESIGNED: J S Y	COUNTY: BEXAR	ORIGINAL 2452	SECTION 02	JOB 023
					HIGHWAY L1604

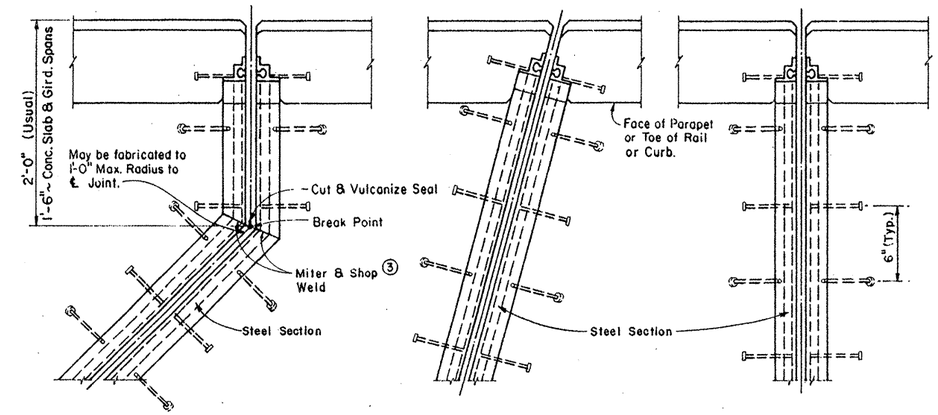
ETC



SECTION THRU
WATSON BOWMAN & ACME CORP.
STRUCTURAL ACCESSORIES INC.
D S BROWN COMPANY







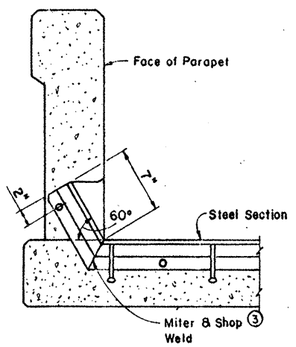
PLANS—END CONDITIONS

NOTE: Steel sections shall be shipped in convenient lengths of 24'-0" max. and 10'-0" min. unless otherwise necessary for stage construction or widenings. One shop splice will be permitted in each shipping length provided no piece is less than 2'-0" in length and sufficient studs are added to limit the stud to shop or field splice distance to 2" min. and 4" max.

Shop and field splices shall be made by butt welding with areas in contact with preformed joint sealer to be ground smooth.

Corresponding sections shall be match marked and bolted together for shipment.

All steel parts are not to be painted or primed unless designated elsewhere on the plans.

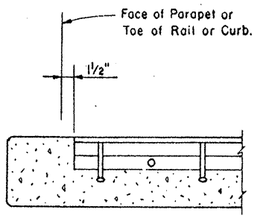


SECTION THRU
OTHER PARAPET RAILS
(LOW SIDE)

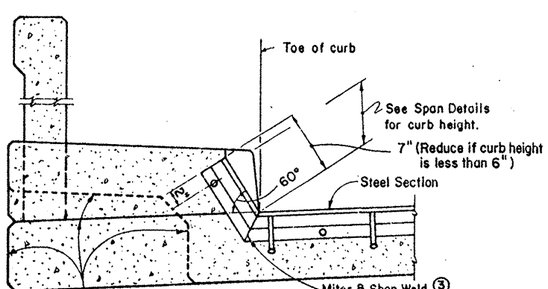
MANUFACTURER	STEEL SECTION ②	NEOPRENE STRIP SEAL			
		3" JOINT		4" JOINT	
		Seal Type	Joint Opening	Seal Type	Joint Opening
Watson Bowman & Acme Corp.	Type M1	SE300	1 3/4"	SE 400	1 3/4"
Structural Accessories Inc.	Type KK	40SS	1 3/4"	50SS	1 3/4"
D. S. Brown	Type SSCM	300L	1 3/4"	400L	1 3/4"

② Shape of steel section shown is typical. Variations depending on manufacturer are permissible.

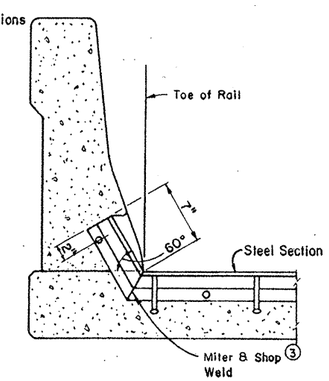
③ Remove all burrs which will be in contact with seal prior to making splice.



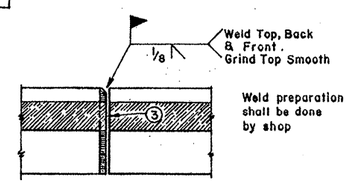
SECTION THRU SLAB
(HIGH SIDE)



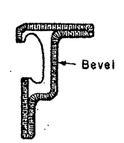
SECTION THRU
SIDEWALK
(LOW SIDE)



SECTION THRU
BARRIER RAIL
(LOW SIDE)



VIEW A-A
AT STEEL SECTION



BEVEL LOCATION
AT STEEL SECTION

GENERAL NOTES:

Sealed Exp. Jts. shall be provided in the size and at all locations shown on plans.

Shop fabrication will be required at all intersections of cross slope and at break points.

At splices, a continuous ground smooth weld shall be provided except on all surfaces in locking contact with seal which shall have no burrs.

Corresponding sections of Sealed Exp. Jts. shall be temporarily shop assembled, checked for fit, and match marked for shipment.

Erection holes, if required, shall be punched so as to line up when Sealed Exp. Jts. are in their final position. Erection bolts, if used, shall be cut off flush with extrusion promptly after the concrete in the latter of the two placements has taken initial set.

Stud anchors shall be electric arc end-welded with complete fusion.

The neoprene seal shall be continuous and included in the price bid for Sealed Exp. Jt.

The Contractor shall arrange for securing the Sealed Exp. Jt. in position, and placing to the proper grade and alignment by welding braces to adjacent slab steel, to prestressed beam stirrups, or to anchors cast in concrete diaframs. Cost of temporary bracing is to be included in the price bid for Sealed Exp. Jt.

TEXAS DEPARTMENT OF TRANSPORTATION
DIVISION OF BRIDGES AND STRUCTURES

SEALED EXPANSION JOINT DETAILS

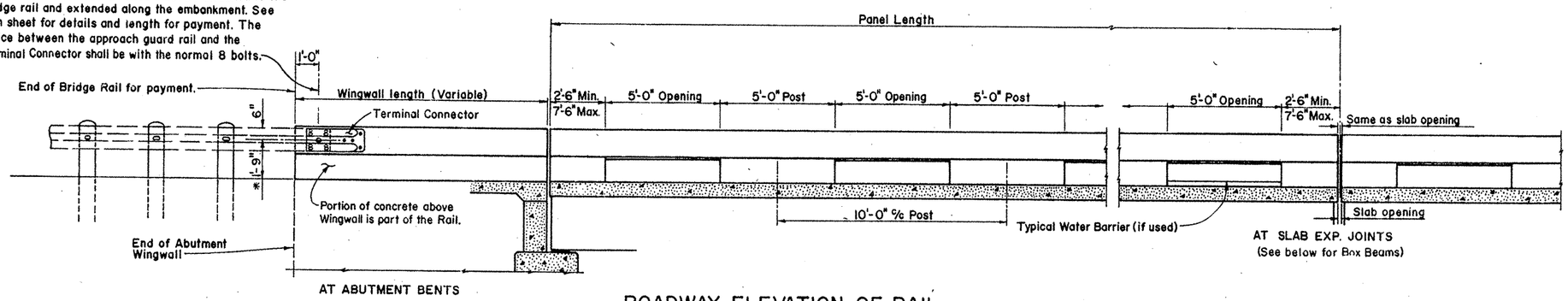
WITHOUT OVERLAY

SEJ-S(1)

Rev. 2-93 (Splices, studs, stl. sec. ship. lgth., sdwlk., CG)
Rev. 8-89 (Ship lgth., paint)
Rev. 11-88 (Seal-DS Brown)
Rev. 8-88 (Paint)

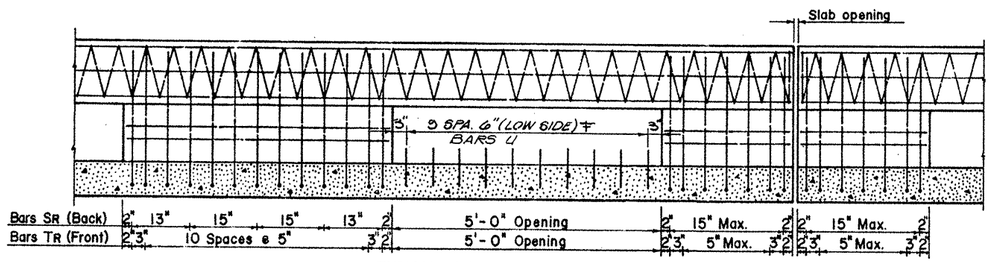
ORIGINAL DRAWING DATE MARCH 1983			STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #	SHEET
DN :-	REVISIONS		15	6		207
CK :-	Rev. 8-84	Rev. 1-87 (SCII)	COUNTY		CONTROL / SECTION / JOB / HIGHWAY	
DW :-DRG	Rev. 10-85	Rev. 1-6-88 (Stud Spa.)	BEXAR		2452 2 42	LP1604
CK :-JCW	Rev. 11-89	Rev. 3-88 (Add BRG Industries Inc.)				
	Rev. 10-86					

Note: Metal Beam Guard Fence must be attached to the bridge rail and extended along the embankment. See plan sheet for details and length for payment. The Splice between the approach guard rail and the Terminal Connector shall be with the normal 8 bolts.

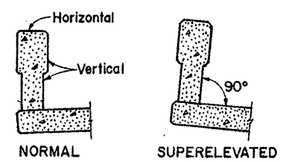


ROADWAY ELEVATION OF RAIL

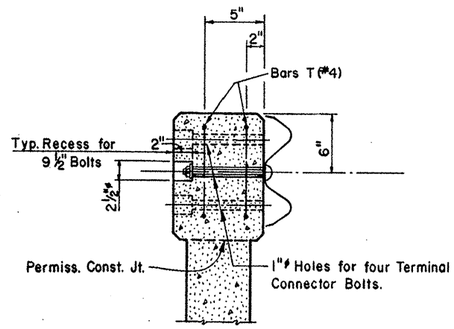
NOTE: Terminal Connector shall receive the same protective coating as the attached Metal Beam Guard Fence.



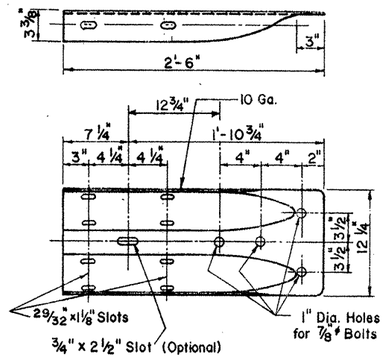
TYPICAL REINFORCING PLACEMENT



PLACEMENT DETAIL



TYP. BM. TO WALL CONNECTION



TERMINAL CONNECTOR

GENERAL NOTES:

Designed according to AASHTO 1977 Standard and current Interim Specifications.

Rail Type T202 is comprised of the following parts: Concrete railing, concrete posts, concrete above wingwall, all reinforcing shown, water barrier, Deep Beam rail connection, Terminal Connector, and all anchorage provisions including bolts, nuts and washers.

All these parts are included in price bid per linear foot of rail.

All steel components except reinforcing shall be galvanized unless otherwise shown in plans.

All concrete shall be Class C. Chamfer all exposed corners.

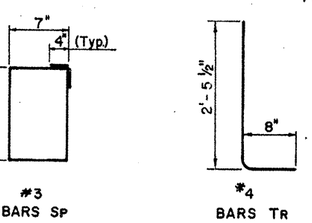
Dimensions relating to reinforcing steel are to centers of bars.

All reinforcing steel shall be Grade 60 except spiral.

Railing shall be as shown in placement detail. Openings shall have end faces perpendicular to adjacent roadway grade.

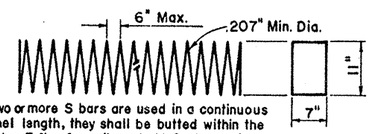
Water barriers shall be provided at openings draining onto under-crossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

Shop drawings will not be required for this rail.



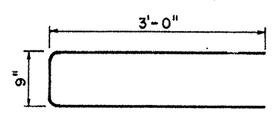
#3 BARS SP

#4 BARS TR

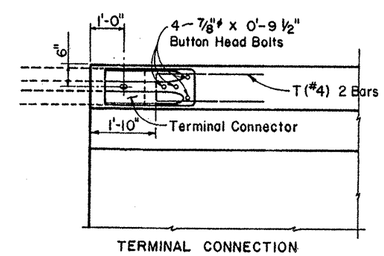


If two or more S bars are used in a continuous panel length, they shall be butted within the center 3 ft. of a rail post. At Contractor's option, Bars SP spaced at 6" may be substituted for Bars S.

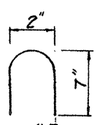
BARS S



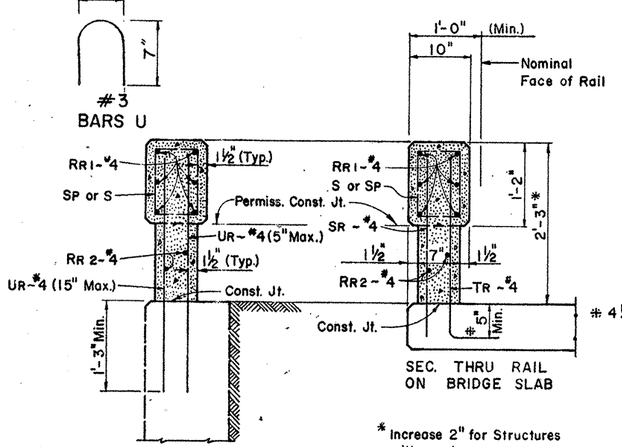
BARS T # 4
(2 at each terminal)



TERMINAL CONNECTION



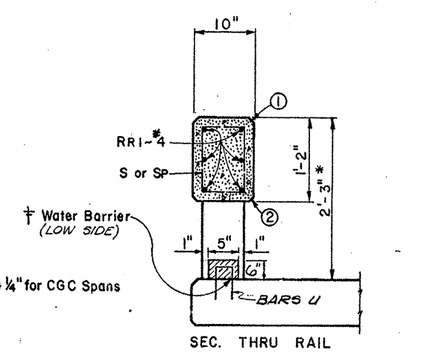
#3 BARS U



SEC. THRU RAIL ON ABUT. WING

SEC. THRU RAIL ON BRIDGE SLAB

* Increase 2" for Structures with overlay.

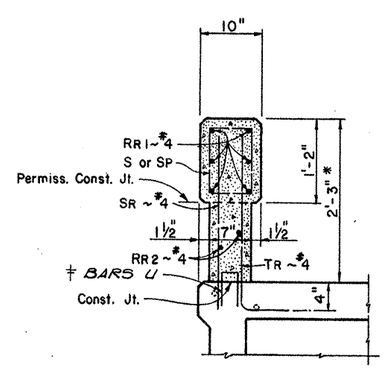


SEC. THRU RAIL AT OPENING

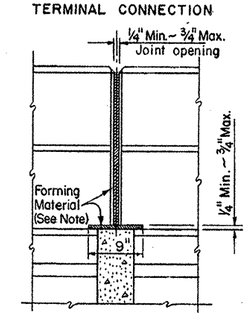
① 3/4 X 3/4 Chamfer (Typ.)

② 1 1/2 X 3/4 or 3/4 X 3/4 Chamfer (Typ.)

‡ AT HUESTA CREEK ONLY



SEC. THRU RAIL ON PRESTR. CONC. BOX BEAMS



RAIL JOINT FOR PRESTR. CONC. BOX BEAMS

Material used in forming joint may be left in place if it is compressible and light in color such as the following materials: styrafoam, molded cork granules, sponge rubber sheet, etc.

RAILS ON HORIZONTAL CURVES

Rad. to Face of Rail	Max. Chord Lgth.	Construction or Fabrication
Over 3200'	33'-0"	Construct wall to the required radius or in chords shown.
Over 2000' 3200'	20'-0"	
Over 300' 2000'	10'-0"	
Thru. 300'	0	Construct wall to the required radius

STATE OF TEXAS — JON H. KILGORE 73980 — REGISTERED PROFESSIONAL ENGINEER

JON H KILGORE P.E. DATE

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

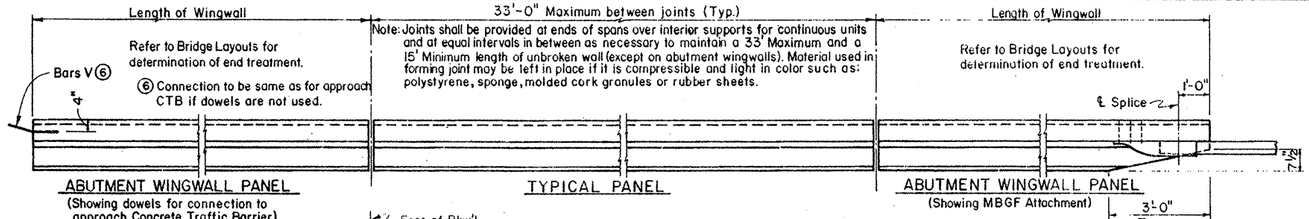
TRAFFIC RAIL TYPE T202 (MOD)

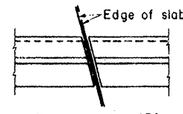
PREPARED BY AND FOR THE USE OF TEXAS SDH&PT.

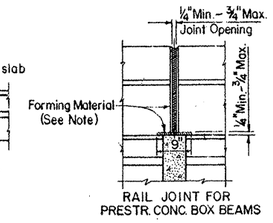
FOR STRUCTURES WITHOUT SIDEWALKS

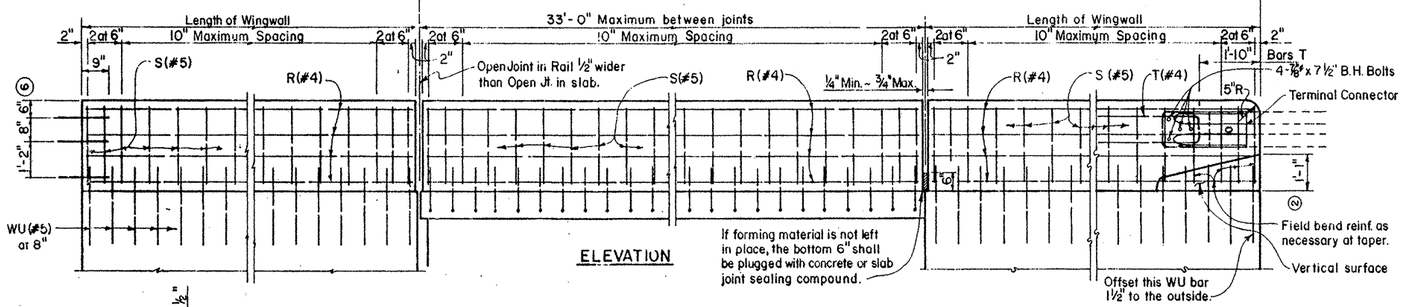
ORIGINAL DRAWING DATE: DEC. 1980	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.:-JJP REVISIONS	15	6		208
CK.:-HJD	COUNTY		CONTROL SECTION JOB	HIGHWAY
DW.:-EDS	BEXAR		2452 02 042	L1604
CK.:-HJD				

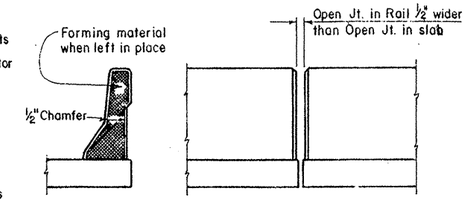
ETC

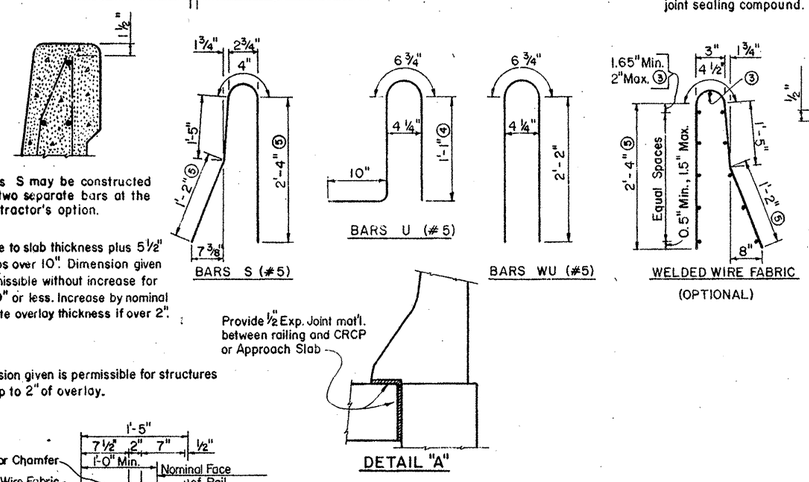


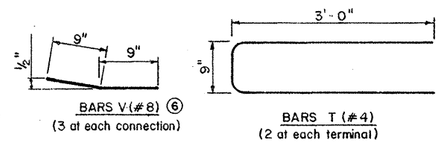






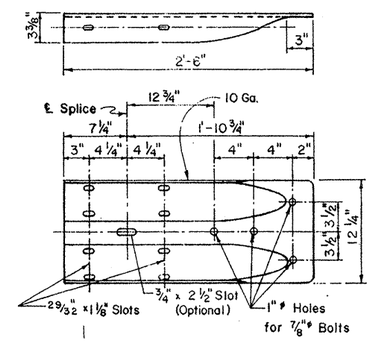






DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
1. Minimum (Cumulative Total) Wire Area	0.933 Sq. In.	0.248 Sq. In. Per. Ft.
2.	No. of Wires	Spacing
Minimum	6	4"
Maximum	11 ③	12"
3. Maximum Wire Size Differential	The smaller wire shall have an area of 40% or more of the larger wire.	

③ Longitudinal wires may be within upper bend if vertical wires are D8.7 or smaller, in which case the 2" dimension to the next lower bars may be increased to 4" max.



TERMINAL CONNECTOR

Terminal Connector shall receive the same protective coating as the attached Metal Beam Guard Fence.

④ Increase to slab thickness plus 5½" for slabs over 10". Dimension given is permissible without increase for slabs 9" or less. Increase by nominal concrete overlay thickness if over 2".

⑤ Dimension given is permissible for structures with up to 2" of overlay.

GENERAL NOTES:

Designed according to AASHTO 1977 Standard and current Interim Specifications.

All parts of the railing including concrete parapet wall, reinforcing, terminal connector, bolts, nuts and washers are included in the price bid per linear foot of rail.

All steel components except reinforcing shall be galvanized unless otherwise shown in plans.

All concrete for railing wall shall be Class "C".

Dimensions relating to reinforcing steel are to centers of bars.

Metal Beam Guard Fence or Concrete Traffic Barrier is usually attached to the abutment wingwall panel. See plan sheet for details and length for payment. The splice between the approach guard fence and the terminal connector shall be with the normal eight bolts. The dowel connection to the approach traffic barrier shall be grouted the same as other barrier joints.

Shop drawings will not be required for this rail.

This railing may be constructed with slip-forms with equipment approved by the Engineer. Sensor control for both line and grade must be provided. When slip-forming is used, the concrete may be cured with membrane curing compound.

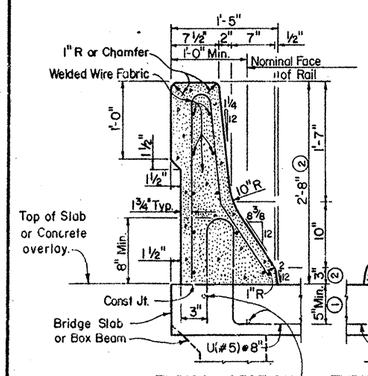
The back of railing shall be vertical unless otherwise shown in plans.

Welded wire fabric may be used as an option to conventional reinforcement and shall be made in accordance with A S T M A497.

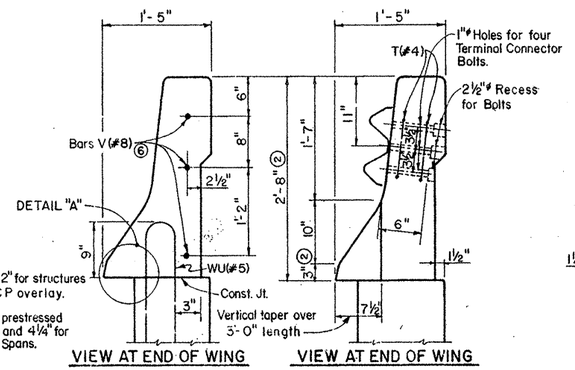
Welded Wire Fabric Detail shown is for D8.4 longitudinal wires and D8.3 vertical wires. Combinations of Reinforcing Steel and Welded Wire Fabric or configurations of Welded Wire Fabric other than shown will be permitted when the conditions in the table are satisfied and the dimension from end of section to first welded vertical wire does not exceed 3".

Additional reinforcing may be tack welded to the upper two thirds of the reinforcing cage to provide bracing when slip-forming is used. Additional anchorage devices may be added when welding is necessary in the lower one third of the cage. Do not weld to U or S bars in the lower one third of the cage.

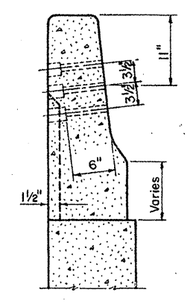
P L F weight of railing (with no overlay increase) is 326 plf.

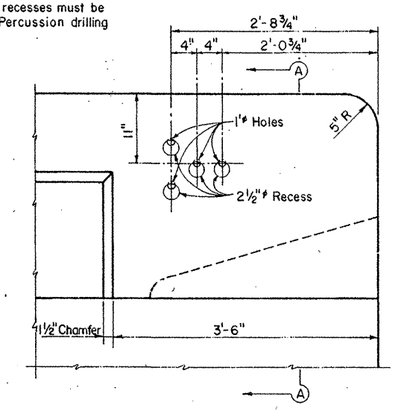


As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars shall be furnished at the Contractors expense.



NOTE: Holes and recesses must be formed or cored. Percussion drilling is not permitted.





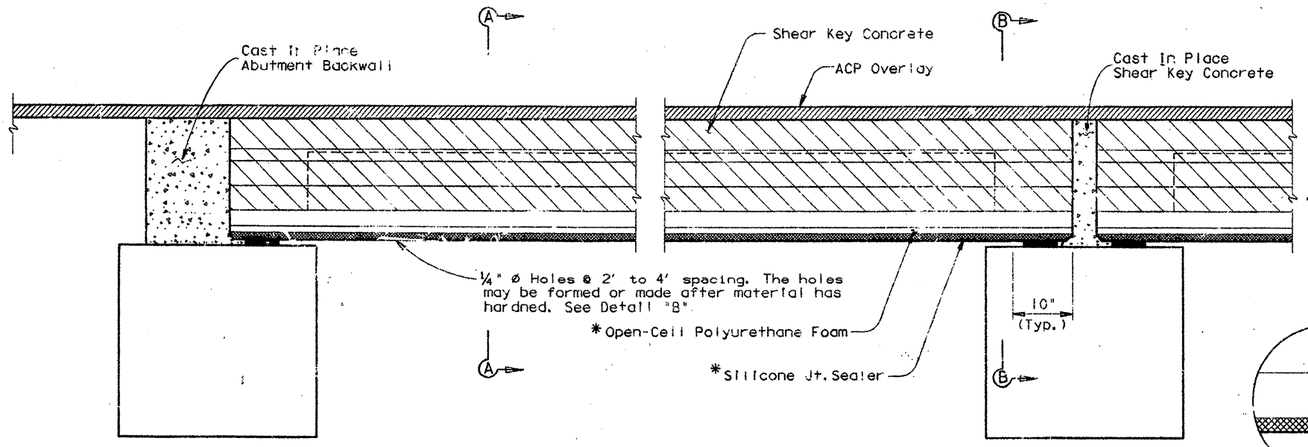
STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

TRAFFIC RAIL

TYPE T501

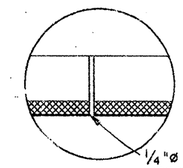
ORIGINAL DRAWING DATE: JUNE 1985	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT				SHEET
DN.:-THD REVISIONS	15	6					209
CK.:-THD Rev. 10-85 (Added Det. "A")	COUNTY		CONTROL	SECTION	JOB	HIGHWAY	
DW.:-EDS Rev. 4-86 (Det. "A") 5-87 (Conc. Overlay)	BEXAR		2452	02	042	L1604	
CK.:-JJP							

ETC

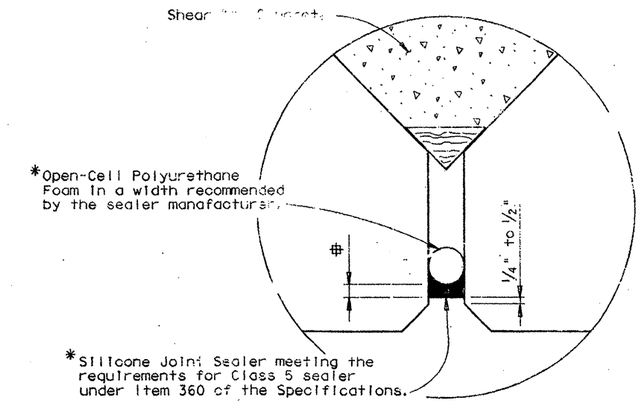


BOX BEAM ELEVATION

METHOD A



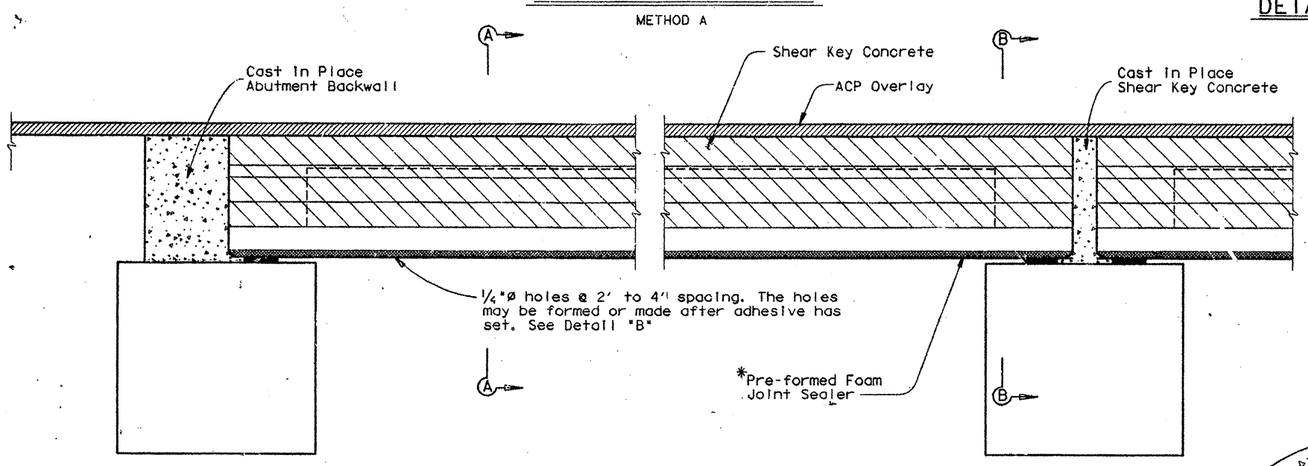
DETAIL "B"



DETAIL "A"

METHOD A

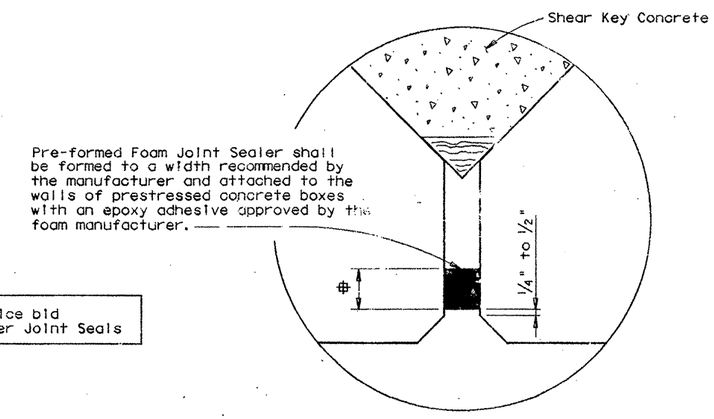
⌗ Manufacturer's Recommendation



BOX BEAM ELEVATION

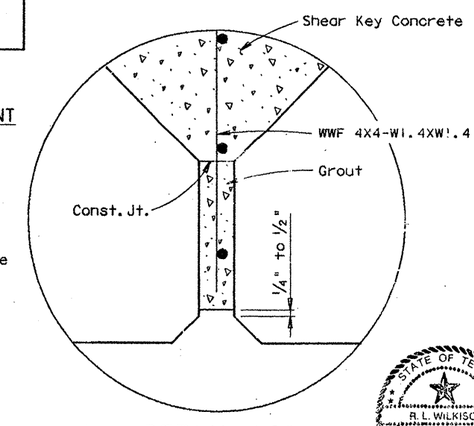
METHOD B

* Included in price bid for Bat Excluder Joint Seals



DETAIL "A"

METHOD B



DETAIL "C"

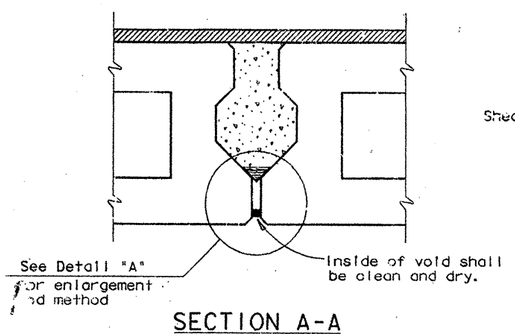
GENERAL NOTES:

Prior to beginning work, the Contractor shall submit to Engineer, for approval, a complete detail of methods to be used, a material list, traffic control plans and methods used for protection of the structure and personal property.

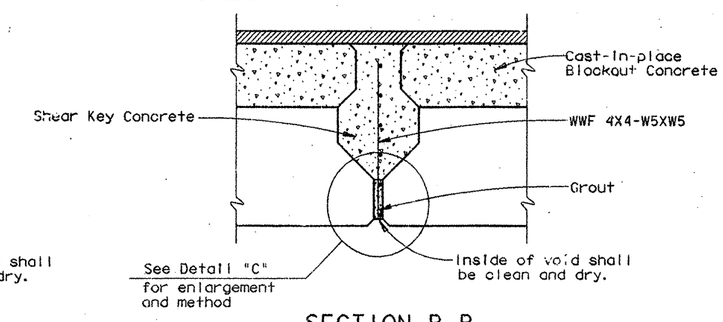
Contractor shall measure the length and width of all voids prior to ordering materials.

The Contractor shall perform all work between November 1 and March 1.

HS 20 LOADING



SECTION A-A



SECTION B-B

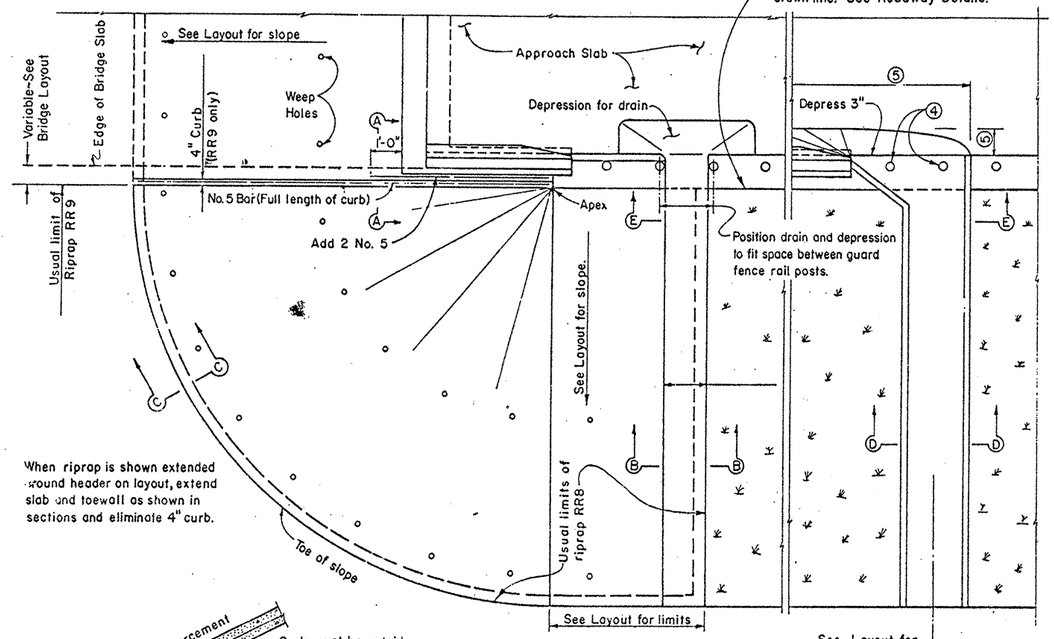
STATE OF TEXAS
R. L. WILKISON
38362
REGISTERED PROFESSIONAL ENGINEER
4/8/93
R.L. Wilkison

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

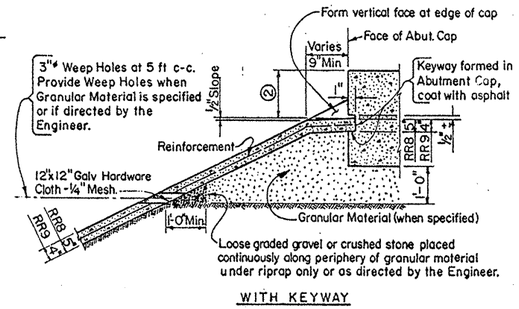
BAT EXCLUDER (ACP OVERLAY)

D45350A1 : ZFA2 : [355107]	BATS.DGN	PREPARED BY AND FOR USE OF TEXAS SDH&PT				
ORIGINAL DRAWING DATE: SEPTEMBER 1990		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
DN.: JCW	REVISIONS	15	6			210
CK.:		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DW.: RNP		bexar		2452	02	023	LP.604
CK.: JCW							

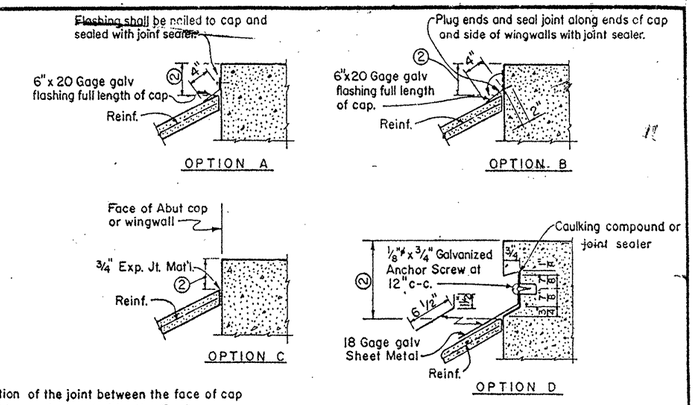
ETC.



PLAN

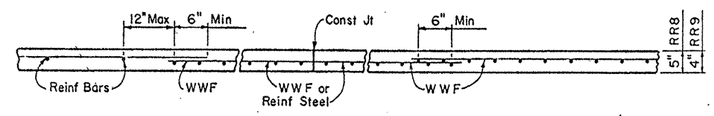


WITH KEYWAY



The sealing option of the joint between the face of cap and riprap shall be as designated by the Engineer. Options A or C may be used at wingwalls in all cases.

SECTIONS THRU RIPRAP AT CAP



Reinforcing bars shall be No. 3 at 18 in. spac c-c. Welded wire fabric shall be 6 x 6 - W2.9 x W2.9. Combinations of WWF and reinforcing bars may be used if both are permitted. Lap splices shall be a minimum of 6 inches, measured from the transverse wire of WWF, and the ends of reinforcing bars.

SECTION THRU REINFORCING AND CONST JOINT

GENERAL NOTES:

Concrete shall be Class B unless noted elsewhere in plans.

Reinforcing other than that shown may be used by substituting reinforcement of equal or greater unit cross-sectional area. The maximum reinforcement spacing shall be 18 inches.

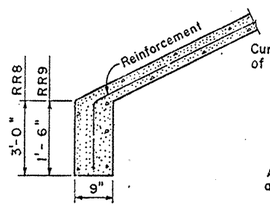
Construction joints or grooved joints extending the full slant slope height shall be at intervals of approximately 20 feet unless otherwise directed by the Engineer.

Porus Concrete Filter Blanket and Gravel Backfill shall be placed if shown elsewhere in the plans or if directed by the Engineer.

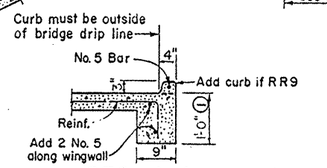
Hardware cloth, loose graded stone behind weep holes, flashing, or other sealing material shall not be paid for directly but shall be subsidiary to the bid item, Riprap.

Unless specified elsewhere in the plans to be only reinforcing bars, the riprap reinforcing may be composed of reinforcing bars, welded wire fabric, or any suitable combination of both types.

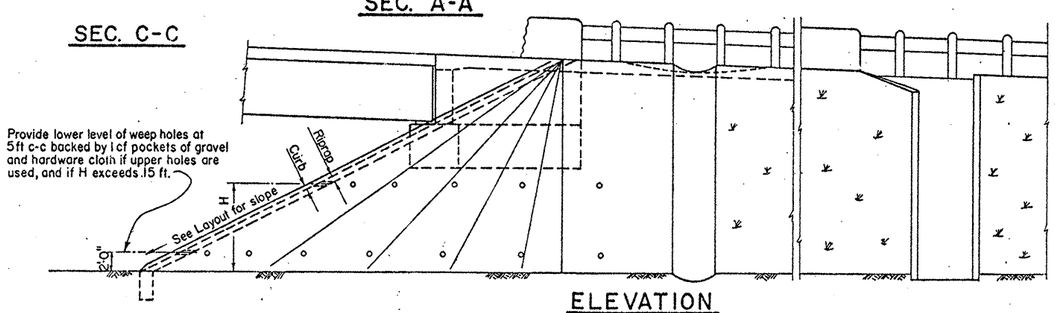
RR8 is to be used on stream crossings.
RR9 is to be used on other embankments.



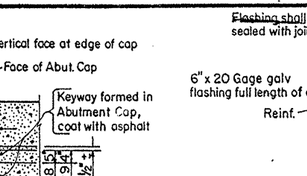
SEC. C-C



SEC. A-A



ELEVATION



RIPRAP DETAIL AT COLUMNS

(As Directed by the Engineer)

① Wall extension may be reduced or modified if approved by the Engineer.

② Dimension varies as directed by the Engineer. Should be 9" Min for stringer type bridges and 1'-6" for slab type bridges.

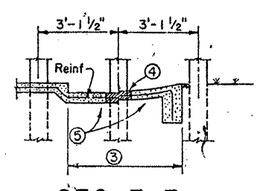
③ Wider or other drain configurations shall be used if shown elsewhere in plans or if directed by the Engineer.

④ A 12 in. diameter leave out should be provided in the riprap at the guard fence location. Backfill with 4 in. of ACP if directed by the Engineer.

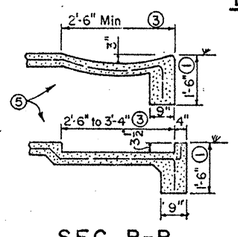
⑤ Limits and configuration of drains and depressions shall be as shown elsewhere in plans or as directed by the Engineer.

FOR CONTRACTOR'S INFORMATION ONLY:

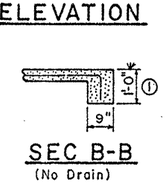
4" of RR9 Riprap	= 0.012 CY/SF
5" of RR8 Riprap	= 0.015 CY/SF
No. 3 Reinf. at 18" c-c	= 0.519 Lbs/SF
6x6-W2.9 x W2.9	= 0.392 Lbs/SF



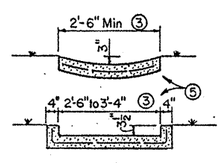
SEC E-E



SEC B-B
(With Drain)



SEC B-B
(No Drain)



SEC D-D
(Shoulder Drain)

TEXAS DEPARTMENT OF TRANSPORTATION
DIVISION OF BRIDGES AND STRUCTURES

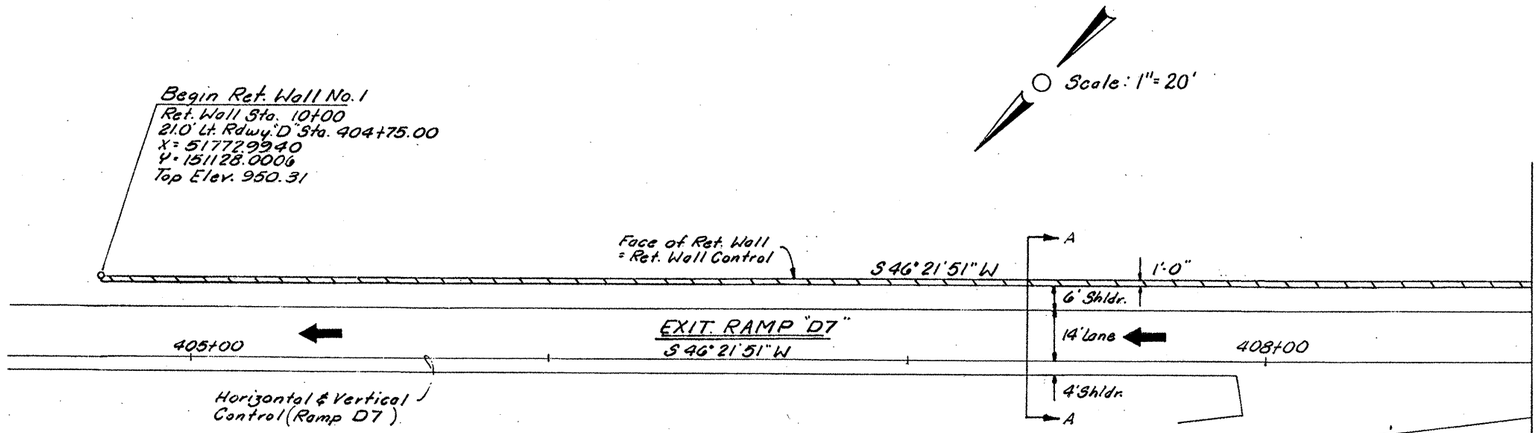
CONCRETE RIPRAP

FOR EMBANKMENT SLOPES UNDER BRIDGE ENDS

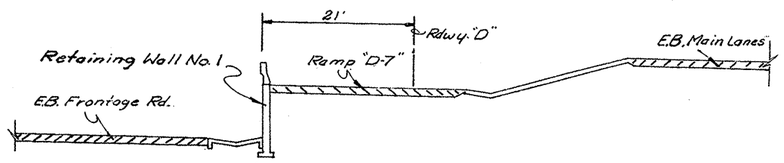
RR8 & RR9

ORIGINAL DRAWING DATE: FEB 1987		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT				SHEET
DR.- JJP	REVISIONS	15	6					212
CK.- THD	Rev.- KC -1/92 : Bikout @ Cols. Rev.- WB -9/92 : Laps, Quan, Info.	COUNTY			CONTROL	SECTION	JOB	HIGHWAY
DN.- EDS		BEXAR			2452	2-23		US 90
CK.- JJP								

ORIGINAL
BRIDGE DIVISION

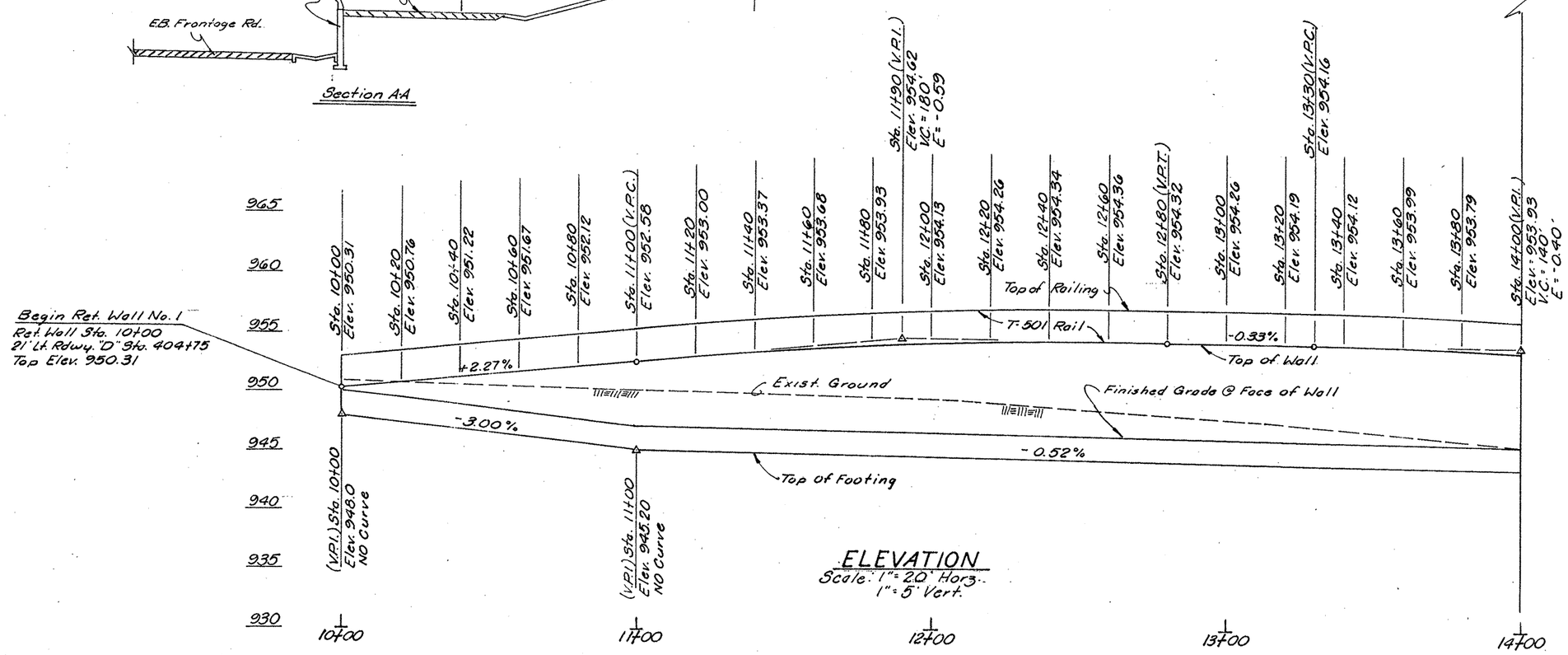


PLAN



Section A-A

Retaining Wall No. 1 Quantity Summary		
Item	Unit	Qty.
Ret. Wall Surf. Area	S.F.	5536
T-501 Rail	L.F.	720



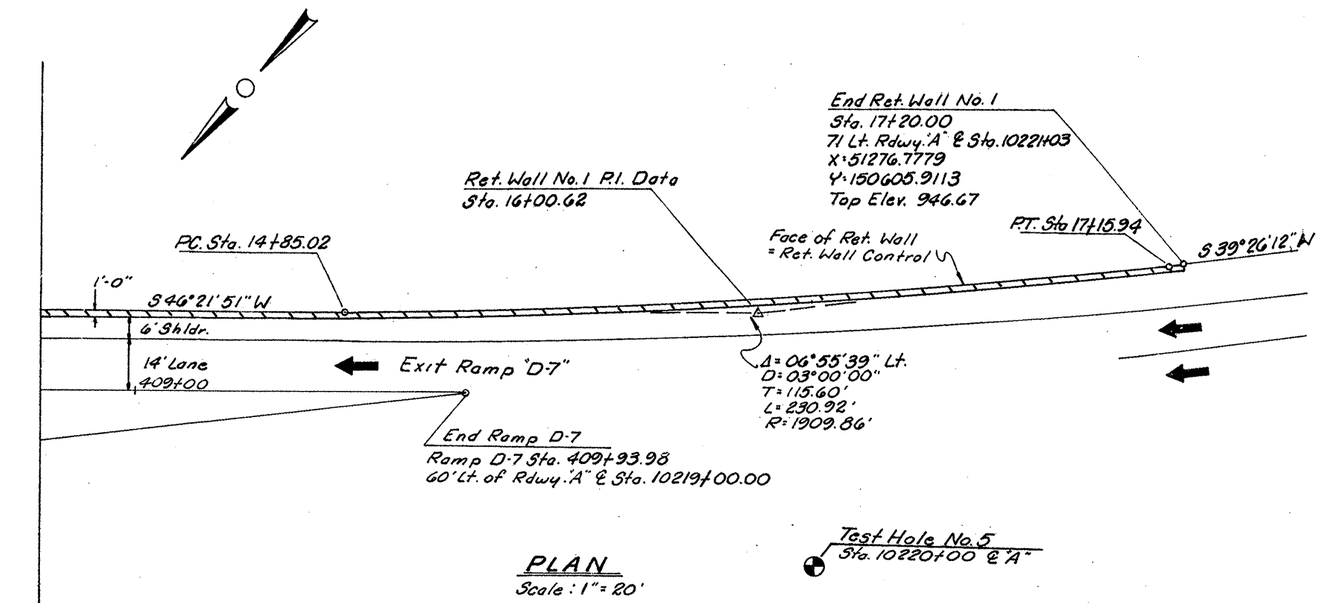
ELEVATION
Scale: 1" = 20' Horz.
1" = 5' Vert.

STATE OF TEXAS
CAROL GREINER LUSCHEN
66450
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

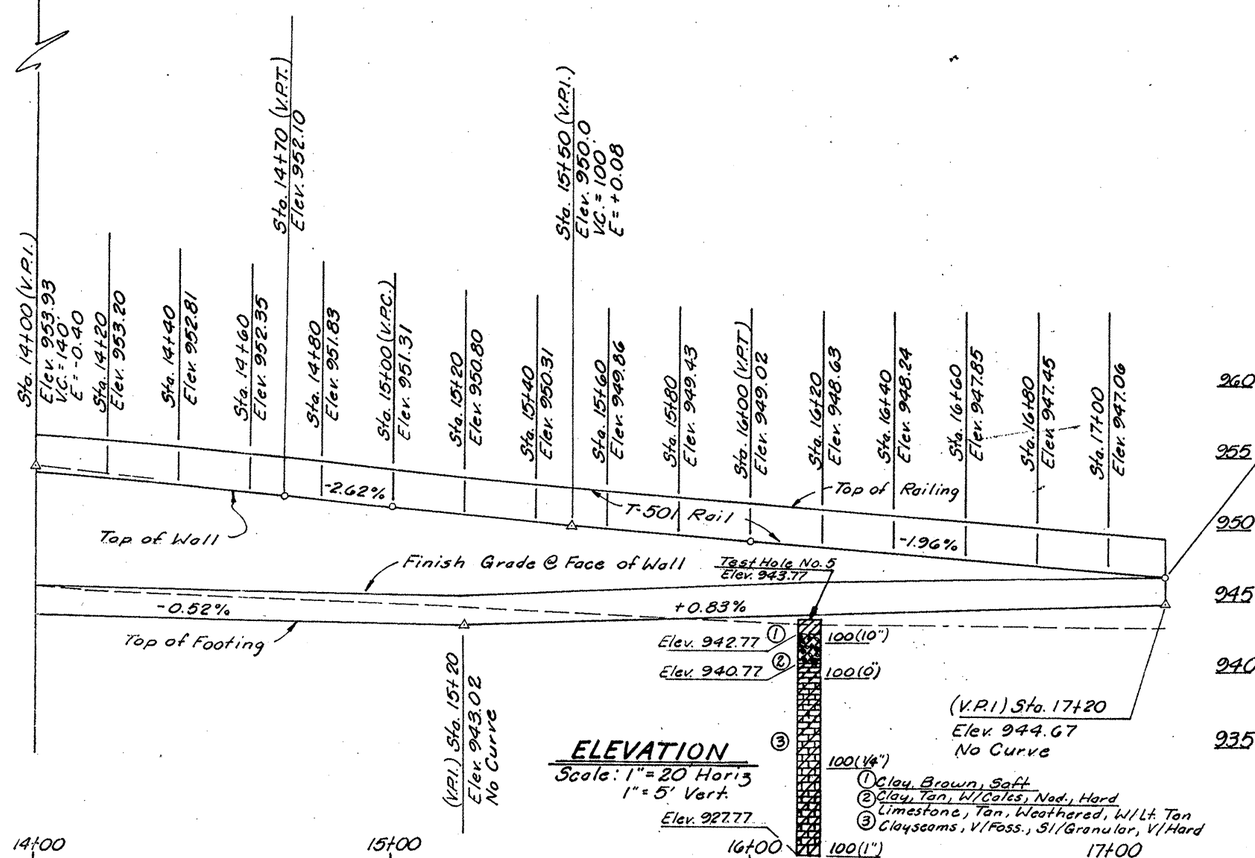
RETAINING WALL NO. 1
FROM STA. 10+00 TO STA. 17+20
SHEET 1 OF 2

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			SHEET NO.
6	TEXAS				213
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR	2452	02	023 ETC.	IP 410



PLAN

Scale: 1" = 20'



ELEVATION

Scale: 1" = 20' Horiz.
1" = 5' Vert.

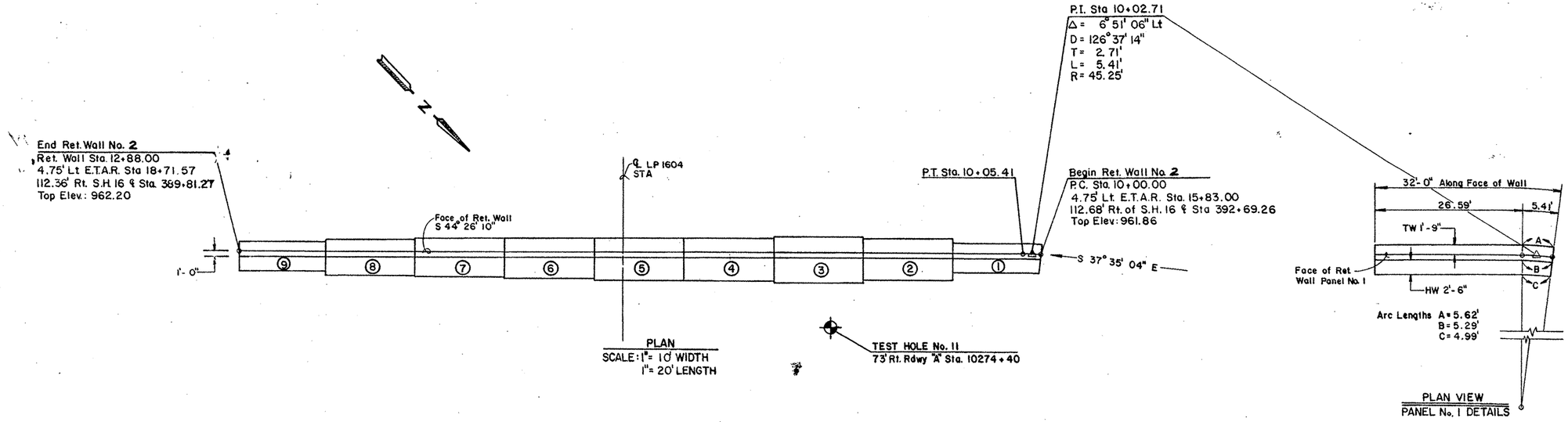
1. Clay, Brown, Soft
2. Clay, Tan, W/Coles, Nod., Hard
3. Limestone, Tan, Weathered, W/Lt. Tan Clayseams, V/Foss., Sl/Granular, V/Hard

THE STATE OF TEXAS
CAROL GREINER LUSCHER
80460
REGISTERED PROFESSIONAL ENGINEER

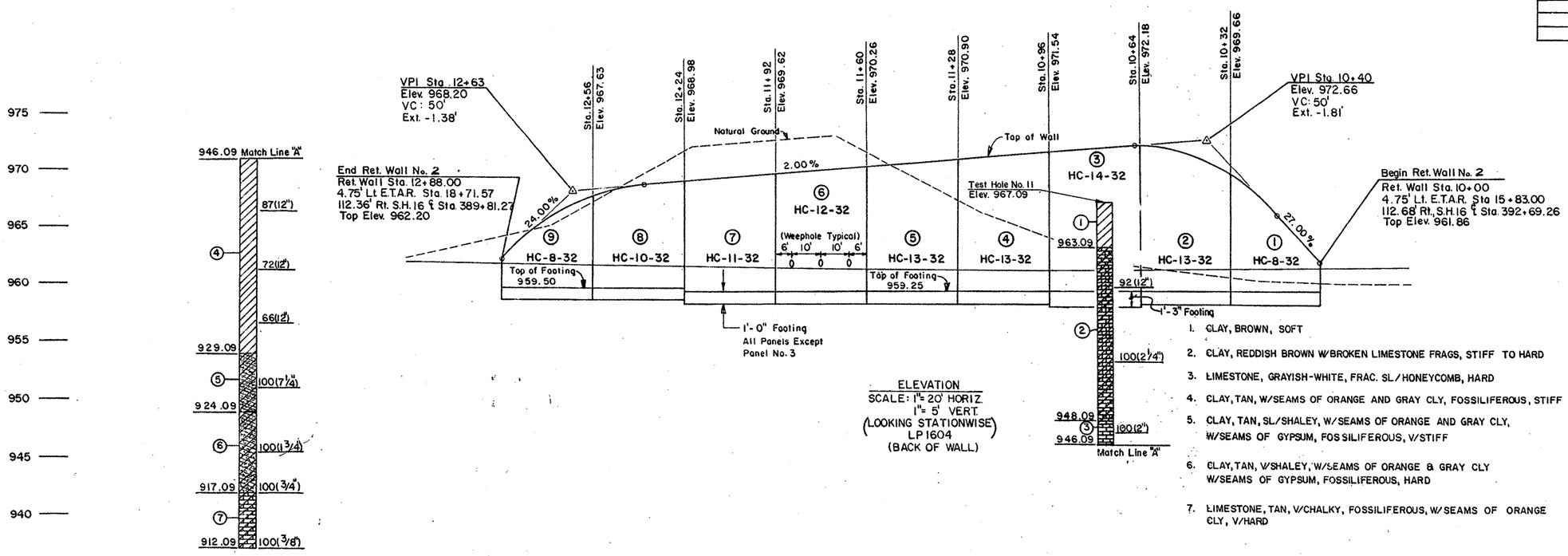
CAROL GREINER LUSCHER, P.E. — 1-31-92
DATE

RETAINING WALL NO 1
FROM STA 10+00 TO STA 17+20
SHEET 2 OF 2

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			SHEET NO.
6	TEXAS				214
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR	2452	02	023	LP 410



RETAINING WALL "2" QUANTITY SUMMARY		
ITEM	UNIT	QTY
RET. WALL SURFACE AREA	SF	2841



ELEVATION
SCALE: 1" = 20' HORIZ.
1" = 5' VERT.
(LOOKING STATIONWISE)
LP 1604
(BACK OF WALL)

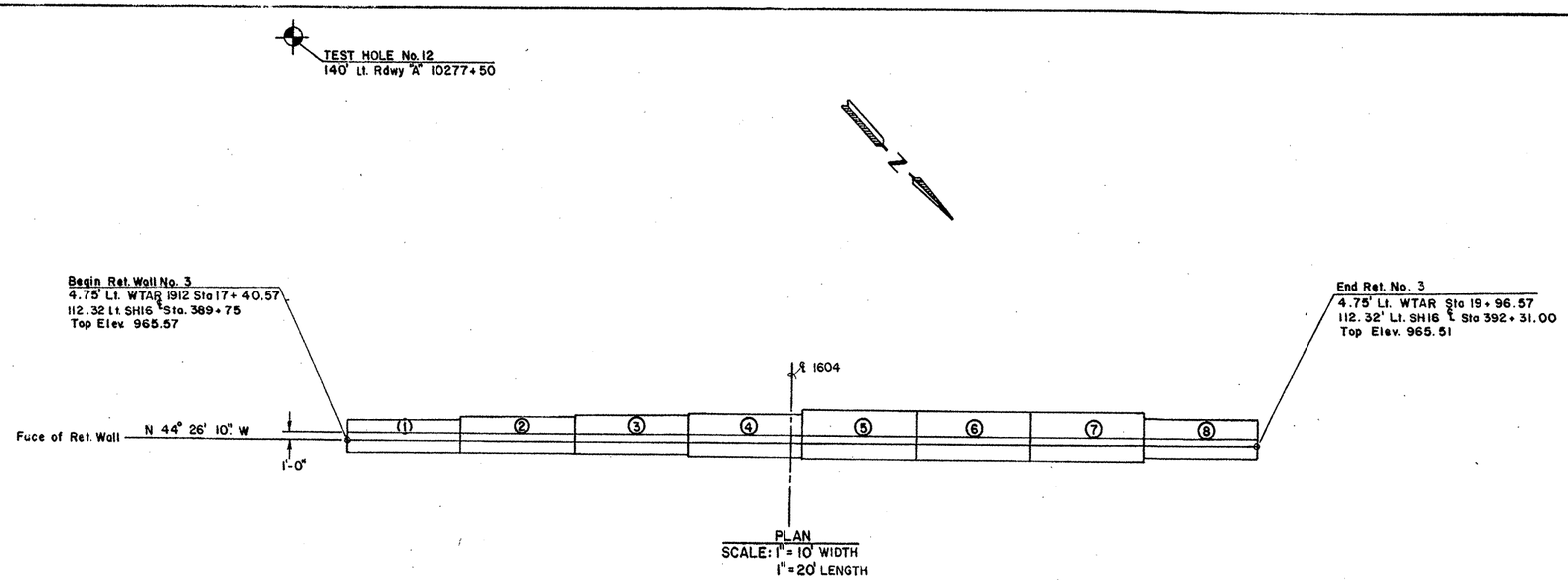
1. CLAY, BROWN, SOFT
2. CLAY, REDDISH BROWN W/BROKEN LIMESTONE FRAGS, STIFF TO HARD
3. LIMESTONE, GRAYISH-WHITE, FRAC. SL/HONEYCOMB, HARD
4. CLAY, TAN, W/SEAMS OF ORANGE AND GRAY CLY, FOSSILIFEROUS, STIFF
5. CLAY, TAN, SL/SHALEY, W/SEAMS OF ORANGE AND GRAY CLY, W/SEAMS OF GYPSUM, FOSSILIFEROUS, V/STIFF
6. CLAY, TAN, V/SHALEY, W/SEAMS OF ORANGE & GRAY CLY W/SEAMS OF GYPSUM, FOSSILIFEROUS, HARD
7. LIMESTONE, TAN, V/CHALKY, FOSSILIFEROUS, W/SEAMS OF ORANGE CLY, V/HARD

STATE OF TEXAS
CAROL GREINER LUSCHER
80430
REGISTERED PROFESSIONAL ENGINEER

Carol G. Luscher P.E. 1-31-92
CAROL GREINER LUSCHER DATE

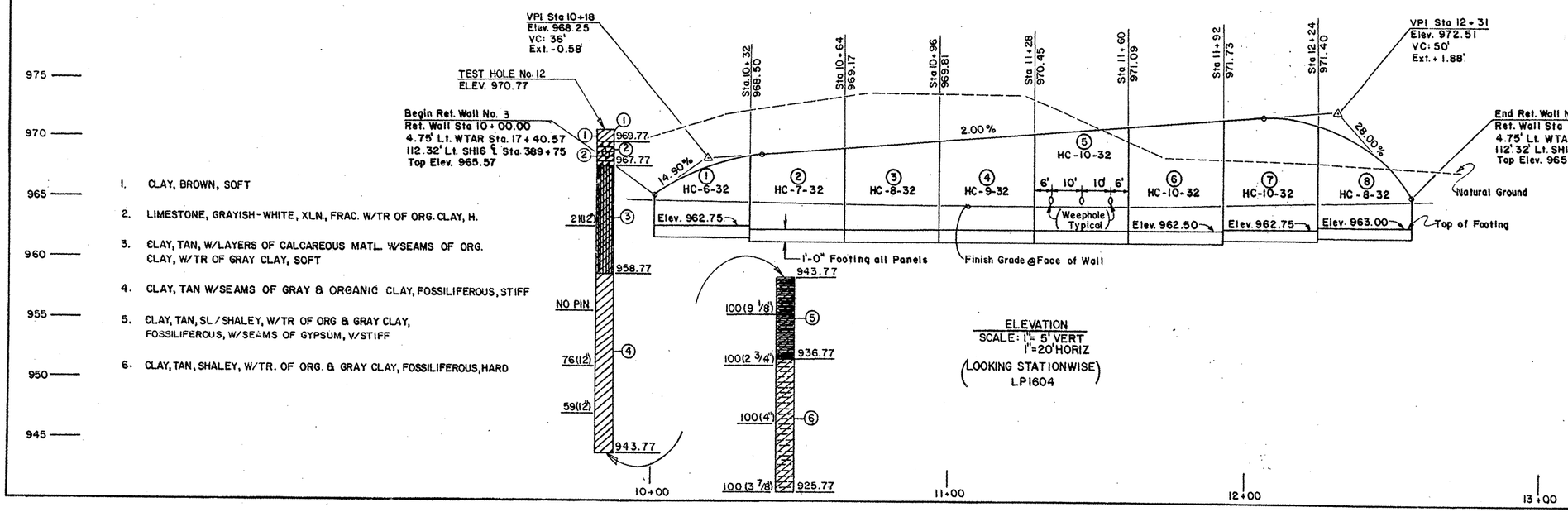
RETAINING WALL No. 2
FROM STA 10+00.00 TO STA 12+88.00

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			SHEET NO.
6	TEXAS				215
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604 ET



PLAN
SCALE: 1" = 10' WIDTH
1" = 20' LENGTH

RETAINING WALL "3" QUANTITY SUMMARY		
ITEM	UNIT	QTY
RET WALL SURFACE AREA	SF	1838



1. CLAY, BROWN, SOFT
2. LIMESTONE, GRAYISH-WHITE, XLN., FRAC. W/TR OF ORG. CLAY, H.
3. CLAY, TAN, W/LAYERS OF CALCAREOUS MATL. W/SEAMS OF ORG. CLAY, W/TR OF GRAY CLAY, SOFT
4. CLAY, TAN W/SEAMS OF GRAY & ORGANIC CLAY, FOSSILIFEROUS, STIFF
5. CLAY, TAN, SL/SHALEY, W/TR OF ORG & GRAY CLAY, FOSSILIFEROUS, W/SEAMS OF GYPSUM, V/STIFF
6. CLAY, TAN, SHALEY, W/TR. OF ORG. & GRAY CLAY, FOSSILIFEROUS, HARD

ELEVATION
SCALE: 1" = 5' VERT
1" = 20' HORIZ
(LOOKING STATIONWISE)
LP1604

STATE OF TEXAS
CAROL GREINER LUSCHEN
80460
REGISTERED PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

RETAINING WALL No. 3
FROM STA 10+00.00 TO STA 12+56.00

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS					216
STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR		2452	02	023	LP1604

ETC

PROPERTIES

Design A (H)	B	C	D	E	F	G	K	Fw	Tw	Sw	Hw	Ft	Kw	Max. Soil Press. T/□'	Min. Req'd As □"/ft. Stem	Toe	Heel
1								0	0	1'-0"	0	0	0	0	.125	0	0
2	1							1'-4"	4"	1'-0"	0	9"	9"	.235	.125	.125	.125
3	2	1						1'-6"	6"	1'-0"	0	9"	9"	.325	.125	.125	.125
4	3	2	1					2'-0"	8"	1'-0"	4"	1'-0"	9"	.236	.125	.125	.125
5	4	3	2	1				2'-7½"	10½"	1'-0"	9"	1'-0"	9"	.320	.125	.125	.125
6	5	4	3	2	1			3'-1½"	1'-1"	1'-0"	1'-0½"	1'-0"	9"	.403	.125	.125	.125
7	6	5	4	3	2	1		3'-9"	1'-3"	1'-0"	1'-6"	1'-0"	9"	.485	.125	.125	.125
8	7	6	5	4	3	2	1	4'-3"	1'-5"	1'-0"	1'-10"	1'-0"	9"	.576	.154	.125	.125
9	8	7	6	5	4	3	2	4'-9"	1'-7"	1'-0"	2'-2"	1'-0"	9"	.666	.229	.125	.158
10	9	8	7	6	5	4	3	5'-3"	1'-9"	1'-0"	2'-6"	1'-0"	9"	.755	.327	.173	.280
11	10	9	8	7	6	5	4	5'-10"	1'-11½"	1'-0"	2'-10½"	1'-0"	9"	.817	.448	.234	.401
12	11	10	9	8	7	6	5	6'-4½"	2'-1½"	1'-0"	3'-3"	1'-0"	9"	.895	.596	.302	.553
13	12	11	10	9	8	7	6	6'-10½"	2'-3½"	1'-0"	3'-7"	1'-0"	9"	.980	.774	.384	.722
14	13	12	11	10	9	8	7	7'-4½"	2'-5½"	1'-0"	3'-11"	1'-0"	9"	1.064	.985	.480	.924
15	14	13	12	11	10	9	8	7'-10½"	2'-7½"	1'-1⅛"	4'-1⅞"	1'-0"	9"	1.148	1.086	.591	1.113
16	15	14	13	12	11	10	9	8'-4½"	2'-9½"	1'-2"	4'-5"	1'-3"	1'-0"	1.250	1.173	.538	.971
17	16	15	14	13	12	11	10	8'-10½"	2'-11½"	1'-3 1/16"	4'-7 15/16"	1'-3"	1'-0"	1.333	1.297	.644	1.148
18	17	16	15	14	13	12	11	9'-4½"	3'-1½"	1'-3 13/16"	4'-11 11/16"	1'-6"	1'-3"	1.434	1.383	.613	1.057
19	18	17	16	15	14	13	12	9'-11½"	3'-4"	1'-5 5/16"	5'-2 7/16"	1'-6"	1'-3"	1.489	1.513	.724	1.246
20	19	18	17	16	15	14	13	10'-4½"	3'-5½"	1'-6 3/16"	5'-4 13/16"	1'-6"	1'-3"	1.601	1.650	.838	1.414
21	20	19	18	17	16	15	14	10'-10½"	3'-7½"	1'-7"	5'-8"	1'-9"	1'-6"	1.702	1.758	.811	1.336
22	21	20	19	18	17	16	15	11'-4½"	3'-9½"	1'-8⅜"	5'-10⅞"	1'-9"	1'-6"	1.785	1.939	.931	1.521
23	22	21	20	19	18	17	16	12'-0"	4'-0"	1'-9¼"	6'-2¾"	1'-9"	1'-6"	1.832	2.066	1.063	1.767
24	23	22	21	20	19	18	17	12'-4½"	4'-1½"	1'-10⅛"	6'-4⅞"	2'-0"	1'-6"	1.986	2.189	1.046	1.648
25	24	23	22	21	20	19	18	12'-11½"	4'-4"	1'-11¼"	6'-8¾"	2'-0"	1'-6"	2.025	2.359	1.177	1.870
26	25	24	23	22	21	20	19	13'-5½"	4'-6"	2'-0⅛"	6'-11⅜"	2'-3"	1'-6"	2.133	2.408	1.167	1.813
27	26	25	24	23	22	21	20	13'-11½"	4'-8"	2'-1¼"	7'-2¼"	2'-3"	1'-6"	2.208	2.672	1.299	2.028
28	27	26	25	24	23	22	21	14'-5½"	4'-10"	2'-2⅜"	7'-5⅛"	2'-3"	1'-9"	2.291	2.862	1.446	2.235
29	28	27	26	25	24	23	22	14'-11½"	5'-0"	2'-3½"	7'-8"	2'-3"	1'-9"	2.374	3.057	1.603	2.468
30	29	28	27	26	25	24	23	15'-5½"	5'-2"	2'-4⅝"	7'-10⅞"	2'-3"	1'-9"	2.456	3.261	1.771	2.717
31	30	29	28	27	26	25	24	15'-11½"	5'-4"	2'-5¾"	8'-1¾"	2'-3"	1'-9"	2.539	3.470	1.951	2.992
32	31	30	29	28	27	26	25	16'-5½"	5'-6"	2'-6⅞"	8'-4⅝"	2'-6"	1'-9"	2.639	3.631	1.983	2.888

Surcharge: Level — None, 1', 2', 3', 4', 5', 6', 7'; Sloped — None, Up to 7:1, 5:1, 3½:1, 2½:1, 2:1, 1¾:1, 1½:1. Wall Height "H". ← DESIGN

REINFORCING STEEL FOR 32'-0" PANEL (DESIGN A)

H	*A1 26~#5 @15" Lgth.	Wt.	*A2 25~#6 @15" Lgth.	Wt.	A3 25~#7 @15" Lgth.	Wt.	**A4 26~#8 @15" Lgth.	Wt.	**A5 25~#9 @15" Lgth.	Wt.	A6 25~#11 @15" Lgth.	Wt.	A7 26~#11 @15" Lgth.	Wt.
1														
2														
3														
4	3'-2"	86												
5	4'-5"	120												
6	5'-7"	151												
7	6'-9"	183												
8	7'-11"	215												
9	9'-1"	246												
10	10'-3"	278	3'-4"	125										
11	11'-5"	310	4'-5"	166										
12	12'-8"	343	5'-6"	207										
13	13'-10"	375	6'-7"	247	4'-6"	230								
14	14'-11"	405	7'-8"	288	5'-8"	290								
15	16'-3"	441	8'-9"	329	6'-11"	353								
16	13'-0"	353	9'-10"	369	8'-2"	417	5'-7"	388						
17	13'-0"	353	10'-11"	410	9'-5"	481	6'-10"	474						
18	13'-0"	353	12'-0"	451	10'-7"	541	8'-1"	561						
19	13'-0"	353	13'-1"	491	11'-11"	609	9'-5"	654						
20	13'-0"	353	14'-2"	532	13'-2"	673	10'-7"	336						
21	13'-0"	353	11'-0"	413	14'-5"	737	11'-10"	821	6'-11"	588				
22	13'-0"	353	11'-0"	413	15'-8"	801	13'-1"	908	8'-1"	687				
23	13'-0"	353	11'-0"	413	16'-11"	864	14'-5"	1001	9'-4"	1004				
24	13'-0"	353	11'-0"	413	18'-2"	928	15'-7"	1082	10'-6"	1130				
25	13'-0"	353	11'-0"	413	12'-0"	613	16'-11"	1174	11'-9"	999	5'-1"	675		
26	13'-0"	353	11'-0"	413	12'-0"	613	18'-2"	1261	13'-0"	1105	6'-1"	808		
27	13'-0"	353	11'-0"	413	12'-0"	613	19'-5"	1348	14'-2"	1204	7'-1"	941		
28	13'-0"	353	11'-0"	413	12'-0"	613	20'-8"	1435	15'-5"	1658	8'-1"	1074		
29	13'-0"	353	11'-0"	413	12'-0"	613	21'-11"	1521	16'-8"	1793	9'-1"	1206		
30	13'-0"	353	11'-0"	413	12'-0"	613	13'-10"	960	17'-10"	1516	10'-1"	1339	11'-9"	1623
31	13'-0"	353	11'-0"	413	12'-0"	613	13'-10"	960	19'-1"	1622	11'-1"	1472	13'-0"	1796
32	13'-0"	353	11'-0"	413	12'-0"	613	13'-10"	960	20'-3"	2090	12'-1"	1605	14'-3"	1968

** For H = 20' use #9 Bars A4

** For following heights use #10 Bars A5 H = 23'; H = 24'; H = 28'; H = 29'.

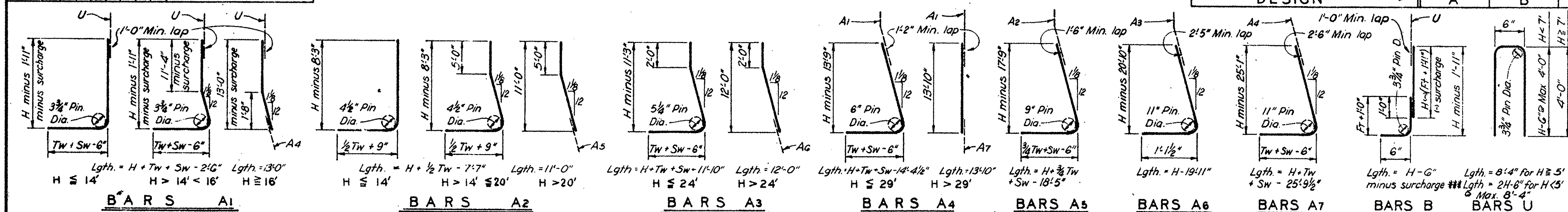
For Walls 32' high use #11 Bars A5

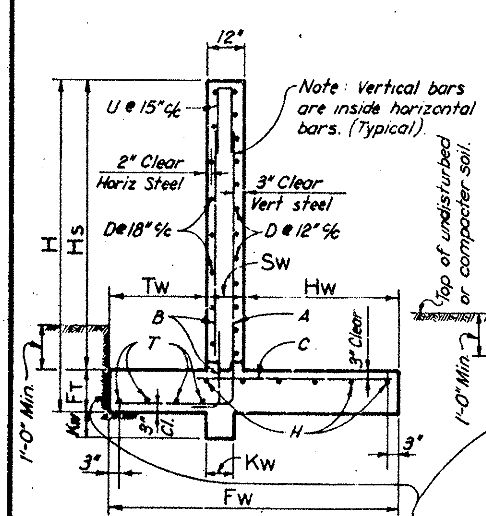
H	B 26~#5 @15" Lgth.	Wt.	C No.	Size	Spa.	Lgth.	Wt.	D #5×31'-6" @12" & 18" No.	Wt.	F⊙ #8×3'-0" @12" No.	Wt.	H #5×31'-6" @12" No.	Wt.	T #5×31'-6" @12" No.	Wt.	###U 26~#5 @15" Lth.	Wt.
1								2	66	2	16					1'-4"	36
2								2	66	3	24			2	66	3'-4"	90
3								4	131	4	32	2	66	2	66	5'-4"	145
4	3'-6"	95	26	#4	15"	1'-10"	32	5	164	5	40	2	66	2	66	7'-4"	199
5	4'-6"	122	26	#4	15"	2'-3"	39	7	230	6	48	2	66	2	66	8'-4"	226
6	5'-6"	149	26	#4	15"	2'-8"	46	9	296	7	56	3	99	2	66	8'-4"	226
7	6'-6"	176	26	#4	15"	3'-0"	52	10	329	8	64	3	99	2	66	8'-4"	226
8	7'-6"	203	26	#4	15"	3'-4"	58	12	394	9	72	3	99	3	99	8'-4"	226
9	8'-6"	231	26	#4	15"	3'-8"	64	13	427	10	80	3	99	3	99	8'-4"	226
10	9'-6"	258	38	#4	10"	4'-0"	102	15	493	11	88	4	131	3	99	8'-4"	226
11	10'-6"	285	38	#6	10"	4'-4"	247	17	559	12	96	4	131	3	99	8'-4"	226
12	11'-6"	312	38	#6	10"	4'-9"	271	19	624	13	104	4	131	4	131	8'-4"	226
13	12'-6"	339	38	#7	10"	5'-1"	395	20	657	14	112	5	164	4	131	8'-4"	226
14	13'-6"	366	38	#8	10"	5'-5"	550	22	723	14	112	5	164	4	131	8'-4"	226
15	14'-6"	393	38	#9	10"	5'-9"	743	24	789	15	120	6	197	4	131	8'-4"	226
16	15'-6"	420	38	#9	10"	6'-1"	786	25	821	16	128	6	197	4	131	8'-4"	226
17	16'-6"	447	38	#9	10"	6'-5"	829	27	887	17	136	7	230	5	164	8'-4"	226
18	17'-6"	475	38	#9	10"	6'-9"	872	29	953	18	144	7	230	5	164	8'-4"	226
19	18'-6"	502	38	#9	10"	7'-2"	926	30	986	18	144	7	230	5	164	8'-4"	226
20	19'-6"	529	38	#10	10"	7'-5"	1213	32	1051	19	152	8	263	5	164	8'-4"	226
21	20'-6"	556	38	#10	10"	7'-9"	1267	34	1117	20	160	8	263	5	164	8'-4"	226
22	21'-6"	583	38	#10	10"	8'-1"	1322	35	1150	21	168	8	263	5	164	8'-4"	226
23	22'-6"	610	76	#8	5"	8'-6"	1725	37	1216	22	176	9	296	6	197	8'-4"	226
24	23'-6"	637	76	#8	5"	8'-9"	1776	39	1281	23	184	9	296	6	197	8'-4"	226
25	24'-6"	664	76	#8	5"	9'-2"	1860	40	1314	24	192	9	296	6	197	8'-4"	226
26	25'-6"	692	76	#8	5"	9'-6"	1928	42	1380	25	200	10	329	6	197	8'-4"	226
27	26'-6"	719	76	#9	5"	9'-10"	2541	44	1446	26	208	10	329	6	197	8'-4"	226
28	27'-6"	746	76	#9	5"	10'-1"	2606	45	1478	27	216	10	329	7	230	8'-4"	226
29	28'-6"	773	76	#9	5"	10'-5"	2692	47	1544	28	224	11	361	7	230	8'-4"	226
30	29'-6"	800	76	#10	5"	10'-9"	3516	49	1610	29	232	11	361	7	230	8'-4"	226
31	30'-6"	827	76	#10	5"	11'-2"	3652	50	1643	31	248	11	361	8	263	8'-4"	226
32	31'-6"	854	76	#10	5"	11'-6"	3761	52	1708	32	256	12	394	8	263	8'-4"	226

DESIGN →

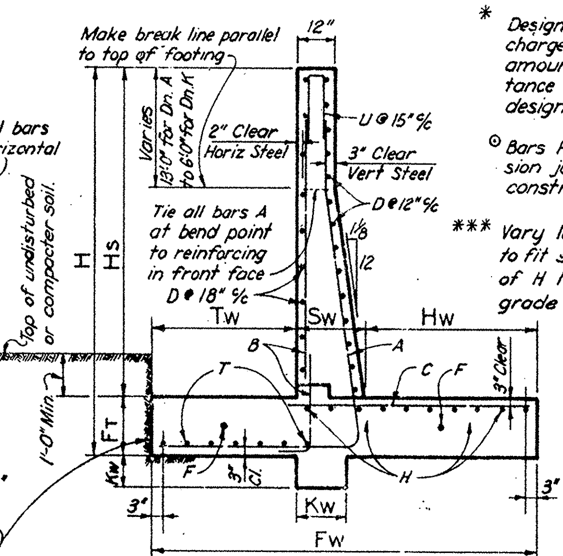
QUANTITIES FOR 32'-0" PANEL

Height plus Surcharge	None Conc. C.Y.	Reinf. Lb.	1' or 7:1 Conc. C.Y.	Reinf. Lb.	2' or 5:1 Conc. C.Y.	Reinf. Lb.	3' or 3½:1 Conc. C.Y.	Reinf. Lb.	4' or 2½:1 Conc. C.Y.	Reinf. Lb.	5' or 2:1 Conc. C.Y.	Reinf. Lb.	6' or 1¾:1 Conc. C.Y.	Reinf. Lb.	7' or 1½:1 Conc. C.Y.	Reinf. Lb.
1	1.2	118														
2	3.3	246	2.1	184												
3	4.7	440	3.5	312	2.3	184										
4	6.6	748	5.4	472	4.2	344	3.0	282								
5	8.5	917	7.3	762	6.1	479	5.0	351	3.8	289						
6	10.3	1089	9.1	961	7.9	711	6.7	519	5.6	391	4.4	329				
7	12.2	1195	11.0	1100	9.9	972	8.7	817	7.5	525	6.3	397	5.1	335		
8	14.0	1366	12.8	1239	11.6	1143	10.4	1015	9.3	860	8.1	564	6.9	436	5.7	374
9	15.8	1472	14.6	1376	13.4	1249	12.2	1154	11.0	1026	9.9	871	8.7	570	7.5	442
10	17.6	1800	16.4	1672	15.2	1576	14.0	1449	12.8	1353	11.6	1225	10.4	1070	9.3	708
11	19.4	2119	18.2	1990	17.1	1862	15.9	1766	14.7	1639	13.5	1544	12.3	1416	11.1	1261
12	21.3	2349	20.1	2222	18.9	2094	17.7	1966	16.5	1870	15.3	1743	14.1	1648	13.0	1520
13	23.0	2876	21.9	2781	20.7	2654	19.5	2526	18.3	2398	17.1	2302	15.9	2174	14.7	2079
14	24.8	3255	23.6	3134	22.4	3039	21.3	2912	20.1	2784	18.9	2656	17.7	2560	16.5	2433
15	26.6	3722	25.5	3594	24.3	3473	23.1	3378	21.9	3251	20.7	3123	19.5	2995	18.4	2899
16	31.2	4236	30.1	4141	28.9	4013	27.7	3893	26.5	3798	25.3	3671	24.1	3543	22.9	3415
17	33.4	4637	32.2	4508	31.0	4414	29.9	4286	28.7	4166	27.5	4071	26.3	3944	25.1	3816
18	38.8	4970	37.6	4840	36.4	4712	35.2	4618	34.0	4490	32.8	4370	31.6	4275	30.5	4148
19	41.4	5285	40.2	5197	39.1	5068	37.9	4940	36.7	4846	35.5	4718	34.3	4598	33.1	4503
20	43.9	6092	42.7	6964	41.5	5877	40.3	5748	39.2	5620	38.0	5526	36.8	5398	35.6	5278
21	50.2	6665	49.0	6536	47.8	6409	46.7	6322	45.5	6193	44.3	6065	43.1	5971	41.8	5843
22	53.2	7038	52.0	6942	50.8	6814	49.6	6687	48.4	6600	47.3	6471	46.1	6343	44.9	6249
23	56.5	8081	55.3	7952	54.1	7857	53.0	7729	51.8	7602	50.6	7515	49.4	7386	48.2	7258
24	62.6	8503	61.4	8375	60.2	8247	59.0	8152	57.8	8024	56.6	7897	55.5	7810	54.3	7681
25	66.2	8976	65.0	8880	63.8	8753	62.6	8625	61.4	8530	60.3	8402	59.1	8275	57.9	8188
26	73.1	9505	71.9	9375	70.7	9280	69.6	9153	68.4	9025	67.2	8930	66.0	8802	64.8	8675
27	76.9	10538	75.7	10409	74.5	10280	73.3	10185	72.1	10058	71.0	9930	69.8	9835	68.6	9707
28	81.7	11614	80.5	11519	79.4	11391	78.2	11262	77.0	11167	75.8	11040	74.6	10912	73.4	10817
29	85.7	11949	84.5	11820	83.3	11726	82.2	11598	81.0	11469	79.8	11374	78.6	11247	77.4	11119
30	89.8	13792	88.6	13663	87.4	13535	86.3	13441	85.1	13313	83.9	13184	82.7	13089	81.5	12962
31	94.0	14449	92.8	14345	91.7	14217	90.5	14089	89.3	13995	88.1	13867	86.9	13738	85.7	13643
32	102.5	16064	101.3	15936	100.1	15833	98.9	15705	97.7	15577	96.5	15483	95.4	15355	94.2	15226
Design	A		B		C		D		E		F		G		K	





SECTION
H ≦ 14'



Place Toewall against undisturbed soil.

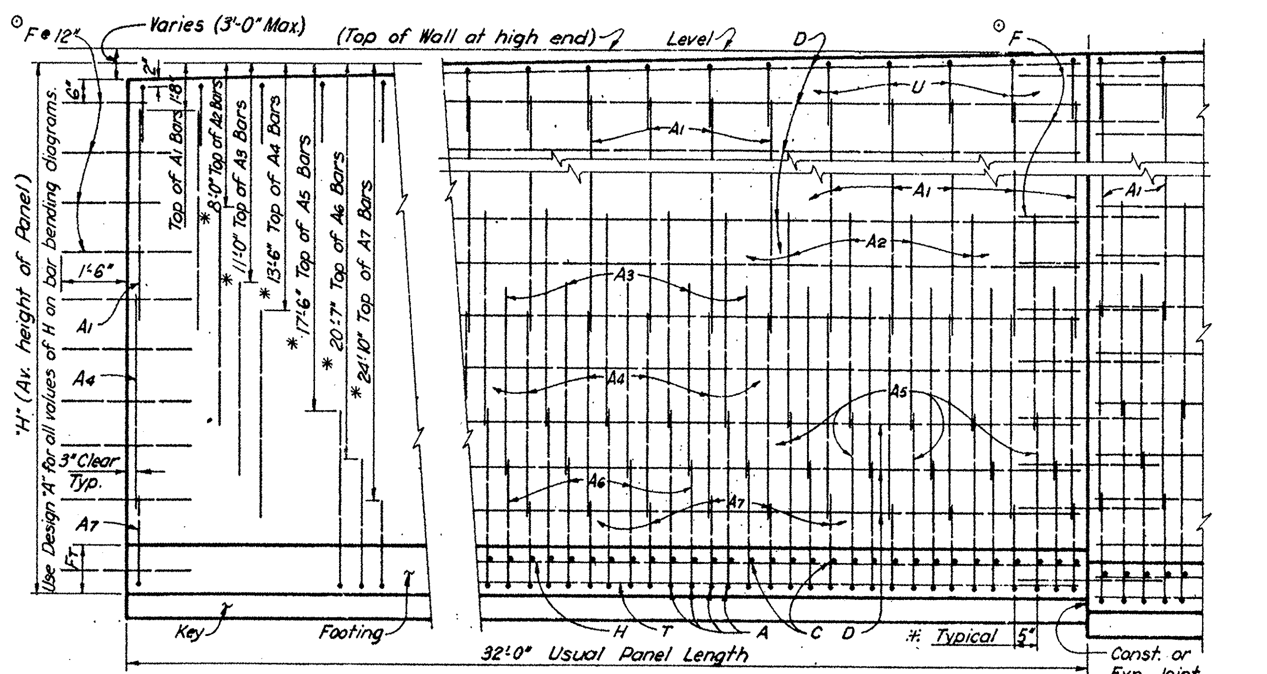
SECTION
H > 14'

* Design "A" Wall with zero surcharge shown at right. Deduct amount of surcharge for distance to top of bar for other designs.

⊙ Bars F to be #8 smooth at expansion joints and #8 deformed at construction joints.

*** Vary length of legs of Bars U to fit slope of Panel for all values of H less than 5'-0" i.e. for 10% grade U1 legs = 1'-0", U26 = 4'-0".

⁑ For Walls less than 13' in height, spacing between Bars A1 & A2 = 7½".



REAR ELEVATION

GENERAL NOTES:

① Reinforcing steel bar lengths tabulated are for no surcharge Design A. To modify bar lengths for different surcharge design, subtract the amount of level surcharge from bars A1 & B. Take bars D & F for design B thru. K walls from Design A wall of the same height. Lengths and number of other bars will be unchanged except bar A2 for H < 14'-0" when surcharge exceeds 6 ft.

② Walls are designed using 40# eq. fluid pressure and with weight of earth at 120 #/cu. ft.

③ All concrete to be Class C; f'c = 3600 psi; fc = 1440 psi.

④ All reinforcing steel to be grade 60; fs = 24,000 psi.

⑥ Quantities are based on "H" being average height of panel.

⑦ Retaining Walls are designed to be coded as follows on Retaining Wall Layout Sheets.

LC - 21 - 28
HA - 28 - 32

- Length of Panel { 28' requires special quantities. 32' is standard
- Average height "H" of panel.
- Design C = 2' Level surcharge or sloped surcharge up thru. 5:1. A = No surcharge.
- Footing pressure design. H = High, L = Low

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

RETAINING WALLS

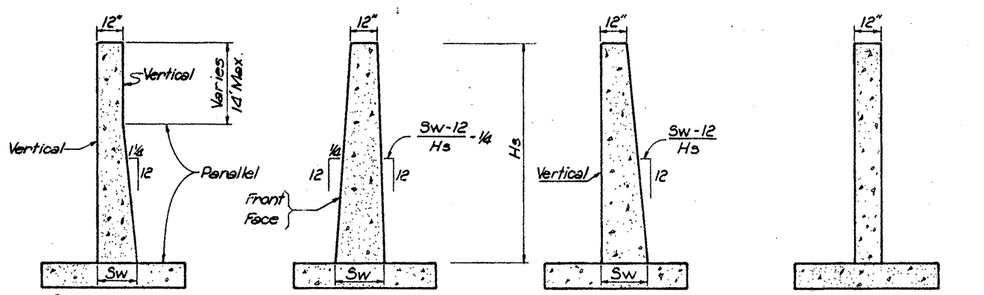
HEIGHTS UP TO 32'-0"

DESIGNS A TO K

RW 1 (H)

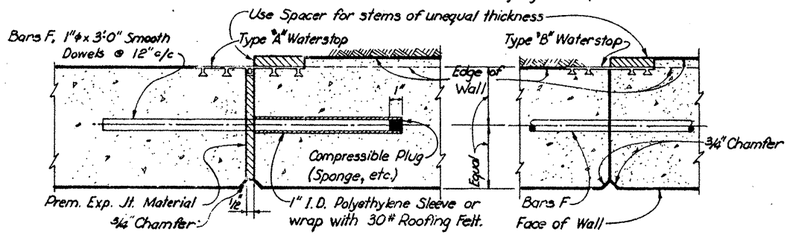
Original drawing date: MAR. 1975	State district	Federal region	Federal aid project	Sheet
DN.: CWC	15	6		223
CK.: DAB	County			
DW.: HWD	BEXAR			
CK.: CWC	Control 2452	Section 02	Job 023	Highway 1604

Revisions



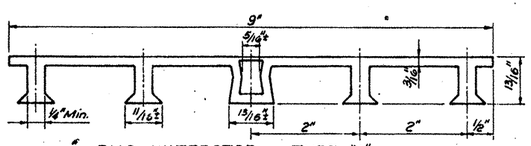
ALTERNATE STEM SLOPE DETAILS

Walls with slopes other than those shown may be used after approval by the Engineer. Sw shall not be less than shown in Table on sheet 1. No payment will be made for excess concrete due to changing of slope of wall face.

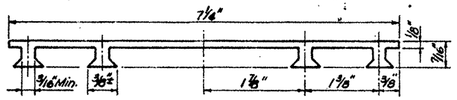


EXPANSION JOINT

CONSTRUCTION JOINT

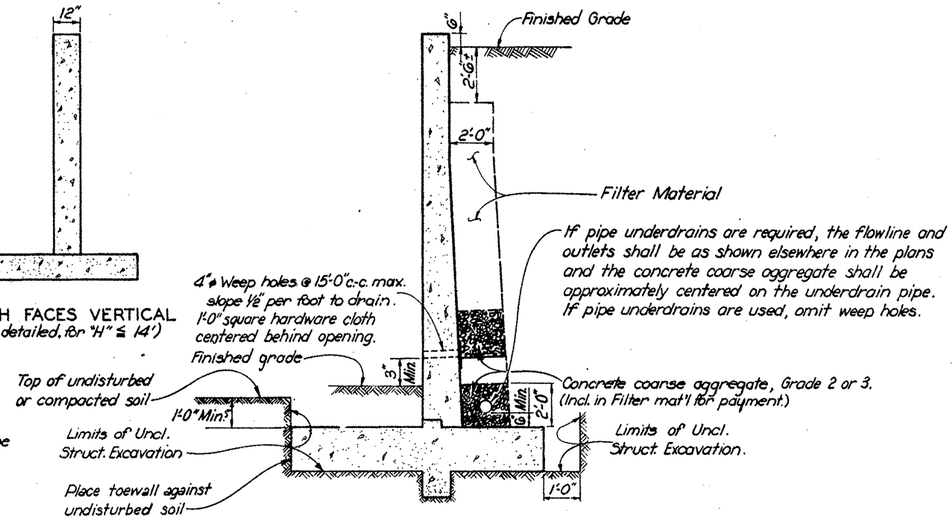


PVC WATERSTOP TYPE "A"



PVC WATERSTOP TYPE "B"

Note: Dimensions & shapes may vary slightly depending on manufacturer.



DRAINAGE DETAILS & EXCAVATION DIAGRAM

GENERAL NOTES:

Walls are designed to provide a minimum factor of safety against sliding of 1.5. The undisturbed or compacted soil depth in front of walls, from bottom of Key up shall not be less than Kw + Ft + 1'-0". The angle of internal friction (φ) of this soil must be greater than 20°.

The bearing capacity of the soil must be equal to or greater than the wall footing pressure.

Retaining Walls with heights up to 15'-0" are detailed to be placed on grades up thru 10% with footing level, with no changes in reinforcing steel. Steeper grades can be accomodated by shortening Bars A1 & B and increasing length of legs of Bars U by the same amount. No change in Quantities will be involved. Walls over 15'-0" in height can be placed on steeper grades with no revisions.

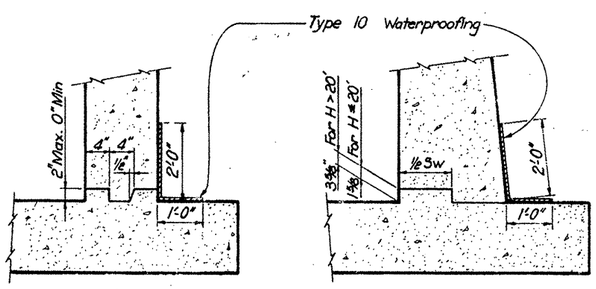
Retaining Walls may be placed on Horizontal Curves by adjusting lengths of footing Bars T & H. Minor revisions of Concrete Quantities may be required when maximum footing pressure walls are used.

Designed in accordance with A.A.S.H.O. 1973 Standard Specifications.

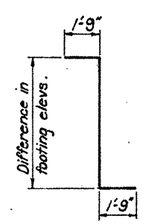
All concrete to be Class C.

Reinforcing bar laps and splices conform to Research Report 113-3

Cost of furnishing and installing expansion Joint material and waterstops shall be included in price bid ≠ (Retaining Walls.)

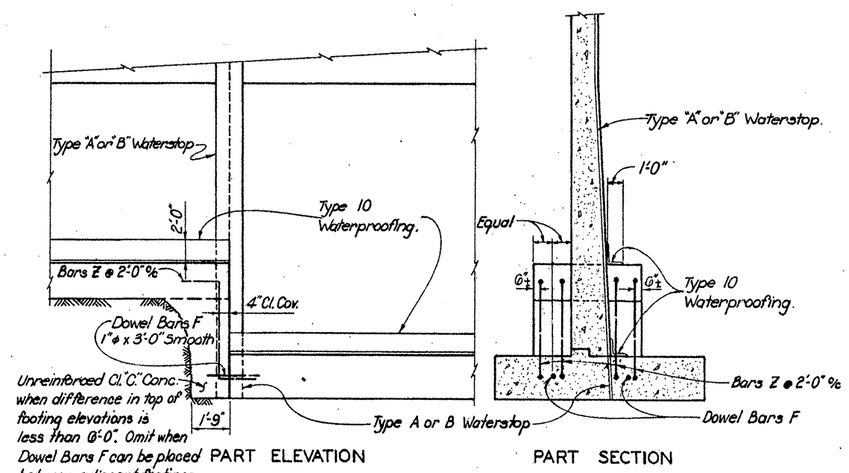


JOINT AND WATERSTOP DETAILS



BARS Z #5

NOTE: Bars Z are to be tabulated on RW-4 sheet. Omit bars Z when difference in top of footing elevations is less than 0'-0".



SHOWING WATERSTOP @ FOOTING JOINT

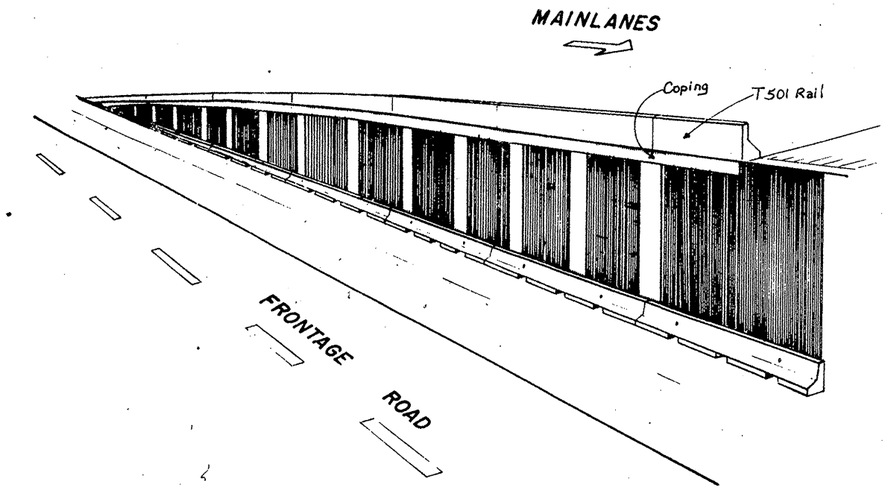
TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

RETAINING WALLS MISCELLANEOUS DETAILS

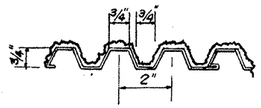
RW 2

ORIGINAL DRAWING DATE: MAR. 1975	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.: CWC	15	6		224
CK.: DAB	COUNTY		CONTROL / SECTION / JOB	HIGHWAY
DW.: AS	BEXAR		2452 / 02 / 023	IH 1604
CK.: CWC				

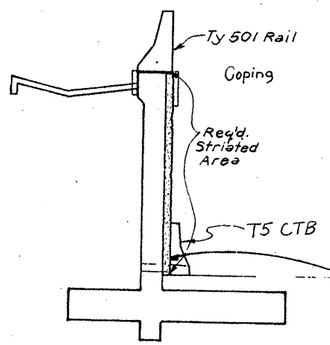
REVISIONS



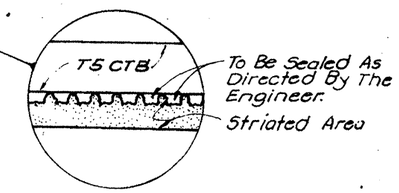
PERSPECTIVE OF STRIATED WALL
IN MAINLANE FILL AREAS



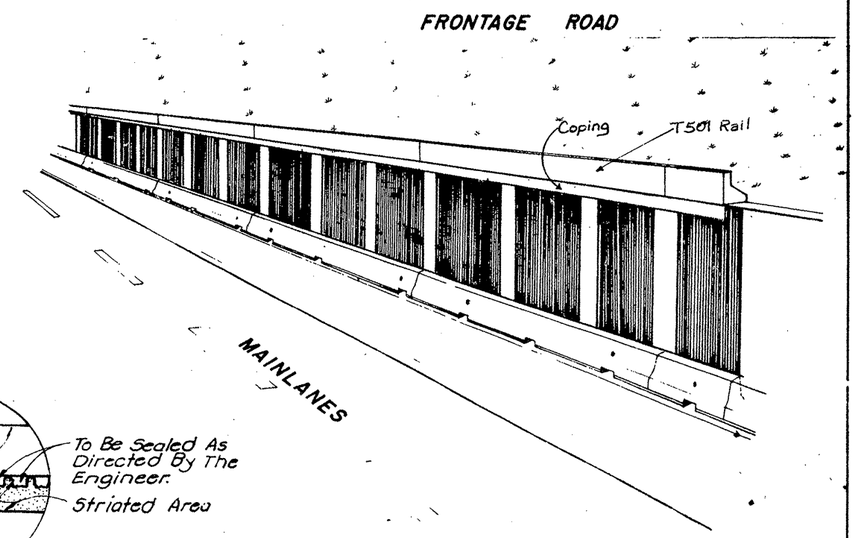
BURKE COMPANY PATTERN
NO. 304 OR EQUAL



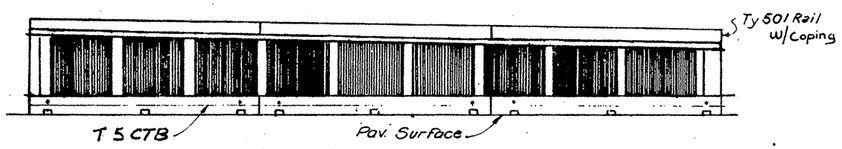
CUT SECTION



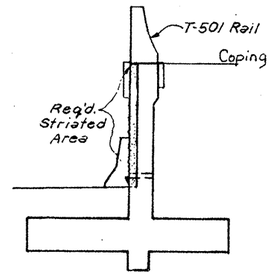
TOP VIEW



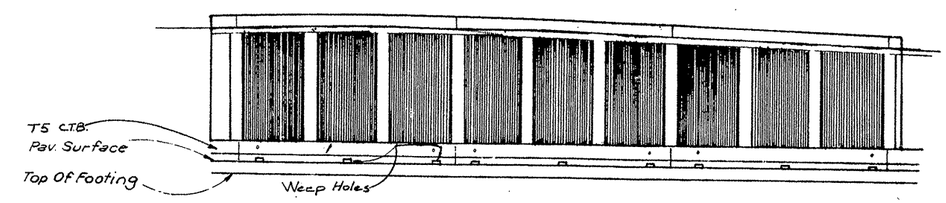
PERSPECTIVE OF STRIATED WALL
IN MAINLANE CUT AREAS



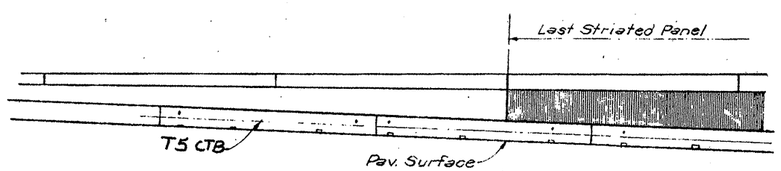
ELEVATION (IN MAINLANE FILL SECTION)



FILL SECTION

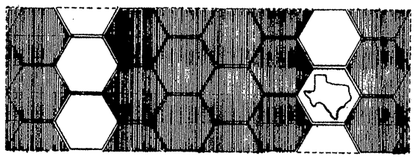


ELEVATION (IN MAINLANE CUT SECTION W/CTB)

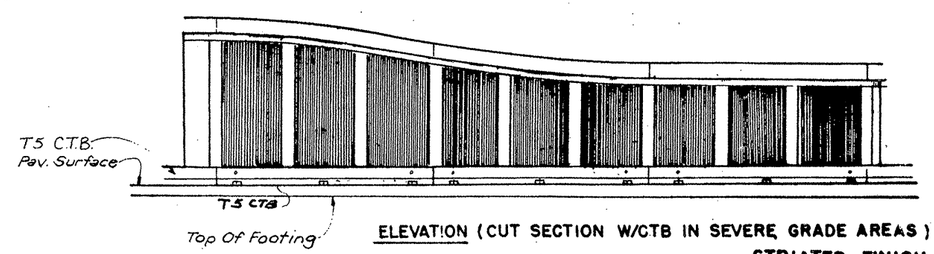


ELEVATION @ END STRIATION AREA
(BOTH CUT AND FILL AREAS OF MAINLANES)

Note: All Striated Retaining Wall Surface Shall Recieve A Class "B" Finish. (Color: Fawn Grey)
All Concrete Rail, Coping and Concrete Traffic Barrier Shall Recieve a Class "B" Finish (Color: Maple Sugar



PRECAST OPTION



ELEVATION (CUT SECTION W/CTB IN SEVERE GRADE AREAS)

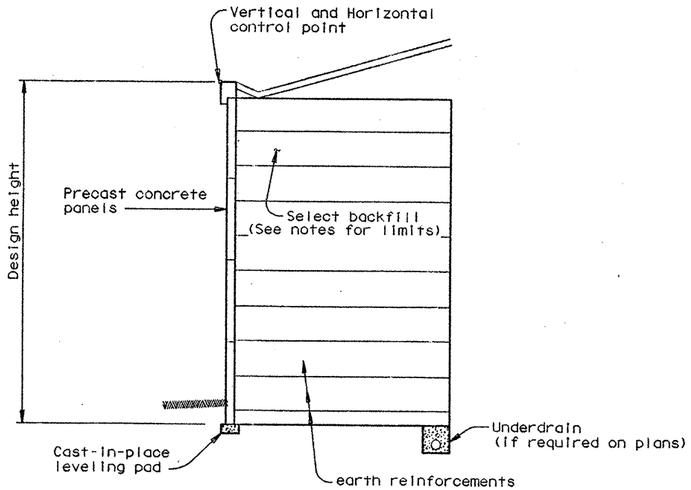
STATE OF TEXAS
ROBERT E. MAGERS
24728
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers 9-10-99
Date

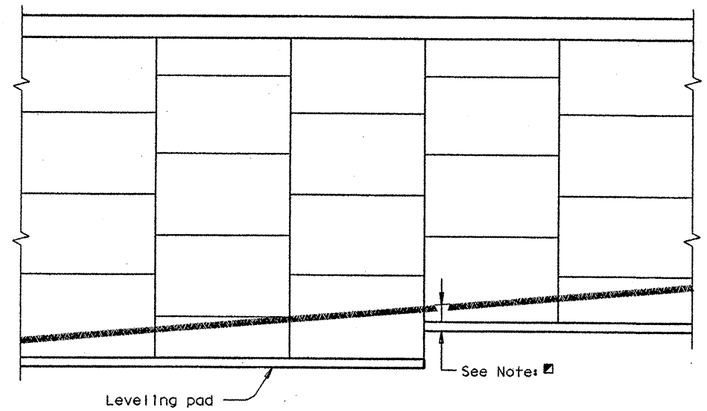
STRIATED FINISH
RETAINING WALL FACING
CAST IN PLACE RET. WALL

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			
6	TEXAS				225
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	
15	BEXAR	2452	02	.023	1160

ETC

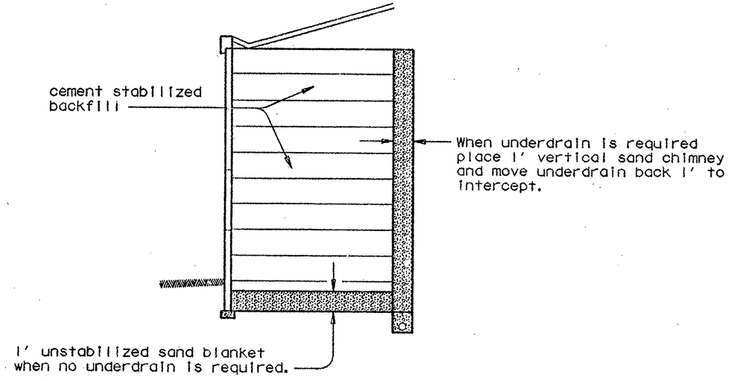


TYPICAL SECTION
(wall at bottom of slope)

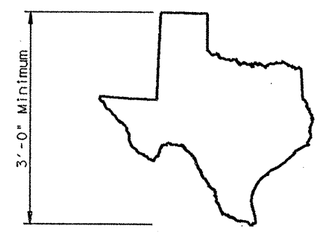


ELEVATION

NOTE: Unless noted elsewhere in the plans, 1' minimum cover shall be provided from the top of leveling pad to finish grade.



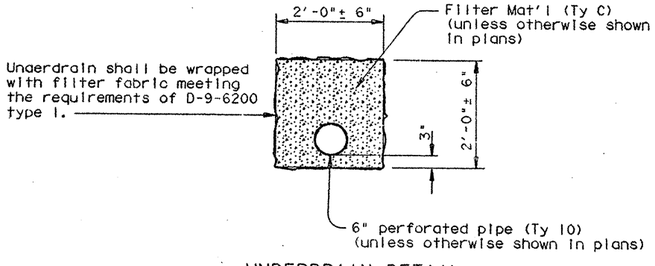
SPECIAL DRAINAGE PROVISIONS
(For use when cement stabilized backfill is used)



MAP OF TEXAS EMBLEM

Map of Texas emblem shall be formed into a wall panel next to each bridge abutment. The exact location of each emblem shall be approved by the Engineer. The cost of forming the emblems will not be paid for directly, but shall be incidental to the item "Retaining Wall".

The map of Texas shall be inset a minimum of 3/4" into the face of the panel, and shall recieve a smooth finish. The inset area shall be finished in a contrasting color as approved by the Engineer.



UNDERDRAIN DETAIL

GENERAL NOTES:

Section and elevation shown is for informational purposes only. Specific geometry is to be determined based on wall layouts and other plan information.

The select backfill specified for use within the mechanically stabilized earth volume shall extend horizontally from the back of the panels to the end of the earth reinforcements. The select backfill shall extend vertically from the top of leveling pad or 4" below the lowest earth reinforcement, whichever is lower, to the top of panels.

The uppermost earth reinforcements shall be no more than 3.5' below the top of wall.

The lowest level of earth reinforcements shall be no more than 2.0' above the top of leveling pad.

Minimum wire size for earth reinforcements shall be W 7.0. If different longitudinal and cross wires are used in an earth reinforcement mesh, the smaller wire shall have at least 50 % of the cross sectional area of the larger wire.

Standard precast concrete panels shall have a maximum height of 6', and a maximum surface area of 50 sq.ft . Minimum panel thickness shall be 5". Panels shall be arranged to provide offset horizontal joints.

An open joint shall be provided around the perimeter of the concrete panels. The nominal joint opening shall be between 3/8" and 3/4". The joint configuration shall be such that the filter fabric or pad materials are not exposed at the wall face.

DESIGN PARAMETERS:

Design of retaining walls shall be based on the following design parameters:

Random Backfill (Embankment or Existing Soils)	unit weight = 125 pcf Ø = 30° c= 0 psf
Select Backfill	unit weight = 125 pcf Ø = 34° c = 0 psf
Cement Stabilized Select Backfill	unit weight = 125 pcf Ø = 45° c = 0 psf

Stress in steel and concrete shall be in accordance with A.A.S.H.T.O. 1992 and current interim specifications.

The minimum length of earth reinforcements shall be 8'.

STABILITY CRITERIA:

Factor of safety in sliding along the base of the structure shall be greater than or equal to 1.5.

Factor of safety in overturning shall be greater than or equal to 2.0.

The base pressure resultant shall fall within the middle third of the retaining wall.

The factor of safety against pullout of the earth reinforcements shall be greater than or equal to 1.5 at each level. Pullout resistance shall be determined from test data evaluated at 3/4 inch strain.

CORROSION CRITERIA:

The earth reinforcement elements shall be designed to have a corrosion resistance - durability to ensure a minimum design life of 75 years. Maximum loss per side due to corrosion shall be computed by assuming a uniform loss model based on the following

Zinc corrosion rate (First 2 years)	- 15 µm/yr.
Zinc corrosion rate (subsequent years)	- 4 µm/yr.
Carbon steel corrosion rate	- 12 µm/yr.

All stress and pullout calculations shall be done on the calculated earth reinforcement section remaining after 75 years.

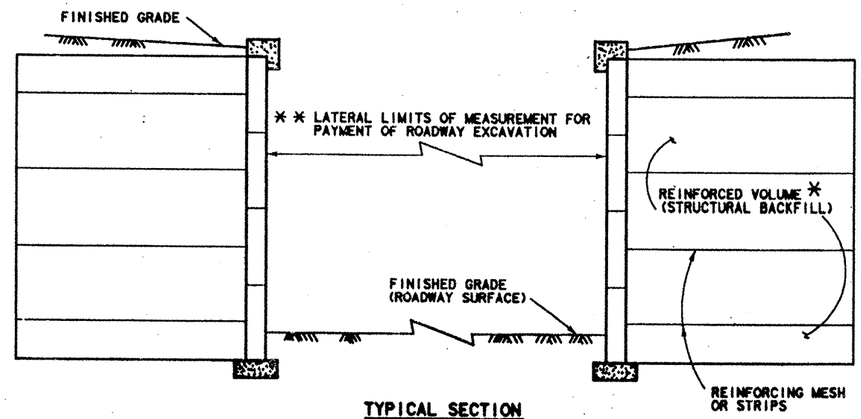
TEXAS DEPARTMENT OF TRANSPORTATION
DIVISION OF BRIDGES AND STRUCTURES

MECHANICALLY STABILIZED EARTH RETAINING WALL

RW (MSE)

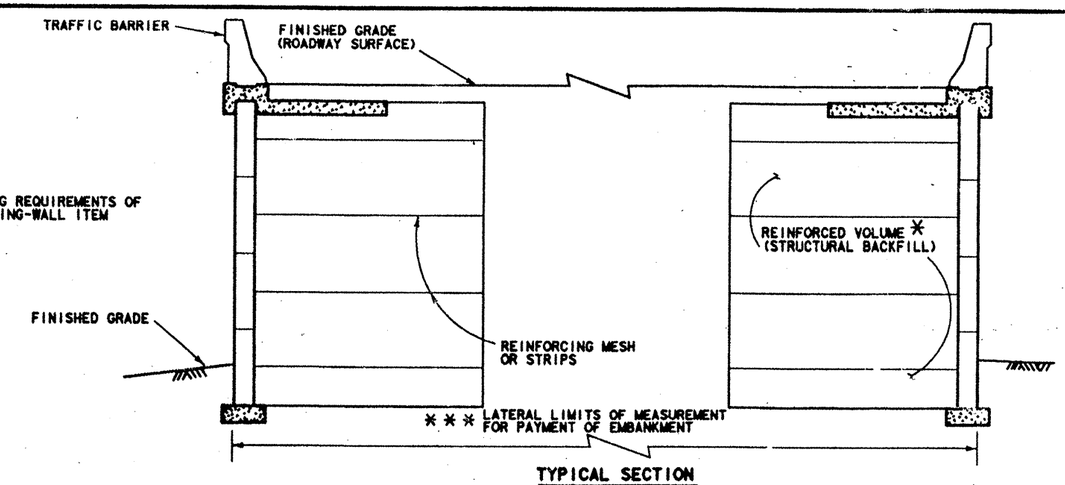
RETSTD010.DGN	PREPARED BY AND FOR USE OF TxDOT						
ORIGINAL DRAWING DATE: AUGUST 1993	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT				SHEET
DN.: MPM	15	6	NH 90(191)M, ETC.				226
CK.: JGG	COUNTY			CONTROL	SECTION	JOB	HIGHWAY
DW.: TGG	BEXAR			2452	2	23	LP1604
CK.: JGG							

REVISIONS



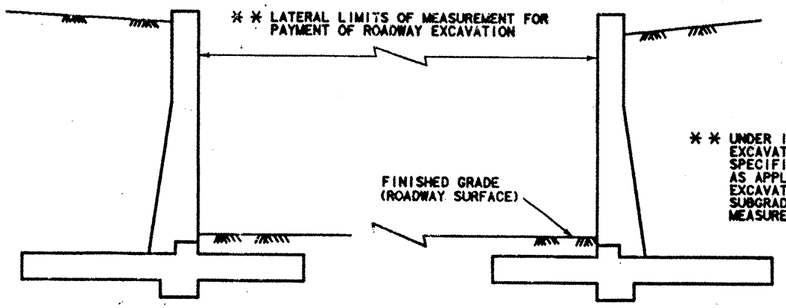
TYPICAL SECTION

ROADWAY EXCAVATION BETWEEN RETAINED EARTH OR REINFORCED EARTH RETAINING WALLS



TYPICAL SECTION

EMBANKMENT BETWEEN RETAINED EARTH OR REINFORCED EARTH RETAINING WALLS



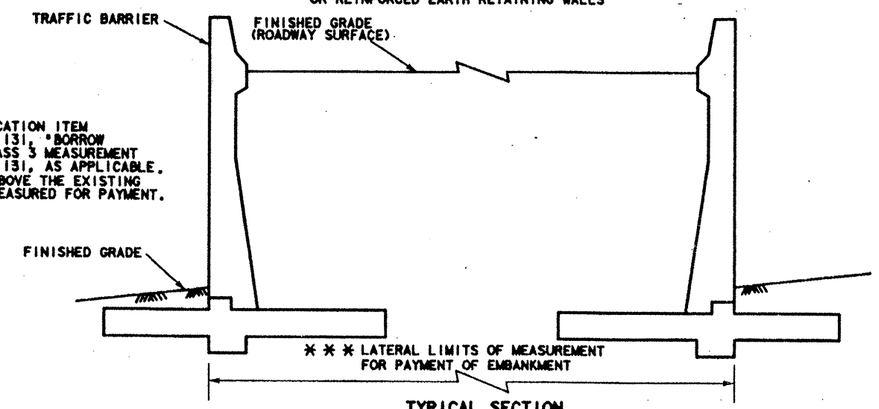
* * UNDER ITEM 110, "ROADWAY EXCAVATION" OR SPECIAL SPECIFICATION ITEM "EXCAVATION", AS APPLICABLE. ONLY THE EXCAVATION ABOVE THE PROPOSED SUBGRADE ELEVATION WILL BE MEASURED FOR PAYMENT.

TYPICAL SECTION

ROADWAY EXCAVATION BETWEEN CONVENTIONAL RETAINING WALLS

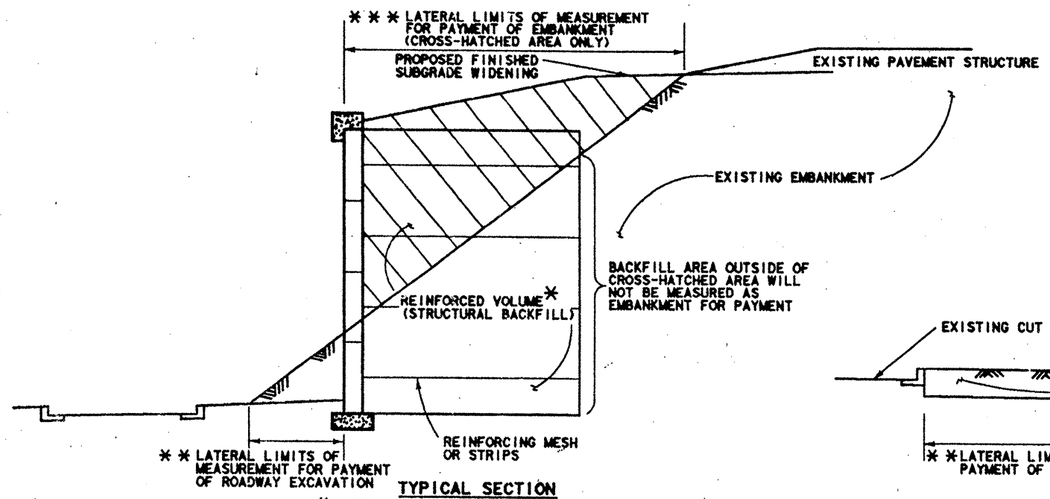
* * * UNDER SPECIAL SPECIFICATION ITEM "EMBANKMENT", OR ITEM 131, "BORROW (DELIVERED)", WHEN CLASS 3 MEASUREMENT IS SPECIFIED FOR ITEM 131, AS APPLICABLE. ONLY THE EMBANKMENT ABOVE THE EXISTING GROUND LINE WILL BE MEASURED FOR PAYMENT.

EARTHWORK MEASUREMENT WITH OTHER DESIGNS OF RETAINING WALLS WILL BE MADE TO THE OUTSIDE FINISHED FACE IN THE SAME MANNER.



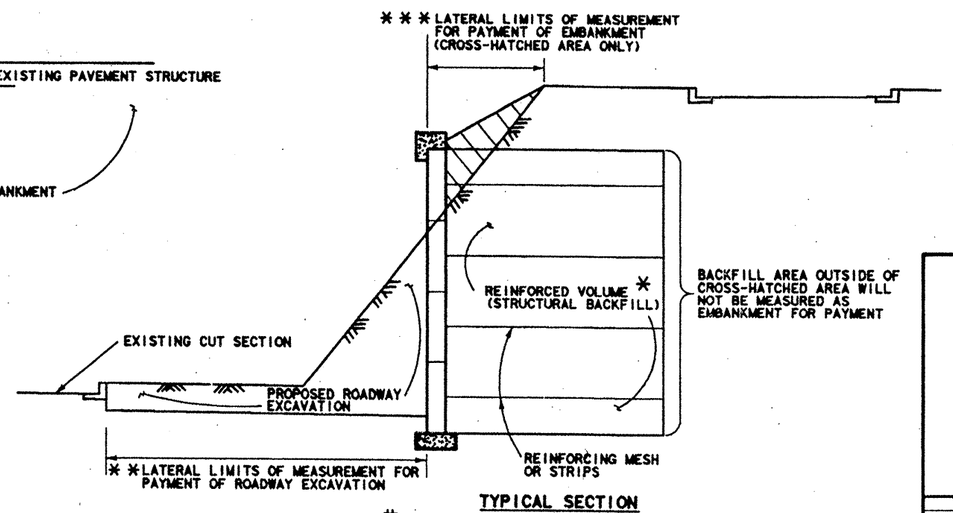
TYPICAL SECTION

EMBANKMENT BETWEEN CONVENTIONAL RETAINING WALLS



TYPICAL SECTION

WIDENING EMBANKMENT WITH RETAINED EARTH OR REINFORCED EARTH RETAINING WALLS



TYPICAL SECTION

WIDENING CUT SECTION WITH RETAINED EARTH OR REINFORCED EARTH RETAINING WALLS

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

EARTHWORK MEASUREMENT AT RETAINING WALLS

EMRW - 88

REVISIONS	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
	6	TEXAS	NH 90(191) M, Etc.			229
	STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
	15	Bexar	2452	2	23	Loop 410

Etc.

A-12

4" X 22"

HC-01-32

BAR	NO.	SIZE	LENGTH	WEIGHT
D	2	5	31'-6"	66
F	2	8	3'-0"	16
T	2	5	31'-6"	66
U	26	5	1'-4"	36

REINFORCING STEEL	LB.	184
CLASS C CONCRETE	C.Y.	2.3
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	SY	

HC-02-32

BAR	NO.	SIZE	LENGTH	WEIGHT
C	25	4	1'-10"	31
D	2	5	31'-6"	66
F	3	8	3'-0"	24
H	2	5	31'-6"	66
T	2	5	31'-6"	66
U	26	5	3'-4"	90

REINFORCING STEEL	LB.	344
CLASS C CONCRETE	C.Y.	4.2
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

HC-03-32

BAR	NO.	SIZE	LENGTH	WEIGHT
C	26	4	2'-3"	39
D	4	5	31'-6"	131
F	4	8	3'-0"	32
H	2	5	31'-6"	66
T	2	5	31'-6"	66
U	26	5	5'-4"	145

REINFORCING STEEL	LB.	479
CLASS C CONCRETE	C.Y.	6.1
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	SY	

HC-04-32

BAR	NO.	SIZE	LENGTH	WEIGHT
A_1	26	5	3'-7"	97
C	26	4	2'-8"	46
D	5	5	31'-6"	164
F	5	8	3'-0"	40
H	3	5	31'-6"	99
T	2	5	31'-6"	66
U	26	5	7'-4"	199

REINFORCING STEEL	LB.	711
CLASS C CONCRETE	C.Y.	7.9
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

HC-05-32

BAR	NO.	SIZE	LENGTH	WEIGHT
A_1	26	5	4'-9"	129
B	26	5	5'-0"	136
C	26	4	4'-6"	52
D	7	5	31'-6"	230
F	6	8	3'-0"	48
H	3	5	31'-6"	99
T	2	5	31'-6"	66
U	26	5	8'-4"	226

REINFORCING STEEL	LB.	972
CLASS C CONCRETE	C.Y.	9.9
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

HC-06-32

BAR	NO.	SIZE	LENGTH	WEIGHT
A_1	26	5	5'-11"	160
B	26	5	5'-6"	149
C	26	4	3-4"	58
D	9	5	31'-6"	296
F	7	8	3'-0"	56
H	3	5	31'-6"	99
T	3	5	31'-6"	99
U	26	5	8'-4"	226

REINFORCING STEEL	LB.	1143
CLASS C CONCRETE	C.Y.	11.6
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

HC-07-32

BAR	NO.	SIZE	LENGTH	WEIGHT
A_1	26	5	7'-1"	192
B	26	5	6'-6"	176
C	26	4	3'-8"	64
D	10	5	31'-6"	329
F	8	8	3'-0"	64
H	3	5	31'-6"	99
T	3	5	31'-6"	99
U	26	5	8'-4"	226

REINFORCING STEEL	LB.	1249
CLASS C CONCRETE	C.Y.	13.4
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

HC-08-32

BAR	NO.	SIZE	LENGTH	WEIGHT
A_1	26	5	8'-3"	224
A_2	25	6	3'-4"	125
B	26	5	7'-6"	203
C	38	4	4'-0"	102
D	12	5	31'-6"	394
F	9	8	3'-0"	72
H	4	5	31'-6"	131
T	3	5	31'-6"	99
U	26	5	8'-4"	226

REINFORCING STEEL	LB.	1576
CLASS C CONCRETE	C.Y.	15.2
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

HC-09-32

BAR	NO.	SIZE	LENGTH	WEIGHT
A_1	26	5	9'-5"	255
A_2	25	6	4'-5"	166
B	26	5	8'-6"	231
C	38	6	4'-4"	247
D	13	5	31'-6"	427
F	10	8	3'-0"	80
H	4	5	31'-0"	131
T	3	5	31'-6"	99
U	26	5	8'-4"	226

REINFORCING STEEL	LB.	1862
CLASS C CONCRETE	C.Y.	17.1
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

HC-10-32

BAR	NO.	SIZE	LENGTH	WEIGHT
A_1	26	5	10'-8"	289
A_2	25	6	5'-6"	207
B	26	5	9'-6"	258
C	38	6	4'-9"	271
D	15	5	31'-6"	493
F	11	8	3'-0"	88
H	4	5	31'-6"	131
T	4	5	31'-6"	131
U	26	5	8'-4"	226

REINFORCING STEEL	LB.	2094
CLASS C CONCRETE	C.Y.	18.9
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

HC-11-32

BAR	NO.	SIZE	LENGTH	WEIGHT
A_1	26	5	11'-10"	321
A_2	25	6	6'-7"	247
B	26	5	10'-6"	285
C	38	7	5'-1"	395
D	17	5	31'-6"	559
F	12	8	3'-0"	96
H	5	5	31'-6"	164
T	4	5	31'-6"	131
U	26	5	8'-4"	226
A_3	25	7	4'-6"	230

REINFORCING STEEL	LB.	2654
CLASS C CONCRETE	C.Y.	20.7
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

HC-12-32

BAR	NO.	SIZE	LENGTH	WEIGHT
A_1	26	5	12'-11"	350
A_2	25	6	7'-8"	288
A_3	25	7	5'-8"	290
B	26	5	11'-6"	312
C	38	8	5'-5"	550
D	19	5	31'-6"	624
F	13	8	3'-0"	104
H	5	5	31'-6"	164
T	4	5	31'-6"	131
U	26	5	8'-4"	226

REINFORCING STEEL	LB.	3039
CLASS C CONCRETE	C.Y.	22.4
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

HC-13-32

BAR	NO.	SIZE	LENGTH	WEIGHT
A_1	26	5	14'-3"	386
A_2	25	6	8'-9"	329
A_3	25	7	6'-11"	353
B	26	5	12'-6"	339
C	38	9	5'-9"	743
D	20	5	31'-6"	657
F	13	8	3'-0"	112
H	6	5	31'-6"	197
T	4	5	31'-6"	131
U	26	5	8'-4"	226

REINFORCING STEEL	LB.	3473
CLASS C CONCRETE	C.Y.	24.3
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

HC-14-32

BAR	NO.	SIZE	LENGTH	WEIGHT
A_1	26	5	11'-0"	298
A_2	25	6	9'-10"	369
A_3	25	7	8'-2"	417
A_4	26	8	5'-7"	388
B	26	5	13'-6"	366
C	38	9	6'-1"	786
D	22	5	31'-6"	723
F	14	8	3'-0"	112
H	6	5	31'-6"	197
T	4	5	31'-6"	131
U	26	5	8'-4"	226

REINFORCING STEEL	LB.	4013
CLASS C CONCRETE	C.Y.	28.9
UNCL. STUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

HC-15-32

BAR	NO.	SIZE	LENGTH	WEIGHT
A_1	26	5	11'-0"	298
A_2	25	6	10'-11"	410
A_3	25	7	9'-5"	481
A_4	26	8	6'-10"	474
B	26	5	14'-6"	393
C	38	9	6'-5"	829
D	24	5	31'-6"	789
F	15	8	3'-0"	120
H	7	5	31'-6"	230
T	5	5	31'-6"	164
U	26	5	8'-4"	226

REINFORCING STEEL	LB.	4414
CLASS C CONCRETE	C.Y.	31.0
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

HC-16-32

BAR	NO.	SIZE	LENGTH	WEIGHT
A_1	26	5	11'-0"	298
A_2	25	6	12'-0"	451
A_3	25	7	10'-7"	541
A_4	26	8	8'-1"	561
B	26	5	15'-6"	420
C	38	9	6'-9"	872
D	25	5	31'-6"	821
F	16	8	3'-0"	128
H	7	5	31'-6"	230
T	5	5	31'-6"	164
U	26	5	8'-4"	226

REINFORCING STEEL	LB.	4712
CLASS C CONCRETE	C.Y.	36.4
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

HC-17-32

BAR	NO.	SIZE	LENGTH	WEIGHT
A_1	26	5	11'-0"	298
A_2	25	6	13'-1"	491
A_3	25	7	11'-11"	609
A_4	26	8	9'-5"	654
B	26	5	16'-6"	447
C	38	9	7'-2"	926
D	27	5	31'-6"	887
F	17	8	3'-0"	136
H	7	5	31'-6"	230
T	5	5	31'-6"	164
U	26	5	8'-4"	226

REINFORCING STEEL	LB.	5068
CLASS C CONCRETE	C.Y.	39.1
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

HC-18-32

BAR	NO.	SIZE	LENGTH	WEIGHT
A_1	26	5	11'-0"	298
A_2	25	7	14'-2"	532
A_3	25	7	13'-2"	673
A_4	26	9	10'-7"	936
B	26	5	17'-6"	475
C	38	10	7'-5"	1213
D	29	5	31'-6"	953
F	18	8	3'-0"	144
H	8	5	31'-6"	263
T	5	5	31'-6"	164
U	26	5	8'-4"	226

REINFORCING STEEL	LB.	6877
CLASS C CONCRETE	C.Y.	41.5
UNCL. STRUCT. EXCAV.	C.Y.	
FILTER MATERIAL	C.Y.	
WATERPROOFING	S.Y.	

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

RETAINING WALLS

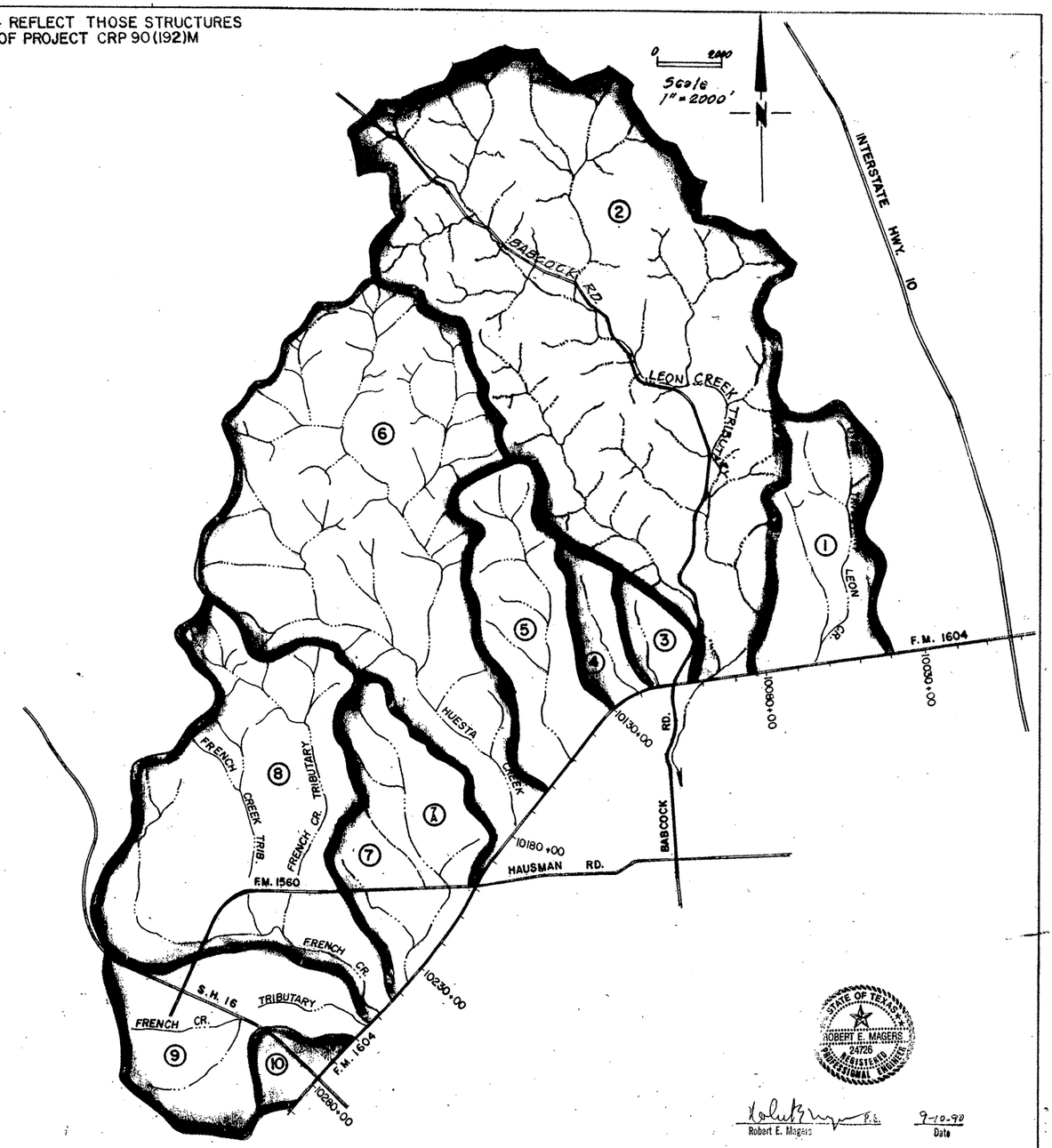
BILL OF REINFORCING STEEL & TABLE OF ESTIMATED QUANTITIES

PREPARED IN AND FOR THE USE OF THE TDH&PT.

RW4 (HC) 1

ORIGINAL DRAWING DATE: MAR. 1975		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #			SHEET
DM.:-CWC	REVISIONS	15					230
CK.:-DAB		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DW.:-HM		BEXAR		2452	2	23	LP 1604
CK.:-DWS							

NOTE: DRAINAGE AREAS 1 thru 4 REFLECT THOSE STRUCTURES CONSTRUCTED AS PART OF PROJECT CRP 90(192)M



HYDROLOGIC DATA SHEET

USING 25, 50 & 100 YEAR FREQUENCIES

D.A. NO.	Method Used	Design Freq. (Yr.)	Area	Tc (min)	I 25 (in/hr)	I 50 (in/hr)	I 100 (in/hr)	Slope (ft/mi)	Runoff Coeff. or Curve No. or BDF	Rainfall Type Or Hydrolo Region	Q 25 cfs	Q50 cfs	Q100 cfs
5	SCS	25	.84 Sq. Mi.	39	—	—	—	—	87	III	1925	2227	2516
6	USGS & DHT	50	3.725 Sq. Mi.	—	—	—	—	65.45	4	5	5052	6935*	9186*
7•	SCS	25	1.035 Sq. Mi.	60	—	—	—	—	87	III	1900	2199	2499
7A	SCS	25	.425 Sq. Mi.	37	—	—	—	—	87	III	976	1130	1284
8	SCS	50	2.395 Sq. Mi.	78	—	—	—	78	87	III	3829**	4444**	5131**
9	SCS	25	.985 Sq. Mi.	50	—	—	—	—	87	III	1986	2302■	2638■
10	Rational	25	188 Ac.	27	5.63	6.30	7.02	—	.85	—	900	1007	1122

* Includes Carry over from Drainage Area No. 5
** Includes Carry over from Drainage Area No. 9
■ Includes Carry over from Drainage Area No. 10
• Drainage Area 7 Includes Drainage Area No. 7A

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers
Robert E. Magers, P.E.

9-10-90
Date

DRAINAGE AREA MAP

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS					231
STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR		2452	02	023	LP/LOOP

ER

HYDRAULIC DATA SHEET FOR BRIDGE CLASS STRUCTURES

(PIPES, PIPE ARCHES & BOX CULVERTS)

LOCATION: LOOP 1604 EB FRONT RD. HUESTA CR. PROP STR: _____ DES ADT: _____

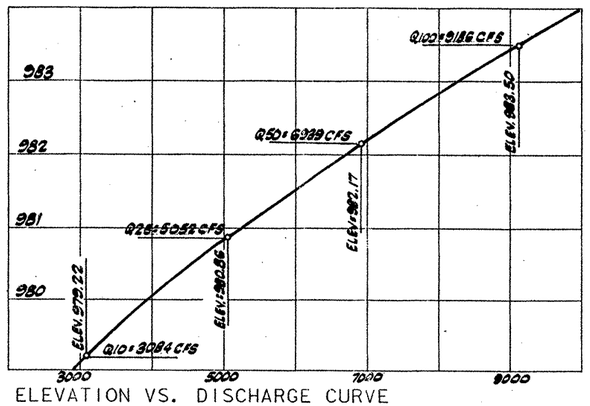
ITEMS	DESIGN Q	Q 100
FREQUENCY	50 YR	100 YR
METHOD USED TO DETERMINE Q	USGS & DHT Equation	
DRAINAGE AREA (AC. OR SQ. MI.)	3.72	
DRAINAGE AREA SLOPE (IN FT./MI. BTWN 10% & 85% PTS.)	65.45 FT/MI	FT/MI
Q	6939 C.F.S	9188 C.F.S
CHANNEL SLOPE (IF SINGLE SECTION METHOD OF BW CALC USED.)	(MANY - SECTION METHOD USED)	
ALLOW HW (ELEV. AT SITE)		
CALC. TW (ELEV. AT SITE)	982.17	983.50
CALC. HW OR BACKWATER (ELEV. AT SITE)	982.17	984.20
VEL THRU STR OR VEL OUT	6.75 FPS	8.19 FPS
VEL THRU NATURAL CHANNEL	6.75 FPS	7.71 FPS
MAX ALLOW VEL OUT	FPS	FPS
AREA BELOW DESIGN HW UNDER SPAN BR	1030 SF	1120 SF

REMARKS: 25 Yr. TW = Elev. 981.38

EFFECTS OF Q 100

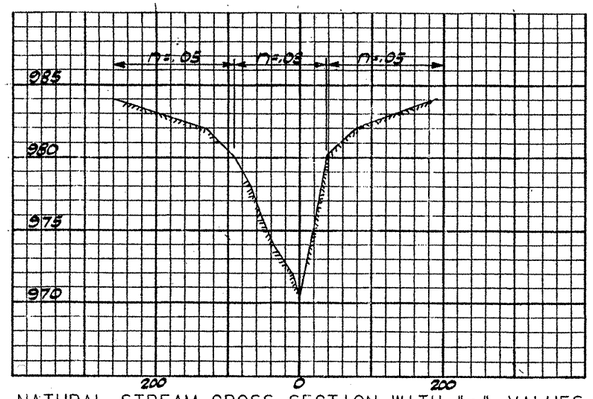
DEPTH OF OVERFLOW OF ROAD: 0 FT.
WIDTH OF OVERFLOW OF ROAD: 0 FT.
Q OVER ROAD: 0 %
Q THRU STRUCTURE: 100 %

OTHER Q 100 COMMENTS:



ELEVATION VS. DISCHARGE CURVE

LOCATION: CHANNEL STA. 8+10



NATURAL STREAM CROSS-SECTION WITH "n" VALUES

LOCATION: CHANEL STA. 6+00

LOCATION: LOOP 1604 HUESTA CR. PROP STR: EAST & WESTBOUND MAINLANES & WESTBOUND FRONTAGE RD. DES ADT: _____

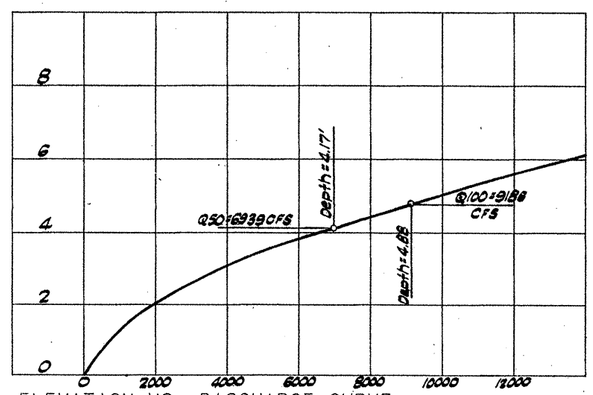
ITEMS	DESIGN Q	Q 100
FREQUENCY	50 YR	100 YR
METHOD USED TO DETERMINE Q	USGS & DHT Equation	USGS & DHT Equation
DRAINAGE AREA (AC. OR SQ. MI.)	3.72	3.72
DRAINAGE AREA SLOPE (IN FT./MI. BTWN 10% & 85% PTS.)	65.45 FT/MI	65.45 FT/MI
Q	* 6939 C.F.S	* 9188 C.F.S
CHANNEL SLOPE (IF SINGLE SECTION METHOD OF BW CALC USED.)	0.0157 FT/FT	0.0157 FT/FT
ALLOW HW (ELEV. AT SITE)	987.33' West Ditch, S.H. 16 Control See	
CALC. TW (ELEV. AT SITE)	Calculated Water Surface Profiles	
CALC. HW OR BACKWATER (ELEV. AT SITE)	** 982.58	** 983.29
VEL THRU STR OR VEL OUT	18.90 FPS	21.02 FPS
VEL THRU NATURAL CHANNEL	18.90 FPS	21.02 FPS
MAX ALLOW VEL OUT	(Rock) 22'± FPS	(Rock) 22'± FPS
AREA BELOW DESIGN HW UNDER SPAN BR	Var. Ea. Bridge SF	Var. Ea. Bridge SF

REMARKS: * Q 50 & Q100 include carry over from Drainage Area No. 5: 92cfs & 287 cfs respectively.
** Depth of flow and elevations may be picked off of the channel profile Huesta Cr. for each Str. (Mainlanes & Frontage Roads)

EFFECTS OF Q 100

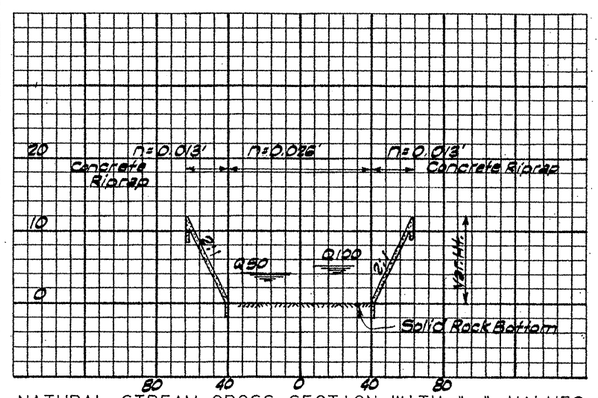
DEPTH OF OVERFLOW OF ROAD: 0 FT.
WIDTH OF OVERFLOW OF ROAD: 0 FT.
Q OVER ROAD: 0 %
Q THRU STRUCTURE: 100 %

OTHER Q 100 COMMENTS:



ELEVATION VS. DISCHARGE CURVE

LOCATION: TYPICAL TRAPEZOIDAL CHANNEL APPROX LIMITS STA. 6+00 TO STA. 14+50



NATURAL STREAM CROSS-SECTION WITH "n" VALUES

LOCATION: STA. 6+00 TO STA. 14+50 CHANNEL LIMITS

LOCATION: _____ PROP STR: _____ DES ADT: _____

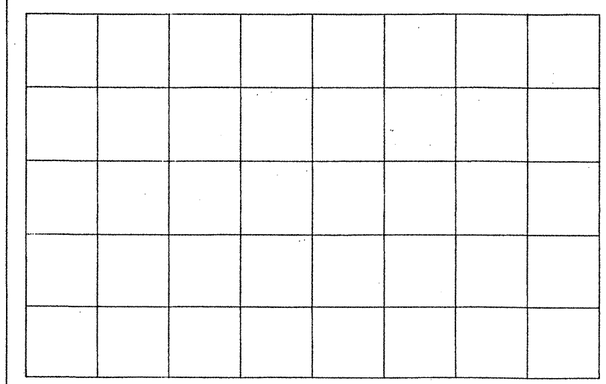
ITEMS	DESIGN Q	Q 100
FREQUENCY	YR	100 YR
METHOD USED TO DETERMINE Q		
DRAINAGE AREA (AC. OR SQ. MI.)		
DRAINAGE AREA SLOPE (IN FT./MI. BTWN 10% & 85% PTS.)	FT/MI	FT/MI
Q	C.F.S	C.F.S
CHANNEL SLOPE (IF SINGLE SECTION METHOD OF BW CALC USED.)	FT/FT	FT/FT
ALLOW HW (ELEV. AT SITE)		
CALC. TW (ELEV. AT SITE)		
CALC. HW OR BACKWATER (ELEV. AT SITE)		
VEL THRU STR OR VEL OUT	FPS	FPS
VEL THRU NATURAL CHANNEL	FPS	FPS
MAX ALLOW VEL OUT	FPS	FPS
AREA BELOW DESIGN HW UNDER SPAN BR	SF	SF

REMARKS:

EFFECTS OF Q 100

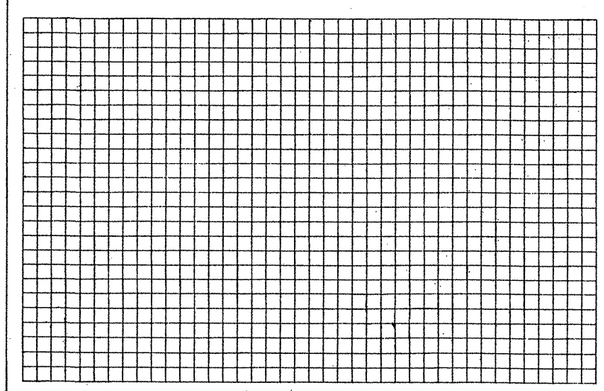
DEPTH OF OVERFLOW OF ROAD: _____ FT.
WIDTH OF OVERFLOW OF ROAD: _____ FT.
Q OVER ROAD: _____ %
Q THRU STRUCTURE: _____ %

OTHER Q 100 COMMENTS:



ELEVATION VS. DISCHARGE CURVE

LOCATION: _____



NATURAL STREAM CROSS-SECTION WITH "n" VALUES

LOCATION: _____

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-18-90
Date

REV. 11-1-89

HYDRAULIC DATA SHEET

SHEET 1 OF 4

FED. RD. DIV. NO.	FEDERAL AID ~~PROJECT~~ NO.		SHEET NO.
6			232
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LOOP 1604

ETC

0547 317110 STD 4. CEL

HYDRAULIC DATA SHEET FOR BRIDGE CLASS STRUCTURES

(PIPES, PIPE ARCHES & BOX CULVERTS)

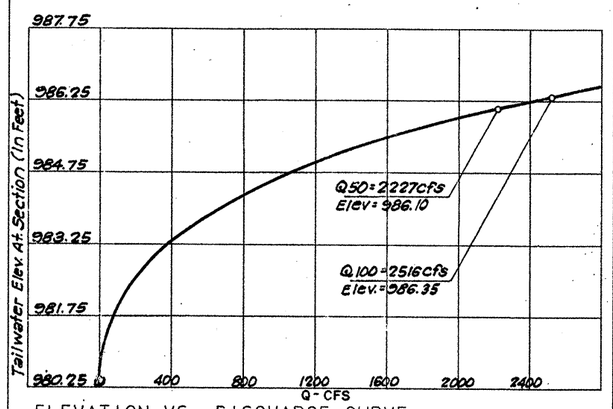
STR. NO. 5
LOOP 1604 ℄ STA.
LOCATION: 10147+80.90 PROP STR: 8-8'x4'x631.07' DES ADT: —

ITEMS	DESIGN Q	Q 100
FREQUENCY	50 YR	100 YR
METHOD USED TO DETERMINE Q	SCS Method	SCS Method
DRAINAGE AREA (AC. OR SQ. MI.)	.84 Sq.Mi.	.84 Sq.Mi.
DRAINAGE AREA SLOPE (IN FT./MI. BTWN 10% & 85% PTS.)	60.72 FT/MI	60.72 FT/MI
Q	2227.0 C.F.S	2516.0 C.F.S
CHANNEL SLOPE (IF SINGLE SECTION METHOD OF BM CALC USED.)	0.0115 FT/FT	0.0115 FT/FT
ALLOW HW (ELEV. AT SITE)	995.69	995.69
CALC. TW (ELEV. AT SITE)	987.82	988.07
CALC. HW OR BACKWATER (ELEV. AT SITE)	995.66	996.26
VEL THRU STR OR VEL OUT	8.70 FPS	9.50 FPS
VEL THRU NATURAL CHANNEL	9.52 FPS	9.51 FPS
MAX ALLOW VEL OUT	12.0 FPS	12.0 FPS
AREA BELOW DESIGN HW UNDER SPAN BR	– SF	– SF

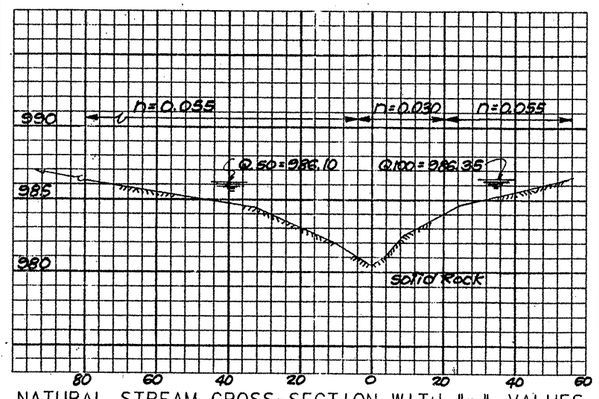
REMARKS: 1. AHW Based on an elev. which occurs on the profile Westbound Front. Rd. Approx. @ Sta. 10152+72 @ T/c.
2. Riprap to be placed at outlet of structure.

EFFECTS OF Q 100

DEPTH OF OVERFLOW OF ROAD: .57 FT.
WIDTH OF OVERFLOW OF ROAD: 400.88 FT.
Q OVER ROAD: 3.34 %
Q THRU SRTUCTURE: 96.66 %



ELEVATION VS. DISCHARGE CURVE
LOCATION: 149.48' DNSTRM OF PROP. DNSTRM END OF CULV. (LT. OF L.P. 1604 ℄)



NATURAL STREAM CROSS-SECTION WITH "n" VALUES
LOCATION: 149.48' DNSTRM. OF PROP. DNSTRM. END OF CULV. (LT. OF L.P. 1604 ℄)

LOCATION: _____ PROP STR: _____ DES ADT: _____

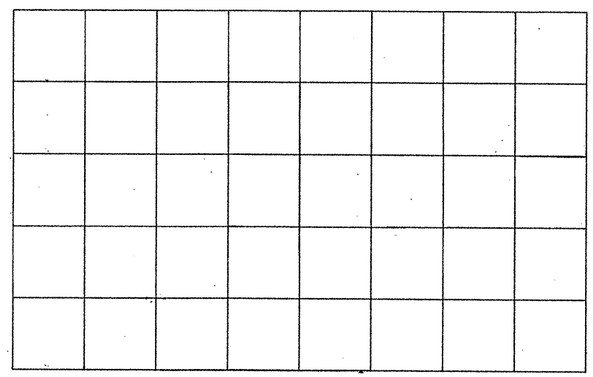
ITEMS	DESIGN Q	Q 100
FREQUENCY	50 YR	100 YR
METHOD USED TO DETERMINE Q		
DRAINAGE AREA (AC. OR SQ. MI.)		
DRAINAGE AREA SLOPE (IN FT./MI. BTWN 10% & 85% PTS.)	FT/MI	FT/MI
Q	C.F.S	C.F.S
CHANNEL SLOPE (IF SINGLE SECTION METHOD OF BM CALC USED.)	FT/FT	FT/FT
ALLOW HW (ELEV. AT SITE)		
CALC. TW (ELEV. AT SITE)		
CALC. HW OR BACKWATER (ELEV. AT SITE)		
VEL THRU STR OR VEL OUT	FPS	FPS
VEL THRU NATURAL CHANNEL	FPS	FPS
MAX ALLOW VEL OUT	FPS	FPS
AREA BELOW DESIGN HW UNDER SPAN BR	SF	SF

REMARKS

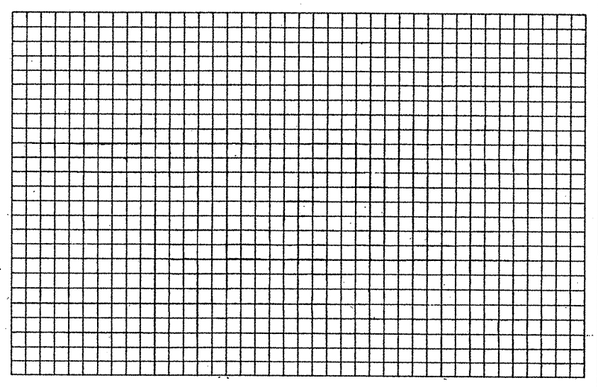
EFFECTS OF Q 100

OTHER Q 100 COMMENTS:

DEPTH OF OVERFLOW OF ROAD: _____ FT.
WIDTH OF OVERFLOW OF ROAD: _____ FT.
Q OVER ROAD: _____ %
Q THRU SRTUCTURE: _____ %



ELEVATION VS. DISCHARGE CURVE
LOCATION: _____



NATURAL STREAM CROSS-SECTION WITH "n" VALUES
LOCATION: _____

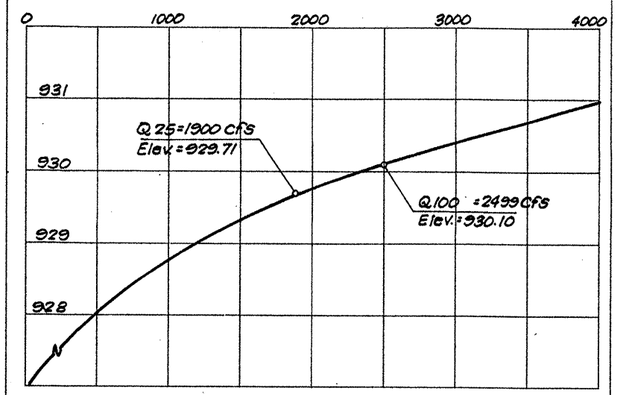
STR. NO. 7
LOOP 1604 ℄ STA.
LOCATION: 10233+05.20 PROP STR: 9-7'x4'x364' EXT. EXIST. DES ADT: N/A

ITEMS	DESIGN Q	Q 100
FREQUENCY	25 YR	100 YR
METHOD USED TO DETERMINE Q	SCS (TR55)	SCS (TR55)
DRAINAGE AREA (AC. OR SQ. MI.)	1.03 Sq.Mi.	1.03 Sq.Mi.
DRAINAGE AREA SLOPE (IN FT./MI. BTWN 10% & 85% PTS.)	78.67 FT/MI	78.67 FT/MI
Q	1900.0 C.F.S	2499.0 C.F.S
CHANNEL SLOPE (IF SINGLE SECTION METHOD OF BM CALC USED.)	.0149 FT/FT	.0149 FT/FT
ALLOW HW (ELEV. AT SITE)	934.58	934.58
CALC. TW (ELEV. AT SITE)	931.37	931.77
CALC. HW OR BACKWATER (ELEV. AT SITE)	934.34	935.89
VEL THRU STR OR VEL OUT	7.54 FPS	9.74 FPS
VEL THRU NATURAL CHANNEL	8.54 FPS	8.97 FPS
MAX ALLOW VEL OUT	12.0 FPS	12.0 FPS
AREA BELOW DESIGN HW UNDER SPAN BR	– SF	– SF

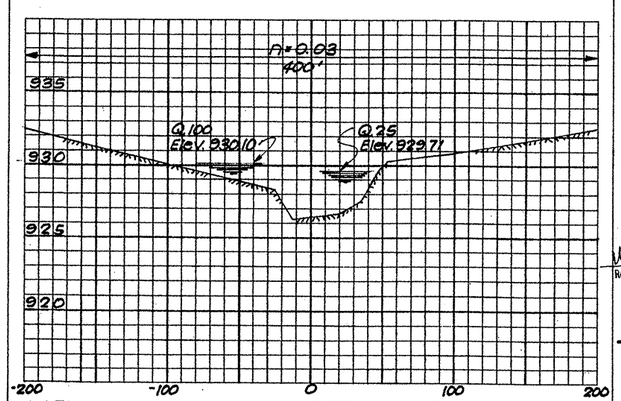
REMARKS: 1. AHW Elev. based on Lowpoint on Westbound Frontage which occurs @ Sta. 10232+00., Elev. 14' Rt. @ T/c. 935.58 - 1.0' = 934.58

EFFECTS OF Q 100 2. Riprap is to be placed at outlet.

DEPTH OF OVERFLOW OF ROAD: 0.31 FT.
WIDTH OF OVERFLOW OF ROAD: 200 FT.
Q OVER ROAD: 1.78 %
Q THRU SRTUCTURE: 98.22 %



ELEVATION VS. DISCHARGE CURVE
LOCATION: 111.62' DNSTRM OF PROP. DNSTRM END OF CULVERT



NATURAL STREAM CROSS-SECTION WITH "n" VALUES
LOCATION: 111.62' DNSTRM OF PROP. DNSTRM END OF CULVERT

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Date

REV. 11-1-89

HYDRAULIC DATA SHEET

SHEET 2 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			233
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	Loop 1604

QSAT 317110 STD A.CEL

HYDRAULIC DATA SHEET FOR BRIDGE CLASS STRUCTURES

(PIPES, PIPE ARCHES & BOX CULVERTS)

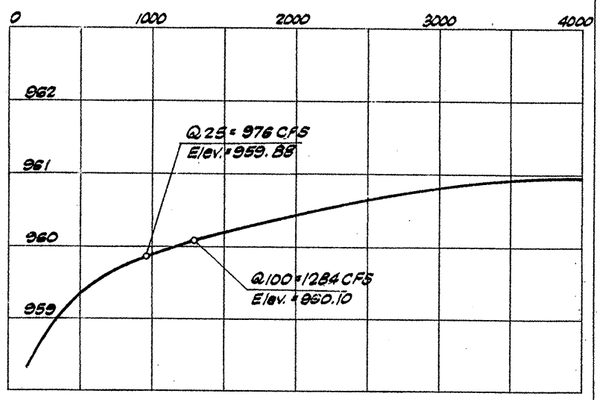
STRUCT. NO.7A
LOCATION: HAUSMAN RD. ℄ STA. 107+40.24 PROP STR: 4-9'x5'x100.5' EXTEND EXIST. DES ADT: ——

ITEMS	DESIGN Q	Q 100
FREQUENCY	25 YR	100 YR
METHOD USED TO DETERMINE Q	SCS (TR55)	SCS (TR55)
DRAINAGE AREA (AC. OR SQ. MI.)	0.42 Sq. Mi.	0.42 Sq. Mi.
DRAINAGE AREA SLOPE (IN FT./MI. BTWN 10% & 85% PTS.)	103.59 FT/MI	103.59 FT/MI
Q	976.0 C.F.S	1284.0 C.F.S
CHANNEL SLOPE (IF SINGLE SECTION METHOD OF BR CALC USED.)	.0196 FT/FT	.0196 FT/FT
ALLOW HW (ELEV. AT SITE)	964.76	964.76
CALC. TW (ELEV. AT SITE)	961.39	961.62
CALC. HW OR BACKWATER (ELEV. AT SITE)	963.47	964.39
VEL THRU STR OR VEL OUT	8.44 FPS	10.92 FPS
VEL THRU NATURAL CHANNEL	4.24 FPS	4.53 FPS
MAX ALLOW VEL OUT	12.0 FPS	12.0 FPS
AREA BELOW DESIGN HW UNDER SPAN BR	- SF	- SF

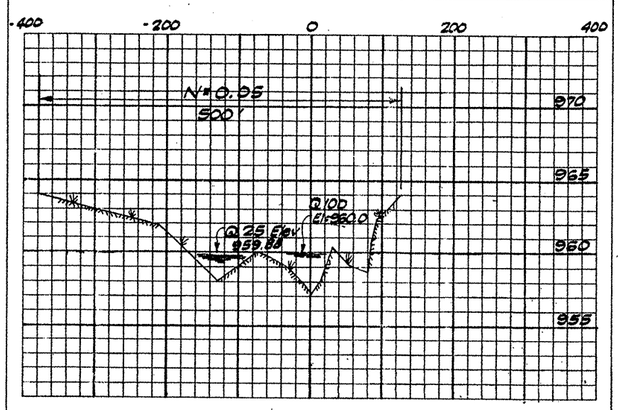
REMARKS: 1: AHW Elev. based on Low Point that occurs on Hausman Rd. ℄ Sta. 108+27.72, Elev. 37' Rt. @ T/c = 964.76
2: Riprap is to be placed both Upstrm & Dnstrm. of this Structure.

EFFECTS OF Q 100
DEPTH OF OVERFLOW OF ROAD: None FT.
WIDTH OF OVERFLOW OF ROAD: None FT.
Q OVER ROAD: None %
Q THRU SRTUCTURE: 100 %

OTHER Q 100 COMMENTS:



ELEVATION VS. DISCHARGE CURVE
LOCATION: 77.30' Dnstrm. of Prop. Dnstrm. End of Culvert



NATURAL STREAM CROSS-SECTION WITH "n" VALUES
LOCATION: 77.30' Dnstrm. of Prop. Dnstrm. End of Culvert

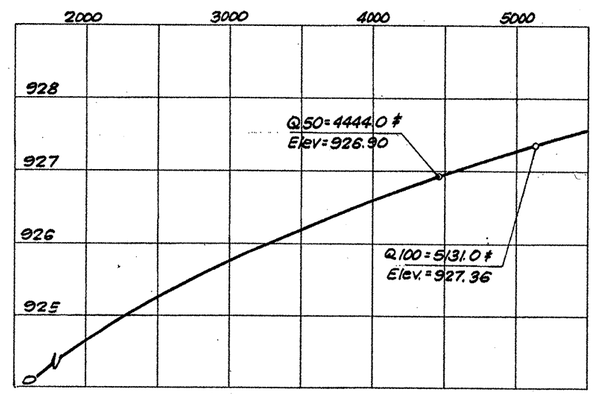
STRUCT. NO. 8
LOCATION: LP 1604 ℄ STA 10247+35.0 PROP STR: 14-8'x5'x328.18 DES ADT: —

ITEMS	DESIGN Q	Q 100
FREQUENCY	50 YR	100 YR
METHOD USED TO DETERMINE Q	SCS (TR55)	SCS (TR55)
DRAINAGE AREA (AC. OR SQ. MI.)	2.39 Sq. Mi	2.39 Sq. Mi.
DRAINAGE AREA SLOPE (IN FT./MI. BTWN 10% & 85% PTS.)	74.98 FT/MI	74.98 FT/MI
Q	≠ 4444.0 C.F.S	≠ 5131.0 C.F.S
CHANNEL SLOPE (IF SINGLE SECTION METHOD OF BR CALC USED.)	.0142 FT/FT	.0142 FT/FT
ALLOW HW (ELEV. AT SITE)	933.02	933.02
CALC. TW (ELEV. AT SITE)	928.64	930.11
CALC. HW OR BACKWATER (ELEV. AT SITE)	932.80	933.46
VEL THRU STR OR VEL OUT	7.94 FPS	8.88 FPS
VEL THRU NATURAL CHANNEL	11.12 FPS	11.48 FPS
MAX ALLOW VEL OUT	12.0 FPS	12.0 FPS
AREA BELOW DESIGN HW UNDER SPAN BR	— SF	— SF

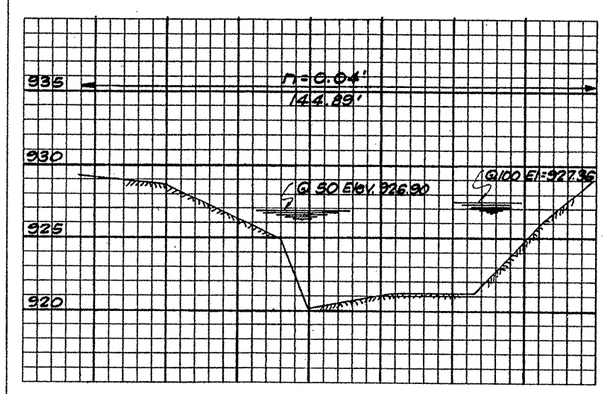
REMARKS: 1. AHW Based upon Lowpoint that occurs on Westbound Frt. Rd. Sta. 10246+78.82 14' Rt. = 933.02
2. Riprap is to be placed both Upstrm & Dnstrm of this Struct.

EFFECTS OF Q 100 ≠ Includes Carryover From Struct. No. 9
DEPTH OF OVERFLOW OF ROAD: 0.44 FT.
WIDTH OF OVERFLOW OF ROAD: 220' FT.
Q OVER ROAD: 3.04 %
Q THRU SRTUCTURE: 96.96 %

Carryover From Struct. No. 9
Q 25 = None
Q 50 = 13 CFS
Q 100 = 96 CFS



ELEVATION VS. DISCHARGE CURVE
LOCATION: 195.39' Dnstrm. of Prop. Dnstrm. End of Culvert



NATURAL STREAM CROSS-SECTION WITH "n" VALUES
LOCATION: 195.39' Dnstrm. of Prop. Dnstrm. End of Culvert

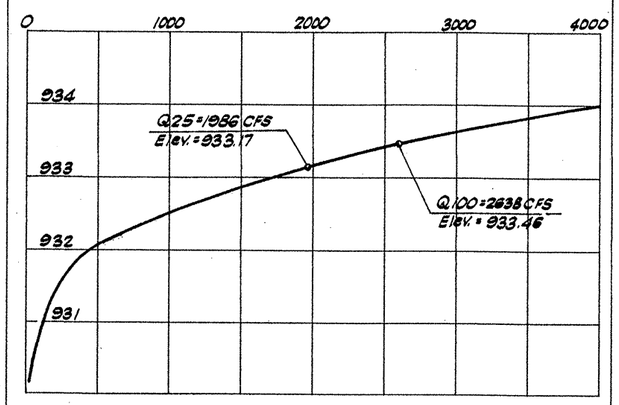
STRUCT. NO. 9
LOCATION: LP 1604 ℄ STA. 10252+62.50 PROP STR: 10-8'x4'x368' DES ADT: —

ITEMS	DESIGN Q	Q 100
FREQUENCY	25 YR	100 YR
METHOD USED TO DETERMINE Q	SCS (TR55)	SCS (TR55)
DRAINAGE AREA (AC. OR SQ. MI.)	.98 Sq. Mi.	.98 Sq. Mi.
DRAINAGE AREA SLOPE (IN FT./MI. BTWN 10% & 85% PTS.)	50.84 FT/MI	50.84 FT/MI
Q	1986.0 C.F.S	▲ 2638 C.F.S
CHANNEL SLOPE (IF SINGLE SECTION METHOD OF BR CALC USED.)	.0096 FT/FT	.0096 FT/FT
ALLOW HW (ELEV. AT SITE)	936.10	936.10
CALC. TW (ELEV. AT SITE)	932.83	933.13
CALC. HW OR BACKWATER (ELEV. AT SITE)	935.97	937.02
VEL THRU STR OR VEL OUT	9.79 FPS	10.55 FPS
VEL THRU NATURAL CHANNEL	3.71 FPS	4.07 FPS
MAX ALLOW VEL OUT	12.0 FPS	12.0 FPS
AREA BELOW DESIGN HW UNDER SPAN BR	- SF	- SF

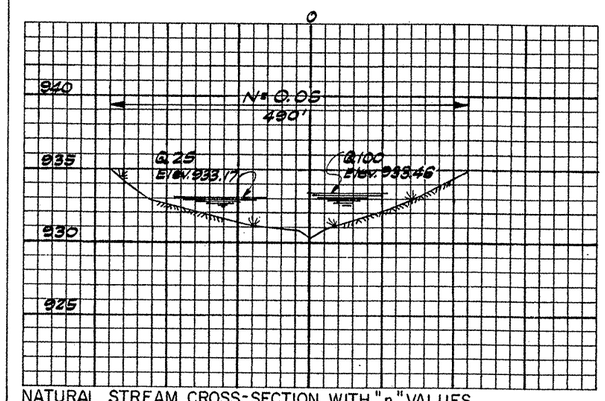
REMARKS: 1. AHW based on Elev. encountered @ Westbound Frontage Rd. ℄ Sta. 10252+07, Rt. @ R.O.W. 936.10 (Nat. Ground)
2. Riprap to be placed Dnstrm. of outlet.

EFFECTS OF Q 100
DEPTH OF OVERFLOW OF ROAD: 0.82 FT.
WIDTH OF OVERFLOW OF ROAD: 10.0 FT.
Q OVER ROAD: 3.62 %
Q THRU SRTUCTURE: 96.38 %

▲ Includes carryover From Struct. No. 10
Q 25 = None
Q 50 = 4 CFS
Q 100 = 26 CFS



ELEVATION VS. DISCHARGE CURVE
LOCATION: 34.68' Upstrm. of Prop. Dnstrm End of Culvert



NATURAL STREAM CROSS-SECTION WITH "n" VALUES
LOCATION: 34.69' UPSTRM OF PROP DNSTRM. END OF CULVERT.
Reason for section being upstrm. of proposed structures outlet is that we had no Channel Easements, contours lacked sufficient definition so we used sections established by our Field Party, the one most representative which was Dnstrm. of existing structure.

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-80
Robert E. Magers Date

HYDRAULIC DATA SHEET

SHEET 3 OF 4 SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	—		234
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	Loop 1604

etc

QSAT 317110 STD A. CEL

HYDRAULIC DATA SHEET FOR BRIDGE CLASS STRUCTURES

(PIPES, PIPE ARCHES & BOX CULVERTS)

LOCATION: STR. NO. 10 LP.1604 ℄ STA. 10265+29.06 PROP STR: 8-7'x3'x661.44 EXTEND EXIST. DES ADT: _____

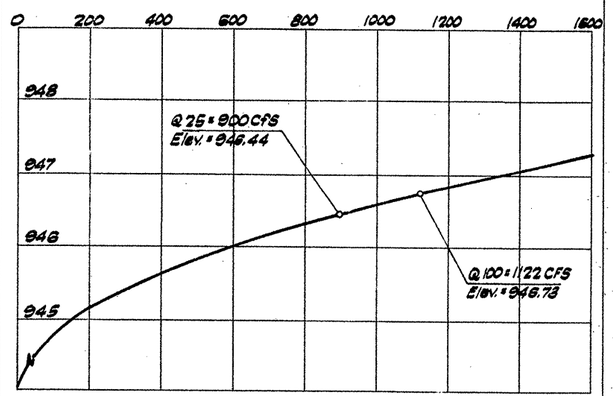
ITEMS	DESIGN Q	Q 100
FREQUENCY	25 YR	100 YR
METHOD USED TO DETERMINE Q	Rational	Rational
DRAINAGE AREA (AC. OR SQ. MI.)	188 Acres	188 Acres
DRAINAGE AREA SLOPE (IN FT./MI. BTWN 10% & 85% PTS.)	46.99 FT/MI	46.99 FT/MI
Q	900.0 C.F.S	1122.0 C.F.S
CHANNEL SLOPE (IF SINGLE SECTION METHOD OF BM CALC USED.)	.0089 FT/FT	.0089 FT/FT
ALLOW HW (ELEV. AT SITE)	951.10	951.10
CALC. TW (ELEV. AT SITE)	947.49	947.78
CALC. HW OR BACKWATER (ELEV. AT SITE)	951.03	951.51
VEL THRU STR OR VEL OUT	8.03 FPS	8.57 FPS
VEL THRU NATURAL CHANNEL	4.24 FPS	4.58 FPS
MAX ALLOW VEL OUT	12.0 FPS	12.0 FPS
AREA BELOW DESIGN HW UNDER SPAN BR	- SF	- SF

REMARKS: 1. AHW based on an elev. which occurs rt. of Westbound Frontage Rd. @ Sta. 10264+00 @ R.O.W. and again on Westbound Frontage Rd. @ Approx. ℄ Sta. 10264+03 @ ℄ ⅊
2. Riprap to be placed @ Outlet.

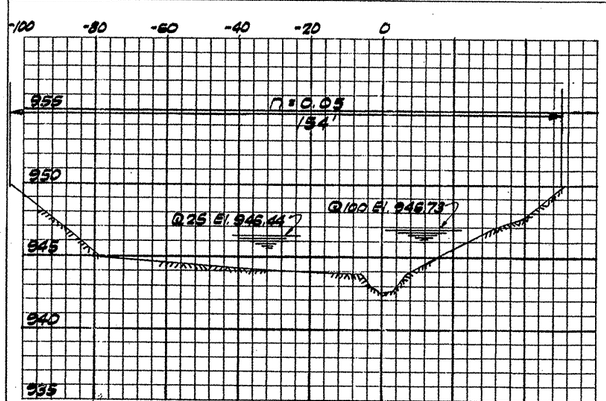
EFFECTS OF Q 100

DEPTH OF OVERFLOW OF ROAD: 0.41 FT.
WIDTH OF OVERFLOW OF ROAD: 104 FT.
Q OVER ROAD: 2.34% %
Q THRU SRTUCTURE: 97.66 %

OTHER Q 100 COMMENTS:



ELEVATION VS. DISCHARGE CURVE
LOCATION: 118.16' Dnstrm. of Prop. Dnstrm. End of Culv. (Lt. of Lp.1604 ℄)



NATURAL STREAM CROSS-SECTION WITH "n" VALUES
LOCATION: 118.16' Dnstrm. of Prop. Dnstrm. End of Culv. (Lt. of ℄ Lp.1604)

LOCATION: _____ PROP STR: _____ DES ADT: _____

ITEMS	DESIGN Q	Q 100
FREQUENCY	YR	100 YR
METHOD USED TO DETERMINE Q		
DRAINAGE AREA (AC. OR SQ. MI.)		
DRAINAGE AREA SLOPE (IN FT./MI. BTWN 10% & 85% PTS.)	FT/MI	FT/MI
Q	C.F.S	C.F.S
CHANNEL SLOPE (IF SINGLE SECTION METHOD OF BM CALC USED.)	FT/FT	FT/FT
ALLOW HW (ELEV. AT SITE)		
CALC. TW (ELEV. AT SITE)		
CALC. HW OR BACKWATER (ELEV. AT SITE)		
VEL THRU STR OR VEL OUT	FPS	FPS
VEL THRU NATURAL CHANNEL	FPS	FPS
MAX ALLOW VEL OUT	FPS	FPS
AREA BELOW DESIGN HW UNDER SPAN BR	SF	SF

REMARKS:

EFFECTS OF Q 100

DEPTH OF OVERFLOW OF ROAD: _____ FT.
WIDTH OF OVERFLOW OF ROAD: _____ FT.
Q OVER ROAD: _____ %
Q THRU SRTUCTURE: _____ %

OTHER Q 100 COMMENTS:

ELEVATION VS. DISCHARGE CURVE
LOCATION: _____

NATURAL STREAM CROSS-SECTION WITH "n" VALUES
LOCATION: _____

LOCATION: _____ PROP STR: _____ DES ADT: _____

ITEMS	DESIGN Q	Q 100
FREQUENCY	YR	100 YR
METHOD USED TO DETERMINE Q		
DRAINAGE AREA (AC. OR SQ. MI.)		
DRAINAGE AREA SLOPE (IN FT./MI. BTWN 10% & 85% PTS.)	FT/MI	FT/MI
Q	C.F.S	C.F.S
CHANNEL SLOPE (IF SINGLE SECTION METHOD OF BM CALC USED.)	FT/FT	FT/FT
ALLOW HW (ELEV. AT SITE)		
CALC. TW (ELEV. AT SITE)		
CALC. HW OR BACKWATER (ELEV. AT SITE)		
VEL THRU STR OR VEL OUT	FPS	FPS
VEL THRU NATURAL CHANNEL	FPS	FPS
MAX ALLOW VEL OUT	FPS	FPS
AREA BELOW DESIGN HW UNDER SPAN BR	SF	SF

REMARKS:

EFFECTS OF Q 100

DEPTH OF OVERFLOW OF ROAD: _____ FT.
WIDTH OF OVERFLOW OF ROAD: _____ FT.
Q OVER ROAD: _____ %
Q THRU SRTUCTURE: _____ %

OTHER Q 100 COMMENTS:

ELEVATION VS. DISCHARGE CURVE
LOCATION: _____

NATURAL STREAM CROSS-SECTION WITH "n" VALUES
LOCATION: _____

STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

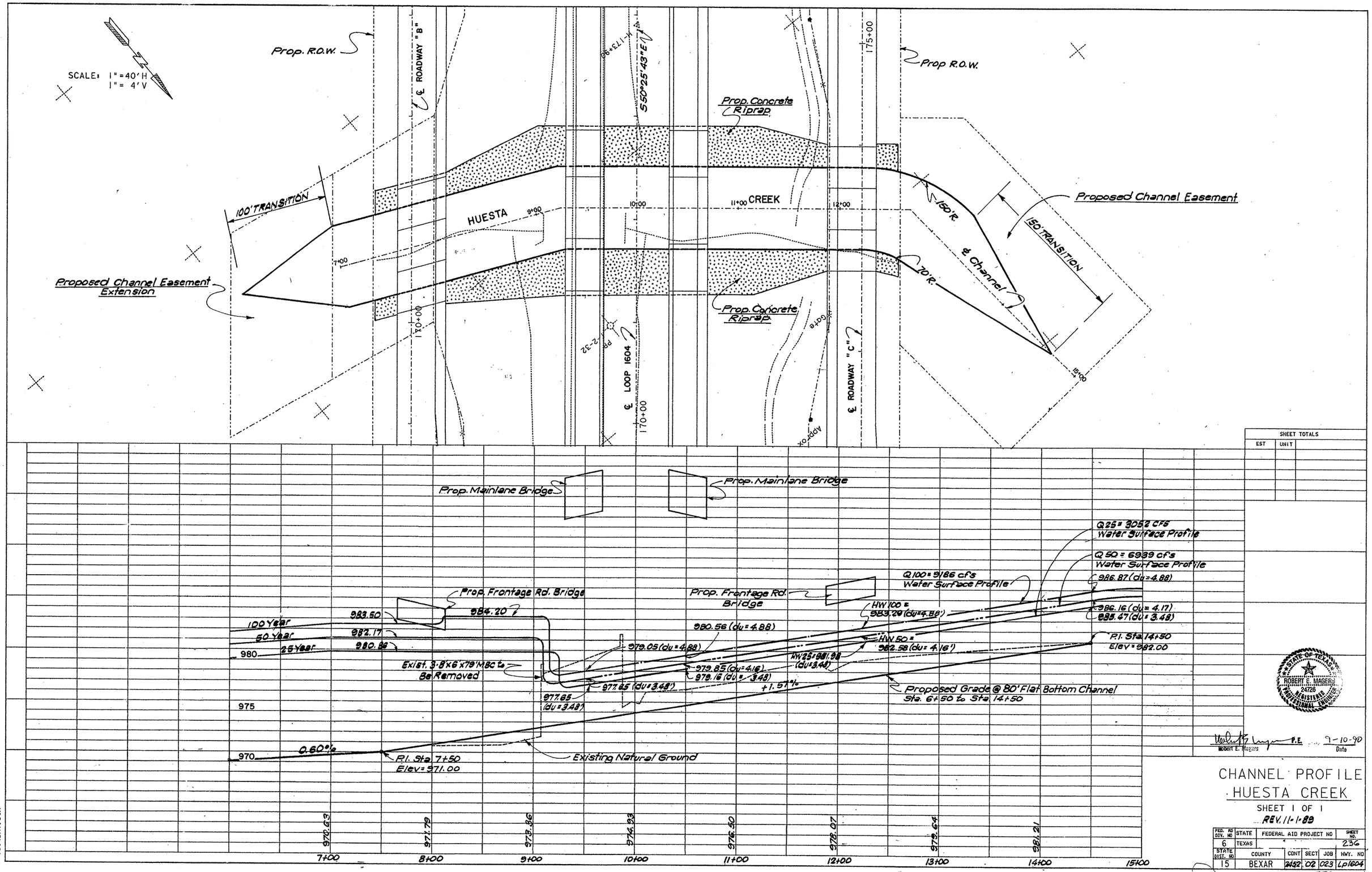
Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

HYDRAULIC DATA SHEET

SHEET 4 OF 4 SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			235
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP.1604

GSAT 317110 STD A.CEL



SHEET TOTALS		
EST	UNIT	

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

CHANNEL PROFILE
HUESTA CREEK

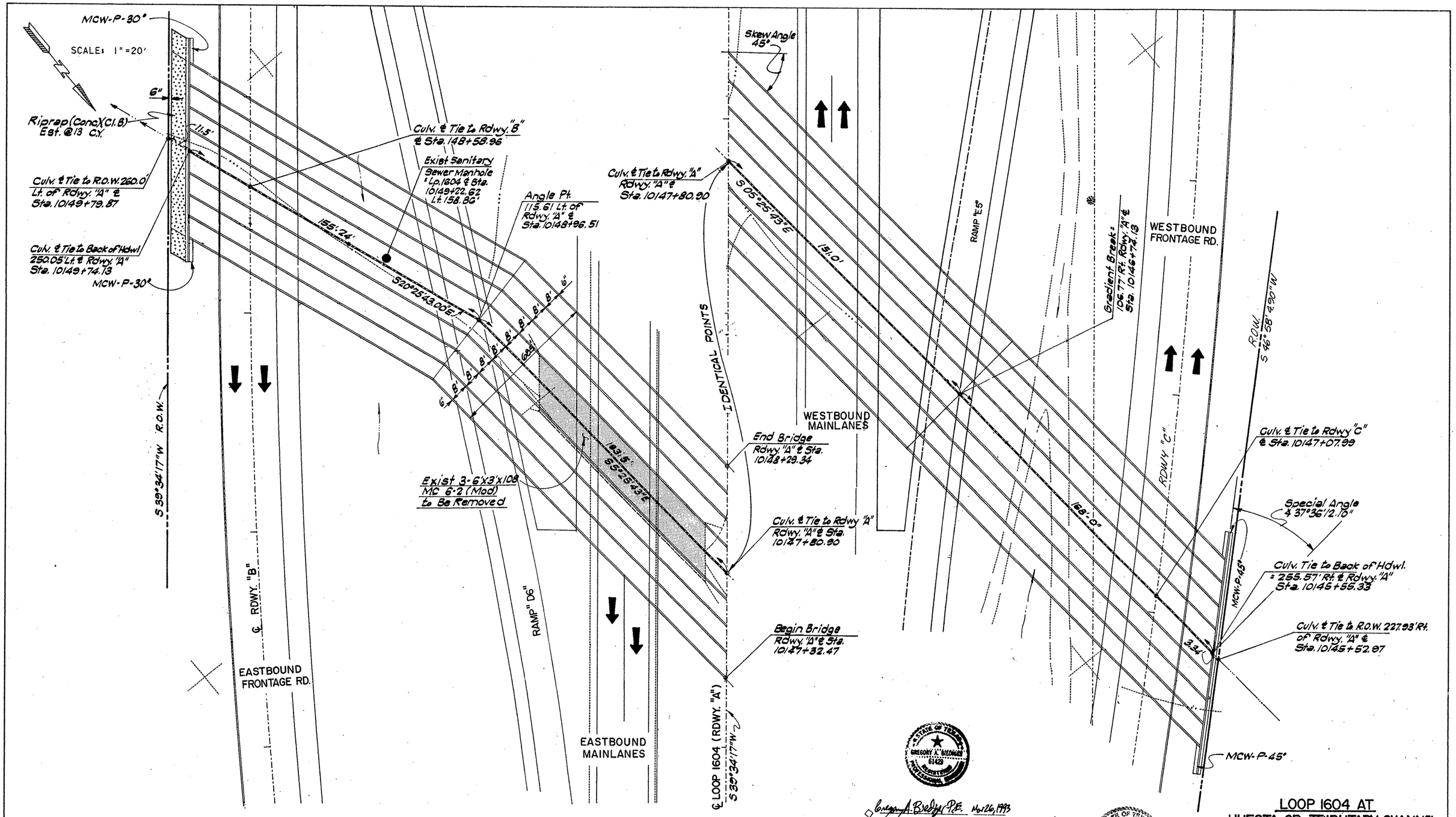
SHEET 1 OF 1

REV. 11-1-89

FED. RD DIV. NO	STATE	FEDERAL AID PROJECT NO			SHEET NO.
6	TEXAS				236
STATE DIST. NO	COUNTY	CONT	SECT	JOB	HWY. NO
15	BEXAR	2452	02	023	LP1604

ETC

1604BR1.DGN



Gregory A. Biedger P.E. Nov 26, 1993

◇ Deleted Storm Sewer From Br. Cl. Str.

Robert E. Magers P.E. 9-10-90 Date

LOOP 1604 AT HUESTA CR. TRIBUTARY CHANNEL BRIDGE CLASS STR. NO. 5

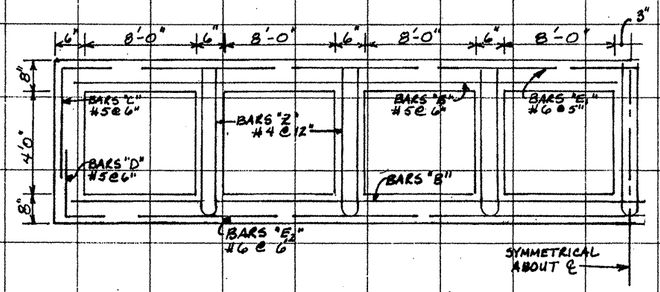
SHEET 1 OF 2

STATE	FEDERAL AID PROJECT NO				SHEET NO.
6	TEXAS				237
STATE DIST. NO	COUNTY	CONT	SECT	JOB	HWY. NO
15	BEXAR	2452	02	023	Lp. 1604

1604BC5.DGN

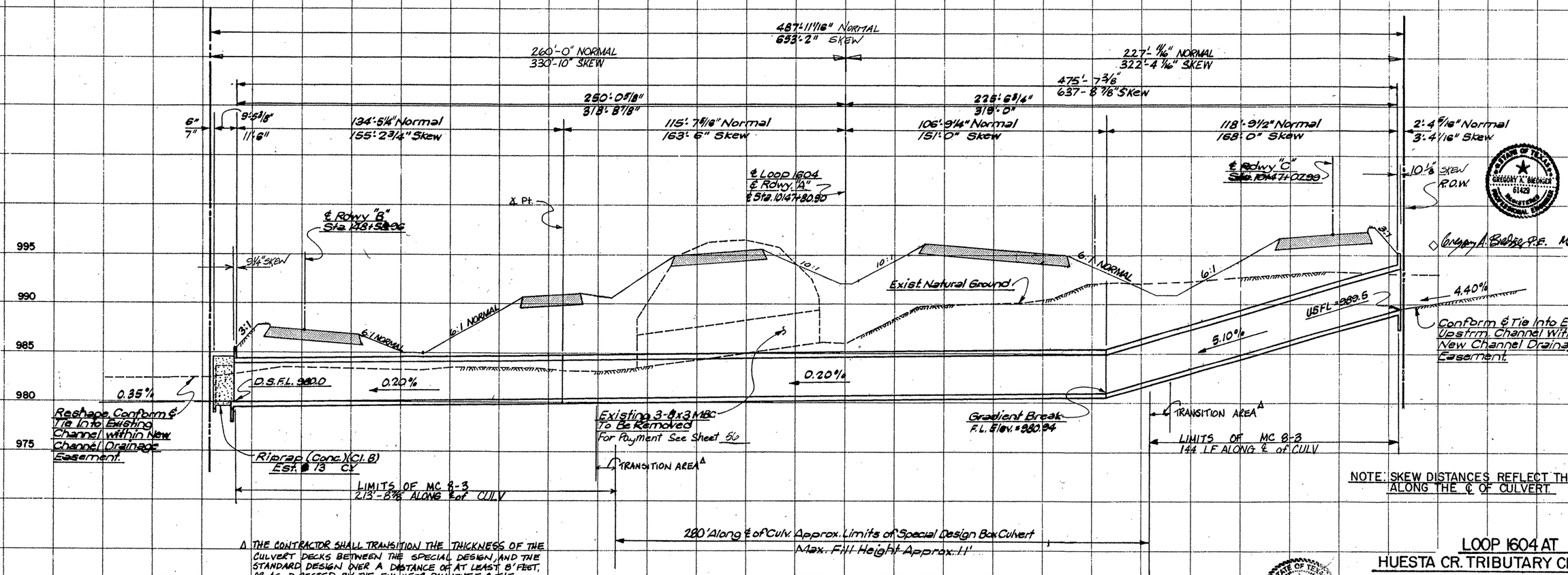
ESTIMATED QUANTITIES		
ITEM	UNIT	QTY
CONC BOX CULV (8'x4')(MC8-3)	LF	2861.92
CONC BOX CULV (8'x4')(SPL)	LF	2240
CULV WINGWALL (MCW-P-45°)(4)	EA	2
CULV WINGWALL (MCW-P-30°)(4)	EA	2
RIPRAP (CONC)(CL B)	CY	13
* STR. EXCAV. (CULV. LARGE)	CY	11377

* FOR CONTRACTOR'S INFORMATION ONLY.



8 - 8'x4' MBC (SPL) (11' FILL)

Notes: Spl. Box Design
1) Other Steel Same as MC8-3
2) Class "C" Conc. Shall Be Used
3) Grade 60 Stl. Shall Be Used



NOTE: SKEW DISTANCES REFLECT THOSE ALONG THE ℄ OF CULVERT.

Δ THE CONTRACTOR SHALL TRANSITION THE THICKNESS OF THE CULVERT DECKS BETWEEN THE SPECIAL DESIGN AND THE STANDARD DESIGN OVER A DISTANCE OF AT LEAST 8' FEET, OR AS DIRECTED BY THE ENGINEER. PAYMENT FOR THE LENGTH OF BARREL WITHIN THE TRANSITION SHALL BE THE SAME AS BID FOR THE STANDARD DESIGN SECTION OUTSIDE THE TRANSITION AREA. NO ADDITIONAL COMPENSATION SHALL BE MADE FOR THE TRANSITION.

STATE OF TEXAS GREGORY A. BIEDIGER 61429 REGISTERED PROFESSIONAL ENGINEER

◇ Gregory A. Biediger, P.E. Mar. 26, 1993

BRIDGE CLASS STR. NO. 5

8-8'x4'x637.74 MBC WITH MCW-P-45° WINGS UPSTRM & MCW-P-30° & RIPRAP DNSTRM.

◇ Deleted Storm Sewer from Br. Cl. Str.

STATE OF TEXAS ROBERT E. MAGERS 64728 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers, P.E. — 9-10-90 Date

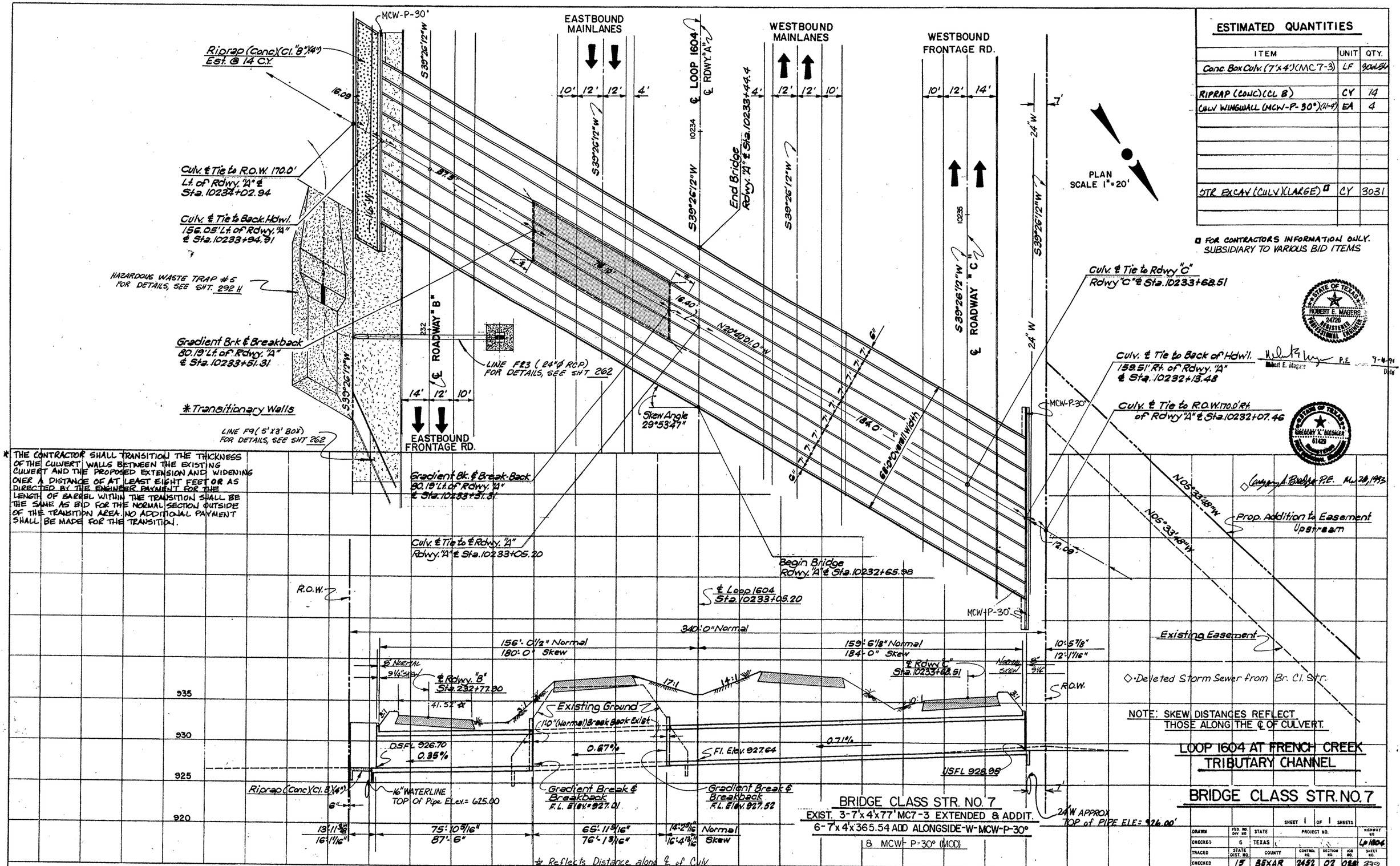
LOOP 1604 AT
HUESTA CR. TRIBUTARY CHANNEL

BRIDGE CLASS STR. NO. 5

SHEET 2 OF 2

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				238
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2492	02	023	Various

ETC.

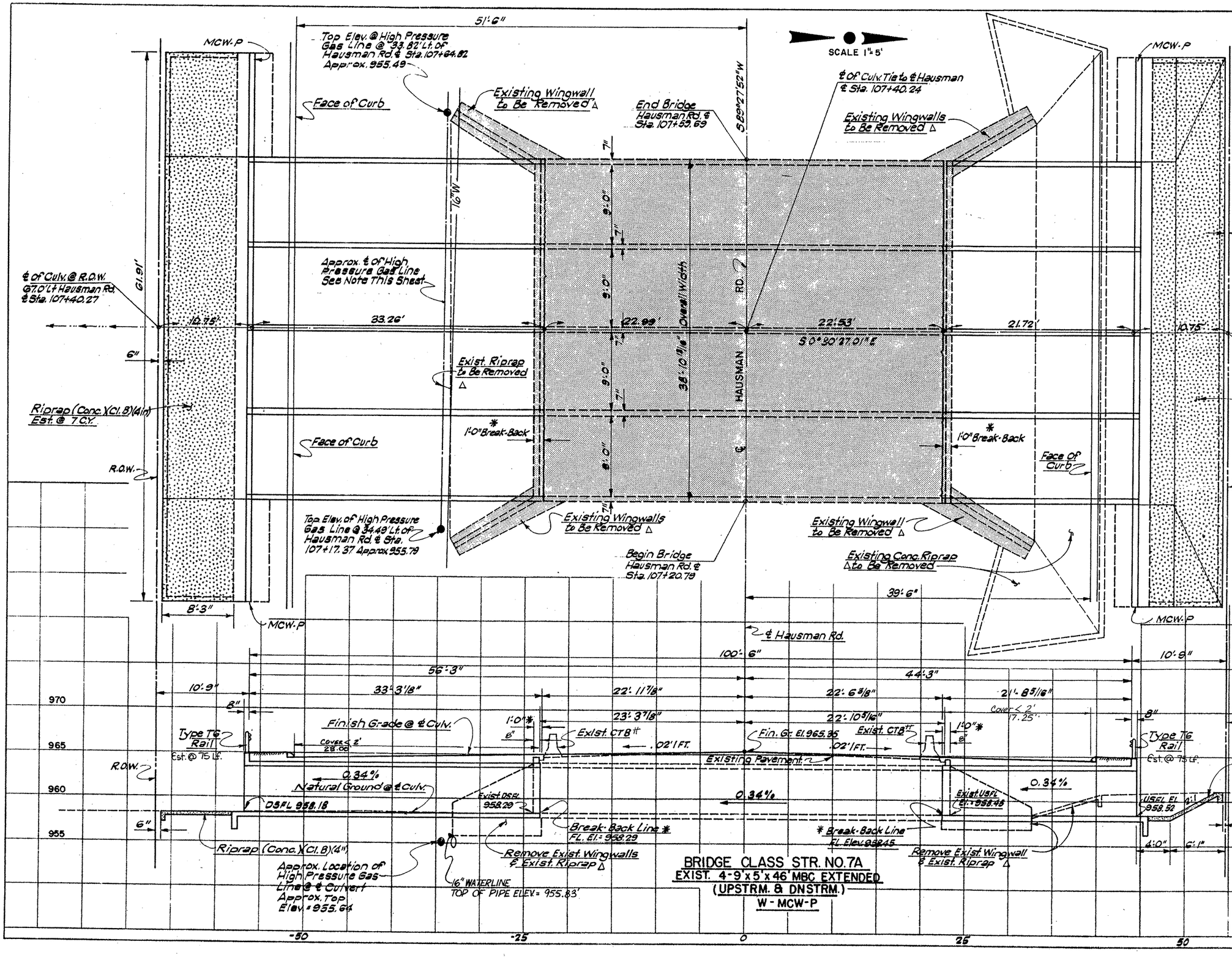


ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
Conc. Box Culv. (7'x4')(MC7-3)	LF	300.54
RIPRAP (CONC)(CL B)	CY	14
CULV WINGWALL (MCW-P-30°)(4'-4')	EA	4
STR EXCAV (CULV)(LARGE) ◻	CY	3031

◻ FOR CONTRACTORS INFORMATION ONLY.
SUBSIDIARY TO VARIOUS BID ITEMS

* THE CONTRACTOR SHALL TRANSITION THE THICKNESS OF THE CULVERT WALLS BETWEEN THE EXISTING CULVERT AND THE PROPOSED EXTENSION AND WIDENING OVER A DISTANCE OF AT LEAST EIGHT FEET OR AS DIRECTED BY THE ENGINEER. PAYMENT FOR THE LENGTH OF BARREL WITHIN THE TRANSITION SHALL BE THE SAME AS BID FOR THE NORMAL SECTION OUTSIDE OF THE TRANSITION AREA. NO ADDITIONAL PAYMENT SHALL BE MADE FOR THE TRANSITION.



ESTIMATED QUANTITIES		
ITEM	UNIT	QTY.
Conc. Box Culv (9'x5')(MC9-1)	LF	225.16
MCW-P (H=5 FT)	EA	4
STR EXCAV (CULV LARGE) △	CY	151
RIPRAP (CONC)(CL B)	CY	16
RAIL TYT-6	LF	150

△ FOR CONTRACTOR'S INFORMATION ONLY SUBSIDIARY TO VARIOUS BID ITEMS.

EXIST. CTB TO BE REMOVED. SEE SHT 36 FOR QUANTITY.

WARNING: THE CONTRACTOR IS ADVISED TO USE EXTREME CAUTION WHEN EXCAVATING NEAR THE HIGH PRESSURE GAS LINE. ELEV'S SHOWN ARE APPROXIMATE.

STATE OF TEXAS — ROBERT E. MAGERS — 24720 — REGISTERED PROFESSIONAL ENGINEER

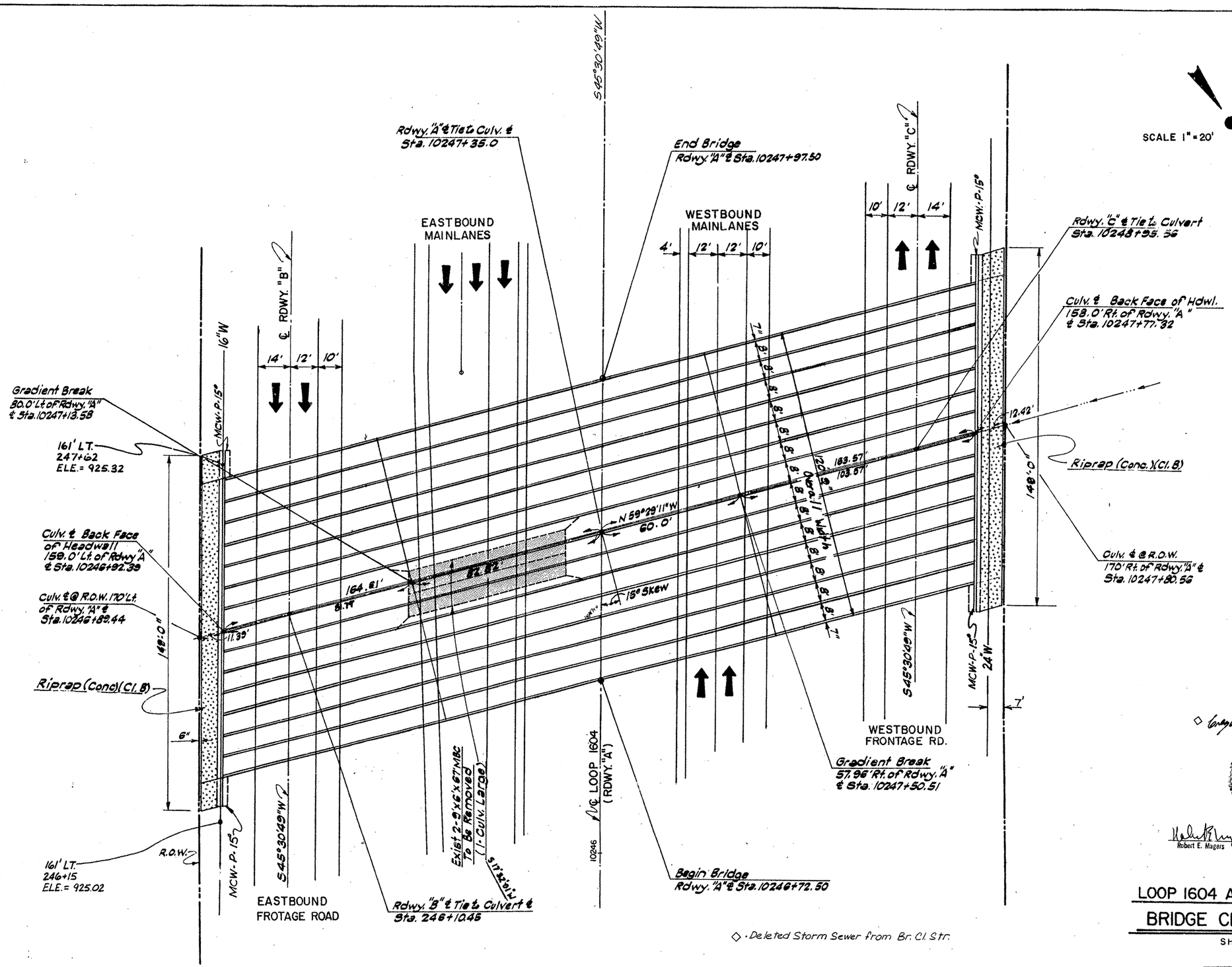
Robert E. Magers P.E. 9-12-90
Date

HAUSMAN RD.
FRENCH CR. TRIBUTARY CHANNEL
BRIDGE CLASS STR. NO. 7A

BRIDGE CLASS STR. NO. 7A
EXIST. 4-9'x5'x46' MBC EXTENDED
(UPSTRM. & DNSTRM.)
W-MCW-P

SHEET 1 OF 1 SHEETS

DRAWN	FED. RD. DIV. NO.	STATE	PROJECT NO.	HIGHWAY NO.
CHECKED	6	TEXAS		Lp. 1604
TRACED	STATE DIST. NO.	COUNTY	CONTROL NO. / SECTION NO. / JOB NO.	SHEET NO.
CHECKED	15	BEXAR	2452 / 02 / 023	290



◇ Deleted Storm Sewer from Br. Cl. Str.

STATE OF TEXAS GREGORY A. BIEDRIGER 61429 REGISTERED PROFESSIONAL ENGINEER

◇ Gregory A. Biedriger P.E. Mar 26, 1993

STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90 Date

LOOP 1604 AT FRENCH CREEK

BRIDGE CLASS STR. NO. 8

SHEET 1 OF 2

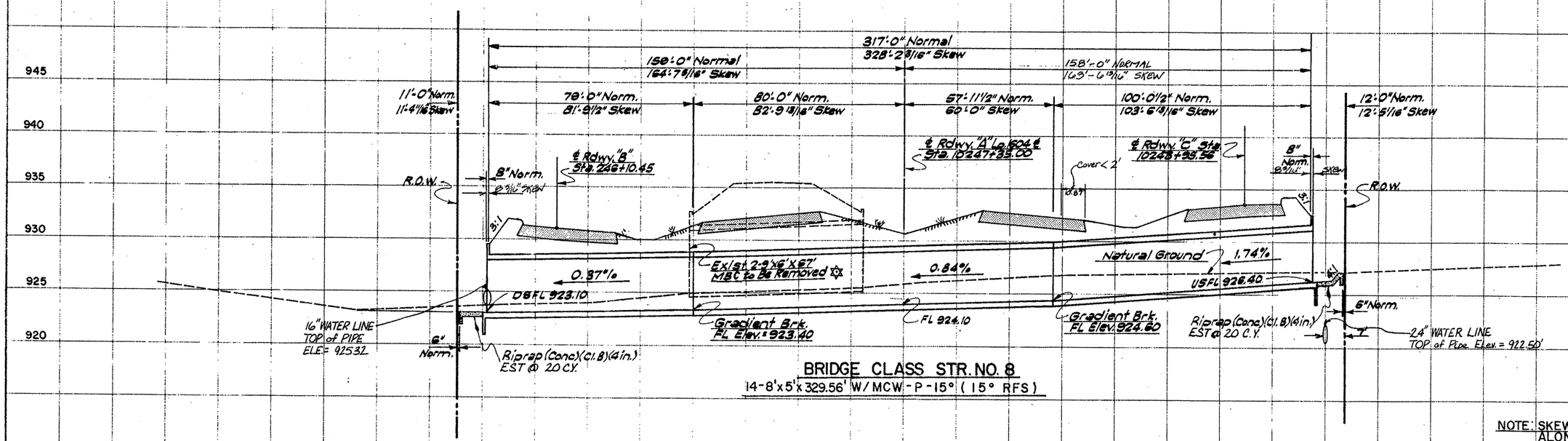
FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS					241
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB		HIGHWAY NO.
15	BEXAR	2452	02	023		[illegible]

ETC

ESTIMATED QUANTITIES		
ITEM	UNIT	QTY.
CONC BOX CULV. (8x5')(MG8-3)	LF	4613.04
CULV WINGWALL (MCW-P-15)(H=5')	EA	4
RIPRAP (CONC)(CL B)	CY	40
STR EXCAV. (CULV LARGE)*	CY	8120

* FOR CONTRACTORS INFORMATION ONLY SUBSIDIARY TO VARIOUS BID ITEMS

✡ FOR PAYMENT OF REMOVAL OF EXIST MULTI-BOX CULVERT, SEE SHT 86.



BRIDGE CLASS STR. NO. 8

14-8'x5'x329.56' W/MCW-P-15° (15° RFS)

NOTE: SKEW DISTANCES REFLECT THOSE ALONG THE ℄ OF CULVERT

◇ · Deleted Storm Sewer from Br. Cl. Str.

◇ Gregory A. Bledsoe P.E. Nov 26, 1993

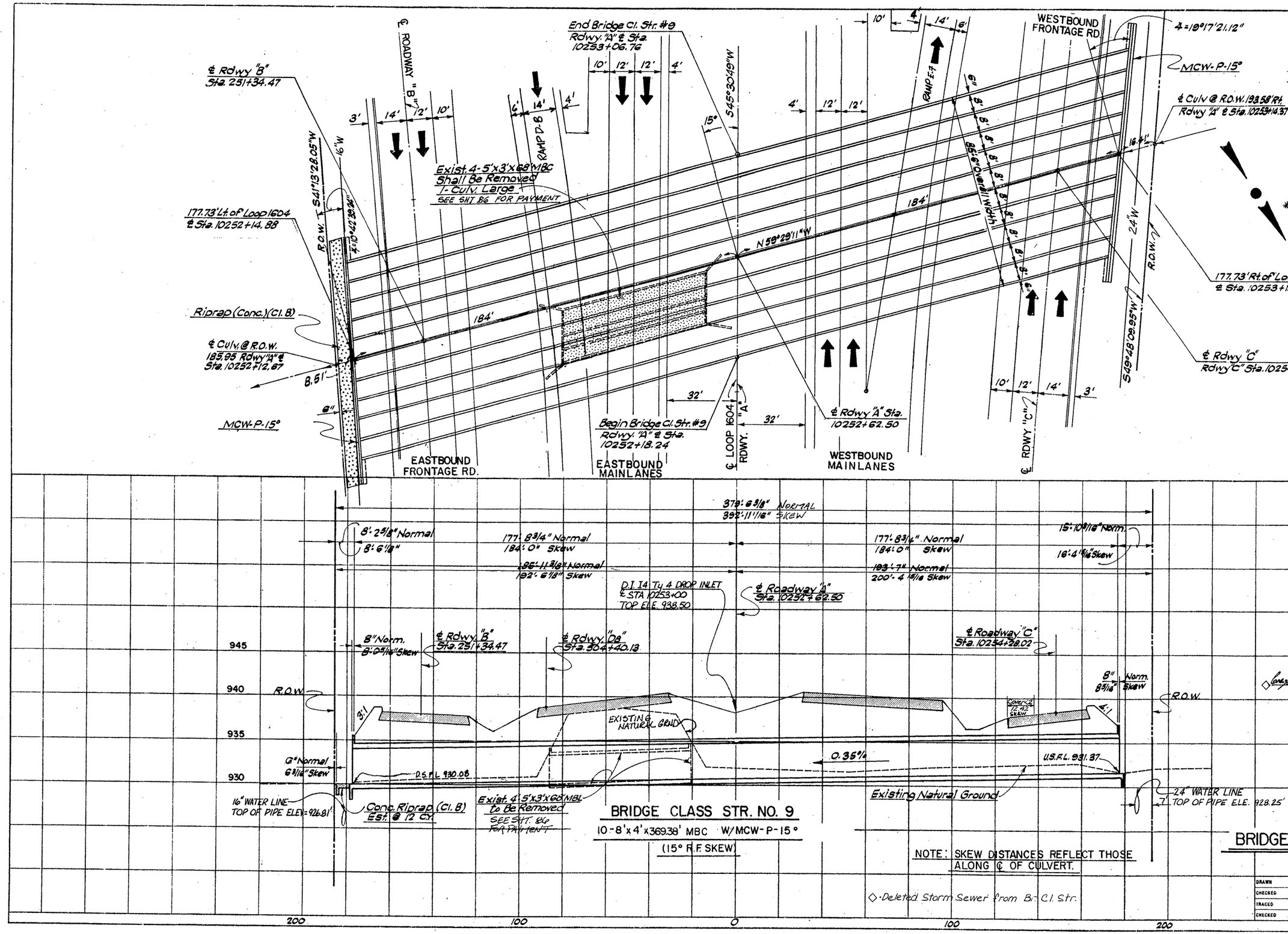
Robert E. Magers P.E. 9-10-90 Date

LOOP 1604 AT FRENCH CREEK

BRIDGE CLASS STR. NO. 8

SHEET 2 OF 2

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					242
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.	
15	BEXAR	2452	02	023	Lp 1604	



BRIDGE CLASS STR. NO. 9

10-8'x4'x369.38' MBC W/MCW-P-15°

(15° R.F. SKEW)

NOTE: SKEW DISTANCES REFLECT THOSE ALONG ℄ OF CULVERT.

◇ Deleted Storm Sewer from Br. Cl. Str.

ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
Conc. Box Culv (8'x4') (MC8-3)	LF	369.38
CULV WINGWALL (MCW-P-15°) (H=4')	EA	4
RIPRAP (CONC) (CL B)	CY	12
STR. EXCAV (CULV. LARGE)*	CY	331.2

* FOR CONTRACTORS INFORMATION ONLY SUBSIDIARY TO VARIOUS BID ITEMS

◇ Gregory A. Bredizer P.E. Mar 26, 1993

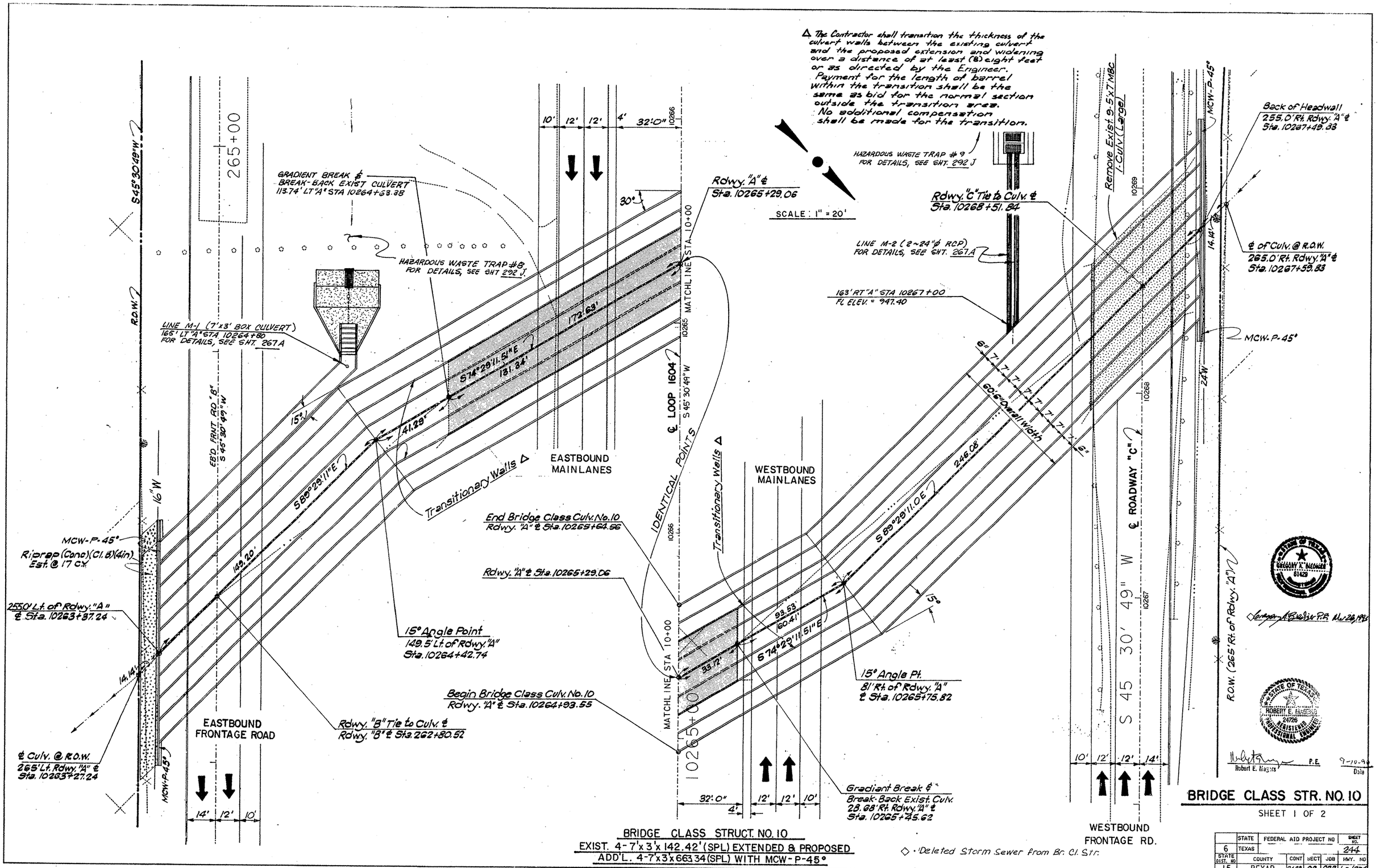
Robert E. Mayers P.E. 9-10-90

BRIDGE CLASS STR. NO. 9

SHEET 1 OF 1 SHEETS

DRAWN	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CHECKED	6	TEXAS				Lp. 1604
TRACED	STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CHECKED	15	BEXAR	2452	02	023	243

ETC



BRIDGE CLASS STRUCT. NO. 10
EXIST. 4-7'x3'x142.42' (SPL) EXTENDED & PROPOSED
ADD'L. 4-7'x3'x663.34 (SPL) WITH MCW-P-45°

◇ · Deleted Storm Sewer from Br. Cl. Str.

Robert E. Magers P.E. 9-10-93 Date

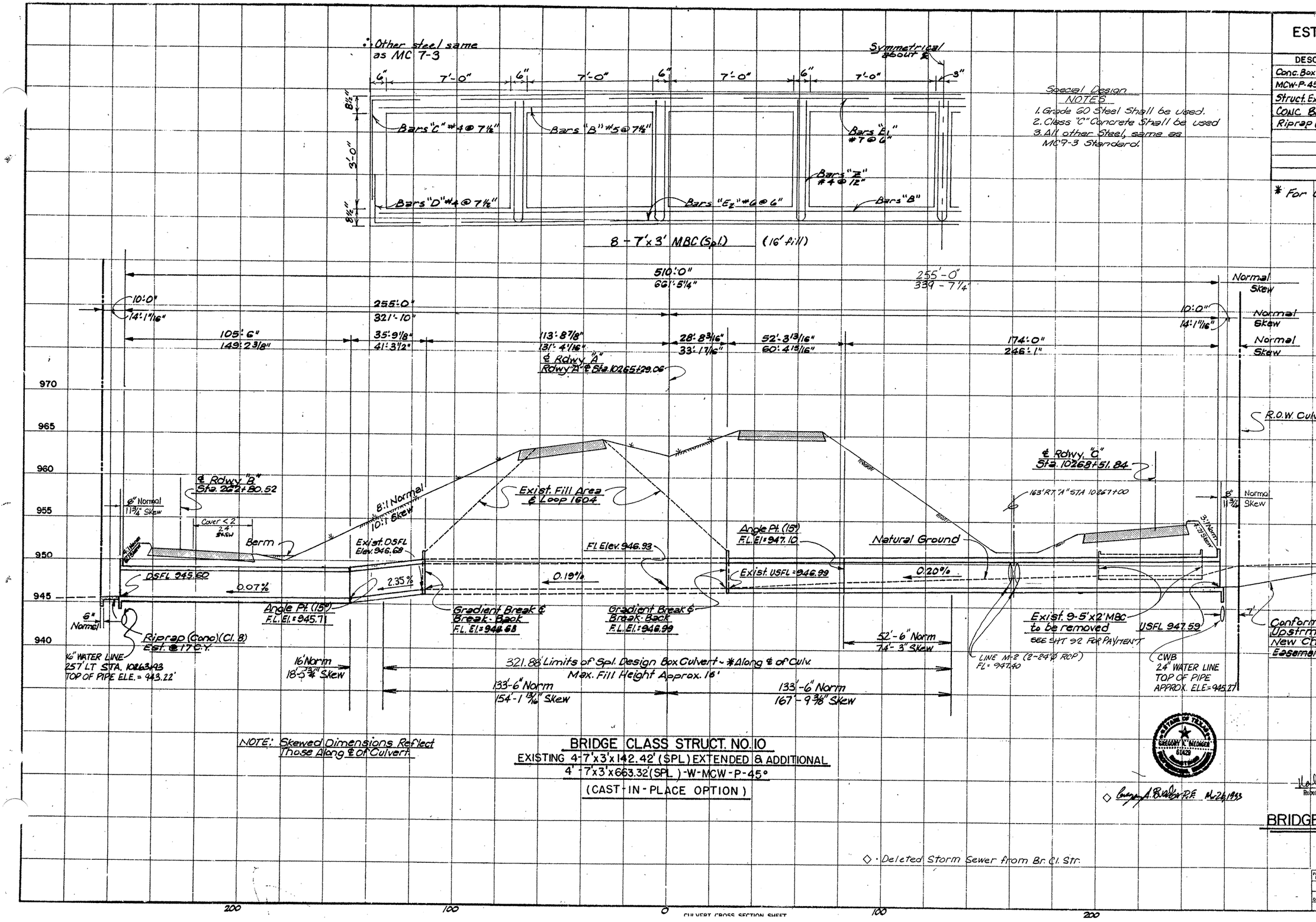
BRIDGE CLASS STR. NO. 10

SHEET 1 OF 2

STATE	FEDERAL AID PROJECT NO				SHEET NO.
6	TEXAS				244
STATE DIST. NO	COUNTY	CONT	SECT	JOB	HWY. NO
15	BEXAR	2452	02	023	Lp. 1604

ETC

1604BC10A.DGN



Special Design NOTES
1. Grade 60 Steel Shall be used.
2. Class "C" Concrete Shall be used
3. All other Steel, same as MC7-3 Standard.

ESTIMATED QUANTITIES

DESCRIPTION (ITEM)	UNIT	QTY.
Conc. Box Culv. (7'x3') (Spl.)	LF	1917.44
MCW-P-45° (H=3')	Ea.	4
Struct. Excav. (Culv. Large) *	CY	4608
Conc. Box Culv. (7'x3') (MC7-3)	LF	2731.52
Riprap (Conc.) (Cl. "B")	CY.	17

* For Contractors Info. Only

NOTE: Skewed Dimensions Reflect Those Along ℄ of Culvert.

BRIDGE CLASS STRUCT. NO. 10

EXISTING 4-7'x3'x142.42' (SPL) EXTENDED & ADDITIONAL
4'-7'x3'x663.32' (SPL) -W-MCW-P-45°
(CAST-IN-PLACE OPTION)

◇ Deleted Storm Sewer from Br. Cl. Str.

STATE OF TEXAS GREGORY A. BUDDEGER 61429 REGISTERED PROFESSIONAL ENGINEER

◇ Gregory A. Buddeger P.E. Mar 26, 1993

STATE OF TEXAS ROBERT E. MAGERS 24226 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90 Date

BRIDGE CLASS STR. NO. 10

SHEET 2 OF 2

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				245
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	Lp 1604

ETC

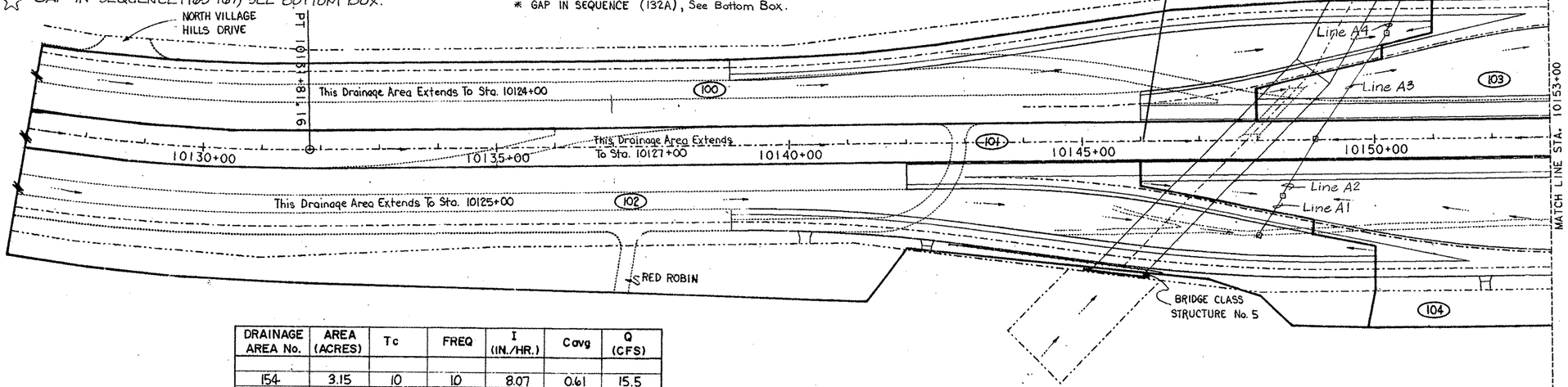
CULVERT CROSS SECTION SHEET

DRAINAGE AREA No.	AREA (ACRES)	Tc	FREQ	I (IN./HR.)	C avg	Q (CFS)
100	7.60	21.7	10	5.53	0.76	31.9
101	5.15	17.5	10	6.21	0.41	13.1
102	11.50	18.3	10	6.06	0.72	50.0
☆ 103	6.00	10	10	8.07	0.64	31.0
104	4.13	10	10	8.07	0.68	22.8
105	3.90	10	10	8.07	0.67	21.0
106	0.69	10	10	8.07	0.74	4.1
107	0.86	10	10	8.07	0.90	6.2
108	0.73	10	10	8.07	0.90	5.3
109	0.58	10	10	8.07	0.84	3.9
110	0.67	10	10	8.07	0.50	2.7
111	1.96	10	10	8.07	0.62	9.8
112	0.98	10	10	8.07	0.90	7.1
113	0.21	10	10	8.07	0.90	1.5
114	10.34	16	10	6.50	0.58	39.0
115	4.09	10	10	8.07	0.48	15.8
116	14.14	17	10	6.30	0.55	49.0
117	0.90	10	10	8.07	0.90	6.5
118	1.25	10	10	8.07	0.90	9.1
119	1.24	10	10	8.07	0.90	9.0
120	2.48	10	10	8.07	0.71	14.2
121	6.20	19	10	5.94	0.45	16.6
122	2.55	10	10	8.07	0.69	14.2
123	5.70	10	10	8.07	0.55	25.3
124	3.01	10	10	8.07	0.61	14.8
125	2.05	10	10	8.07	0.71	11.7
126	2.53	10	10	8.07	0.68	13.9

☆ GAP IN SEQUENCE (165-167) SEE BOTTOM BOX.

DRAINAGE AREA No.	AREA (ACRES)	Tc	FREQ	I (IN./HR.)	C avg	Q (CFS)
127	1.37	10	10	8.07	0.76	8.4
128	1.31	10	10	8.07	0.73	7.7
129	2.62	10	10	8.07	0.68	14.4
130	2.07	10	10	8.07	0.71	11.9
131	1.33	10	10	8.07	0.61	6.5
* 132	**8.01**	**15**	10	**6.71**	**0.48**	**25.9**
133	1.07	10	10	8.07	0.70	6.0
134	0.89	10	10	8.07	0.61	4.4
135	**3.80**	10	10	8.07	**0.73**	**22.3**
136	2.06	10	10	8.07	0.77	12.8
139	4.68	10	10	8.07	0.58	21.9
141	4.72	10	10	8.07	0.62	23.6
142	4.96	10	10	8.07	0.55	22.0
143	3.38	10	10	8.07	0.50	13.6
144	0.45	10	10	8.07	0.53	1.9
145	0.74	10	10	8.07	0.90	5.4
146	0.64	10	10	8.07	0.44	2.3
147	0.60	10	10	8.07	0.90	4.4
148	0.71	10	10	8.07	0.54	3.1
149	0.50	10	10	8.07	0.90	3.6
150	0.59	10	10	8.07	0.54	2.6
151	0.71	10	10	8.07	0.90	5.2
152	10.69	18	10	6.11	0.44	28.7
153	5.49	18	10	6.11	0.35	10.5

* GAP IN SEQUENCE (132A), See Bottom Box.



DRAINAGE AREA No.	AREA (ACRES)	Tc	FREQ	I (IN./HR.)	Cavg	Q (CFS)
154	3.15	10	10	8.07	0.61	15.5
155	14.29	18	10	6.11	0.53	46.3
156	8.87	12	10	7.46	0.61	40.4
157	5.90	10	10	8.07	0.71	33.8
158	6.14	10	10	8.07	0.63	31.2
159	15.0	10	10	8.07	0.50	60.5
160	1.33	10	10	8.07	0.44	4.7
161	3.71	10	10	8.07	0.55	16.5
162	0.73	10	10	8.07	0.55	3.2
163	1.13	10	10	8.07	0.46	4.2
164	8.38	15	10	6.71	0.51	28.7
* 132A	1.07	10	10	8.07	0.70	6.0
☆ 165	4.03	10	10	8.07	0.61	19.8
166	0.95	10	10	8.07	0.40	3.1
167	3.49	10	10	8.07	0.61	17.2

◇ · Added System "A"

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

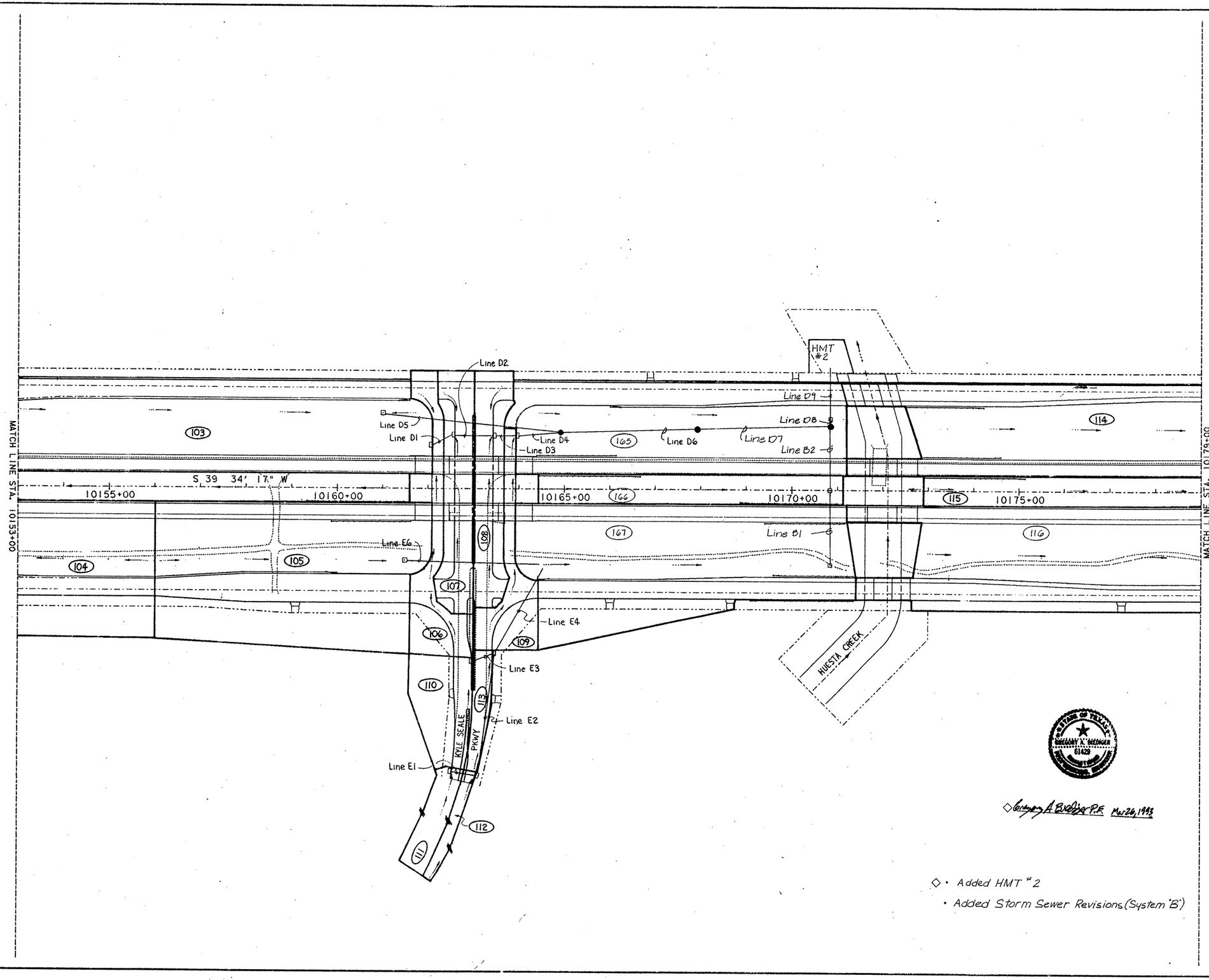
Gregory A. Blaylock P.E. Mar 26, 1993

LP 1604 DRAINAGE AREA MAP

SHEET 1 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			246
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

1604L001.DGN



SCALE: 1"=100'

STATE OF TEXAS
CAROL GREINER LUSCHER
66450
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHER DATE

STATE OF TEXAS
GREGORY A. BECKINGER
61429
REGISTERED
PROFESSIONAL ENGINEER

◇ Gregory A. Beckinger P.E. Mar 26, 1993

◇ • Added HMT #2

• Added Storm Sewer Revisions (System "B")

LP 1604 DRAINAGE AREA MAP

SHEET 2 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			247
STATE	DIST.	COUNTY	
TEXAS		BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP 1604

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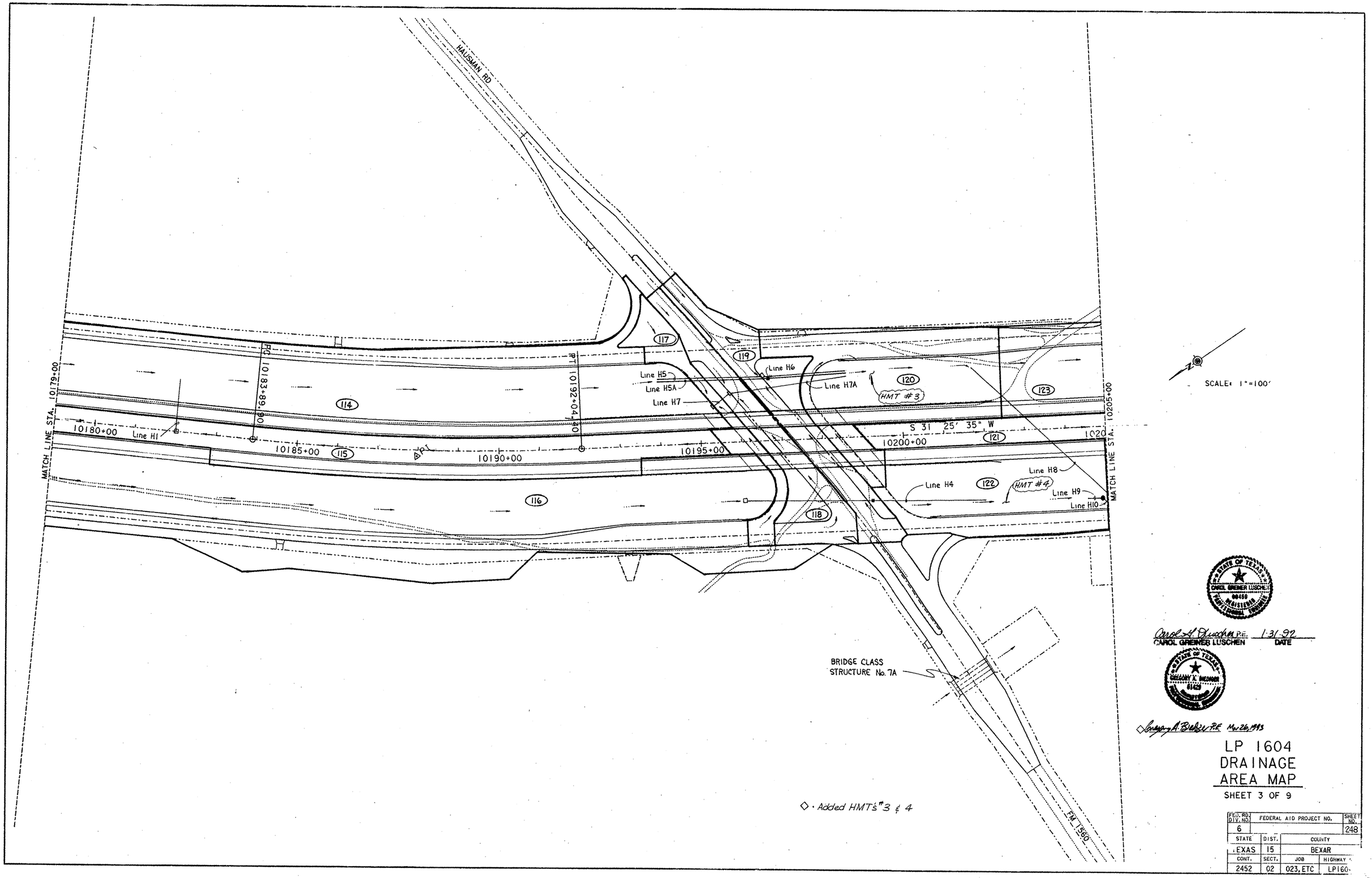

STATE OF TEXAS
CAROL GREINER LUSCHEN
60459
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

STATE OF TEXAS
GREGORY A. BIEHLER
81429

Gregory A. Biehler P.E. Mar 26, 1993

LP 1604
DRAINAGE
AREA MAP

SHEET 3 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			248
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY
2452	02	023, ETC	LP1604

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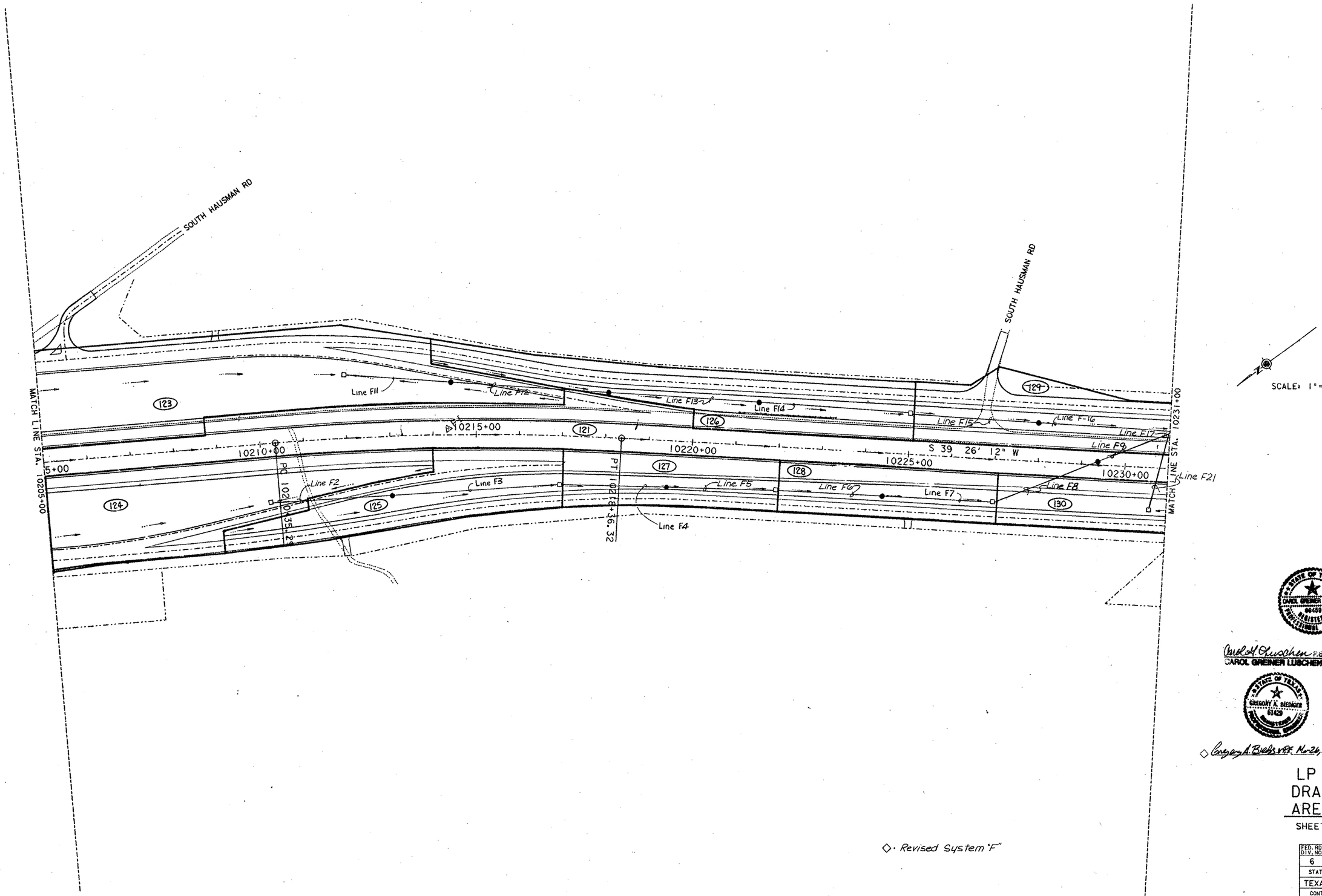


CAROL GREINER LUSCHEN
90459
REGISTERED
PROFESSIONAL ENGINEER
STATE OF TEXAS

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

GREGORY A. BIEDIGER
61429
REGISTERED
STATE OF TEXAS

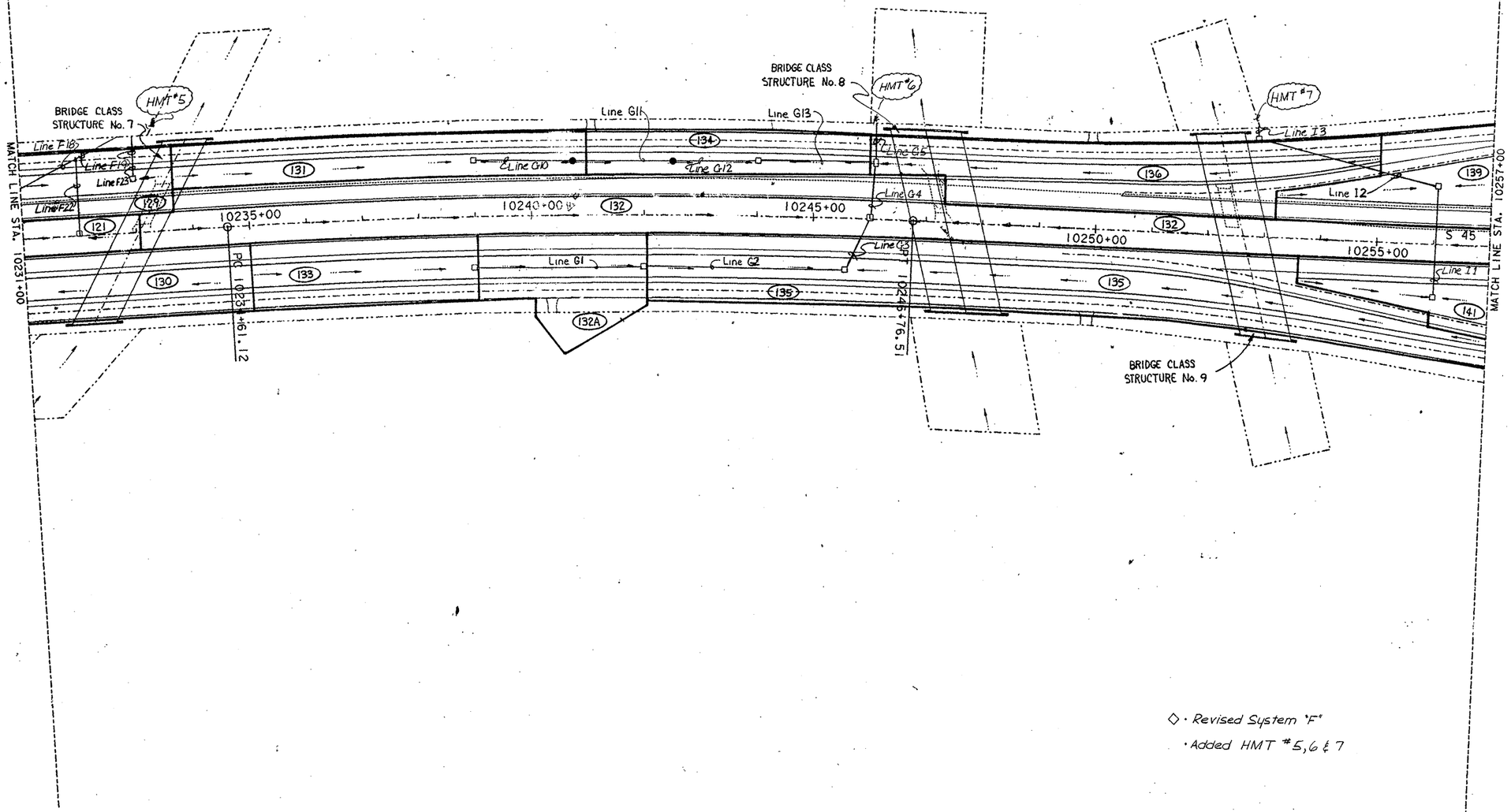
◇ Gregory A. Biediger P.E. Nov 26, 1993

LP 1604 DRAINAGE AREA MAP

SHEET 4 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			249
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY
2452	02	023, ETC	LP

1604L004.DGN



SCALE: 1"=100'

◇ · Revised System "F"

· Added HMT #5, 6 & 7

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED
PROFESSIONAL ENGINEER

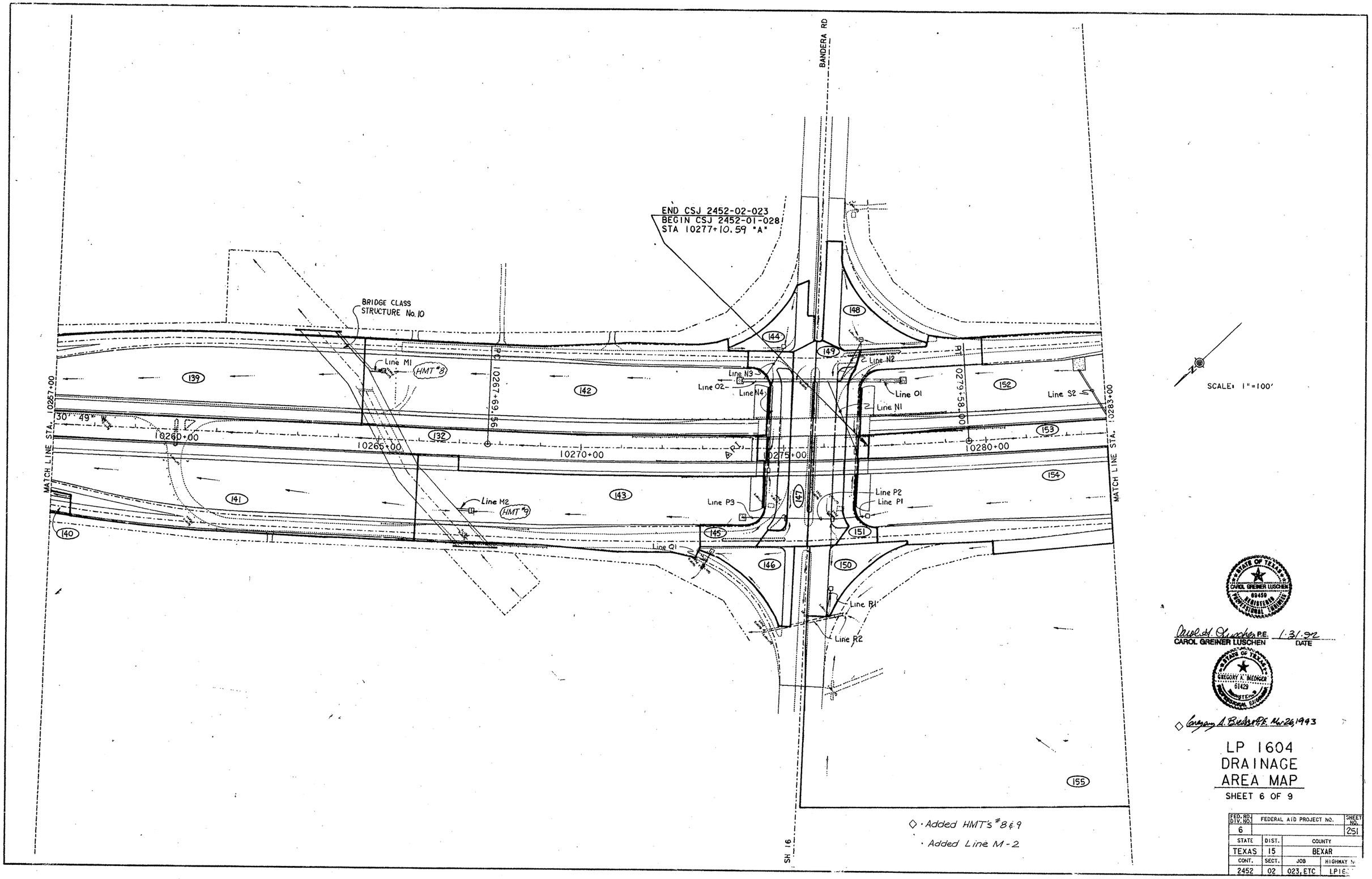
Gregory A. Biediger P.E. 1/26/1993

LP 16Q4
DRAINAGE
AREA MAP

SHEET 5 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			250
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY
2452	02	023, ETC	P

1604L005.DGN



STATE OF TEXAS
CAROL GREINER LUSCHEN
69450
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

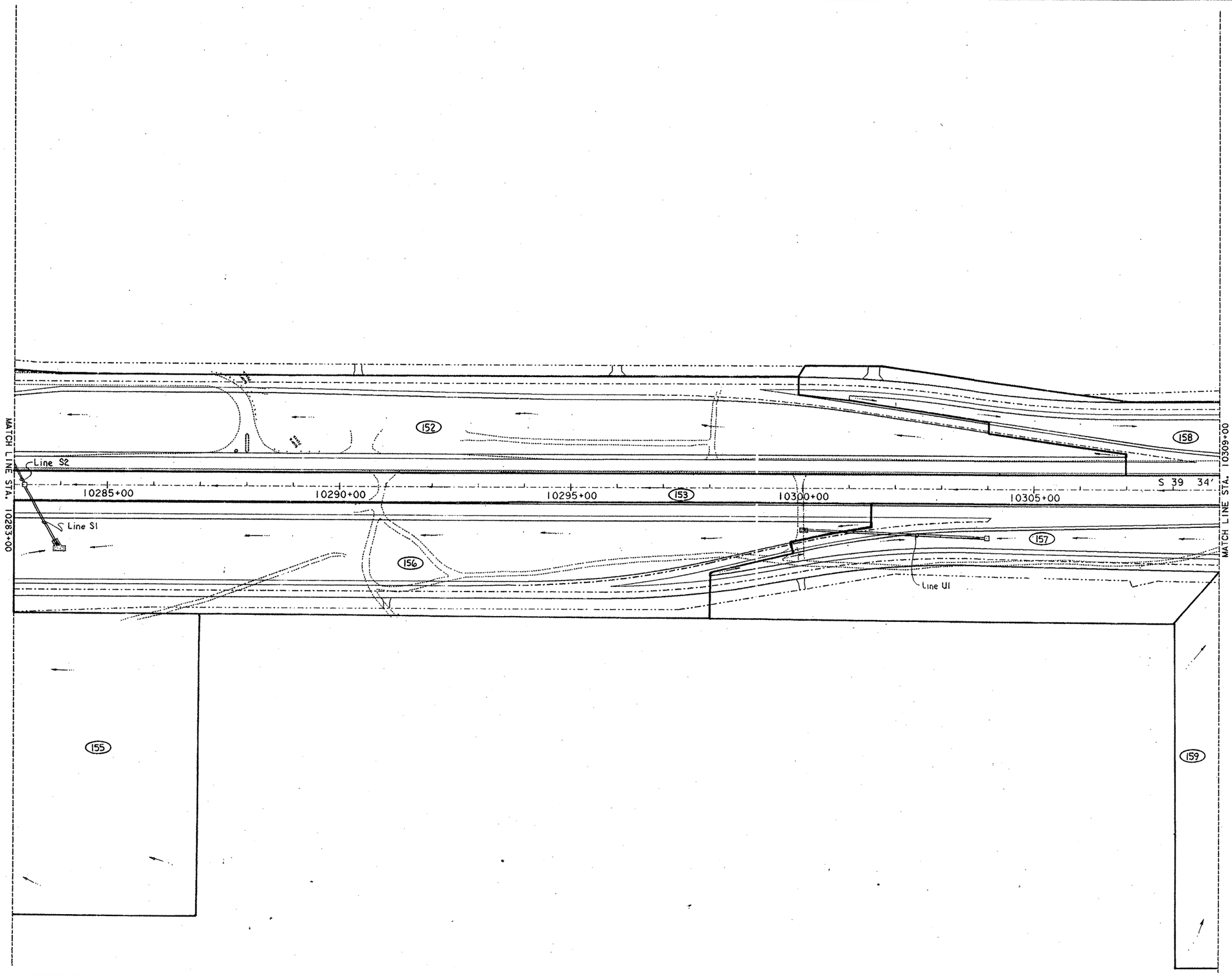
STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED
PROFESSIONAL ENGINEER

◇ Gregory A. Biediger P.E. Mar 26 1993

LP 1604
DRAINAGE
AREA MAP

SHEET 6 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			251
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP16[illegible]



SCALE: 1"=100'

STATE OF TEXAS
CAROL GREINER LUSCHEN
90450
REGISTERED
PROFESSIONAL ENGINEER

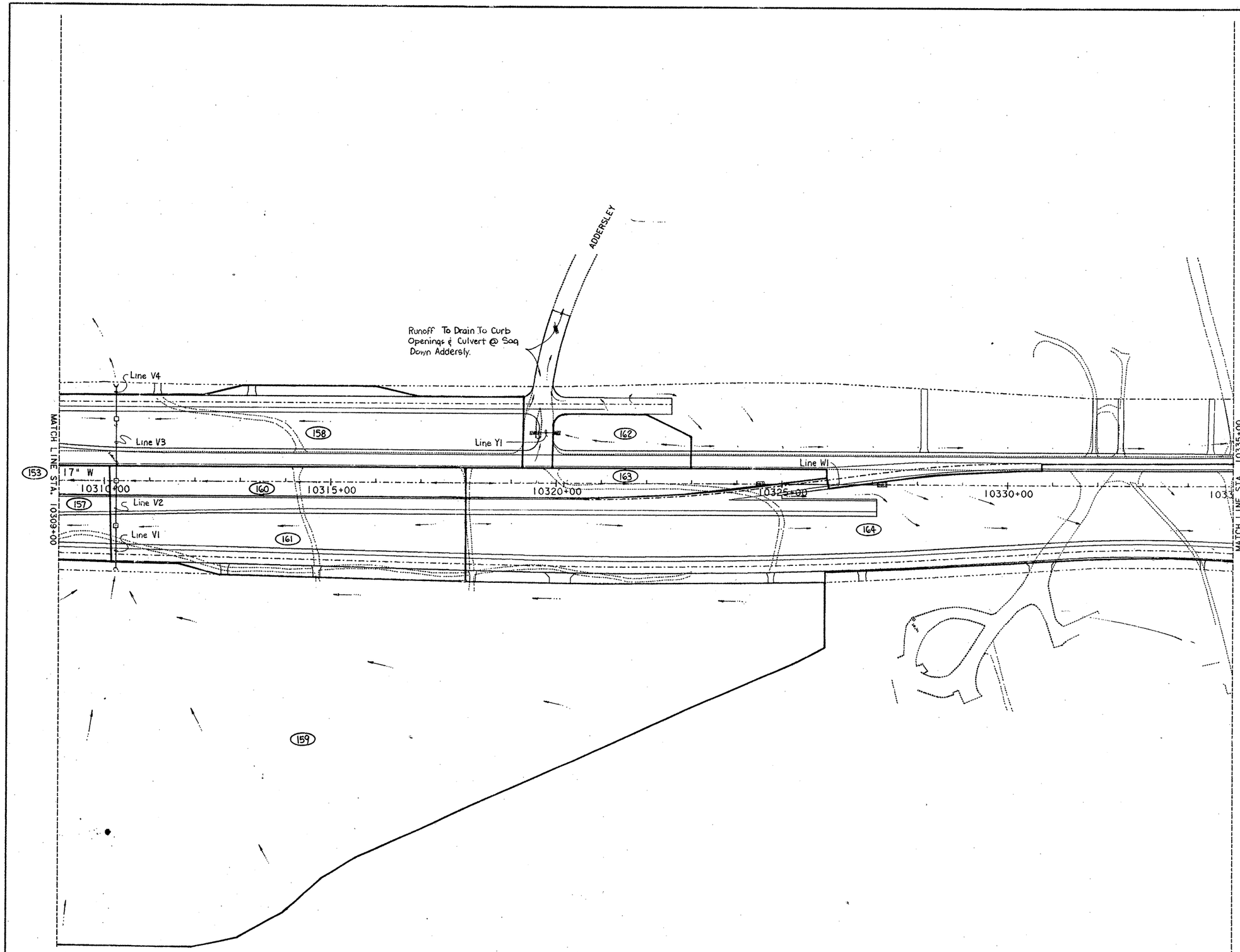
Carol G. Luschen P.E. 1.31.92
CAROL GREINER LUSCHEN DATE

LP 1604 DRAINAGE AREA MAP

SHEET 7 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			252
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY
2452	02	023, ETC	LP

1604L007.DGN



SCALE: 1" = 100'

STATE OF TEXAS
CAROL GREINER LUSCHEN
68450
REGISTERED
PROFESSIONAL ENGINEER

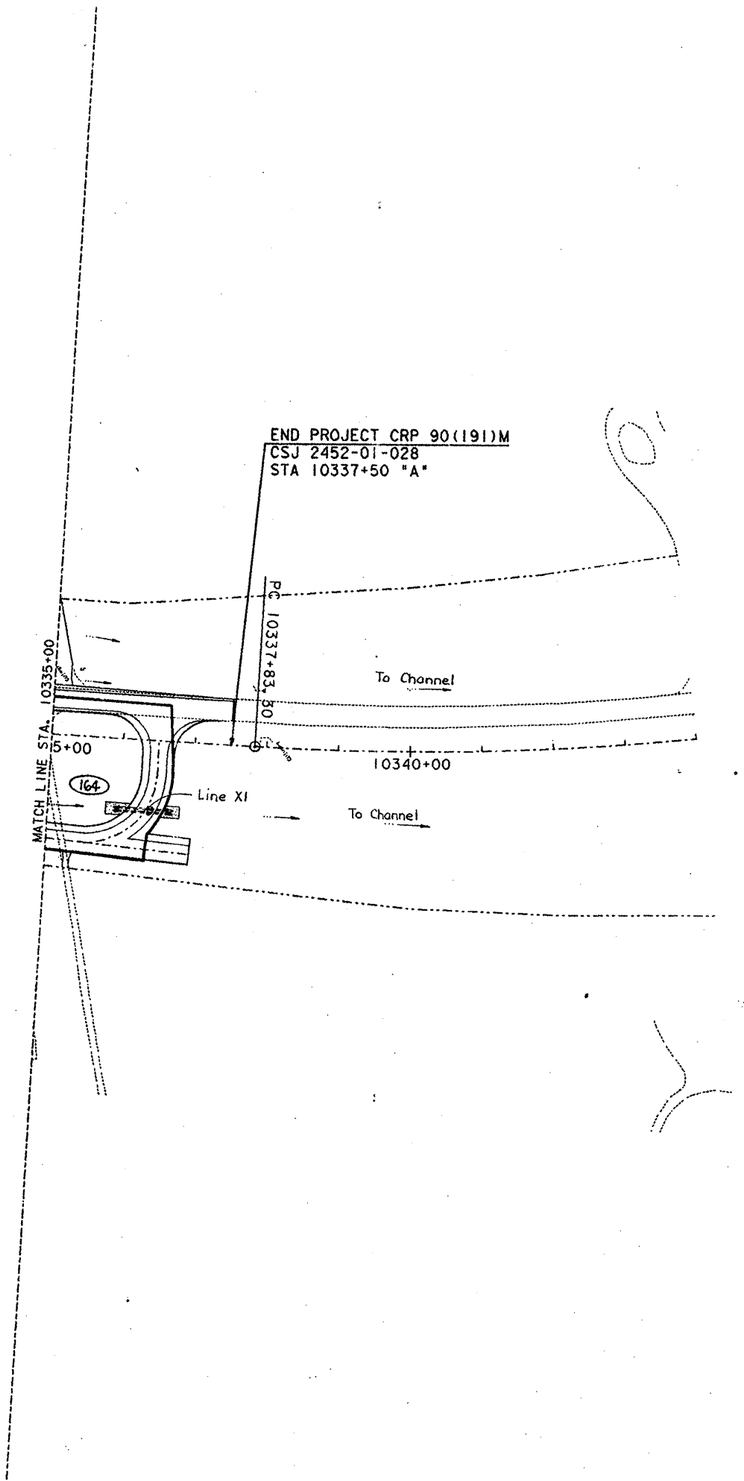
Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

LP 1604 DRAINAGE AREA MAP

SHEET 8 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			253
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY
2452	02	023, ETC	LP

1604L008.DGN



SCALE: 1"=100'

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

LP 1604
DRAINAGE
AREA MAP

SHEET 9 OF 9

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			254
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO
2452	02	023, ETC	LP1604

1604L009.DGN

LINE	FROM	TO	DRAINAGE AREA NO.	TOTAL D.A. AC.	TOTAL C.A	LENGTH FT.	TIME OF CONCENTRATION MINUTES ALONG SEWER LINE	INLET TIME	USED IN DESIGN	i IN./HR.	Q C.F.S.	DESIGN DIA. IN.	SLOPE %	DEPTH DU	VEL DU FT./SEC.	REMARKS
							SYSTEM 'A'									
A1	D.I. A1	D.I. A2	102	11.50	8.25	77	*2200/(2.0X60)=	18.3	18.3	6.06	50.0	2~30	0.80	1.44	8.6	ENTR CONTROL, EACH PIPE 1/2 Q
A2	D.I. A2	D.I. A3	102,104	15.63	11.08	113	18.3+77/(8.6X60)=	10.0	18.4	6.04	66.9	2~36	0.60	1.67	8.3	EACH PIPE TO HANDLE 1/2 Q
A3	D.I. A3	D.I. A4	101,102,104	20.78	13.19	225	18.44+113/(8.3X60)=	17.5	18.6	6.01	79.3	2~36	0.60	1.86	8.6	EACH PIPE TO HANDLE 1/2 Q
A4	D.I. A4	OUTFALL	100-102,104	28.83	18.96	94	*2600/(2.0X60)=	21.7	21.7	5.53	104.8	7'X 3'	0.40	1.73	8.6	
							SYSTEM 'B'									
B1	D.I. B1	D.I. B2	105,110-113,165	11.75	7.69	164	* 680/(2.3X60)=	4.93	10	8.07	62.1	36	0.70	2.54	9.7	ENTRANCE CONTROL
B2	D.I. B2	D.I. B3	105,110-113,165,166	12.70	8.07	140	4.93+164/(9.7X60)=	5.21	10	8.07	65.1	36	0.70	2.67	9.8	
							SYSTEM 'D'									
D1	C.I. D1	C.I. D2	106	0.69	0.51	57	* 450/(3.0X60)=	2.50	10	8.07	4.1	18	0.30	0.90	3.8	
D2	C.I. D2	C.I. D3	106-107	1.55	1.28	88	2.50+57/(3.8X60)=	2.75	10	8.07	10.3	24	0.30	1.32	4.8	
D3	C.I. D3	C.I. D4	106-108	2.28	1.94	50	2.75+88/(4.8X60)=	3.06	10	8.07	15.7	24	0.50	1.44	6.4	
D4	C.I. D4	M.H. D6	106-109	2.86	2.43	107	3.06+50/(6.4X60)=	3.19	10	8.07	19.6	24	0.75	1.52	7.8	
D5	D.I. D5	M.H. D6	103	6.00	3.84	402	*1300 / (2.25X60)=	9.60	10	8.07	31.0	30	0.60	1.80	8.0	
D6	M.H. D6	M.H. D7	103,106-109	8.86	6.27	300	9.60+402/(8.0X60)=	10.40	10.40	7.94	49.8	36	0.66	2.14	9.2	
D7	M.H. D7	M.H. D8	103,106-109	8.86	6.27	283	10.40+283/(9.2X60)=	10.94	10.94	7.77	48.7	36	0.66	2.11	9.2	
D8	M.H. D8	D.I. D9	103,105,-113,165,166	21.56	14.34	13	10.94+283/(9.2X60)=	11.45	11.45	7.62	109.3	6'X 3'	0.33	2.19	8.3	
D9	D.I. D9	OUTFALL	103,105-113,165,167	25.05	16.47	109	11.45+13(8.3X60)=	11.71	11.71	7.54	124.2	6'X 3'	0.33	2.40	8.6	
							SYSTEM 'E'									
E1	C.I. E1	C.I. E2	111	1.96	1.22	53	1500/(3.0X60)=8.33	8.33	10	8.07	9.8	18	3.00	0.75	11.0	ENTRANCE CONTROL
E2	C.I. E2	C.I. E4	111,112	2.94	2.10	295	8.33+58/(11.0X60)=8.41	8.41	10	8.07	16.9	24	1.61	1.04	10.2	ENTRANCE CONTROL
E3	C.I. E3	C.I. E4	110	0.67	0.34	88	* 250/(3.0X60)=1.39	1.39	10	8.07	2.7	18	0.42	0.63	3.9	
E4	C.I. E4	DITCH	110-113	3.82	2.62	203	8.41+295/(10.2X60)=8.89	8.89	10	8.07	21.1	30	0.36	1.67	6.0	
E5	D.I. E5	STR #5	104	4.13	2.81	368	* 550/(2.2X60)=4.17	4.17	10	8.07	22.7	24	0.90	1.50	9.0	
E6	D.I. E6	OUTFALL	105	3.90	2.61	306	* 550/(2.2X60)=4.17	4.17	10	8.07	21.1	4 EA 18	0.35	1.00	4.3	EACH PIPE TO HANDLE 1/4 Q
							SYSTEM 'F'									
F2	D.I. F2	M.H. F3	124	3.01	1.84	310	* 560 / 2 / 60 = 4.67	4.67	10	8.07	14.8	24	0.70	1.26	7.0	ENTRANCE CONTROL
F3	M.H. F3	D.I. F4	124	3.01	1.84	390	4.67+(310 / 7.0 / 60) =	5.41	10	8.07	14.8	24	0.70	1.26	7.0	
F4	D.I. F4	M.H. F5	124,125	5.06	3.30	250	5.41+(390 / 7.0 / 60) =	6.34	10	8.07	26.6	30	0.50	1.85	6.7	
F5	M.H. F5	D.I. F6	124,125	5.06	3.30	250	6.34+(250 / 6.7 / 60) =	6.96	10	8.07	26.6	30	0.50	1.85	6.7	
F6	D.I. F6	M.H. F7	124, 125, 127	6.43	4.34	250	6.96+(250 / 6.7 / 60) =	7.58	10	8.07	35.0	30	0.75	1.95	8.2	
F7	M.H. F7	D.I. F8	124, 125, 127	6.43	4.34	250	7.58+(250 / 8.2 / 60) =	8.09	10	8.07	35.0	30	0.75	1.95	8.2	
F8	D.I. F8	M.H. F9	124,125,127,128	7.74	5.30	250	8.09+(250 / 8.2 / 60) =	8.60	10	8.07	42.8	36	0.46	2.22	8.0	
F9	M.H. F9	JUNC F17	124,125,127,128	7.74	5.30	180	8.60+(250 / 8.0 / 60) =	9.12	10	8.07	42.8	5'X 3'	0.41	1.22	6.9	
F9	JUNC F17	JUNC F18	124,125,127,128	7.74	5.30	10	9.12+(180 / 6.9 / 60) =	9.55	10	8.07	42.8	5'X 3'	0.30	1.36	6.3	
F11	D.I. F11	M.H. F12	123	5.70	3.14	250	* 960 / 3 / 60 =	5.33	10	8.07	25.3	30	0.40	1.95	6.2	
F12	M.H. F12	M.H. F13	123	5.70	3.14	350	5.33+(250 / 6.2 / 60) =	6.00	10	8.07	25.3	30	0.40	1.95	6.2	
F13	M.H. F13	M.H. F14	123	5.70	3.14	350	6.00+(350 / 6.2 / 60) =	6.94	10	8.07	25.3	30	0.41	1.94	6.2	
F14	M.H. F14	D.I. F15	123	5.70	3.14	350	6.94+(350 / 6.2 / 60) =	7.88	10	8.07	25.3	30	0.41	1.94	6.2	
F15	D.I. F15	M.H. F16	123, 126	8.23	4.86	300	7.88+(350 / 6.2 / 60) =	8.82	10	8.07	39.2	36	0.35	2.31	6.7	
F16	M.H. F16	JUNC F18	123, 126	8.23	4.86	300	8.82+(300 / 6.7 / 60) =	9.56	10	8.07	39.2	36	0.45	2.10	7.5	
F21	D.I. F21	JUNC F18	130	2.07	1.48	190	* 450 / 2 / 60 =	3.75	10	8.07	11.9	24	0.30	1.50	4.7	
F18	JUNC F18	JUNC F19	123,124,125,126,127,128,130	18.04	11.64	110	9.56+(10 / 7.5 / 60) =	9.58	10	8.07	93.9	5'X 3'	0.30	2.41	7.8	
F22	D.I. F22	JUNC F19	121	6.20	2.79	138	* 3300 / 2.9 / 60 =	18.96	19	5.94	16.6	24	0.83	1.26	8.0	ENTRANCE CONTROL
F19	JUNC F19	OUTFALL	121,124,125,126,127,128,130	24.24	14.43	77	18.96+(110 / 8.0 / 60) =	19.19	19.19	5.91	85.3	5'X 3'	0.30	2.24	7.6	
F23	D.I. F23	OUTFALL	129	2.62	1.78	75	* 790 / 2.0 / 60 =	6.58	10	8.07	14.4	24	0.50	1.44	6.0	@ CRITICAL SLOPE

* OVERLAND FLOW

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Gregory A. Biediger, P.E. 61429, on Mar 26, 1993

Gregory A. Biediger

STORM SEWER COMPUTATIONS

SHEET 1 OF 3 SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	CRP 90(191)M	256

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

ETC.

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LINE	FROM	TO	DRAINAGE AREA NO.	TOTAL D.A. AC.	TOTAL C.A	LENGTH FT.	TIME OF CONCENTRATION MINUTES ALONG SEWER LINE	INLET TIME	USED IN DESIGN	I IN./HR.	Q C.F.S.	DESIGN DIA. IN.	SLOPE %	DEPTH DU	VEL DU FT./SEC.	REMARKS
							SYSTEM 'G'									
G1	D.I. G1	D.I. G2	133	1.07	0.75	300	* 400 / 2.0 / 60 = 3.33	3.33	10	8.07	6.1	18	0.51	0.98	5.0	
G2	D.I. G2	D.I. G3	133, 132A	2.14	1.50	354	3.33+(300 / 5.0 / 60)=	4.33	10	8.07	12.1	24	0.57	1.18	6.1	
G3	D.I. G3	D.I. G4	133, 132A, 135	5.94	4.26	100	4.33+(354 / 6.1 / 60)=	5.30	10	8.07	34.4	2~24	0.60	1.52	6.8	EACH PIPE TO HANDLE ½ Q
G4	D.I. G4	D.I. G5	133, 132A, 135, 132	13.95	8.10	98	5.30+(100 / 6.8 / 60)=	5.55	15	6.71	54.4	2~30	0.65	1.70	7.6	EACH PIPE TO HANDLE ½ Q
G10	D.I. G10	M.H. G11	131	1.33	0.81	175	* 500 / 2.0 / 60 =	4.17	10	8.07	6.5	24	0.25	1.06	4.0	
G11	M.H. G11	M.H. G12	131	1.33	0.81	175	4.17+(175 / 4.0 / 60(=	4.90	10	8.07	6.5	24	0.25	1.06	4.0	
G12	M.H. G12	D.I. G13	131	1.33	0.81	150	4.90+(175 / 4.0 / 60)=	5.63	10	8.07	6.5	24	0.25	1.06	4.0	
G13	D.I. G13	D.I. G5	131, 134	2.22	1.35	200	5.63+(150 / 4.0 / 60)=	6.26	10	8.07	10.9	24	0.31	1.50	4.7	
G5	D.I. G5	OUTFALL	131, 132, 132A, 133, 134, 135, 136	18.23	11.04	72	15.0+(200 / 4.7 / 60)=	15.71	15.7	6.56	72.4	5'x 3'	0.23	2.20	6.6	
							SYSTEM 'H'									
H1	D.I. H1	OUTFALL	115	4.09	1.96	125	* 1350/(3.0X60)=7.5	7.50	10	8.07	15.8	30	0.41	1.40	5.8	@ CRITICAL SLOPE, OUTFALL DITCH
H4	D.I. H4	OUTFALL	116	14.14	7.78	600	* 2350 / (2.3 X 60)=	17.0	17.0	6.3	49.0	36	0.55	2.37	8.1	OUTFALL @ RIPRAP DITCH
H5	R.H.15 H5	C.I. H6	114, 115	14.43	7.96	251	**7.5+(125/5.8/60)+(1200/2.5/60)=	15.86	16.0	6.5	25.9 ⅔	36	0.63	1.50	7.5	ENTR CONTROL, OUTFALL DITCH
H6	C.I. H6	OUTFALL	114, 115, 119	15.67	9.06	220	15.86 +(251 / 7.5 / 60)=	16.42	17.0	6.3	32.1 ★	36	0.63	1.68	8.0	
H5A	R.H.15 H5A	OUTFALL	114, 115	14.43	7.96	470	**7.5+(125/5.8/60)/(1200/2.5/60)=	15.86	16.0	6.5	25.9 ⅔	36	0.63	1.50	7.5	ENTR CONTROL, OUTFALL DITCH
H7	C.I. H7	C.I. H7A	117	0.90	0.81	50	* 400/(3.0X60)=2.2	2.2	10	8.07	6.5	24	2.08	0.58	8.7	ENTRANCE CONTROL
H7A	C.I. H7A	OUTFALL	117, 118	2.15	1.94	298	* 450/(3.0X60)=2.5	2.5	10	8.07	15.7	24	0.87	1.20	8.0	OUTFALL DITCH
H8	R.H.15 H8	OUTFALL	114, 115, 117-120	20.3	11.73	594	***15.9=(470/7.5/60)+(320/5/60)=	18.0	18.0	6.11	71.9	48	0.40	2.60	8.3	@ CRITICAL DEPTH
H9	R.H.15 H9	M.H. H10	116, 122	16.69	9.54	38	18.24+(250/8/60)=	18.8	19.0	5.94	56.7	36	1.19	1.98	11.5	ENTRANCE CONTROL
H10	M.H. H10	OUTFALL	116, 122	16.69	9.54	130	18.8+38/(11.5X60)=	18.9	19.0	5.94	56.7	36	1.19	1.98	11.5	OUTFALL CREEK
							SYSTEM 'I'									
I1	D.I. I1	D.I I2	141	4.72	2.93	206	* 1000 / 2.0 / 60 =	8.33	10	8.07	23.6	30	0.50	1.68	6.7	
I2	D.I. I2	M.H. I3	141, 139	9.40	5.64	306	8.33+(206 / 6.7 / 60)=	8.84	10	8.07	45.5	36	0.60	2.10	8.8	
I3	M.H. I3	OUTFALL	141, 139	9.40	5.64	23	8.84+(306 / 8.88 / 60)=	9.42	10	8.07	45.5	36	0.60	2.10	8.8	
							SYSTEM 'M'									
M1	165'LT 10264+80	OUTFALL	142, 144, 145, 148, 151-153, 156, 157	38.52	20.88	146	24+50/(18.9X60)+350/(80X60) +880/(2X60)=32.1	32.1	32	4.40	91.9	7'x3'	0.43	1.54	8.5	HW=949.11 ALLOW.HW=951.79
M2	D.I. M2	OUTFALL	154, 149, 147, 143	7.63	4.60	90	**5.5+(107/4.3/60)+(720/2.0/60)=	11.90	12.0	7.46	34.3	2~24	0.70	1.46	7.0	EACH PIPE TO HANDLE ½ Q
							SYSTEM 'N'									
N1	C.I. N1	7'X3' S.B.C.	151	0.71	0.64	165	* 450/(3.1X60)=2.4	2.4	10	8.07	5.2	18	1.01	0.71	6.3	ENTRANCE CONTROL
N2	D.I. N2	7'X3' S.B.C.	148	0.71	0.38	104.5	* 250/(1.8X60)=2.3	2.3	10	8.07	3.1	18	0.24	0.80	3.3	
N3	D.I. N3	7'X3' S.B.C.	144	0.45	0.24	85.17	* 150/(1.8X60)=1.4	1.4	10	8.07	1.9	18	0.46	0.51	3.7	@ CRITICAL DEPTH
N4	C.I. N4	7'X3' S.B.C.	145	0.74	0.67	186	* 280/(2.0X60)=2.33	2.33	10	8.07	5.4	18	0.35	1.04	4.2	-

* OVERLAND FLOW

** DENOTES OVERLAND + PIPE + OVERLAND FLOW

*** DENOTES OVERLAND + PIPE + OVERLAND + PIPE + OVERLAND FLOW

⅔ ½ Q USED IN DESIGN

★ ½ Q FROM D.A. #114, 115 PLUS TOTAL Q FROM D.A. #119 USED IN DESIGN

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED PROFESSIONAL ENGINEER

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Gregory A. Biediger

STORM SEWER COMPUTATIONS

SHEET 2 OF 3 SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	CRP 90(191)M	257

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023,	LP 1604

ETC.

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LINE	FROM	TO	DRAINAGE AREA NO.	TOTAL D.A. AC.	TOTAL C.A	LENGTH FT.	TIME OF CONCENTRATION MINUTES: ALONG SEWER LINE	TIME OF CONCENTRATION MINUTES: INLET TIME	TIME OF CONCENTRATION MINUTES: USED IN DESIGN	I IN./HR.	Q C.F.S.	DESIGN: DIA. IN.	DESIGN: SLOPE %	DESIGN: DEPTH DU	DESIGN: VEL DU FT./SEC.	REMARKS
							SYSTEM 'O'									
O1	165'LT 10278+00	165'LT 10277+50	152, 153, 156, 157	30.95	16.22	50	20.0+440/(2.0X60)=23.7	23.7	24	5.22	84.7	7'x3'	5.30	0.64	18.9	HW=962.79 ALLOW. HW=964.00
O2	165'LT 10277+50	165'LT 10274+00	152, 153, 156, 157	30.95	16.22	350	20.0+440/(2.0X60)=23.7	23.7	24	5.22	84.7	7'x3'	0.38	1.52	8.0	EACH PIPE TO HANDLE 1/2Q
							SYSTEM 'P'									
P1	D.I. P1	C.I. P2	154	3.15	1.92	83	* 600/(2.0X60)=5.0	5.0	10	8.07	15.5	24	0.45	1.54	5.97	HW=962.8 ALLOW. HW=965.0
P2	C.I. P2	C.I. P3	149, 154	3.65	2.37	109	5.0+83/(5.97X60)=5.2	5.2	10	8.07	19.1	30	0.45	1.48	6.25	@ CRITICAL DEPTH
P3	C.I. P3	170'RT 10274+00	147, 149, 154	4.25	2.91	107	5.2+109/(6.25X60)=5.5	5.5	10	8.07	23.5	2 ea 30	0.20	1.40	4.3	EACH PIPE TO HANDLE 1/2Q
							SYSTEM 'Q'									
Q1	D.I. Q1	297'RT 10273+25	146	0.64	0.28	42	* 250/(1.8X60)=2.3	2.3	10	8.07	2.3	18	0.50	0.55	3.9	@ CRITICAL DEPTH
							SYSTEM 'R'									
R1	@ BANDERA RD	395+46	150	0.59	0.32	68	* 210/(1.8X60)=1.9	1.9	10	8.07	2.6	18	0.66	0.45	4.08	ENTRANCE CONTROL
R2	@ BANDERA RD	395+46	150, 155	14.88	7.89	202	* 1510/(1.4X60)=18.0	18.0	18	6.11	48.2	5'x2'	0.17	1.82	5.29	EXIST BOX TO BE EXTENDED
							SYSTEM 'S'									
S1	134'RT 10284+00	D.I. S2	156, 157	14.77	9.59	146.5	610/(2X60)+400/(4.3X60)+1580/(2X60) (OVERLAND) (PIPE) (OVERLAND)	19.8	19.8	5.81	55.7	2 ea 30	0.60	1.75	7.5	EA PIPE TO HANDLE 1/2Q
S2	D.I. S2	156'LT 10282+37	153, 156, 157	20.26	11.51	171	19.8+146.5/(7.5X60)=20.1	20.1	20	5.78	66.5	2 ea 36	0.70	1.65	8.4	EA PIPE TO HANDLE 1/2Q
							SYSTEM 'U'									
U1	℄ 300+00	℄ 304+00	157	59	4.21	400	* 600/(2.5X60)=4.0	4.0	10	8.07	34.0	3 ea 24	0.25	1.60	4.3	EA PIPE TO HANDLE 1/3 Q
							SYSTEM 'V'									
V1	190'RT 10310+25	D.I. V2	159	15.00	7.50	89.25	* 1800/(2.7X60)=11.1	11.1	11.1	7.71	57.8	30	5.60	1.35	21.0	ENTRANCE CONTROL, HW=1025.73 ALLOW. HW=1026.10
V2	D.I. V2	D.I. V3	159, 161	18.71	9.54	93.25	11.1+89.25/(21.0X60)=11.17	11.17	11.2	7.68	73.3	30	4.06	1.75	19.0	
V3	D.I. V3	D.I. V4	159-161	20.04	10.13	128.75	11.2+93.25/(19.0X60)=11.28	11.28	11.3	7.66	77.6	42	0.55	2.84	9.1	
V4	D.I. V4	200'LT 10310+25	158-162	26.18	13.90	63.75	11.3+128.75/(9.1X60)=11.5	11.5	11.5	7.58	105.4	48	0.55	3.04	10.2	
							SYSTEM 'W'									
W1	℄ 10324+60	℄ 10327+10	163	1.13	0.52	250	* 700/(2.0X60)=5.8	5.8	10	8.07	4.2	18"CGM	2.00	0.78	4.6	HW=1021.86 ALLOW. HW=1023.0
							SYSTEM 'X'									
X1	100'RT 10336+00	100'RT 10336+70	163, 164	9.51	4.79	70	* 1800/(2.0X60)=15.0	15	15	6.71	32.1	2 ea 30"CGM	2.40	1.20	6.5	HW=987.0 ALLOW. HW=991.0 EA PIPE TO HANDLE 1/2Q
							SYSTEM 'Y'									
Y1	110'LT 10320+00	110'LT 10319+50	162	0.73	0.40	50	* 325/(2.0X60)=2.71	2.71	10	8.07	3.2	18"CGM	0.60	0.96	2.7	HW=1023.02 ALLOW. HW=1023.06

* OVERLAND FLOW

** DENOTES OVERLAND + PIPE + OVERLAND FLOW

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Gregory A. Biediger, P.E. 61429, on Mar 26, 1993

Gregory A. Biediger

STORM SEWER COMPUTATIONS

SHEET 3 OF 3 SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	CRP 90(191)M		258
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023,	LP 1604

ETC

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CURB INLETS

Inlet ID	Inlet Location	D.A. No	Q cfs	CO cfs	Qa cfs	z	z/n	s ft/ft	y ft	P ft	a ft	qL cfs	Lr Curb ft	La ft	La/Lr	a/y	Q1/Qa Curb	Q1 cfs	Q1-Qa cfs	Carry-over to:	Remarks
D-1	EB TAR @ KYLE SEALE	106	4.1	-	4.1	50	3333	SAG	0.21	* 10.5	0.25	1.10	3.7	10	2.7	-	-	-	-		2:1 SAFETY FACTOR (+/-)
D-2	1+50 RT KYLE SEALE	107	6.2	-	6.2	50	3333	SAG	0.23	* 11.5	0.25	1.10	5.6	10	1.79	-	-	-	-		2:1 SAFETY FACTOR (+/-)
D-3	1+50 LT KYLE SEALE	108	5.3	-	5.3	50	3333	SAG	0.22	* 10.8	0.25	1.10	4.8	10	2.1	-	-	-	-		2:1 SAFETY FACTOR (+/-)
D-4	WB TAR @ KYLE SEALE	109	3.9	-	3.9	50	3333	.0092	0.24	12.0	0.25	0.40	9.75	10	1.02	1.04	1.0	3.9	-		
E-1	8+84 RT KYLE SEALE	111	9.8	-	9.8	33.3	2222	.0213	0.36	12.0	0.25	0.51	19.2	20	1.04	0.69	1.0	9.8	-		OUTSIDE R.O.W.
E-2	8+80 LT KYLE SEALE	112	7.1	-	7.1	33.3	2222	.0213	0.32	10.6	0.25	0.48	14.8	20	1.34	0.78	1.0	7.1	-		OUTSIDE R.O.W.
E-3	6+20 RT KYLE SEALE	110	2.7	-	2.7	50	3333	.02	0.19	9.6	0.25	0.36	7.5	10	1.33	1.32	1.0	2.7	-		OUTSIDE R.O.W.
E-4	6+05 LT KYLE SEALE	113	1.5	-	1.5	50	3333	.02	0.16	8.0	0.25	0.34	4.4	10	2.27	1.56	1.0	1.5	-		OUTSIDE R.O.W.
H-6	43.83'LT 98+27 HAUSMAN	119	9.0	-	9.0	50	3333	SAG	0.27	13.5	0.25	1.10	8.2	20	2.44	-	-	-	-		2:1 SAFETY FACTOR (+/-)
H-7	93.83'RT 98+13 HAUSMAN	117	6.5	-	6.5	50	3333	SAG	0.24	12.0	0.25	1.10	5.9	10	1.70	-	-	-	-		2:1 SAFETY FACTOR (+/-)
H-7A	43.83'RT 98+13 HAUSMAN	118	9.1	-	9.1	50	3333	SAG	0.27	13.5	0.25	1.10	8.3	20	2.41	-	-	-	-		2:1 SAFETY FACTOR (+/-)
N-1	161.5'LT 10276+50	151	5.2	-	5.2	50	3333	SAG	0.28	* 14.0	0.17	1.10	4.8	10	2.08	-	-	-	-		2:1 SAFETY FACTOR (+/-)
N-4	EB TAR @ SH 16	145	5.4	-	5.4	50	3333	SAG	0.28	* 14.0	0.17	1.10	4.9	10	2.04	-	-	-	-		2:1 SAFETY FACTOR (+/-)
P-2	392+86 LT SH 16	147	4.4	-	4.4	40	2667	.0025	0.33	13.2	0.25	0.48	9.2	10	1.09	0.76	1.0	4.4	-		
P-3	392+78 RT SH 16	149	3.6	-	3.6	33.3	2222	.0012	0.38	12.7	0.25	0.53	6.8	10	1.47	0.66	1.0	3.6	-		

* PONDING WIDTH IN APPROACH GUTTER IS GREATER THAN PONDING WIDTH AT SAG.
PONDING WIDTH USED FOR DESIGN IS THAT OF APROACH GUTTER.

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Carol Greiner Luschen, P.E. 69459, on Jan 31, 1992

Carol G. Luschen

INLET CALCULATIONS

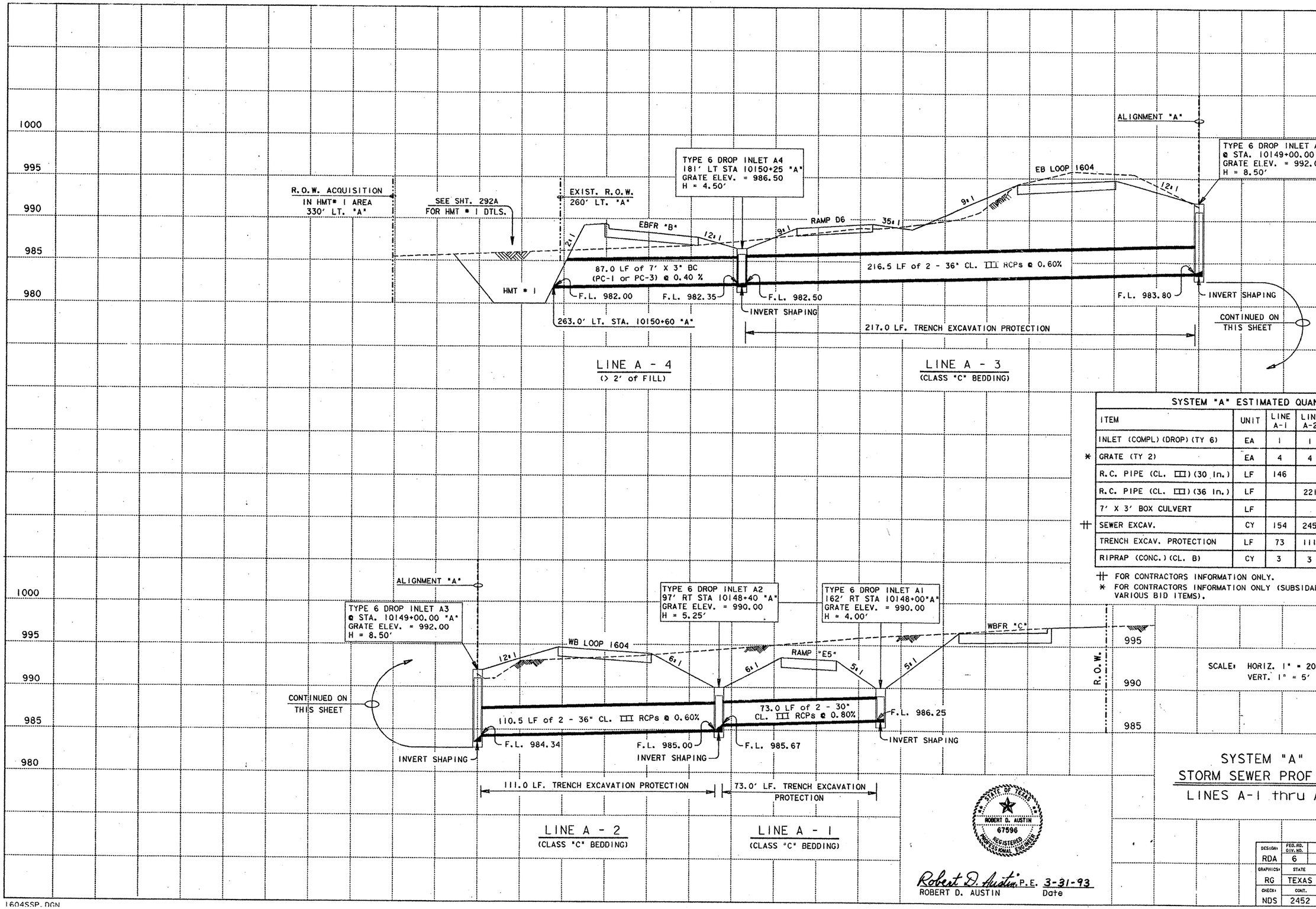
SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		259

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023,	LP 1604

151p2e1 1604grs.dgn



SYSTEM "A" ESTIMATED QUANTITIES							
	ITEM	UNIT	LINE A-1	LINE A-2	LINE A-3	LINE A-4	SHEET TOTALS
	INLET (COMPL) (DROP) (TY 6)	EA	1	1	1	1	4
*	GRATE (TY 2)	EA	4	4	4	4	16
	R.C. PIPE (CL. III) (30 In.)	LF	146				146
	R.C. PIPE (CL. III) (36 In.)	LF		221	433		654
	7' X 3' BOX CULVERT	LF				87	87
#	SEWER EXCAV.	CY	154	245	625	201	1225
	TRENCH EXCAV. PROTECTION	LF	73	111	217		401
	RIPRAP (CONC.) (CL. B)	CY	3	3	3	3	12

FOR CONTRACTORS INFORMATION ONLY.
* FOR CONTRACTORS INFORMATION ONLY (SUBSIDARY TO THE VARIOUS BID ITEMS).

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

SYSTEM "A"
STORM SEWER PROFILES
LINES A-1 thru A-4

STATE OF TEXAS
ROBERT D. AUSTIN
67596
REGISTERED PROFESSIONAL ENGINEER

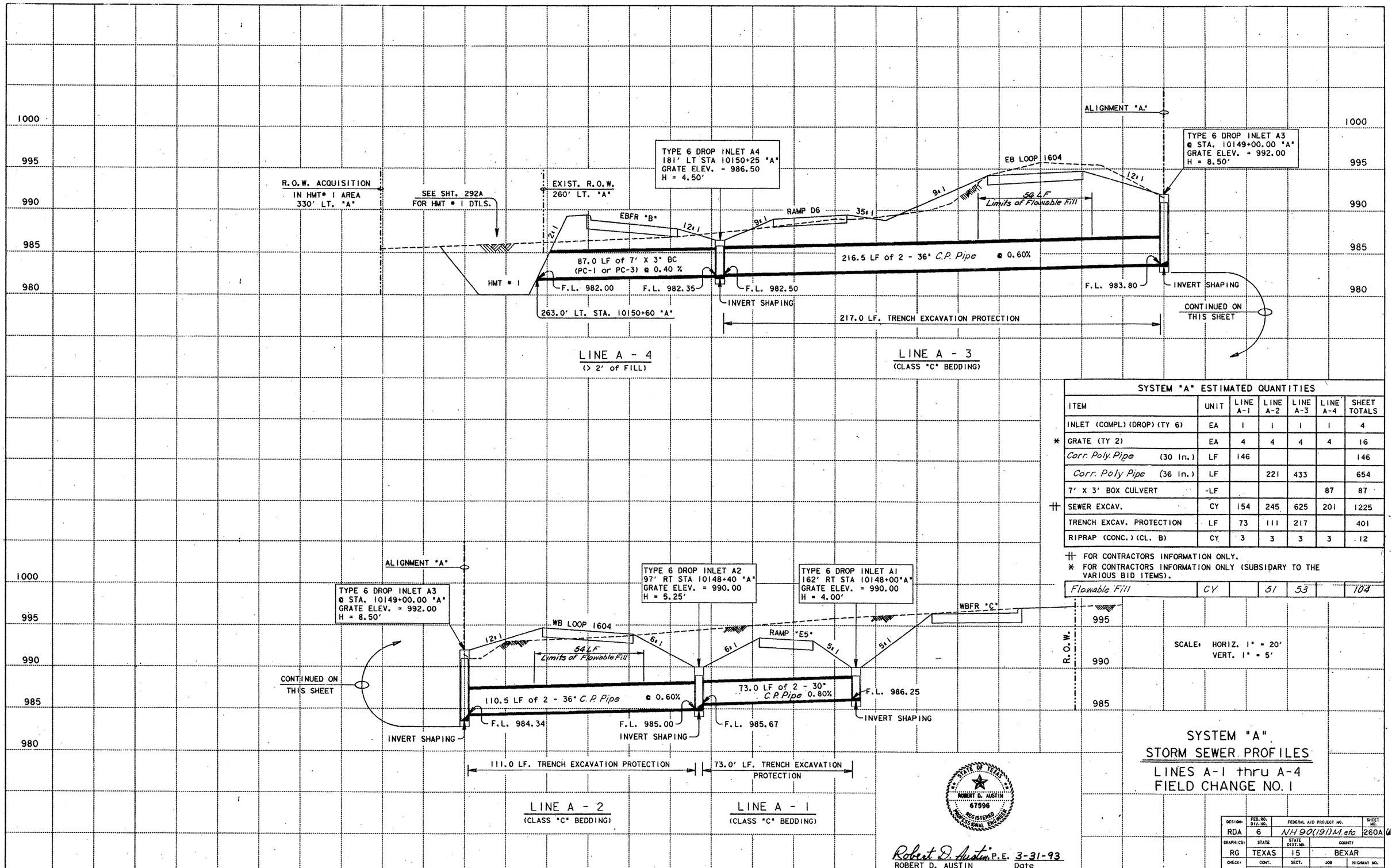
Robert D. Austin P.E. 3-31-93
ROBERT D. AUSTIN Date

DESIGN:	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	SHEET NO.
RDA	6		260A

GRAPHICS:	STATE	STATE DIST.NO.	COUNTY
RG	TEXAS	15	BEXAR

CHECK:	CONT.	SECT.	JOB	HIGHWAY NO.
NDS	2452	02	023 ETC	LP 1604

1604SSP.DGN



SYSTEM "A" ESTIMATED QUANTITIES

	ITEM	UNIT	LINE A-1	LINE A-2	LINE A-3	LINE A-4	SHEET TOTALS
	INLET (COMPL) (DROP) (TY 6)	EA	1	1	1	1	4
*	GRATE (TY 2)	EA	4	4	4	4	16
	Corr. Poly. Pipe (30 In.)	LF	146				146
	Corr. Poly Pipe (36 In.)	LF		221	433		654
	7' X 3' BOX CULVERT	-LF				87	87
‡	SEWER EXCAV.	CY	154	245	625	201	1225
	TRENCH EXCAV. PROTECTION	LF	73	111	217		401
	RIPRAP (CONC.) (CL. B)	CY	3	3	3	3	12
	Flowable Fill	CY		51	53		104

‡ FOR CONTRACTORS INFORMATION ONLY.

* FOR CONTRACTORS INFORMATION ONLY (SUBSIDARY TO THE VARIOUS BID ITEMS).

STATE OF TEXAS
ROBERT D. AUSTIN
67596
REGISTERED
PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
ROBERT D. AUSTIN Date

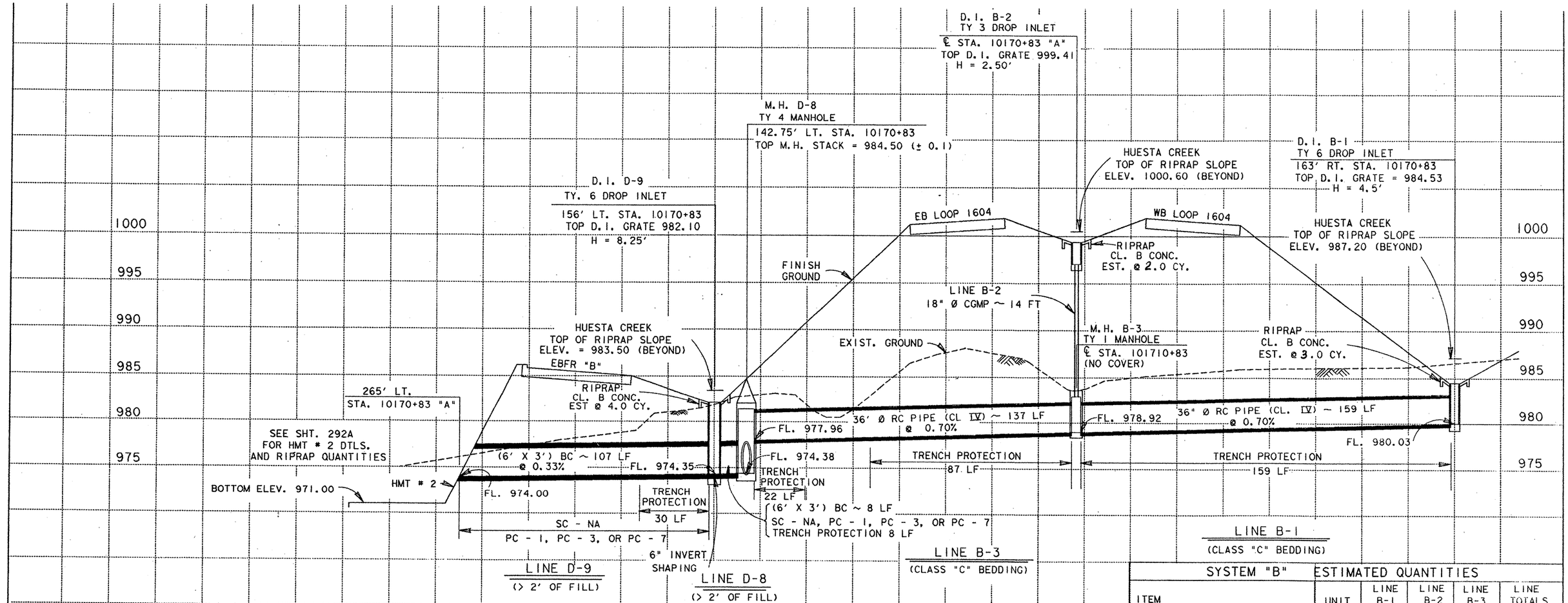
SYSTEM "A"
STORM SEWER PROFILES
LINES A-1 thru A-4
FIELD CHANGE NO. 1

DESIGN:	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
RDA	6	NH 90(191)M etc	260A

GRAPHICS:	STATE	STATE DIST. NO.	COUNTY
RG	TEXAS	15	BEXAR

CHECK:	CONT.	SECT.	JOB	HIGHWAY NO.
NDS	2452	02	023 ETC	LP 1604

1604SSP.DGN



(PART) SYSTEM "D" ESTIMATED QUANTITIES					
ITEM	UNIT	LINE D-8	LINE D-9		SHEET TOTALS
INLET (COMPL) (DROP) (TY 6)	EA	-	1		1
* GRATE (TY 2)	EA	-	4		4
MANHOLE (COMPL) (TY 4)	EA	1	-		1
* RING & COVER (24")	EA	1	-		1
6' X 3' BOX CULV.	LF	8	107		115
++ SEWER EXCAV.	CY	21	179		200
TRENCH EXCAV. PROTEC.	LF	8	30		38
RIPRAP (CONC.) (CL. B)	CY	-	4		4

SYSTEM "B" ESTIMATED QUANTITIES					
ITEM	UNIT	LINE B-1	LINE B-2	LINE B-3	LINE TOTALS
INLET (COMPL) (DROP) (TY 6)	EA	1	-	-	1
INLET (COMPL) (DROP) (TY 3)	EA	-	1	-	1
* GRATE (TY 2)	EA	4	1	-	5
MANHOLE (COMPL) (TY 1)	EA	-	-	1	1
R.C. PIPE (CL. IV) (36 IN)	LF	159	-	137	296
CGMP (18 IN)	LF	-	14	-	14
++ SEWER EXCAV.	CY	220	-	190	410
TRENCH EXCAV. PROTEC.	LF	159	-	109	268
RIPRAP (CONC.) (CL. B)	CY	3	2	-	5

++ FOR CONTRACTORS INFORMATION ONLY.
* FOR CONTRACTORS INFORMATION ONLY (SUBSIDARY TO THE VARIOUS BID ITEMS.)

STATE OF TEXAS
ROBERT D. AUSTIN
67596
REGISTERED PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
ROBERT D. AUSTIN Date

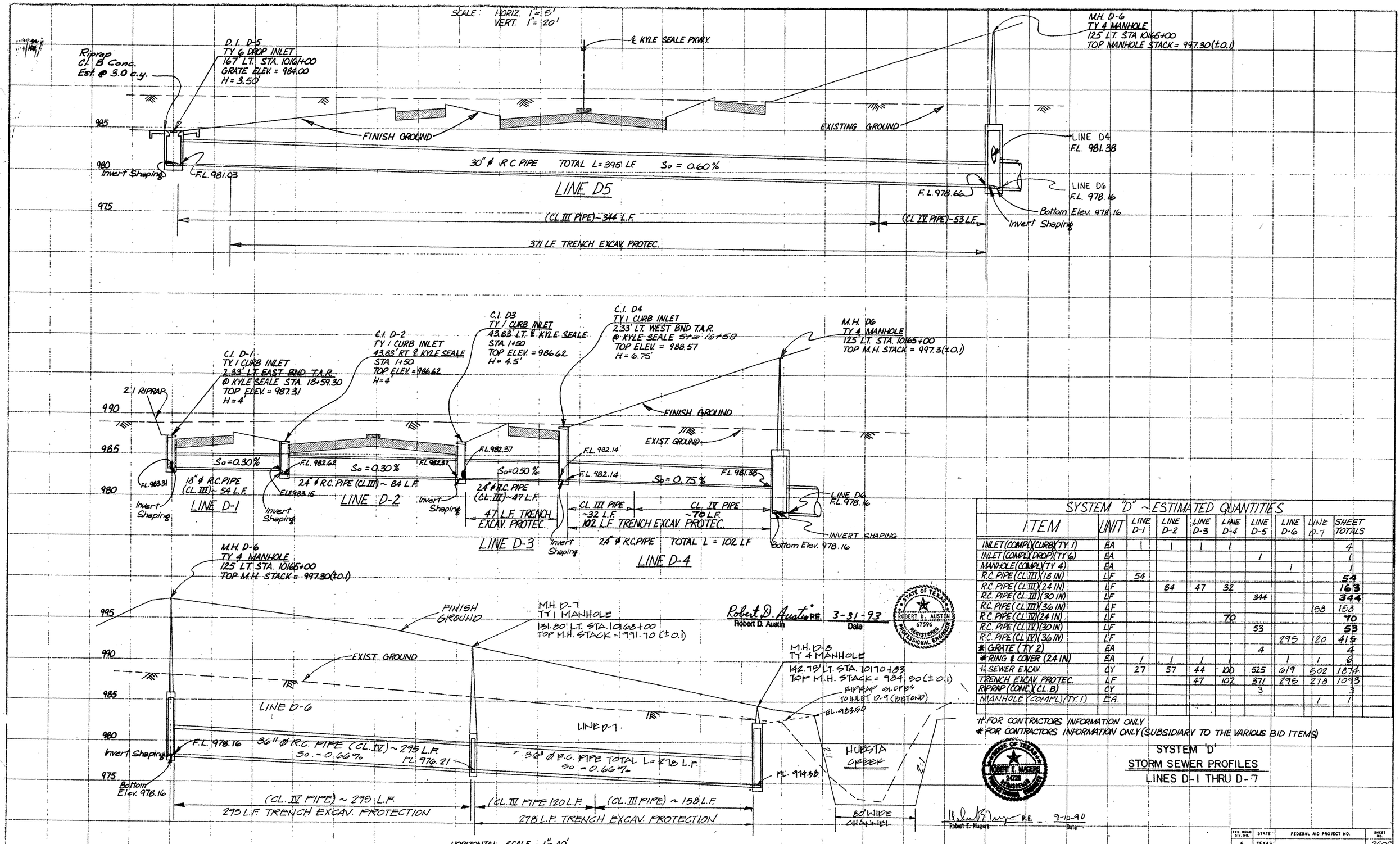
SYSTEM "B" STORM SEWER PROFILES

LINES B-1 thru B-3 & D-8 thru D-9

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		260B

STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP 1604



Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

STATE OF TEXAS
ROBERT D. AUSTIN
67596
REGISTERED PROFESSIONAL ENGINEER

SYSTEM "D" ~ ESTIMATED QUANTITIES

ITEM	UNIT	LINE D-1	LINE D-2	LINE D-3	LINE D-4	LINE D-5	LINE D-6	LINE D-7	SHEET TOTALS
INLET (COMPL) (CURB) (TY 1)	EA	1	1	1	1				4
INLET (COMPL) (DROP) (TY 6)	EA					1			1
MANHOLE (COMPL) (TY 4)	EA						1		1
R.C. PIPE (CL III) (18 IN)	LF	54							54
R.C. PIPE (CL III) (24 IN)	LF		84	47	32				163
R.C. PIPE (CL III) (30 IN)	LF					344			344
R.C. PIPE (CL III) (36 IN)	LF							158	158
R.C. PIPE (CL IV) (24 IN)	LF				70				70
R.C. PIPE (CL IV) (30 IN)	LF					53			53
R.C. PIPE (CL IV) (36 IN)	LF						295	120	415
* GRATE (TY 2)	EA					4			4
* RING & COVER (24 IN)	EA	1	1	1	1		1	1	6
# SEWER EXCAV.	CY	27	57	44	100	525	619	502	1874
TRENCH EXCAV. PROTEC.	LF			47	102	371	295	278	1093
RIPRAP (CONC.) (CL. B)	CY					3			3
MANHOLE (COMPL) (TY. 1)	EA.							1	1

FOR CONTRACTORS INFORMATION ONLY
* FOR CONTRACTORS INFORMATION ONLY (SUBSIDIARY TO THE VARIOUS BID ITEMS)

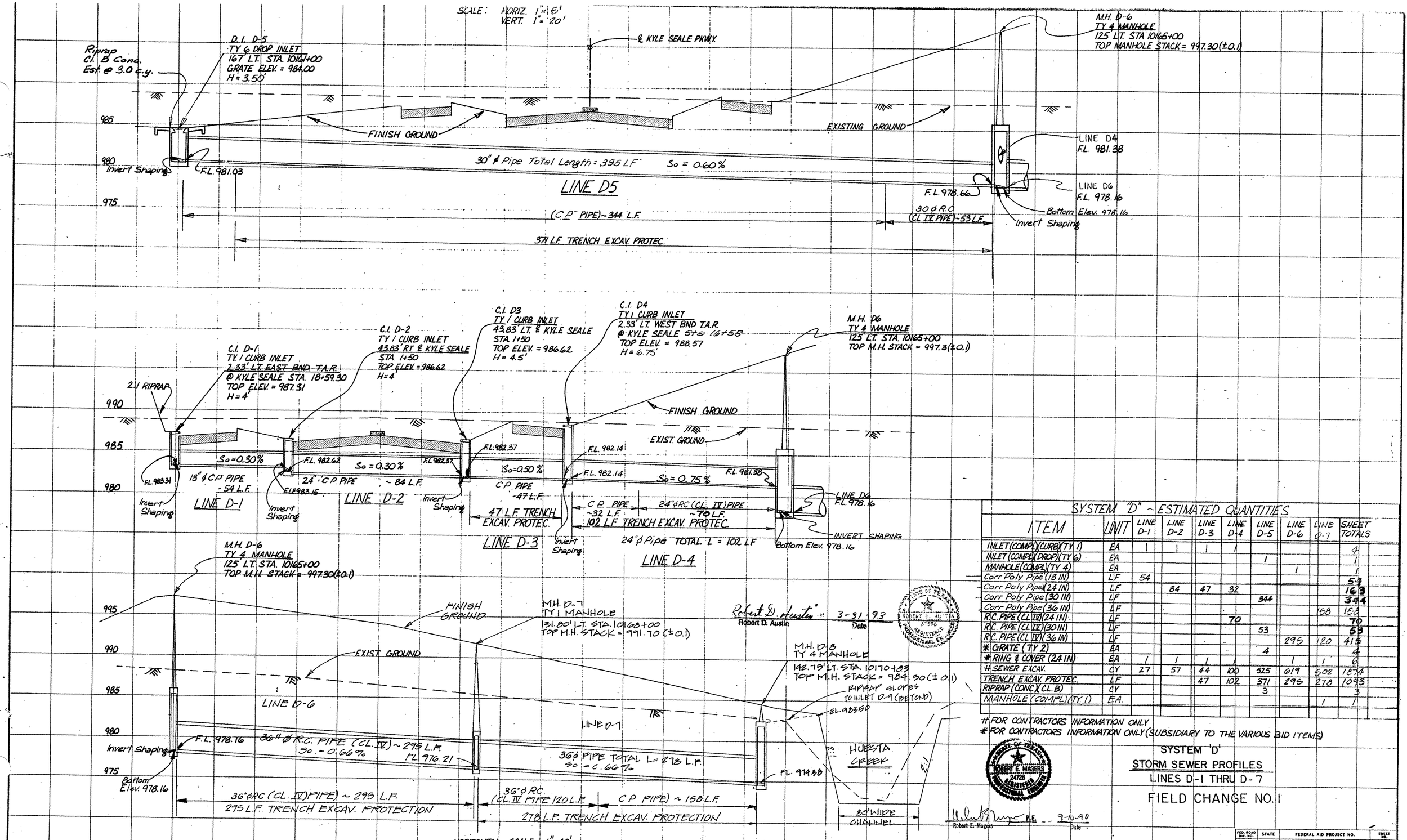
STATE OF TEXAS
ROBERT E. MAGERS
24028
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

SYSTEM 'D'
STORM SEWER PROFILES
LINES D-1 THRU D-7

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				2600
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	Vp/604

C-1570 CROSS SECTION SHEET



Robert D. Austin 3-31-93
Robert D. Austin Date

STATE OF TEXAS ROBERT D. AUSTIN 2556 REGISTERED PROFESSIONAL ENGINEER

SYSTEM "D" ~ ESTIMATED QUANTITIES

ITEM	UNIT	LINE D-1	LINE D-2	LINE D-3	LINE D-4	LINE D-5	LINE D-6	LINE D-7	SHEET TOTALS
INLET (COMPL) (CURB) (TY 1)	EA	1	1	1	1				4
INLET (COMPL) (DROP) (TY 6)	EA					1			1
MANHOLE (COMPL) (TY 4)	EA						1		1
Corr Poly Pipe (18 IN)	LF	54							54
Corr Poly Pipe (24 IN)	LF		84	47	32				163
Corr Poly Pipe (30 IN)	LF					344			344
Corr Poly Pipe (36 IN)	LF							158	158
R.C. PIPE (CL IV) (24 IN)	LF				70				70
R.C. PIPE (CL IV) (30 IN)	LF					53			53
R.C. PIPE (CL IV) (36 IN)	LF						295	120	415
* GRATE (TY 2)	EA					4			4
* RING & COVER (24 IN)	EA	1	1	1	1		1	1	6
# SEWER EXCAV.	CY	27	57	44	100	525	619	502	1874
TRENCH EXCAV. PROTEC.	LF			47	102	371	295	278	1093
RIPRAP (CONC) (CL. B)	CY					3			3
MANHOLE (COMPL) (TY. 1)	EA.							1	1

FOR CONTRACTORS INFORMATION ONLY
* FOR CONTRACTORS INFORMATION ONLY (SUBSIDIARY TO THE VARIOUS BID ITEMS)

STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

SYSTEM 'D'
STORM SEWER PROFILES
LINES D-1 THRU D-7
FIELD CHANGE NO. 1

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS	NH 90(191) M, etc	260C (8
STATE DIST. NO.	COUNTY	CONTROL SECTION NO. / JOB NO. / HIGHWAY NO.	
15	BEXAR	0452 02 023, etc.	Vp 604

CULVERT CROSS SECTION SHEET

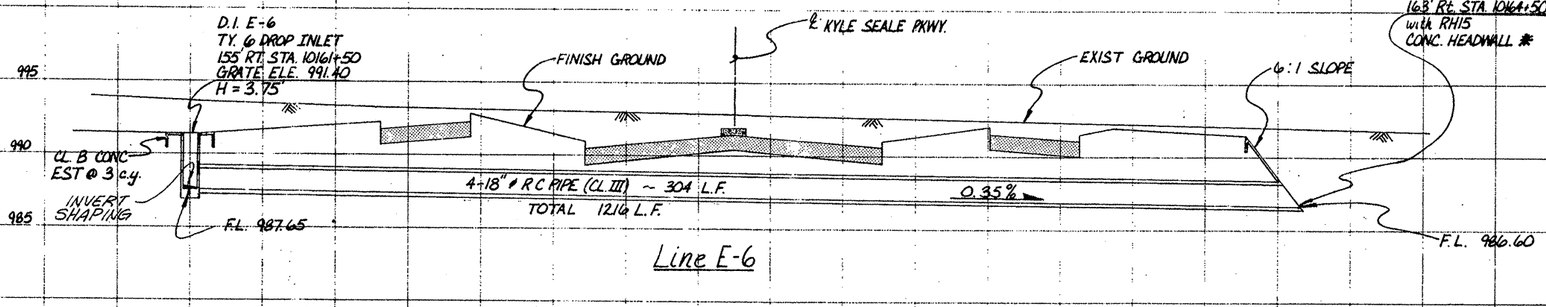
Scale: Horizontal 1 in = 20 ft.
Vertical 1 in = 5 ft.

Lines 'E' ~ ESTIMATED QUANTITIES

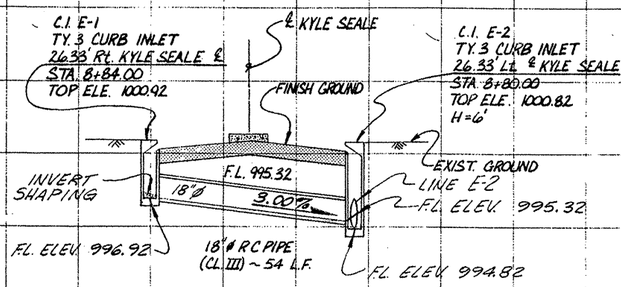
ITEM	UNIT	LINE E-1	LINE E-2	LINE E-3	LINE E-4		LINE E-6		SHEET TOTALS
# Sewer Excav.	CY	39	250	54	277		416		1036
Riprap (Conc)(CL. B)	CY						3		3
R C Pipe (CL. III)(18 in)	LF	54		83			1216		1353
R C Pipe (CL. III)(24 in)	LF		260						260
R C Pipe (CL. III)(30 in)	LF				198				198
Inlet (Compl)(Drop)(TY 6)	EA						1		1
Inlet (Compl)(Curb)(TY 1)	EA			1	1				2
Inlet (Compl)(Curb)(TY 3)	EA	1	1						2
# Grate (TY 2)	EA						4		4
# Ring & Cover (24)	EA	1	1	1	1				4
Trench Excav Protec.	LF		147		198				345

FOR CONTRACTOR'S INFORMATION ONLY (SUBSIDIARY TO VARIOUS BID ITEMS)

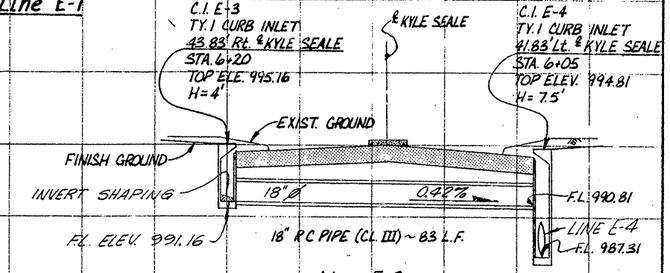
* FOR PAYMENT SEE Sht. 29



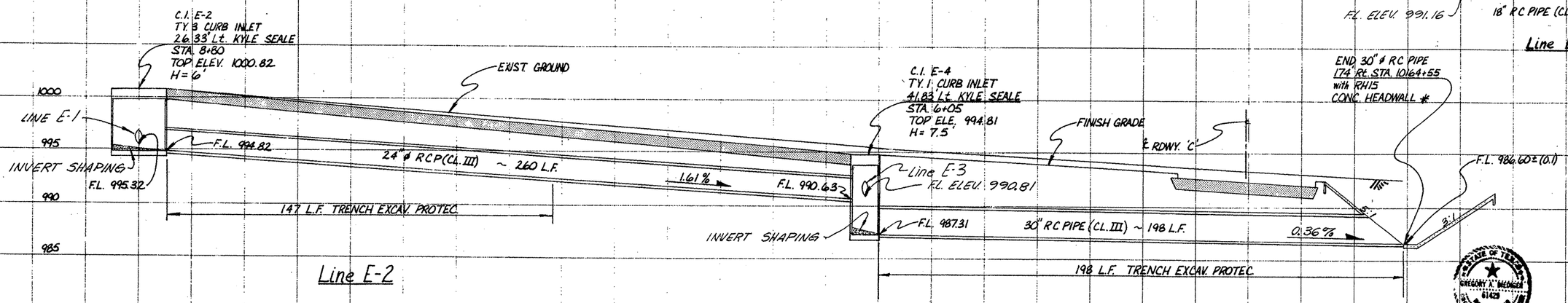
Line E-6



Line E-1



Line E-3



Line E-2

Line E-4

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

STATE OF TEXAS
GREGORY A. BLUNDELL
61429
REGISTERED
PROFESSIONAL ENGINEER

▽ Gregory A. Blundell P.E. Mar 26, 1993

▽ REVISED: ELIM. LINE E5

SYSTEM 'E'
STORM SEWER PROFILES
LINES E-1 thru E-6

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS		261

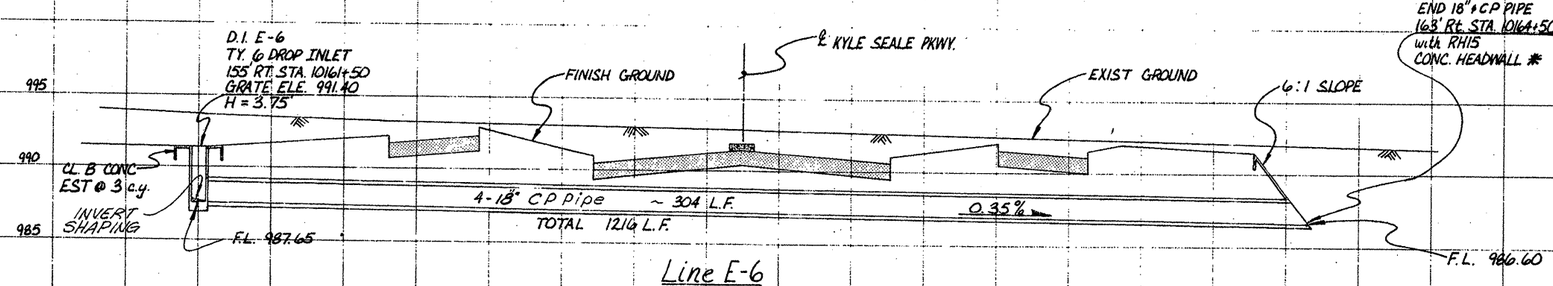
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023, etc.	Up 1604

Scale: Horizontal 1 in = 20 ft.
Vertical 1 in = 5 ft.

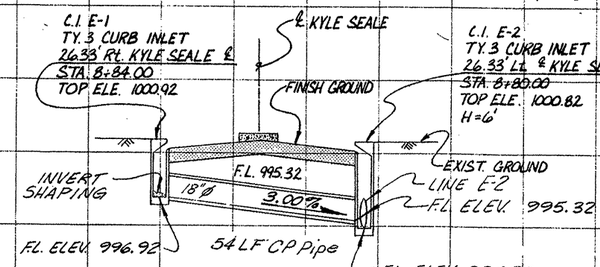
Lines "E" ~ ESTIMATED QUANTITIES

ITEM	UNIT	LINE E-1	LINE E-2	LINE E-3	LINE E-4		LINE E-6		SHEET TOTALS
# Sewer Excav.	CY	39	250	54	277		416		1036
Riprap (Conc)(CL. B)	CY						3		3
Corr Poly Pipe (18 in)	LF	54		83			1216		1353
Corr Poly Pipe (24 in)	LF		260						260
Corr Poly Pipe (30 in)	LF				198				198
Inlet (Compl)(Drop)(TY 6)	EA						1		1
Inlet (Compl)(Curb)(TY 1)	EA			1	1				2
Inlet (Compl)(Curb)(TY 3)	EA	1	1						2
# Grate (TY 2)	EA						4		4
# Ring & Cover (24)	EA	1	1	1	1				4
Trench Excav Protec.	LF		147		198				345

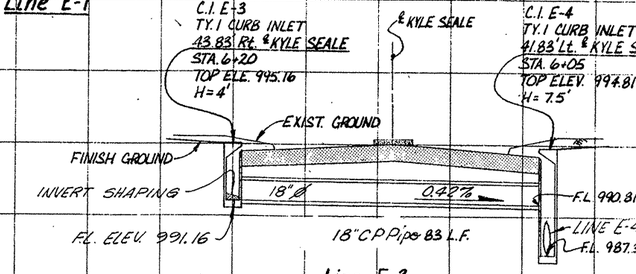
FOR CONTRACTOR'S INFORMATION ONLY (SUBSIDIARY TO VARIOUS BID ITEMS)
* FOR PAYMENT SEE Sht. 59



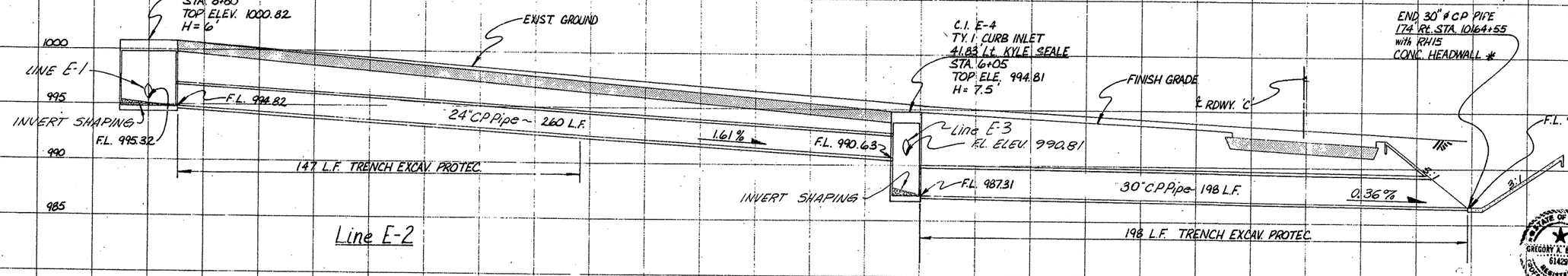
Line E-6



Line E-1



Line E-3



Line E-2

Line E-4

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Date

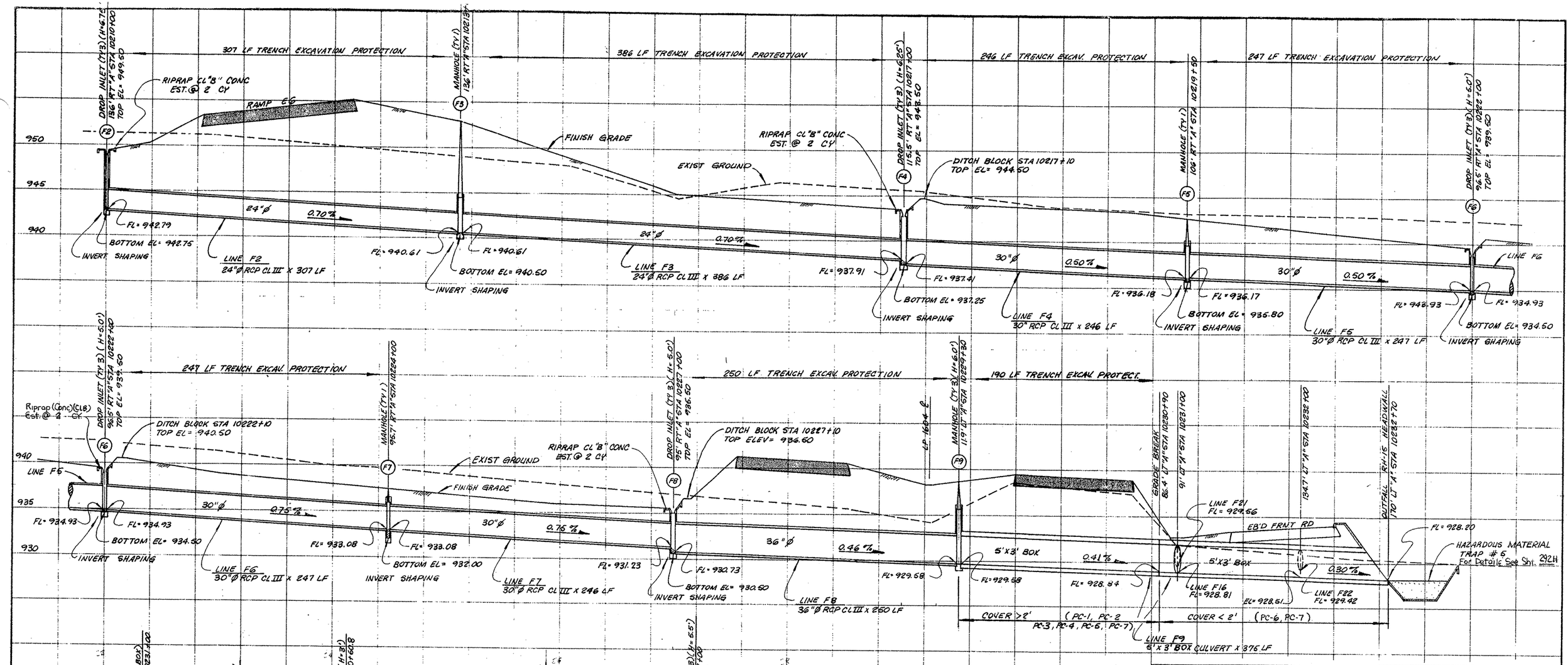
STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED
PROFESSIONAL ENGINEER

▽ [illegible] P.E. Nov 26, 1993

▽ REVISED: ELIM. LINE E5.

SYSTEM 'E'
STORM SEWER PROFILES
LINES E-1 thru E-6
FIELD CHANGE NO. 1

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS	NH90(191)M, etc.			261
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023, Vp, 104	



ESTIMATED QUANTITIES

ITEM	UNIT	LINE NO. F2	F3	F4	F5	F6	F7	F8	F9	F21	F22	F23	TOTAL
24"ø RCP CL III	LF	307	386							186	133	71	1083
30"ø RCP CL III	LF			246	247	247	246						986
36"ø RCP CL III	LF							250					250
5'x3' BOX CULVERT	LF								375				375
INLET (COMPL) DROP TY 3	EA	1		1		1		1		1	1		6
INLET (COMPL) DROP TY6	EA											1	1
MANHOLE (COMPL) TY1	EA		1		1		1						3
MANHOLE (COMPL) TY3	EA							1					1
GRATE TY2	EA	1		1		1		1		1	1	4	10
24" RING & COVER	EA		1		1		1		1				4
RIPRAP CL"B" CONC.	CY	2		2		2		2		2	2	3	15
TRENCH EXCAVATION PROTECTION	LF	307	386	246	247	247		250	190	91	80		2044
* SEWER EXCAVATION	CY	450	500	330	270	245	210	320	580	155	105	45	3210

* FOR CONTRACTOR'S INFORMATION ONLY.

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED
PROFESSIONAL ENGINEER

Gregory A. Biediger P.E.
Nov 26, 1993

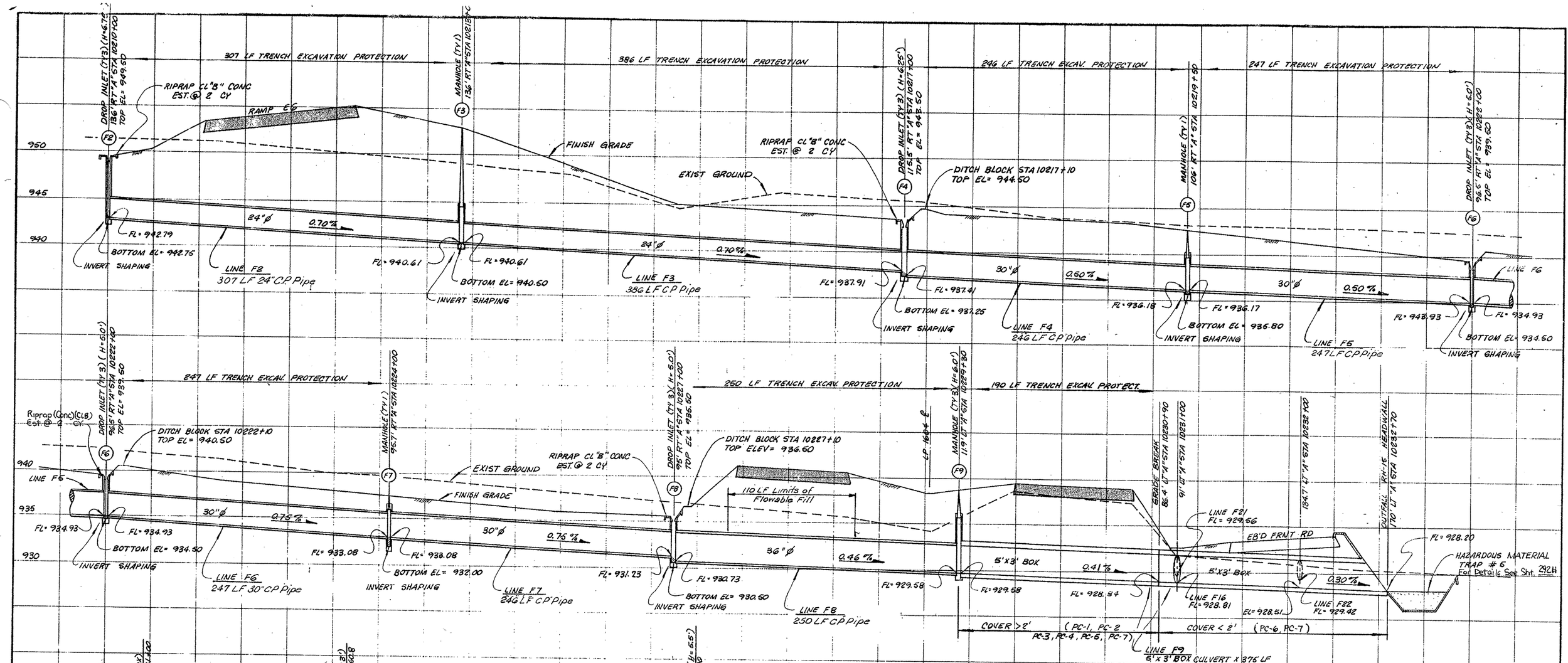
SYSTEM "F"
STORM SEWER SECTIONS

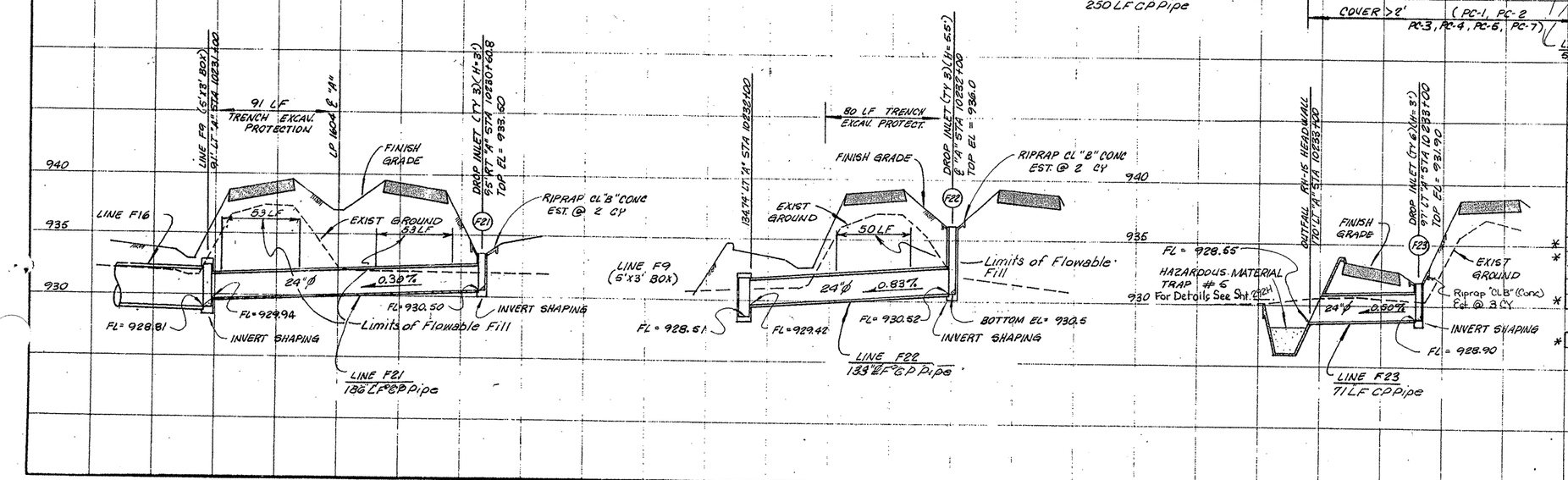
SHEET 1 OF 2

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					262
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.	
15	BEXAR	2452	02	023,	LP1604	

CULVERT CROSS SECTION SHEET

Etc.





ESTIMATED QUANTITIES

ITEM	UNIT	LINE NO. F2	F3	F4	F5	F6	F7	F8	F9	F21	F22	F23	TOTAL
24" Corr Poly Pipe	LF	307	386							186	133	71	1083
30" Corr Poly Pipe	LF			246	247	247	246						986
36" Corr Poly Pipe	LF							250					250
5'x3' BOX CULVERT	LF								375				375
INLET (COMPL) DROP TY 3	EA	1		1		1		1		1	1		6
INLET (COMPL) DROP TY6	EA											1	1
MANHOLE (COMPL) TY1	EA		1		1		1						3
MANHOLE (COMPL) TY3	EA								1				1
* GRATE TY2	EA	1	- 1			1		1		1	1	4	10
* 24" RING & COVER	EA		1		1				1				4
RIPRAP CL "B" CONC.	CY	2		2		2		2		2	2	3	15.
TRENCH EXCAVATION PROTECTION	LF	307	386	246	247	247		250	190	91	80		2044
* SEWER EXCAVATION	CY	450	500	330	270	245	210	320	580	155	105	45	3210
* FOR CONTRACTOR'S INFORMATION ONLY.													
* Flowable Backfill	CY							53		50	24		127

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED PROFESSIONAL ENGINEER

SYSTEM "F"
STORM SEWER SECTIONS

SHEET 1 OF 2

FIELD CHANGE NO. 1

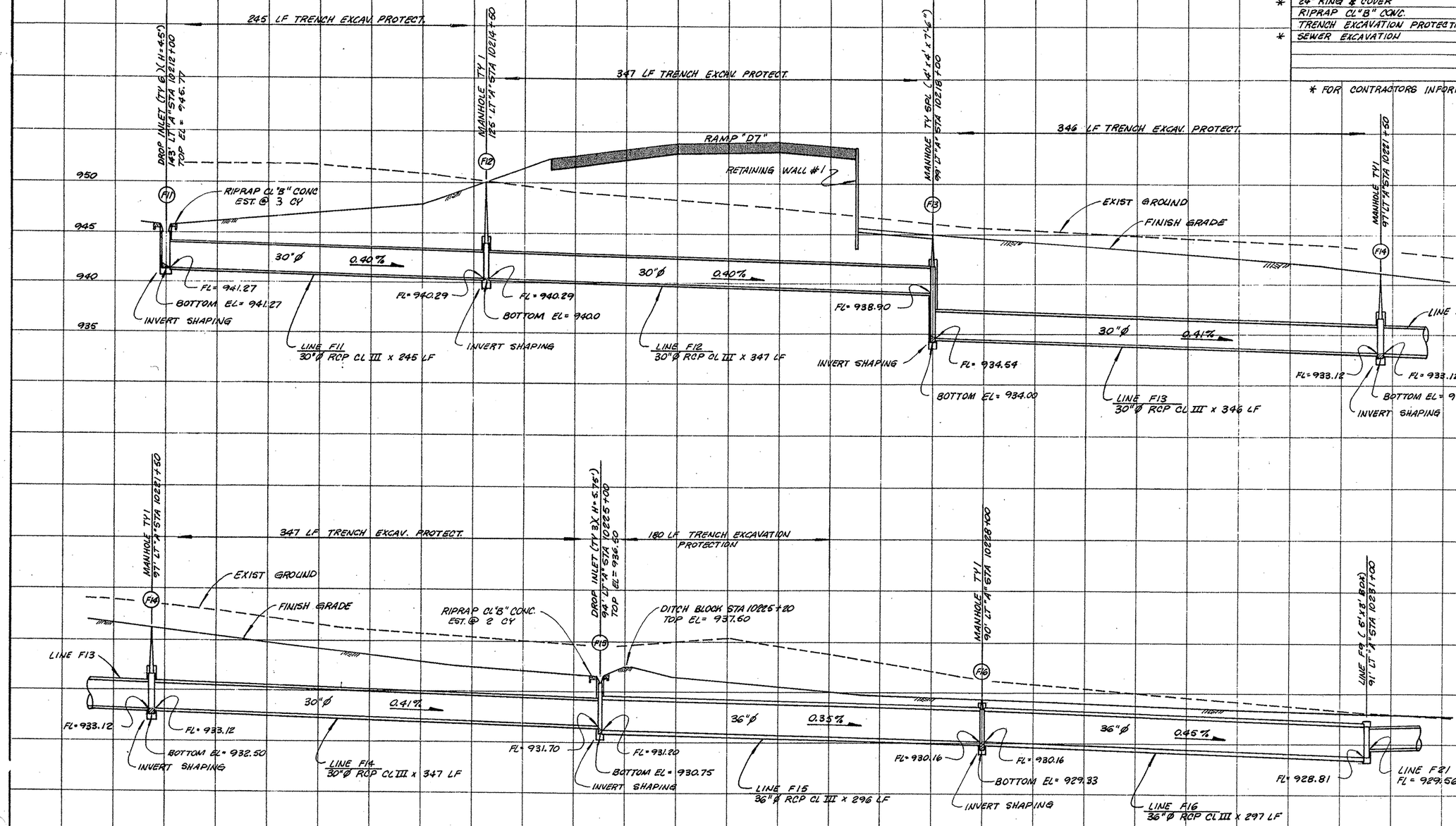
FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS	NH90(191)M, etc	262

STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2262	02	023	IH 10

ESTIMATED QUANTITIES

	ITEM	UNIT	LINE NO. F11	F12	F13	F14	F15	F16	TOTAL
	30"Ø RCP CL III	LF	245	347	346	347			1285
	36"Ø RCP CL III	LF					296	297	593
	INLET (COMPL) DROP TY 3	EA					1		1
	INLET (COMPL) DROP TY 6	EA	1						1
	MANHOLE (COMPL) TY 1	EA		1		1		1	3
	MANHOLE (COMPL) TY 6PL (4'x4'x25')	EA			1				1
*	GRATE TY 2	EA	4				1		5
*	24" RING & COVER	EA		1	1	1		1	4
	RIPRAP CL "B" CONC.	CY	3				2		5
	TRENCH EXCAVATION PROTECTION	LF	245	347	346	347	180		1465
*	SEWER EXCAVATION	CY	340	535	630	450	350	285	2590

* FOR CONTRACTORS INFORMATION ONLY.



STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED
PROFESSIONAL ENGINEER

Gregory A. Biediger P.E.
May 26, 1993

SYSTEM "F"
STORM SEWER SECTIONS

SHEET 2 OF 2

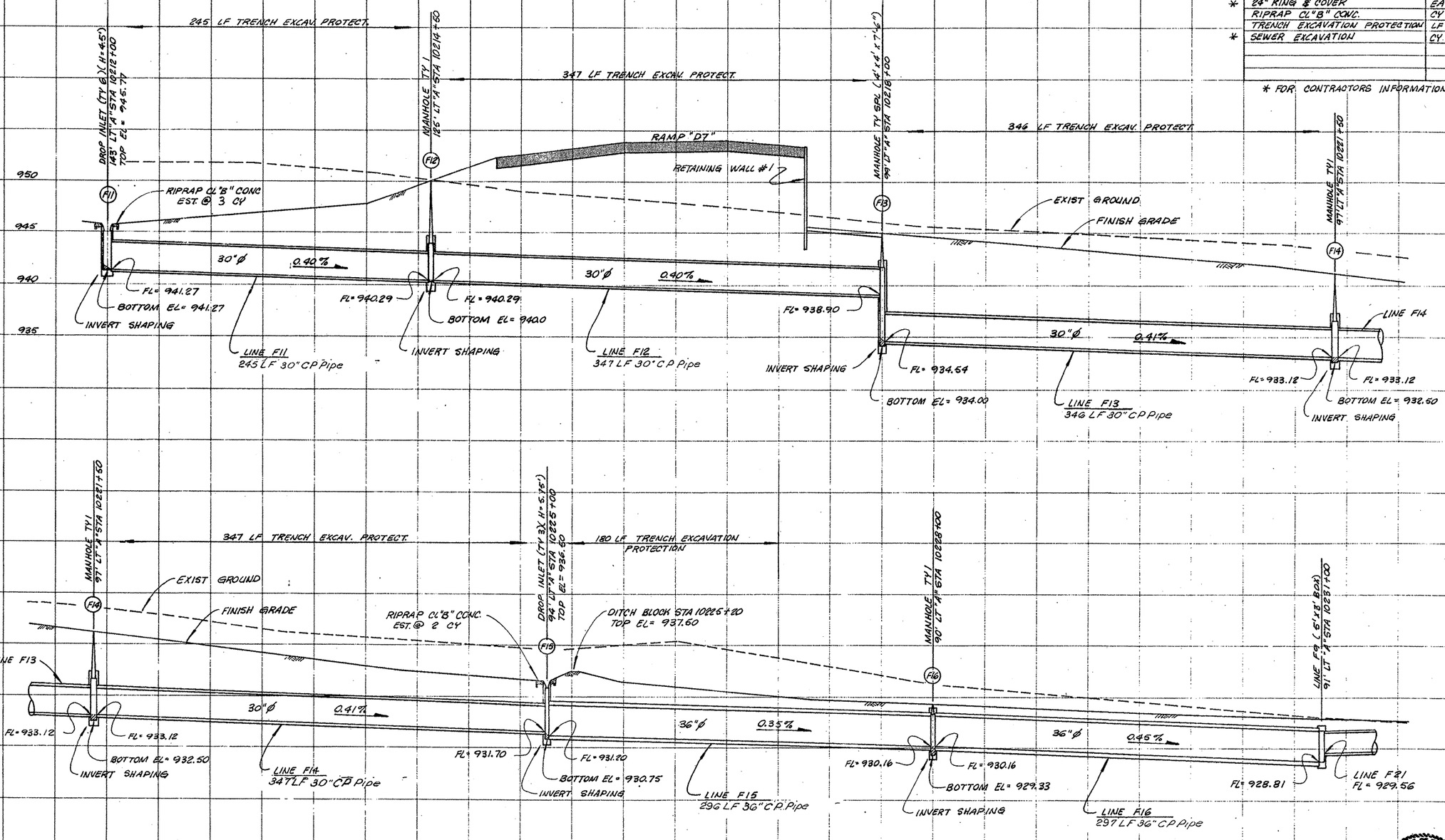
FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				263
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

CULVERT CROSS SECTION SHEET

ESTIMATED QUANTITIES

	ITEM	UNIT	LINE NO. F11	F12	F13	F14	F15	F16	TOTAL
	30" Corr Poly Pipe	LF	245	347	346	347			1285
	36" Corr Poly Pipe	LF					296	297	593
	INLET (COMPL) D. ° TY 3	EA					1		1
	INLET (COMPL) DROP TY 6	EA	1						1
	MANHOLE (COMPL) TY .	EA		1		1		1	3
	MANHOLE (COMPL) TY 6PL (4'x4'x25')	EA			1				1
*	GRATE TY 2	EA	4				1		5
*	24" RING & COVER	EA		1	1	1		1	4
	RIPRAP CL "B" CONC.	CY	3				2		5
	TRENCH EXCAVATION PROTECTION	LF	245	347	346	347	180		1465
*	SEWER EXCAVATION	CY	340	535	630	450	350	285	2590

* FOR CONTRACTORS INFORMATION ONLY.



STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED
PROFESSIONAL ENGINEER

FIELD CHANGE NO. 1

SYSTEM "F"

STORM SEWER SECTIONS

SHEET 2 OF 2

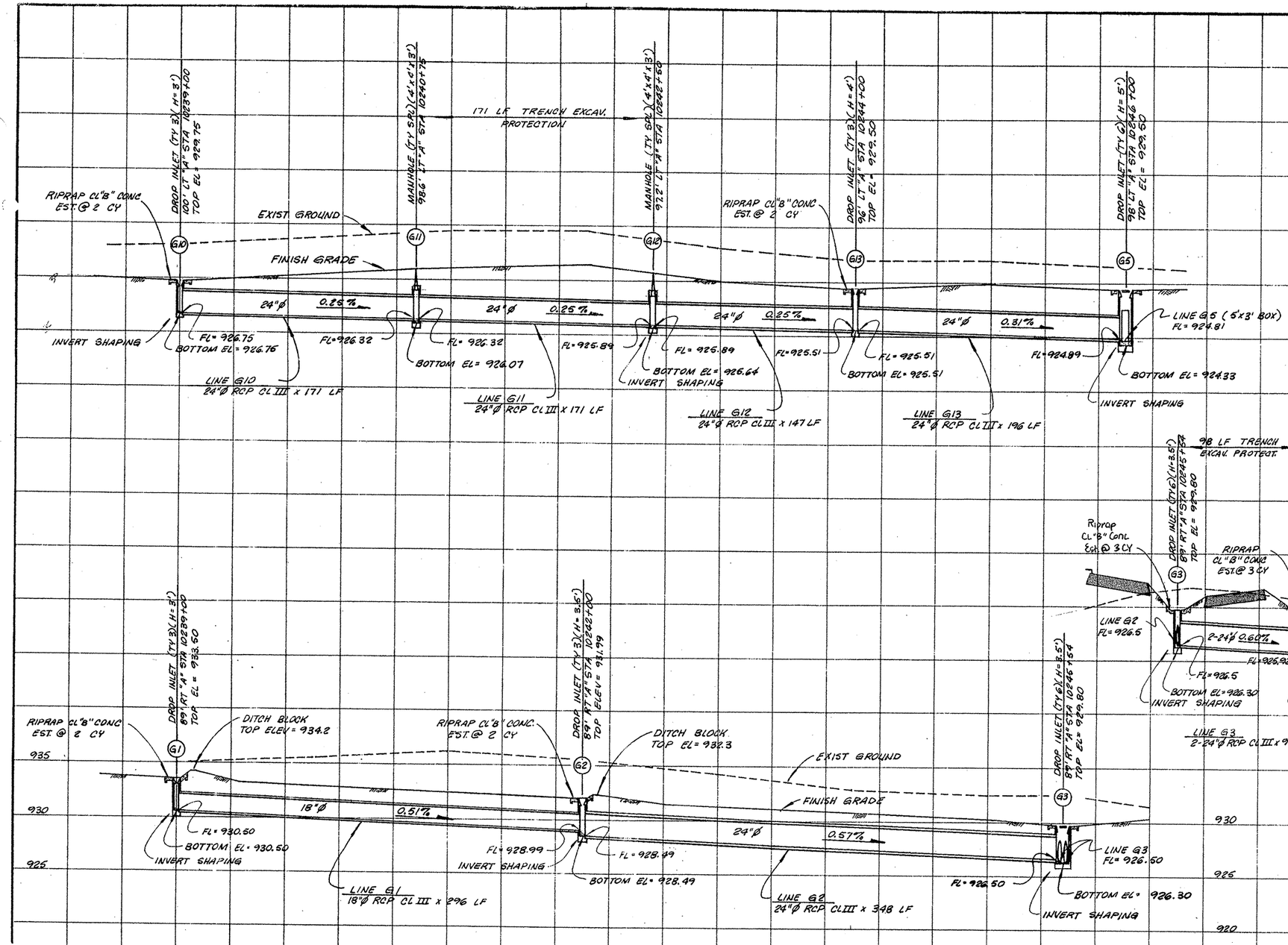
FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS	NH 90(191)M, etc	263
STATE DIST. NO.	COUNTY	CONTROL NO. / SECTION NO. / JOB NO.	HIGHWAY NO.
15	BEXAR	2452 / 02 / 023	LP1604

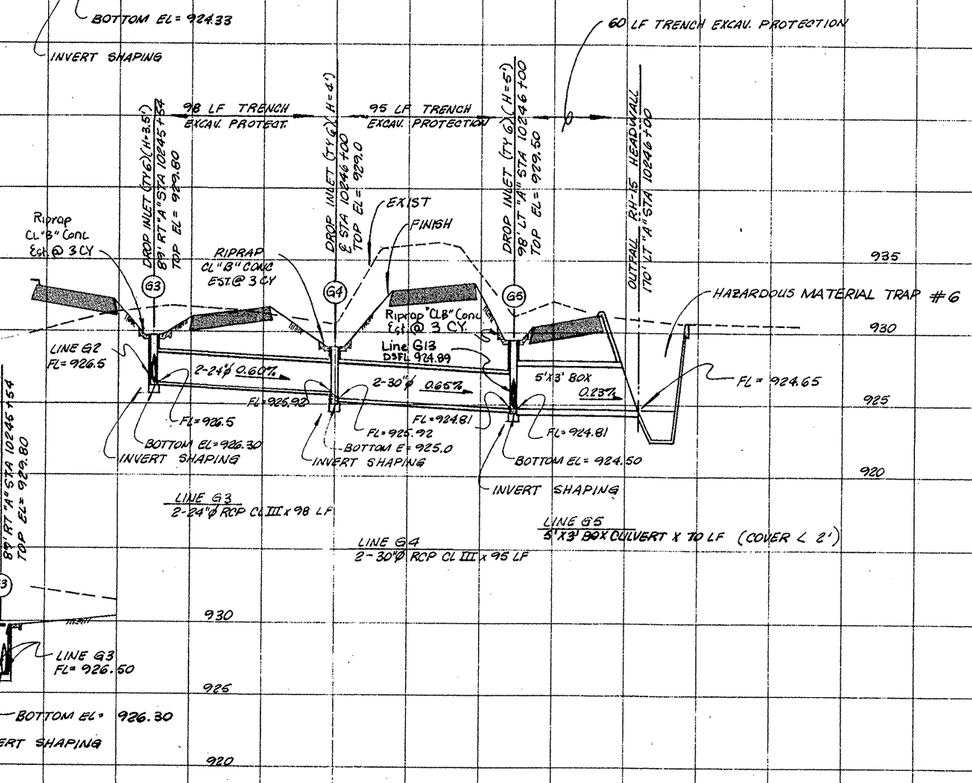
1a

ESTIMATED QUANTITIES

	ITEM	UNIT	LINE NO G1	G2	G3	G4	G5	G10	G11	G12	G13	TOTAL
	18"Ø RCP CL III	LF	296									296
	24"Ø RCP CL III	LF		348	196			171	171	147	196	1229
	30"Ø RCP CL III	LF				190						190
	5'x3' BOX CULVERT	LF					70					70
	INLET (COMPL) DROP (TY 3)	EA	1	1				1			1	4
	INLET (COMPL) DROP (TY G)	EA			1	1	1					3
	MANHOLE (COMPL) TY SPL (4'x4'x3')	EA							1	1		2
*	GRATE TY 2	EA	1	1	4	4	4	1			1	16
*	24" RING & COVER	EA							1	1		2
	TRENCH EXCAVATION PROTECTION	LF			98	95	60		171			424
*	SEWER EXCAVATION	CY	170	280	125	205	115	120	150	115	160	1380
	Riprap (Conc)(CIB) (4IN)	CY	2	2	3	3	3	2			2	17

* FOR CONTRACTOR'S INFORMATION ONLY.





STATE OF TEXAS
GREGORY A. BRECKNER
61429
REGISTERED PROFESSIONAL ENGINEER

Gregory A. Breckner P.E.
Nov 26, 1993

SYSTEM "G" STORM SEWER SECTIONS

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					264
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.	
15	BEXAR	2452	02	023,	LP 1604	

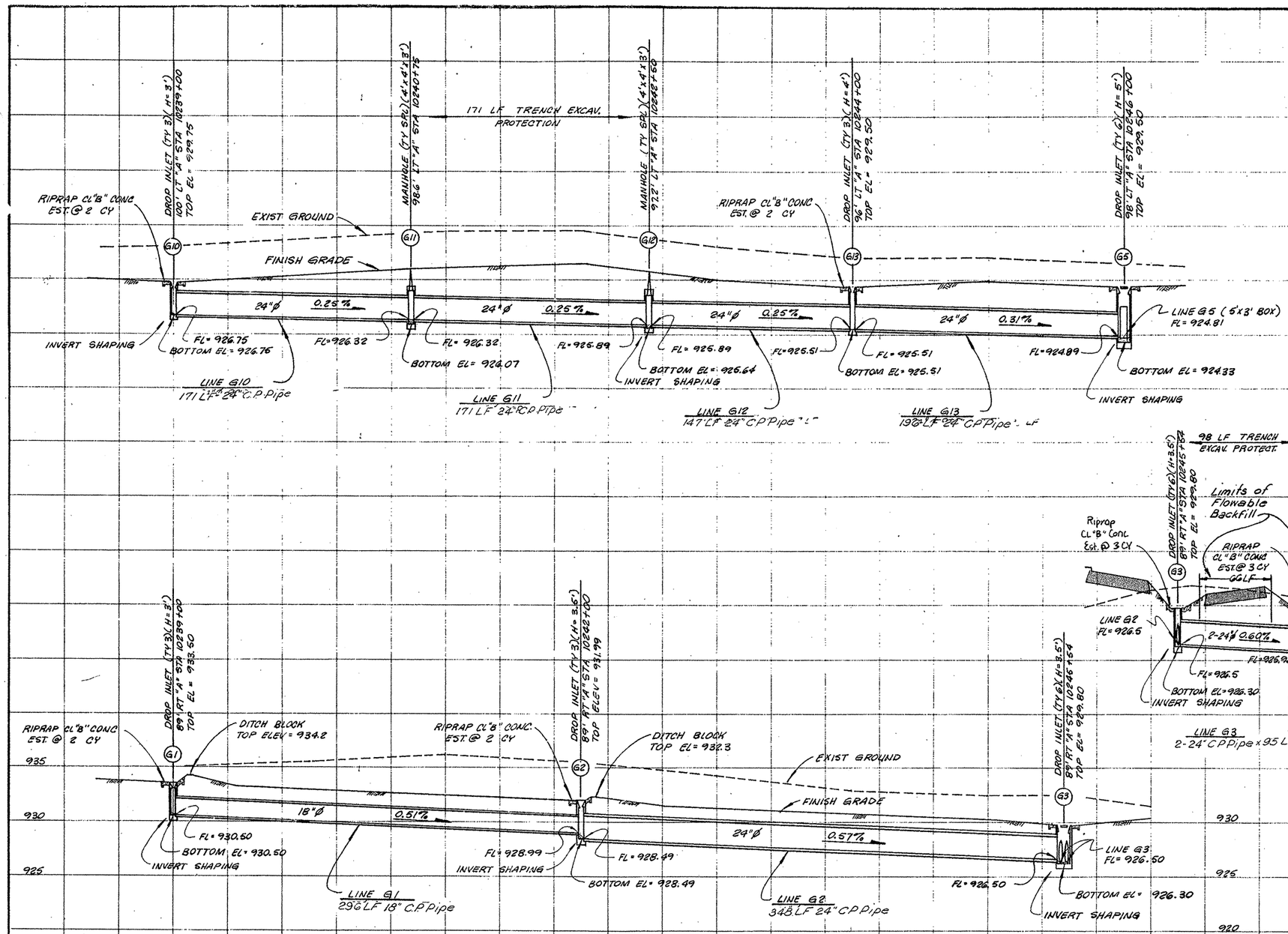
CULVERT CROSS SECTION SHEET

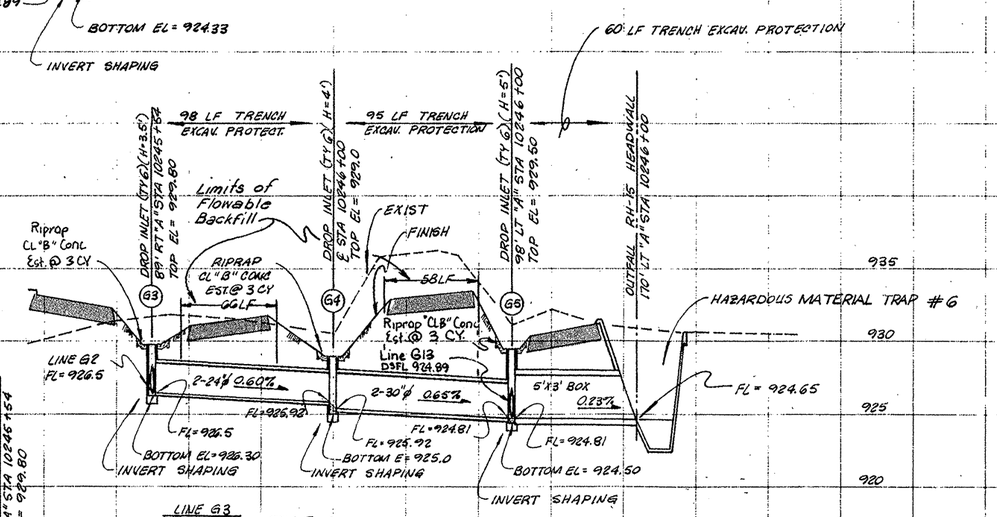
Etc.

ESTIMATED QUANTITIES

	ITEM	UNIT	LINE NO G1	G2	G3	G4	G5	G10	G11	G12	G13	TOTAL
	18" Corr Poly Pipe	LF	296									296
	24" Corr Poly Pipe	LF		348	196			171	171	147	196	1229
	30" Corr Poly Pipe	LF				190						190
	5'x3' BOX CULVERT	LF					70					70
	INLET (COMPL) DROP (TY 3)	EA	1	1				1			1	4
	INLET (COMPL) DROP (TY 6)	EA			1	1	1					3
	MANHOLE (COMPL) TY SPL (4'x4'x3')	EA							1	1		2
*	GRATE TY 2	EA	1	1	4	4	4	1			1	16
*	24" RING & COVER	EA							1	1		2
	TRENCH EXCAVATION PROTECTION	LF			98	95	60		171			424
*	SEWER EXCAVATION	CY	170	220	125	205	115	120	150	115	160	1380
	Riprap (Conc) (CIB) (4IN)	CY	2	2	3	3	3	2			2	17
*	Flowable Backfill	CY			39	44						83

* FOR CONTRACTOR'S INFORMATION ONLY.





STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED PROFESSIONAL ENGINEER

Gregory A. Biediger P.E.
Mar 31, 1995

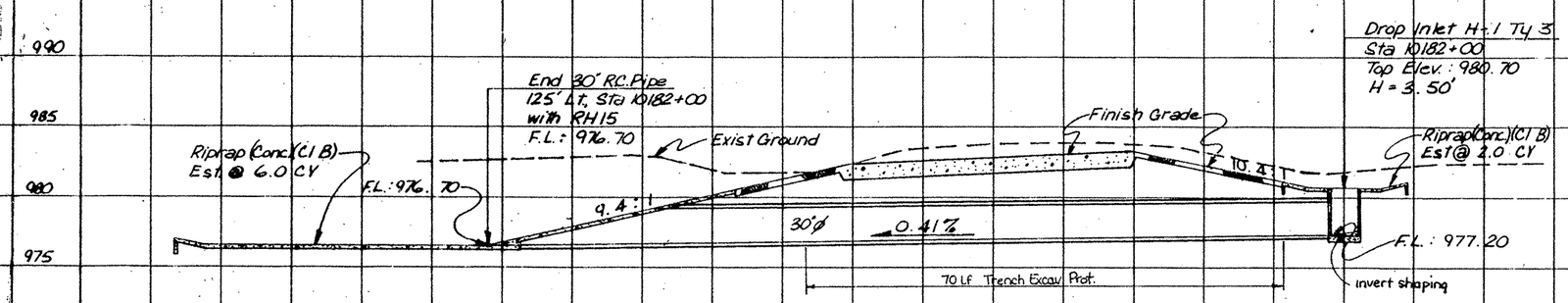
FIELD CHANGE NO. 1

SYSTEM "G"
STORM SEWER SECTIONS

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS	NH 90(191) M, etc.	264

STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP 1604

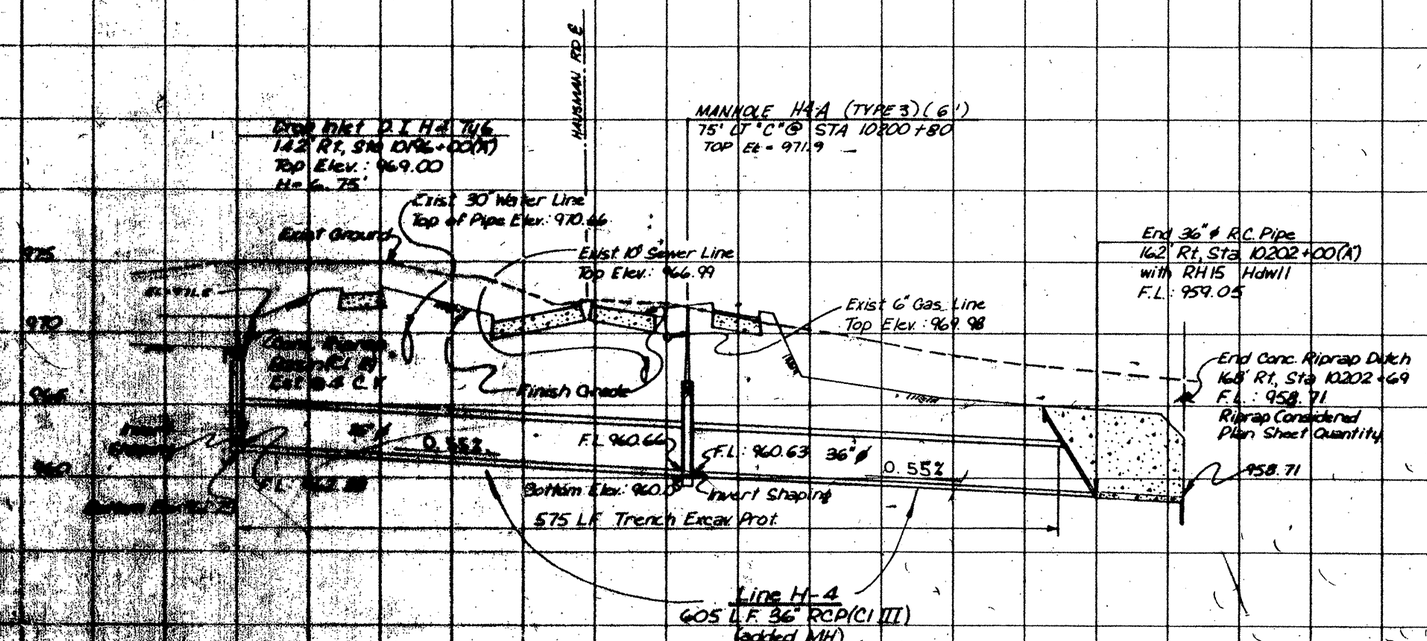
etc.



Lines "H" ~ ESTIMATED QUANTITIES

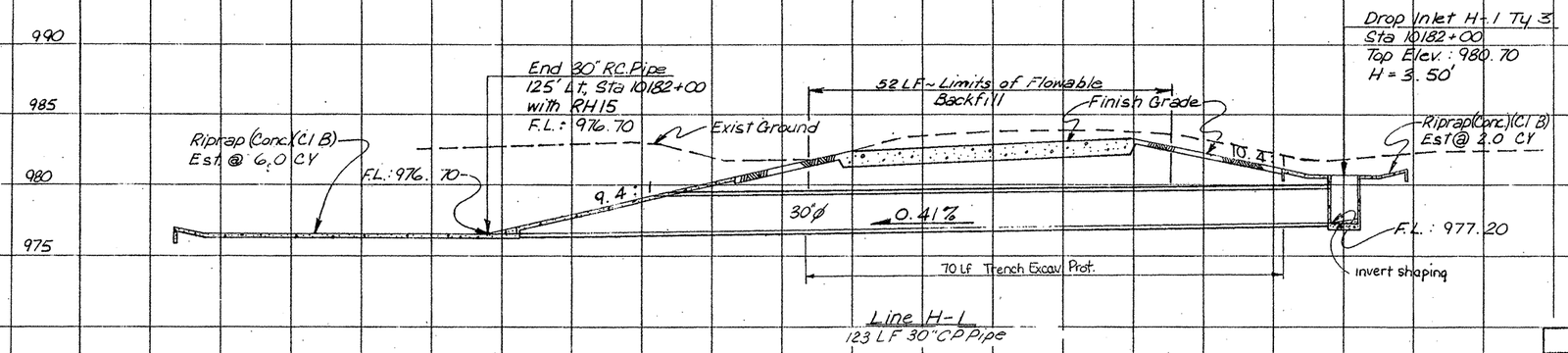
	ITEM	Unit	Lines H-1		Lines H-4				Sheet Totals
††	Sewer Excav.	CY	88		686				724
	Riprap(Conc)(Cl B)	CY	8		4				12
	R.C. Pipe(Cl III)(30 in)	LF	123						123
	R.C. Pipe(Cl III)(36 in)	LF			605				605
	Manhole(Compl)(Ty 3)	EA			1				1
	Inlet (Drop)(Ty 3)	EA	1						1
	Inlet (Compl)(Drop)(Ty 6)	EA			1				1
††	Grate(Ty 2)	EA	1		4				5
	Trench Excav. Prot.	LF	70		575				[illegible]
††	RING & COVER (24")	EA			1				1

†† For Contractors Information Only.



System H
STORM SEWER PROFILE
Lines H-1 thru H-4

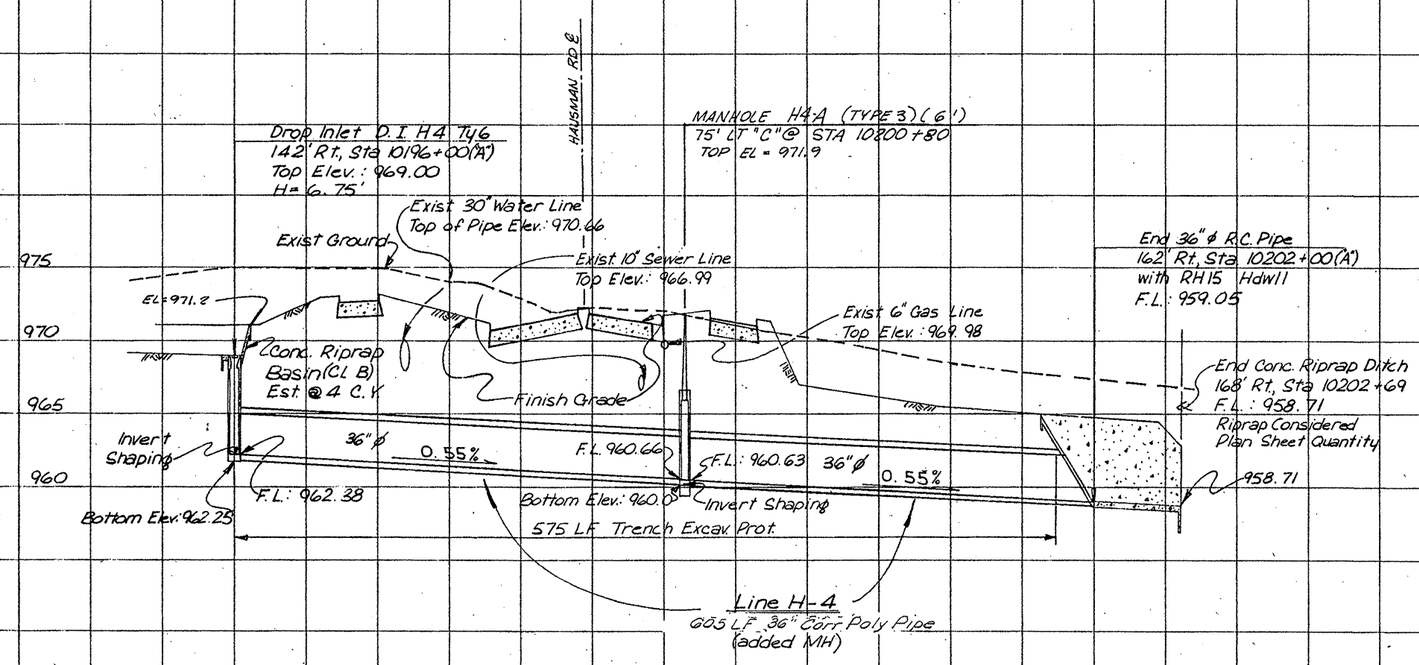
Mar 26, 1993



Lines "H" ~ ESTIMATED QUANTITIES

	ITEM	Unit	Lines H-1		Lines H-4				Sheet Totals
++	Sewer Excav.	CY	88		686				724
	Riprap(Conc.)(Cl B)	CY	8		4				12
	30" Corr. Poly. Pipe	LF	123						123
	36" Corr. Poly. Pipe	LF			605				605
	Manhole (Compl)(Ty 3)	EA			1				1
	Inlet (Drop)(Ty 3)	EA	1						1
	Inlet (Compl)(Drop)(Ty 6)	EA			1				1
++	Grate (Ty 2)	EA	1		4				5
	Trench Excav. Prot.	LF	70		575				645
++	RING & COVER (24")	EA			1				1
++	Flowable Backfill	CY	22						22

++ For Contractors Information Only.



STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED
PROFESSIONAL ENGINEER

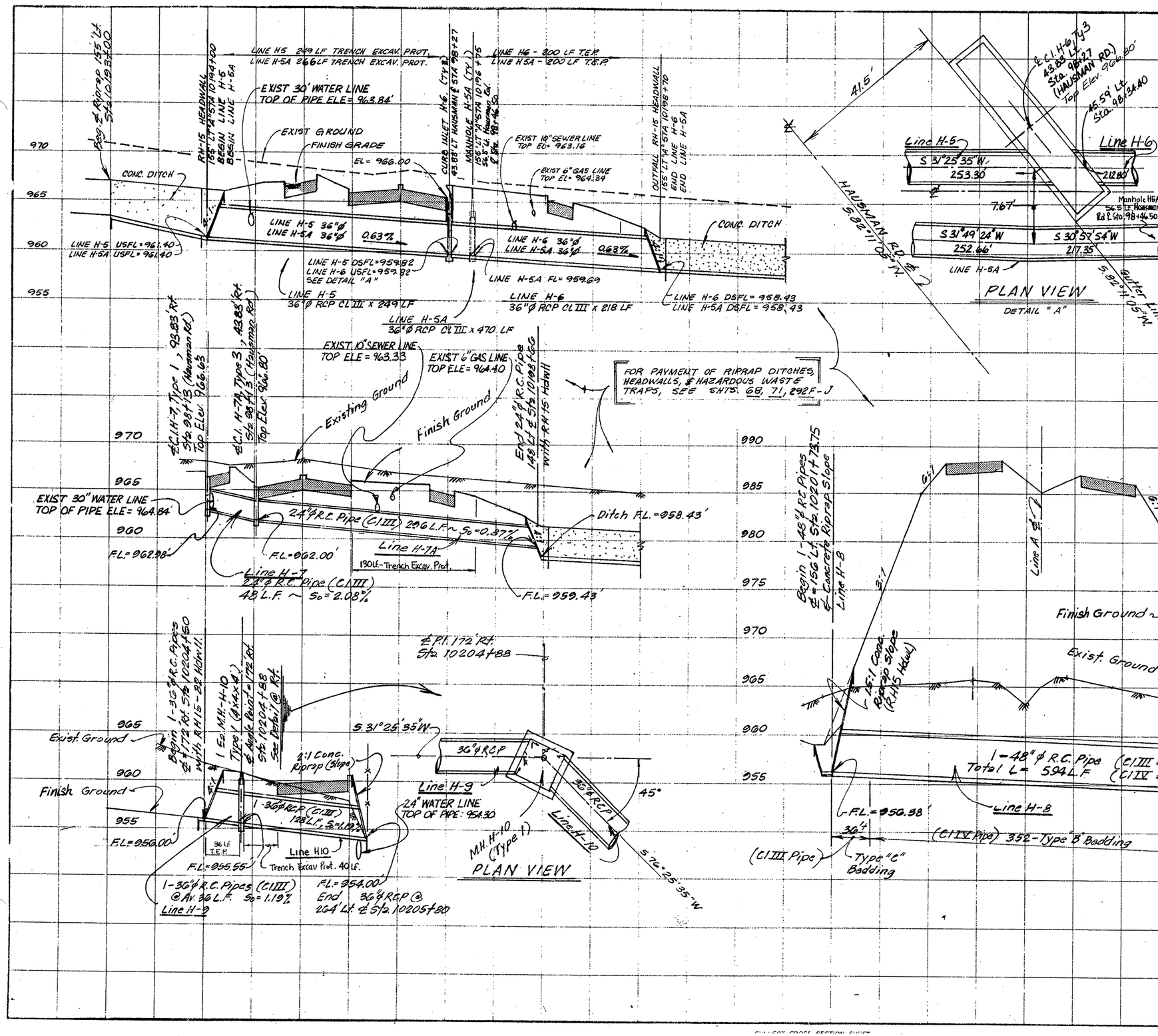
FIELD CHANGE NO. 1

System "H"

STORM SEWER PROFILES

Lines H-1 thru H-4

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	NH90(191)M, etc		265 (2)
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP1604



Note: For Contractors information only.

LINES "H" ~ ESTIMATED QUANTITIES

ITEM	UNIT	Line H-5	Line H-6	Line H-7	Line H-7A	Lines H8	Lines H9	Lines H10	Line H3A	Sheet Totals
# Sewer Excav.	C.Y.	340	275	60	315	1650	45	160	640	3485
Riprap (Conc.) (CIB)	C.Y.									
R.C. Pipe (CL III) (24 In)	L.F.			48	296					344
R.C. Pipe (CL III) (36 In)	L.F.	249	218				36	128	466	1097
R.C. Pipe (CL III) (48 In)	L.F.					242				242
R.C. Pipe (CL IV) (48 In)	L.F.					352				352
Manhole (Compl) (Ty 1)	Ea.							1	1	2
Ring & Cover (24") H	Ea.		1	1	1			1	1	5
Inlet (Compl) (Curb) (Ty 3)	Ea.		1		1					2
Inlet (Compl) (Curb) (Ty 1)	EA.			1						1
Trench Excav. Protection	L.F.	249	200		130	594	36	40	466	1715

*Note: Line H-5A To Run Alongside Line H-5 & H-6 and Share Same Inlet & Outlet @ RH-15 Headwall. Trench Excav. Protection Est. @ 466 Lf.

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Date

STATE OF TEXAS
GREGORY A. WALLER
61429

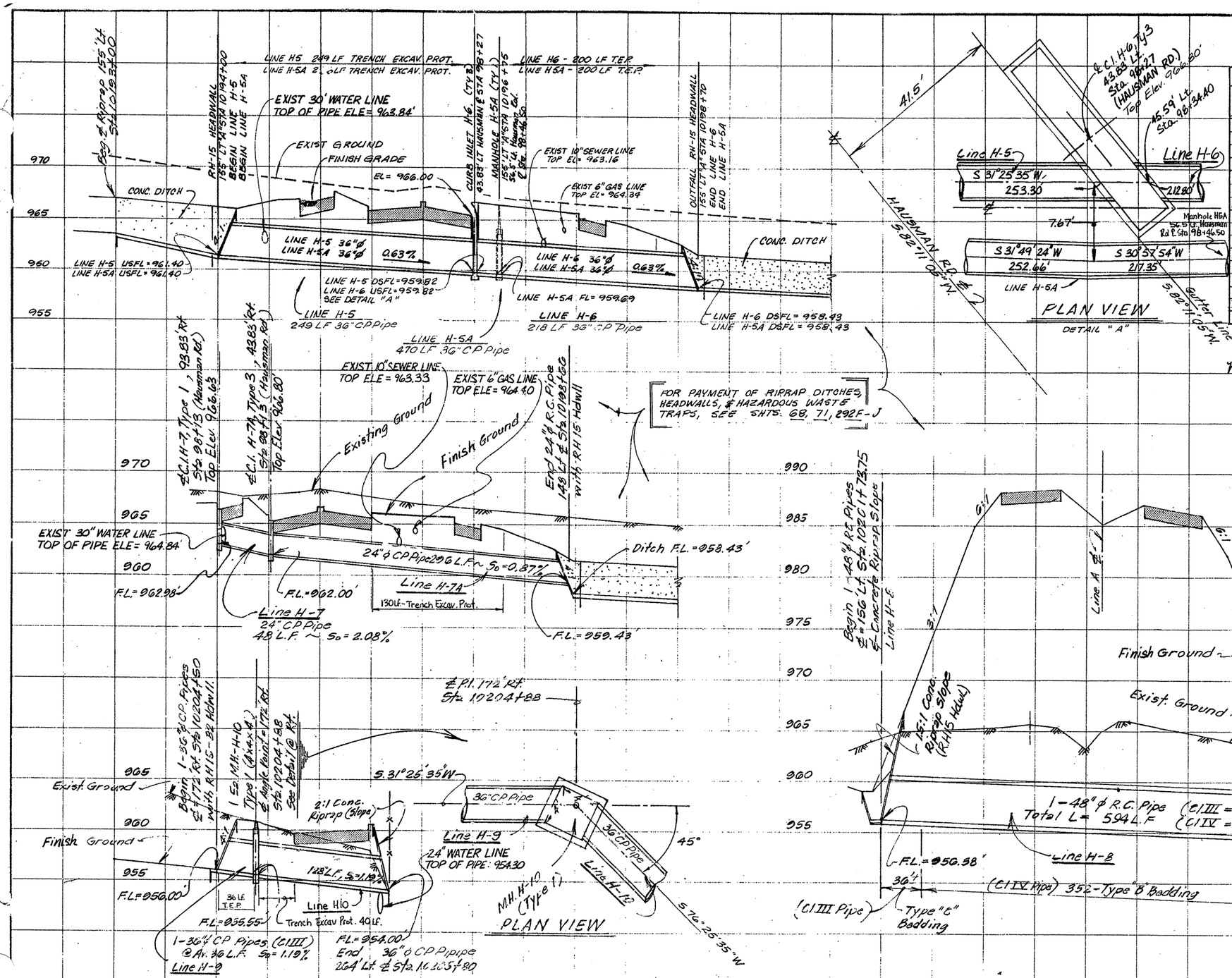
△ Gregory A. Waller P.E. May 26, 1993

△ REVISED: ADDED MANHOLE H-5A

SYSTEM 'H'
STORM SEWER PROFILES
LINES H-5 thru H-10.

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				266
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	Up 1604

FULLSCAY CROSS SECTION SHEET



Note: For Contractors information only.

LINES "H" ~ ESTIMATED QUANTITIES

ITEM	UNIT	Line H-5	Line H-6	Line H-7	Line H-7A	Lines H8	Lines H9	Lines H10	Line H5A	Sheet Totals
# Sewer Excav.	C.Y.	340	275	60	315	1650	45	160	640	3485
Riprap (Conc.) (Cl B)	C.Y.									
Corr Poly Pipe (24 In)	L.F.			48	296					344
Corr Poly Pipe (36 In)	L.F.	249	218				36	128	466	1097
R.C. Pipe (C III) (48 In)	L.F.					242				242
R.C. Pipe (C IV) (48 In)	L.F.					352				352
Manhole (Comp) (Ty 1)	Ea.							1	1	2
Ring & Cover (24") #	Ea.		1	1	1			1	1	5
Inlet (Comp) (Curb) (Ty 3)	Ea.		1		1					2
Inlet (Comp) (Curb) (Ty 1)	EA.			1						1
Trench Excav. Protection	L.F.	249	200		130	594	36	40	466	1715

Note: Line H-5A To Run Alongside Line H-5 & H-6 and Share Same Inlet & Outlet @ RH-15 Headwall. Trench Excav. Protection Est. @ ... Lf.

STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90 Date

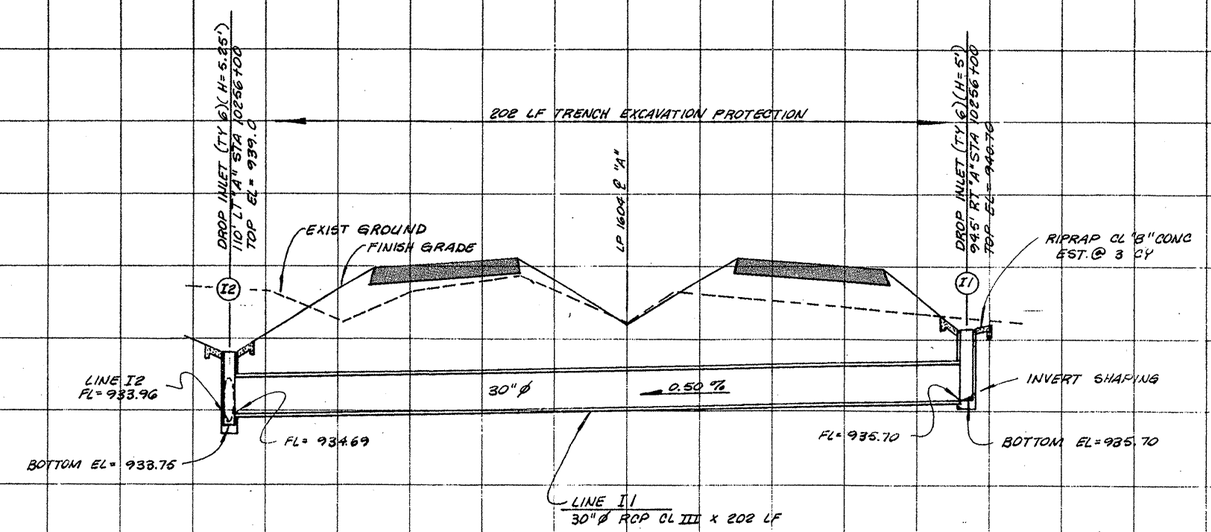
STATE OF TEXAS GREGORY K. BRENGER 61429 REGISTERED

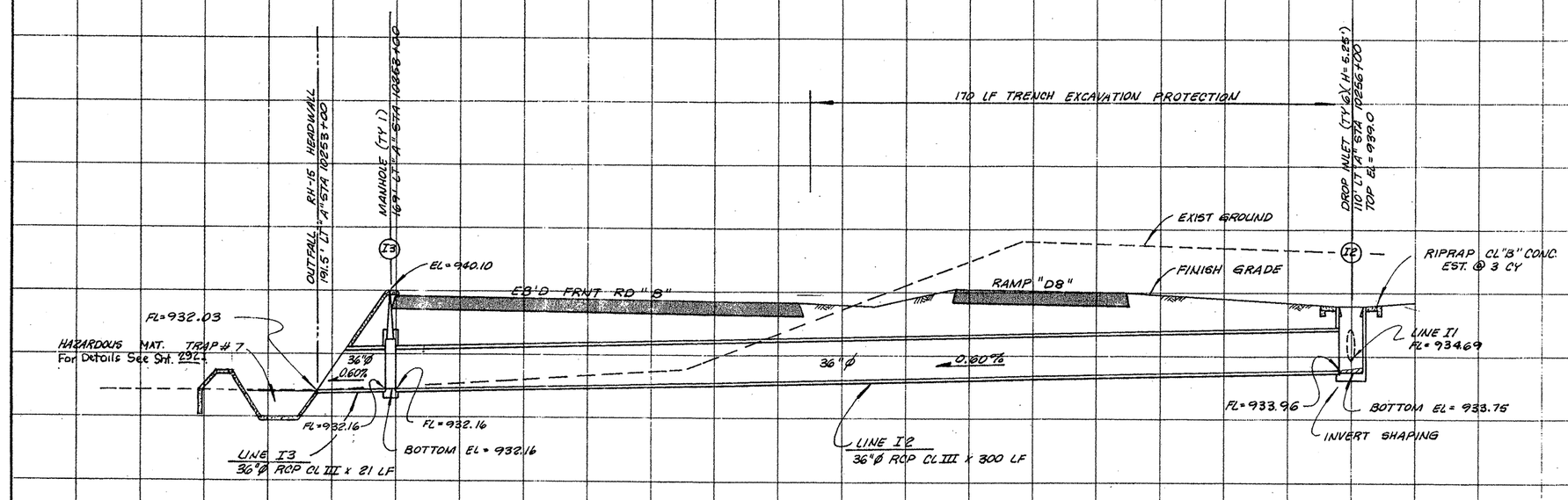
△ REVISED: ADDED MANHOLE H-5A

FIELD CHANGE NO. 1
SYSTEM 'H'
STORM SEWER PROFILES
LINES H-5 thru H-10.

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS	NH 90 (191) Meto	206

STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	0452	02	023	Loop 410





ESTIMATED QUANTITIES

	ITEM	UNIT	LINE NO. I1	LINE NO. I2	LINE NO. I3	TOTAL
	30" ø RCP CL III	LF	202			202
	36" ø RCP CL III	LF		300	21	321
	INLET (COMPL) DROP (TY 6)	EA	1	1		2
	MANHOLE (COMPL) (TY 1)	EA			1	1
*	GRATE TY 2	EA	4	4		8
*	24" RING & COVER	EA			1	1
	RIPRAP CL "B" CONC	CY	3	3		6
	TRENCH EXCAVATION PROTECTION	LF	202	170		372
*	SEWER EXCAVATION	CY	275	350	15	640

* FOR CONTRACTOR'S INFORMATION ONLY.

STATE OF TEXAS
GREGORY A. BRIDGER
61429
REGISTERED
PROFESSIONAL ENGINEER

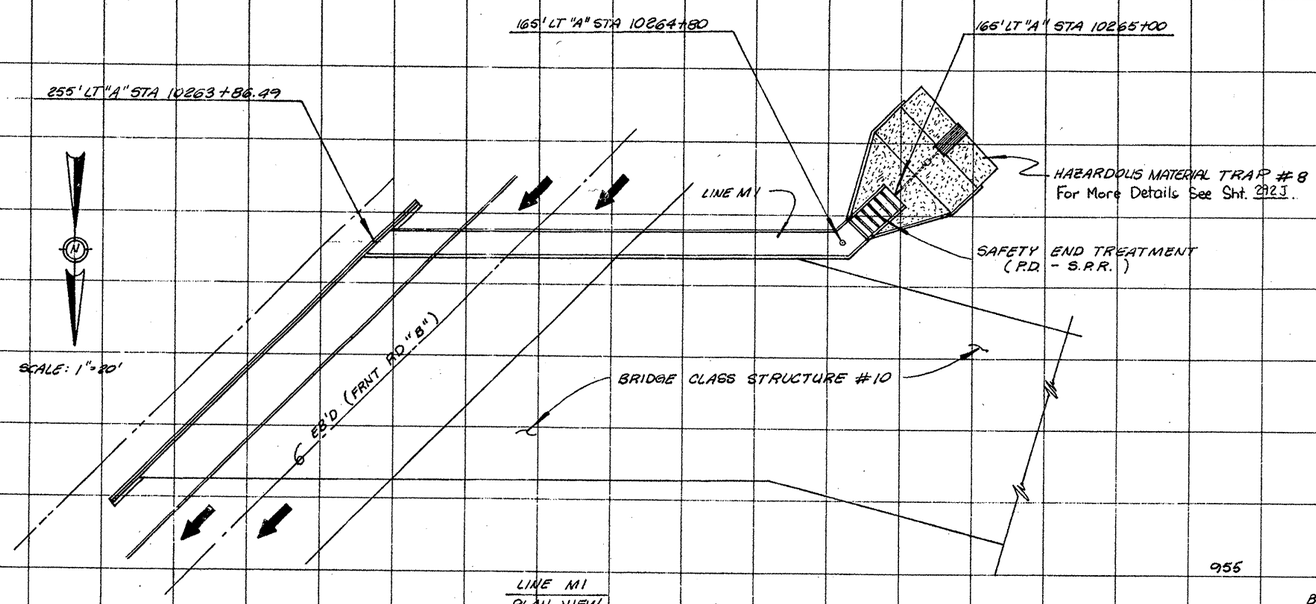
Gregory A. Bridger P.E
Mar 26, 1993

SYSTEM "I" STORM SEWER SECTIONS

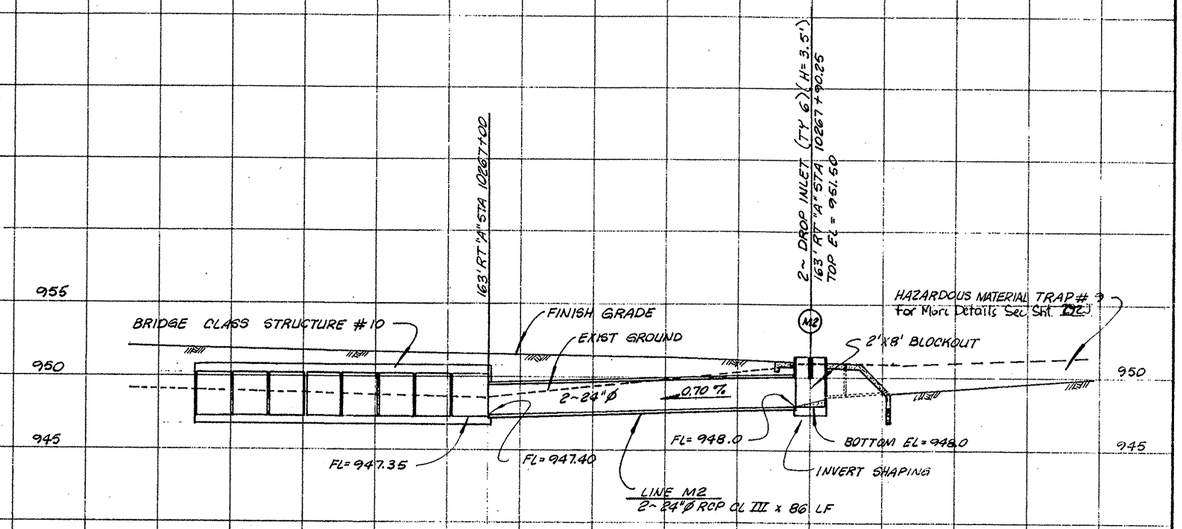
FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					267
STATE DIST. NO.	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
15	BEXAR		2452	02	023	LP 1604

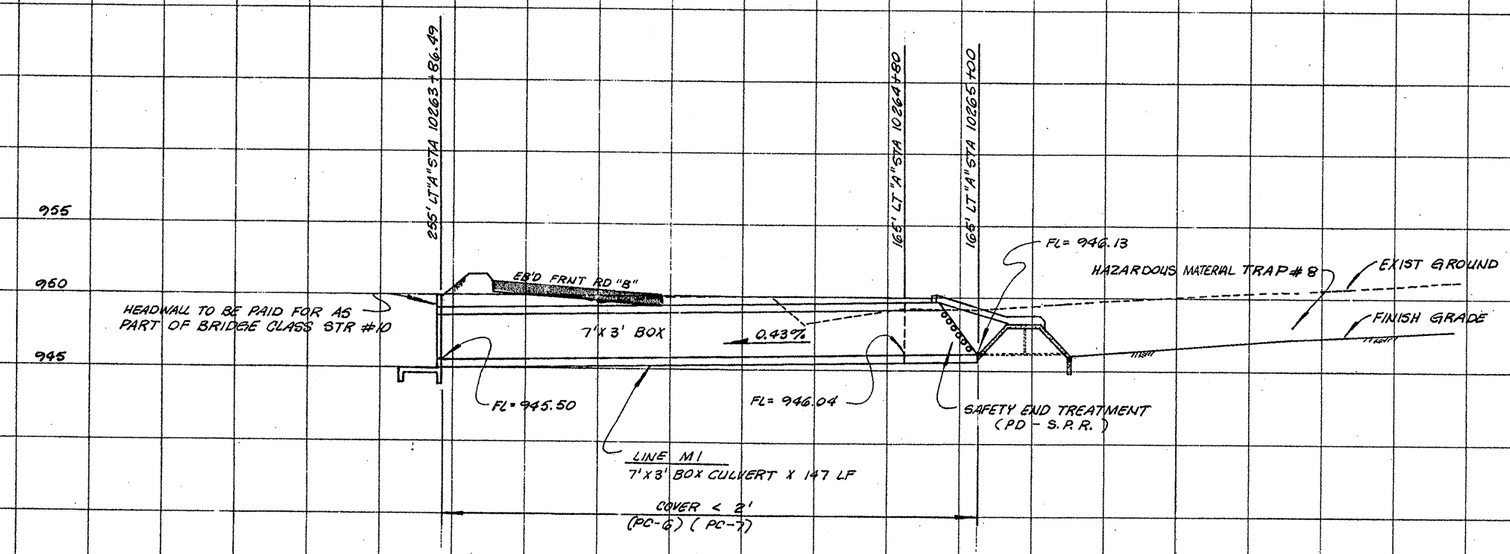
etc.

CULVERT CROSS SECTION SHEET



LINE M1
PLAN VIEW





ESTIMATED QUANTITIES

	ITEM	UNIT	LINE NO. M1	LINE NO. M2	TOTAL
	24"Ø RCP CL III	LF		172	172
	INLET (COMPL) DROP (TY6)	EA		2	2
	7'x3' BOX CULVERT	LF	147		147
	SAFETY END TREAT. (PD-S.P.R.)	EA	1		1
*	GRATE TY 2	EA		8	8
*	SEWER EXCAVATION	CY	195	90	285

* FOR CONTRACTOR'S INFORMATION ONLY.

STATE OF TEXAS
GREGORY A. BUCHOLZ
61429
REGISTERED
PROFESSIONAL ENGINEER

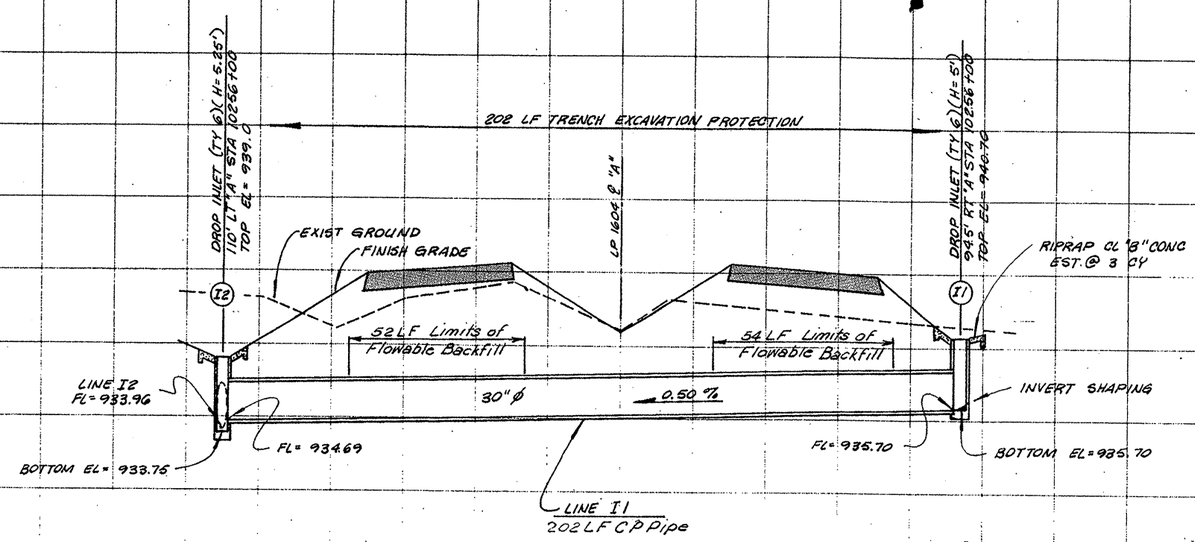
Gregory A. Bucholz P.E.
Nov 26, 1993

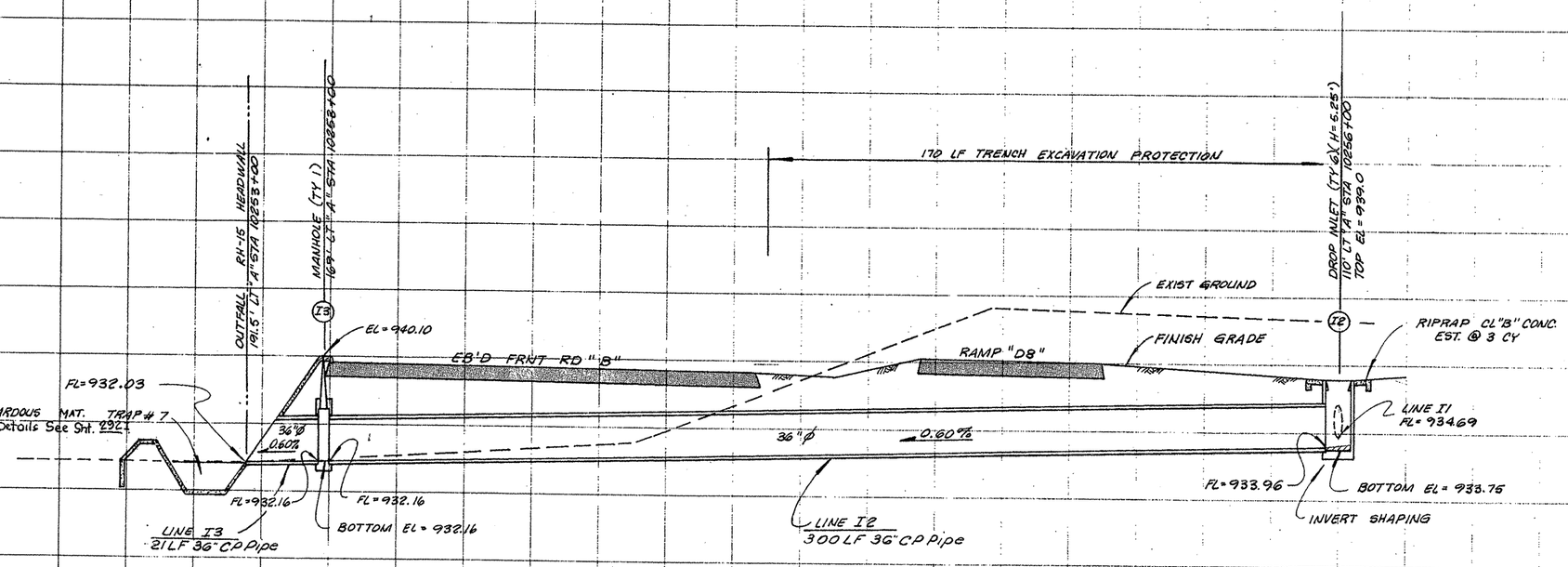
SYSTEM "M"
STORM SEWER SECTIONS

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					267A
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.	
15	BEXAR	2432	02	023,	LP604	

Etc.

CULVERT CROSS SECTION SHEET





ESTIMATED QUANTITIES

	ITEM	UNIT	LINE NO. I1	LINE NO. I2	LINE NO. I3	TOTAL
	30" Corr Poly Pipe	LF	202			202
	36" Corr Poly Pipe	LF		300	21	321
	INLET (COMPL) DROP (TY 6)	EA	1	1		2
	MANHOLE (COMPL) (TY 1)	EA			1	1
*	GRATE TY 2	EA	4	4		8
*	24" RING & COVER	EA			1	1
	RIPRAP CL "B" CONC	CY	3	3		6
	TRENCH EXCAVATION PROTECTION	LF	202	170		372
*	SEWER EXCAVATION	CY	275	350	15	640

* FOR CONTRACTOR'S INFORMATION ONLY.

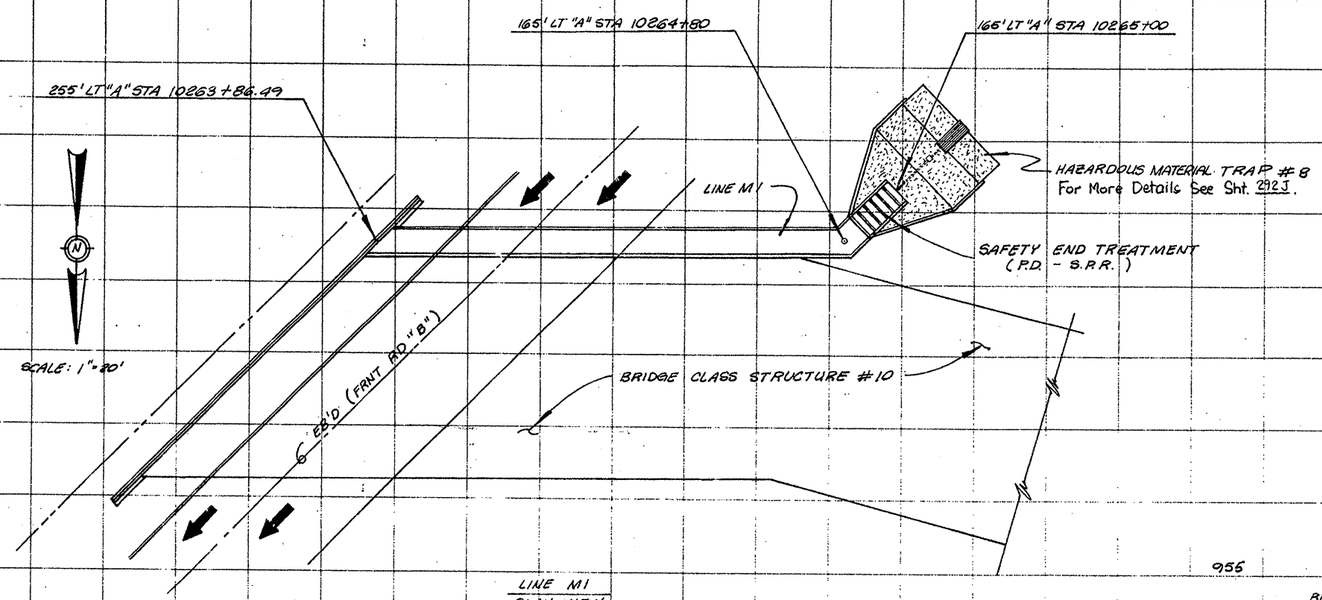
*	Flowable Backfill	CY	44			44

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED
PROFESSIONAL ENGINEER

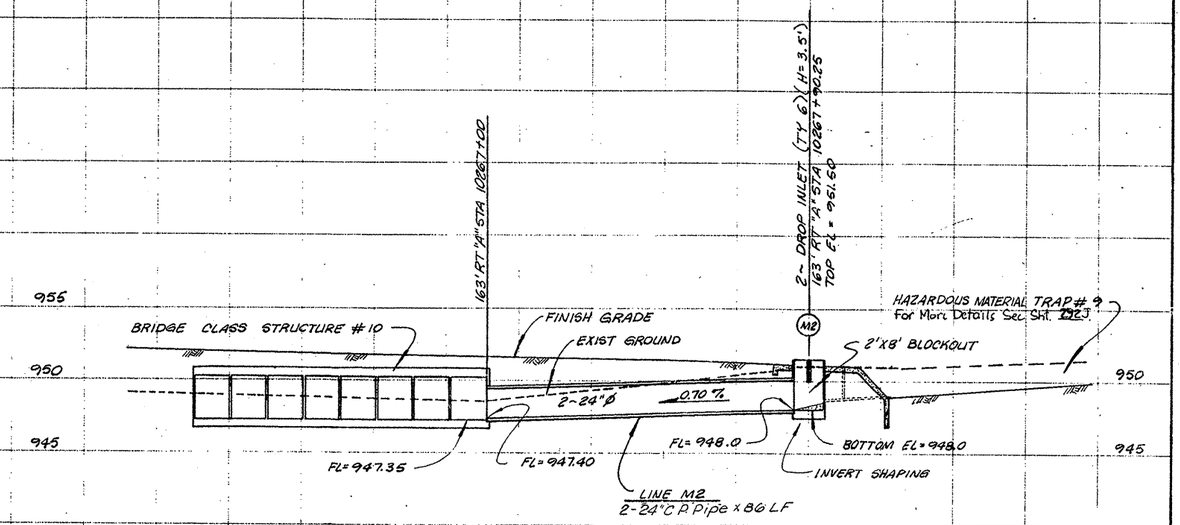
FIELD CHANGE NO. I
SYSTEM "I"
STORM SEWER SECTIONS

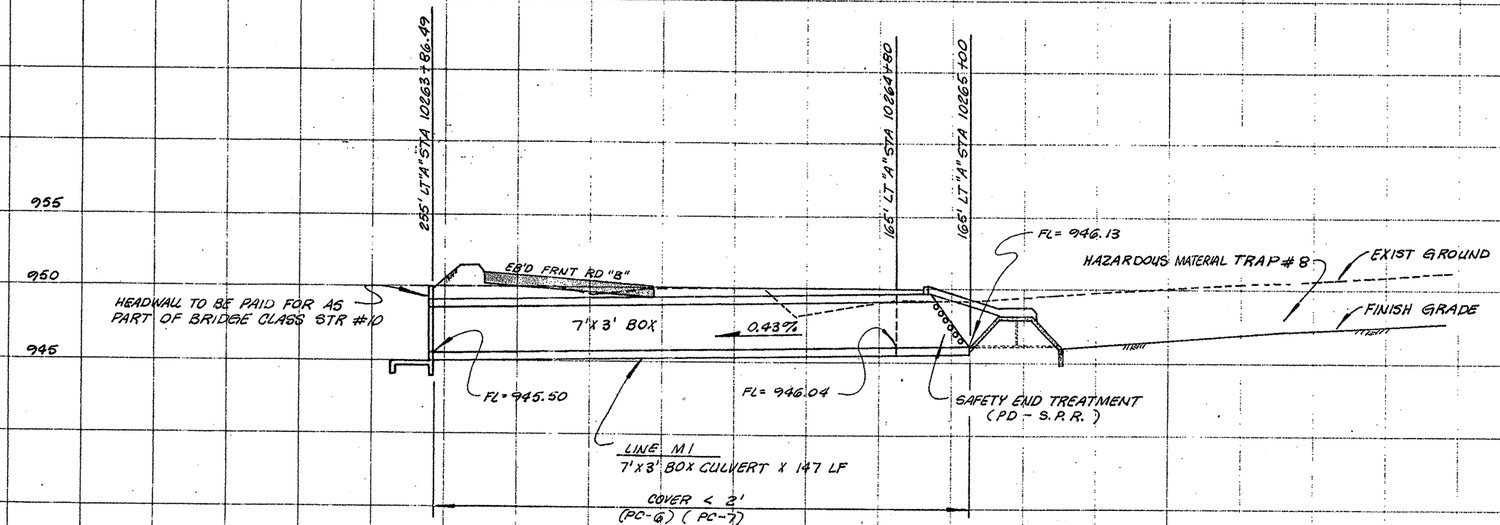
FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS	NH90(191)M, etc	267

STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	029	LP 1604



LINE M1
PLAN VIEW





ESTIMATED QUANTITIES

	ITEM	UNIT	LINE NO. M1	LINE NO. M2	TOTAL
	24" Corr Poly Pipe	LF		172	172
	INLET (COMPL) DROP (TY6)	EA		2	2
	7'x3' BOX CULVERT	LF	147		147
	SAFETY END TREAT. (PD-S.P.R.)	EA	1		1
*	GRATE TY 2	EA		8	8
*	SEWER EXCAVATION	CY	195	90	285

* FOR CONTRACTOR'S INFORMATION ONLY.

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED PROFESSIONAL ENGINEER

FIELD CHANGE NO. 1
SYSTEM "M"
STORM SEWER SECTIONS

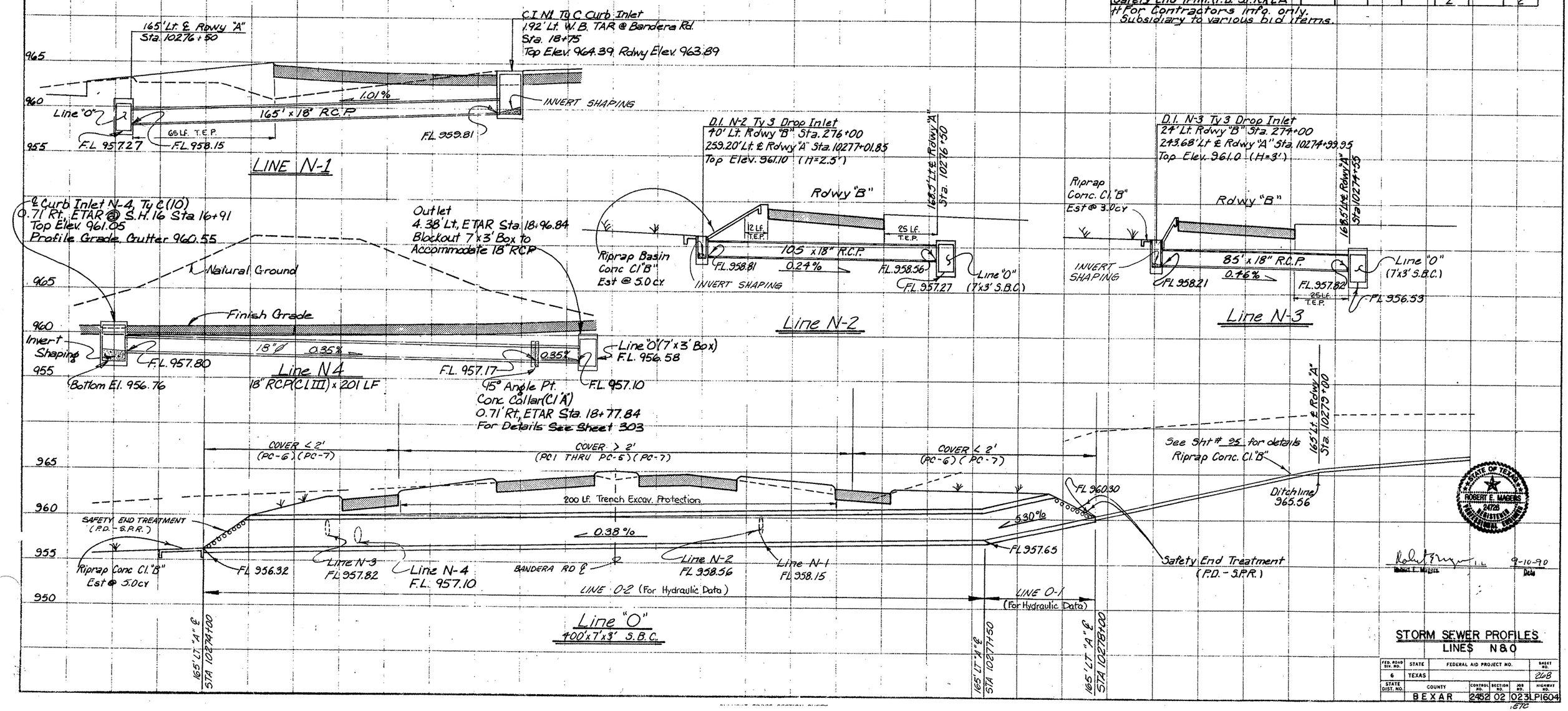
FED ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS	NH 90(191)M, etc				267 A
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.	
15	BEXAR	2452	02	023	LP1604	

etc.

Estimated Quantities

Item	Unit		Line N-1	Line N-2	Line N-3	Line O	Line N-4	Sheet Total
~~†† Sewer Excav.~~	~~CY~~		~~96~~	~~70~~	~~55~~	~~935~~	~~66~~	~~1222~~
Riprap (Conc)(Cl. B)	CY			5.0	3.0			8.0
Conc. Box Culv (7'x3')	LF					400		400
~~R.C. Pipe (Cl III)(24")~~	~~LF~~							
R.C. Pipe (Cl III)(18")	LF		165	105	85		201	556
Inlet (Compl.)(Drop)(Ty 3)	EA			1	1			2
Inlet (Compl.)(Curb)(Ty C)	EA		1				1	2
Grate (Ty 2) ††	EA			1	1			2
~~Ring & Cover (18") ††~~	~~EA~~		~~1~~				~~1~~	~~2~~
Trench Excav. Protection	LF		65	37	25	200		327
Safety End Trmt. (P.D.-S.P.R.)	EA					2		2

†† For Contractors Info. only.
Subsidiary to various bid items.



STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers I.L. 9-10-90
Robert E. Magers Date

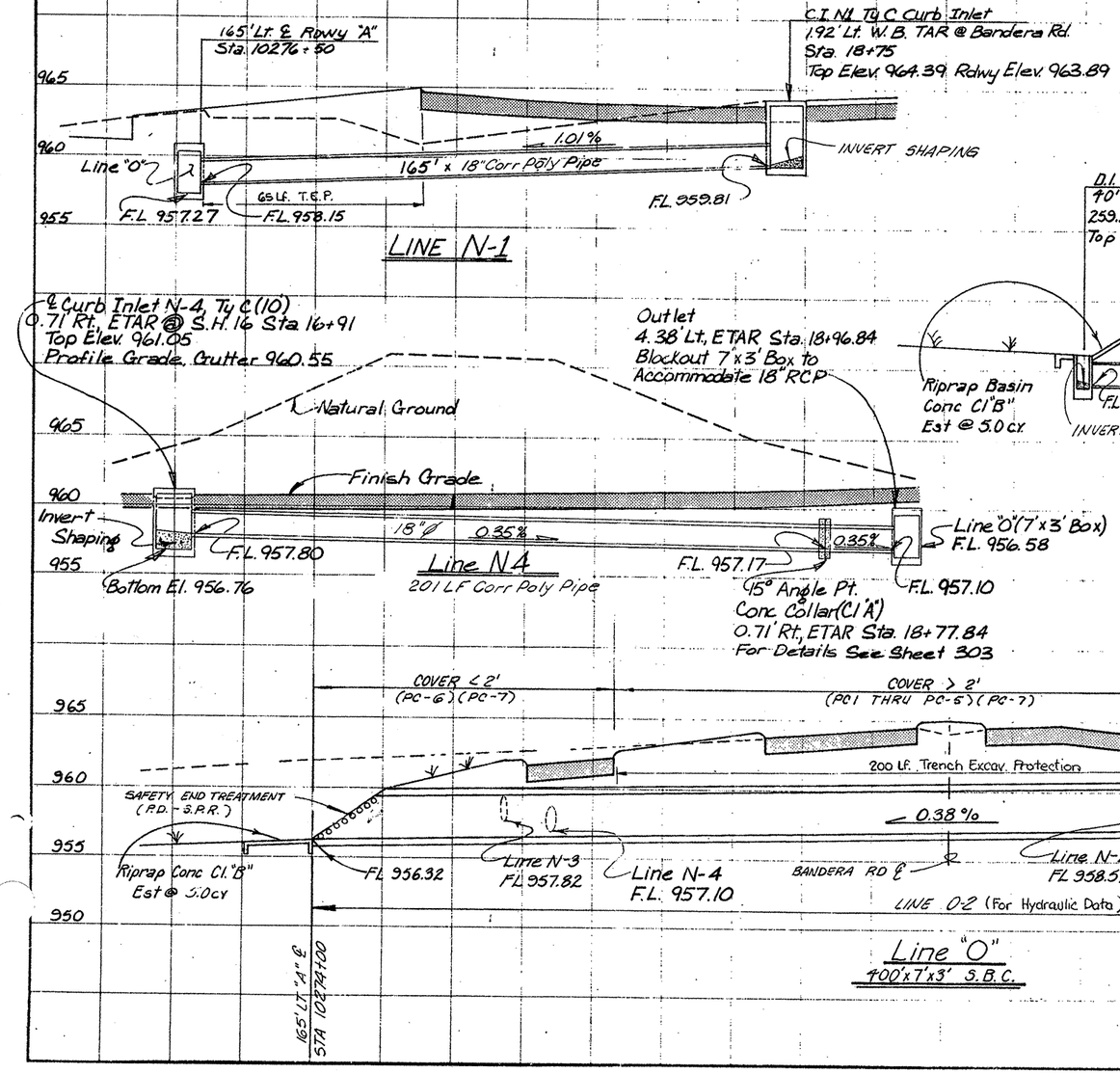
STORM SEWER PROFILES
LINES N & O

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					268
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.	
	BEXAR	2452	02	023	LP1604	

Estimated Quantities

Item	Unit		Line N-1	Line N-2	Line N-3	Line O	Line N-4	Sheet Total
~~‡ Sewer Excav.~~	~~CY~~		~~96~~	~~70~~	~~55~~	~~935~~	~~66~~	~~1222~~
Riprap (Concl (Cl. B)	CY			5.0	3.0			8.0
Conc. Box Culv (7'x3')	LF					400		400
~~R.C. Pipe (Cl III) (24")~~	~~LF~~							
Corr Poly Pipe (18")	LF		~~165~~	~~105~~	~~85~~		~~201~~	~~556~~
Inlet (Compl.) (Drop) (Ty 3)	EA			1	1			2
Inlet (Compl.) (Curb) (Ty C)	EA		1				1	2
Grate (Ty 2) ‡‡	EA			1	1			2
Ring & Cover (18") ‡‡	EA		1				1	2
Trench Excav. Protection	LF		65	37	25	200		327
Safety End Trmt. (P.D.-S.P.R.)	EA					2		2

‡‡ For Contractors info. only. Subsidiary to various bid items.

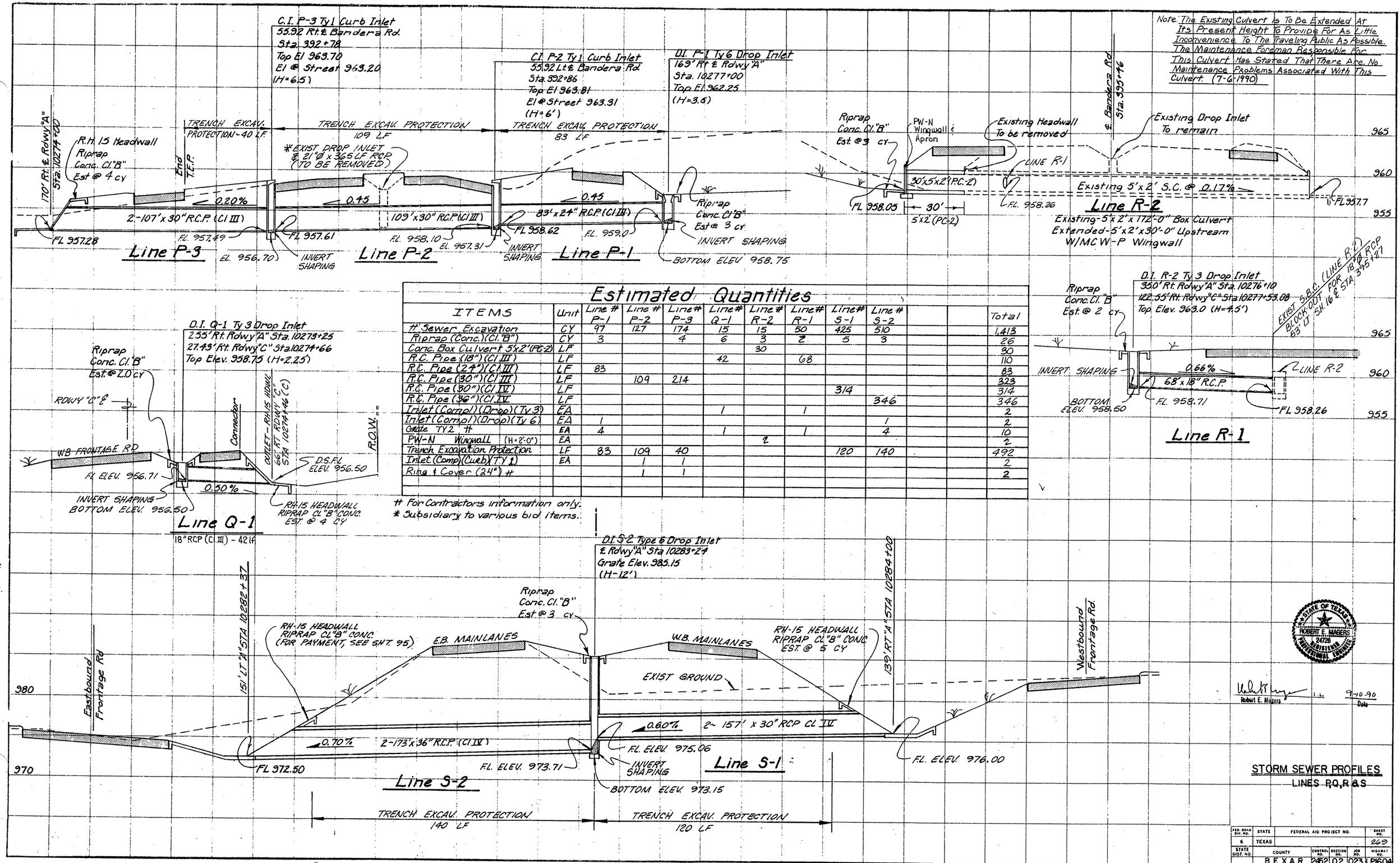


STATE OF TEXAS
ROBERT E. MAGESS
24726
REGISTERED
PROFESSIONAL ENGINEER

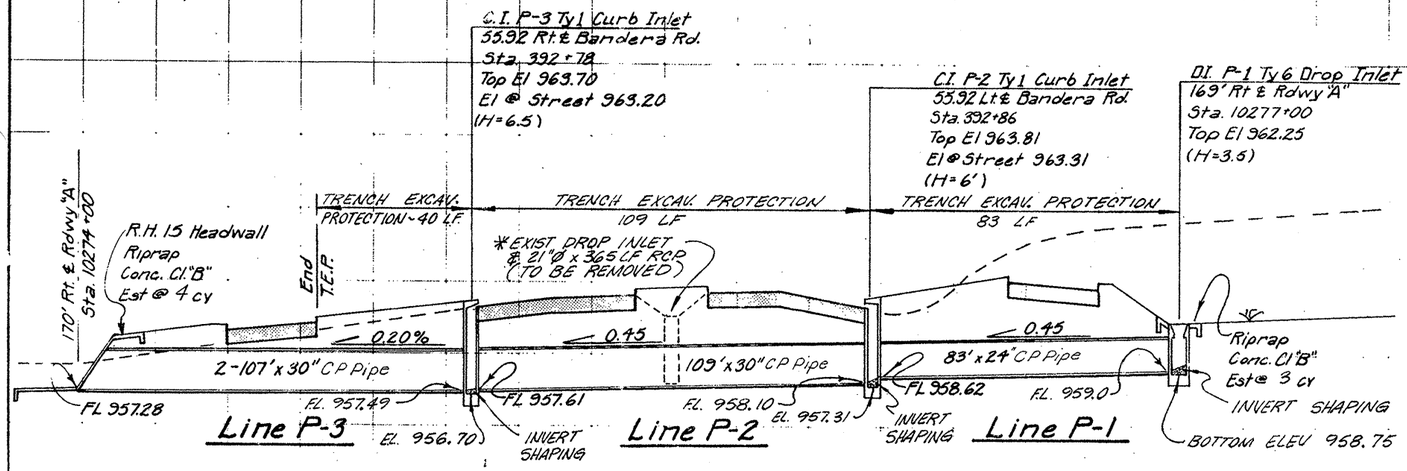
Robert E. Magess 9-10-90
Robert E. Magess Date

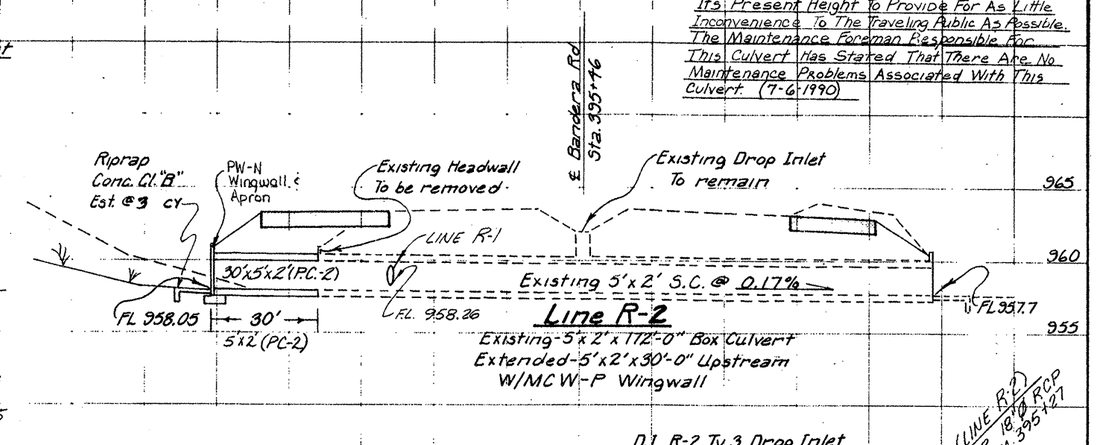
FIELD CHANGE NO. 1
STORM SEWER PROFILES
LINES N & O

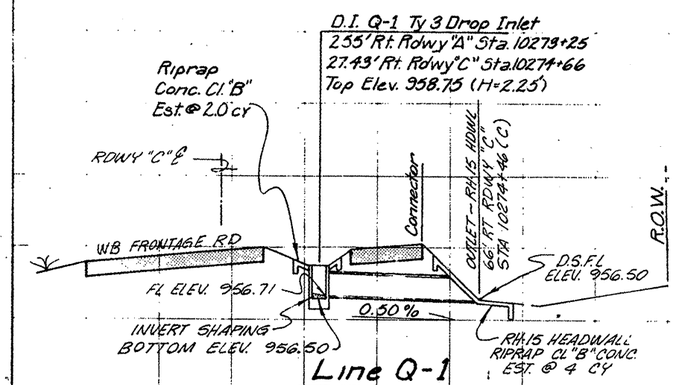
FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS	NH90(191)M, etc	208
STATE DIST. NO.	COUNTY	CONTROL NO. / SECTION NO. / JOB NO. / HIGHWAY NO.	
	BEXAR	2452 02 1023	LP1604

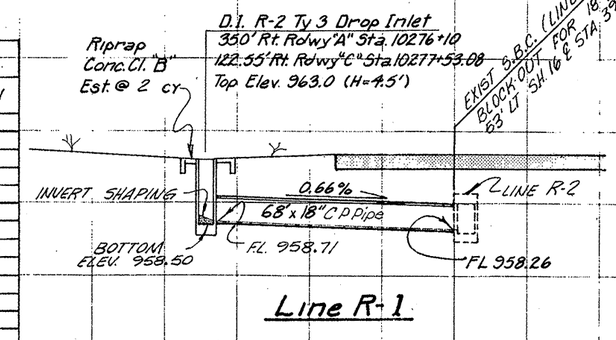

C.I. P-3 Ty1 Curb Inlet
55.92 Rt. ℄ Bandera Rd.
Sta. 392+78
Top El 963.70
El @ Street 963.20
(H=6.5)
C.I. P-2 Ty1 Curb Inlet
55.92 Lt ℄ Bandera Rd.
Sta. 392+86
Top El 963.81
El @ Street 963.31
(H=6')
D.I. P-1 Ty6 Drop Inlet
169' Rt ℄ Rdwy "A"
Sta. 10277+00
Top El. 962.25
(H=3.5)
Note: The Existing Culvert Is To Be Extended At Its Present Height To Provide For As Little Inconvenience To The Traveling Public As Possible. The Maintenance Foreman Responsible For This Culvert Has Stated That There Are No Maintenance Problems Associated With This Culvert. (7-6-1990)
170' Rt. ℄ Rdwy "A" Sta. 10274+00
R.H. 15 Headwall
Riprap
Conc. Cl. "B"
Est @ 4 cy
TRENCH EXCAV. PROTECTION ~ 40 LF
TRENCH EXCAV. PROTECTION 109 LF
TRENCH EXCAV. PROTECTION 83 LF
End T.E.P.
* EXIST DROP INLET & 21" Ø x 365 LF RCP (TO BE REMOVED)
0.20%
0.45
0.45
2-107' x 30" R.C.P. (Cl III)
109' x 30" R.C.P. (Cl III)
83' x 24" R.C.P. (Cl III)
FL 957.28
FL. 957.49
FL 957.61
FL. 958.10
EL. 957.31
FL 958.62
FL. 959.0
EL. 956.70
INVERT SHAPING
Line P-3
Line P-2
Line P-1
Riprap
Conc. Cl. "B"
Est @ 3 cy
INVERT SHAPING
BOTTOM ELEV 958.75
Riprap
Conc. Cl. "B"
Est. @ 3 cy
PW-N Wingwall & Apron
Existing Headwall To be removed
Existing Drop Inlet To remain
℄ Bandera Rd. Sta. 395+46
LINE R-1
30' x 5' x 2' (P.C.-2)
FL 958.05
30'
5' x 2' (PC-2)
FL. 958.26
Existing 5' x 2' S.C. @ 0.17%
FL 957.7
Line R-2
Existing-5' x 2' x 172'-0" Box Culvert
Extended-5' x 2' x 30'-0" Upstream
W/MC W-P Wingwall
965
960
955
D.I. Q-1 Ty 3 Drop Inlet
255' Rt. Rdwy "A" Sta. 10273+25
27.43' Rt. Rdwy "C" Sta. 10274+66
Top Elev. 958.75 (H=2.25)
Riprap
Conc. Cl. "B"
Est. @ 2.0 cy
RDWY "C" ℄
WB FRONTAGE RD
Connector
OUTLET - RH-15 HDWL 66' RT. RDWY "C" STA 10274+46 (C)
R.O.W.
D.S.F.L. ELEV. 956.50
F.L. ELEV. 956.71
0.50%
INVERT SHAPING
BOTTOM ELEV. 956.50
RH-15 HEADWALL
RIPRAP CL "B" CONC.
EST. @ 4 CY
Line Q-1
18" RCP (Cl. III) - 42 LF
D.I. R-2 Ty 3 Drop Inlet
350' Rt. Rdwy "A" Sta. 10276+10
122.55' Rt. Rdwy "C" Sta. 10277+53.08
Top Elev. 963.0 (H=4.5')
Riprap
Conc. Cl. "B"
Est. @ 2 cy
EXIST S.B.C. (LINE R-2) BLOCK-OUT FOR 18" RCP 63' LT. SH. 16 ℄ STA 395+27
INVERT SHAPING
0.66%
68' x 18" R.C.P.
LINE R-2
BOTTOM ELEV. 958.50
F.L. 958.71
FL 958.26
Line R-1
965
960
955
Estimated Quantities
ITEMS | Unit | Line # P-1 | Line # P-2 | Line # P-3 | Line # Q-1 | Line # R-2 | Line # R-1 | Line # S-1 | Line # S-2 | | | Total
Sewer Excavation | CY | 97 | 127 | 174 | 15 | 15 | 50 | 425 | 510 | | | 1,413
Riprap (Conc.) (Cl. "B") | CY | 3 | | 4 | 6 | 3 | 2 | 5 | 3 | | | 26
Conc. Box Culvert 5'x2' (PC-2) | LF | | | | | 30 | | | | | | 30
R.C. Pipe (18") (Cl III) | LF | | | | 42 | | 68 | | | | | 110
R.C. Pipe (24") (Cl III) | LF | 83 | | | | | | | | | | 83
R.C. Pipe (30") (Cl III) | LF | | 109 | 214 | | | | | | | | 323
R.C. Pipe (30") (Cl IV) | LF | | | | | | | 314 | | | | 314
R.C. Pipe (36") (Cl IV) | LF | | | | | | | | 346 | | | 346
Inlet (Compl) (Drop) (Ty 3) | EA | | | | 1 | | 1 | | | | | 2
Inlet (Compl) (Drop) (Ty 6) | EA | 1 | | | | | | | 1 | | | 2
Grate TY2 # | EA | 4 | | | 1 | | 1 | | 4 | | | 10
PW-N Wingwall (H=2'-0") | EA | | | | | 2 | | | | | | 2
Trench Excavation Protection | LF | 83 | 109 | 40 | | | | 120 | 140 | | | 492
Inlet (Comp) (Curb) (TY 1) | EA | | 1 | 1 | | | | | | | | 2
Ring & Cover (24") # | | | 1 | 1 | | | | | | | | 2
For Contractors information only.
* Subsidiary to various bid items.
D.I. S-2 Type 6 Drop Inlet
℄ Rdwy "A" Sta. 10283+24
Grate Elev. 985.15
(H=12')
Riprap
Conc. Cl. "B"
Est @ 3 cy
151' LT "A" STA 10282+37
RH-15 HEADWALL
RIPRAP CL "B" CONC.
(FOR PAYMENT, SEE SHT. 95)
E.B. MAINLANES
W.B. MAINLANES
RH-15 HEADWALL
RIPRAP CL "B" CONC
EST. @ 5 CY
139' RT "A" STA 10284+00
EXIST GROUND
Eastbound Frontage Rd.
Westbound Frontage Rd.
0.70%
2-173' x 36" R.C.P. (Cl IV)
0.60%
2-157' x 30" RCP CL IV
FL 972.50
F.L. ELEV. 973.71
F.L. ELEV. 975.06
INVERT SHAPING
BOTTOM ELEV. 973.15
F.L. ELEV. 976.00
Line S-2
Line S-1
980
970
TRENCH EXCAV. PROTECTION 140 LF
TRENCH EXCAV. PROTECTION 120 LF
STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER
Robert E. Magers
9-10-90
Date
STORM SEWER PROFILES
LINES R, Q, R & S
FED. ROAD DIV. NO. 6
STATE TEXAS
FEDERAL AID PROJECT NO.
SHEET NO. 269
STATE DIST. NO.
COUNTY BEXAR
CONTROL NO. 2462
SECTION NO. 02
JOB NO. 023
HIGHWAY NO. LP1604

Note: The Existing Culvert Is To Be Extended At Its Present Height To Provide For As Little Inconvenience To The Traveling Public As Possible. The Maintenance Foreman Responsible For This Culvert Has Stated That There Are No Maintenance Problems Associated With This Culvert. (7-6-1990)





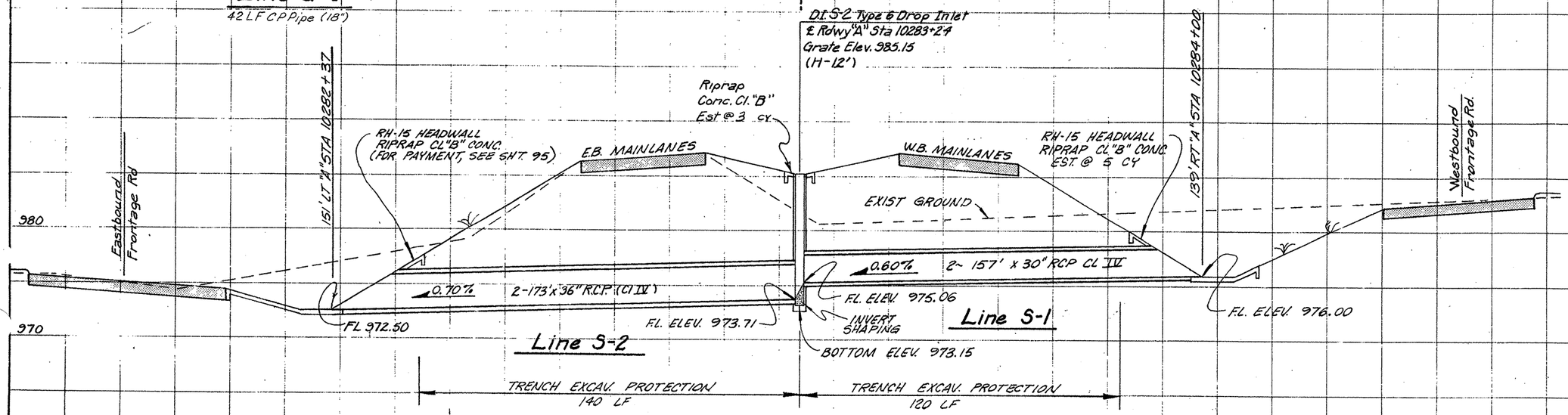




Estimated Quantities

ITEMS	Unit	Line # P-1	Line # P-2	Line # P-3	Line # Q-1	Line # R-2	Line # R-1	Line # S-1	Line # S-2			Total
# Sewer Excavation	CY	97	127	174	15	15	50	425	510			1,413
Riprap (Conc.)(Cl. "B")	CY	3		4	6	3	2	5	3			26
Conc. Box Culvert 5'x2' (PC-2)	LF					30						30
Corr Poly Pipe (18")	LF				42		68					110
Corr Poly Pipe (24")	LF	83										83
Corr Poly Pipe (30")	LF		109	214								323
R.C. Pipe (30") (Cl IV)	LF							314				314
R.C. Pipe (36") (Cl IV)	LF								346			346
Inlet (Compl) (Drop) (Ty 3)	EA				1		1					2
Inlet (Compl) (Drop) (Ty 6)	EA	1							1			2
Grate TY 2 #	EA	4			1		1		4			10
PW-N Wingwall (H=2'-0")	EA					2						2
Trench Excavation Protection	LF	83	109	40				120	140			492
Inlet (Comp) (Curb) (TY 1)	EA		1	1								2
Ring & Cover (24") #			1	1								2

For Contractors information only.
* Subsidiary to various bid items.



STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers 9-10-90
Robert E. Magers Date

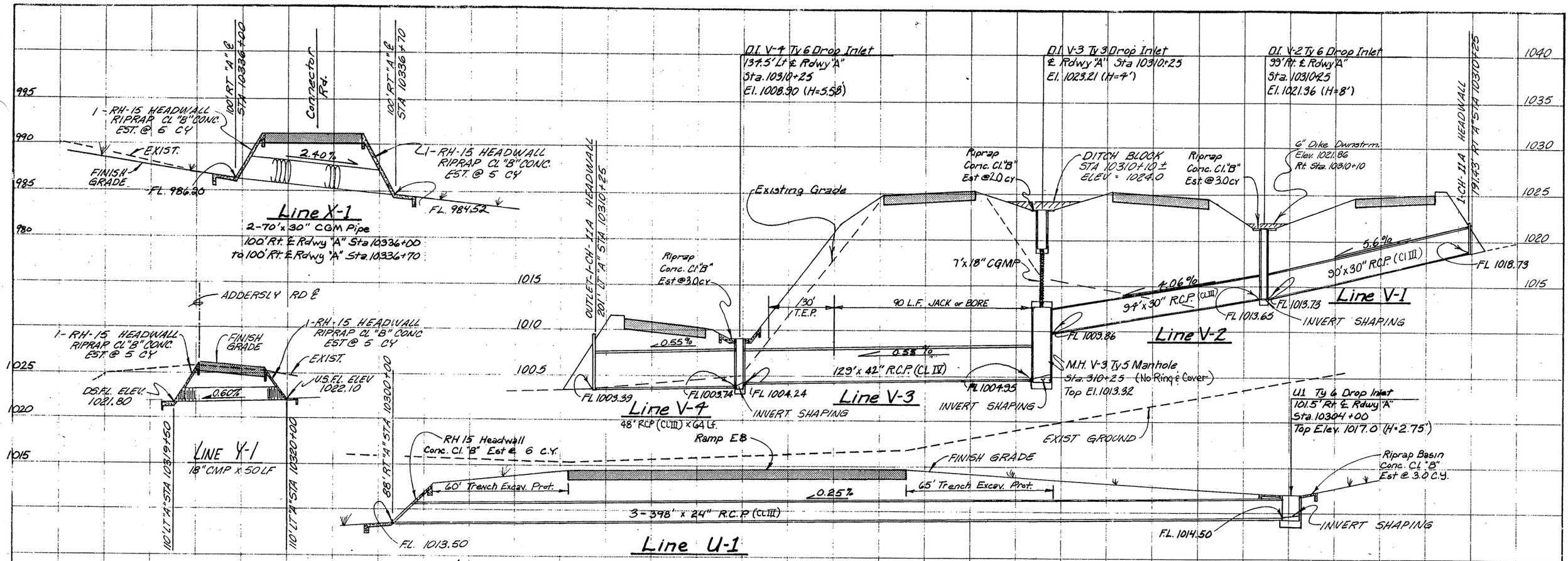
STORM SEWER PROFILES
LINES P,Q,R & S

FIELD CHANGE NO. 1

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS	NH 90 (191) M, etc.	269
STATE DIST. NO.	COUNTY	CONTROL NO. / SECTION NO. / JOB NO.	HIGHWAY NO.
	BEXAR	2452 / 02 / 023	IP604

1270

CULVERT CROSS SECTION SHEET



Estimated Quantities

ITEMS	Unit	Line #	Line # U-1	Line # V-1	Line # V-2	Line # V-3	Line # V-4	Line # W-1	Line # X-1	Line # Y-1	TOTAL
* Sewer Excavation	CY		740		70	615	20	65		30	1540
Riprap (Conc) (CL "B")	CY		9		3	2	3	10	10	10	47
CGM Pipe (18")	LF					7.0		250		50	307
CGM Pipe (30")	LF								140		140
R.C. Pipe (24") (CL III)	LF		1194								1194
R.C. Pipe (30") (CL III)	LF			90	94						184
R.C. Pipe (42") (CL IV)	LF					39					39
CH 11A Headwall	EA			1			1				2
Inlet (Comp) (TY 3)	EA					1					1
Inlet (Comp) (TY 6)	EA		1		1		1				3
* Grate TY 2	EA		4		4	1	4				13
Trench Excavation Prot.	LF		125			30					155
Manhole (Ty 5)	EA					1					1
Jack or Bore (42") (CL IV R.C.P.)	LF					90					90
R.C. Pipe (48") (CL III)	LF						64				64

* For Contractors information only
Subsidiary to various bid items

STATE OF TEXAS
ROBERT E. MABERS
24726
REGISTERED
PROFESSIONAL ENGINEER

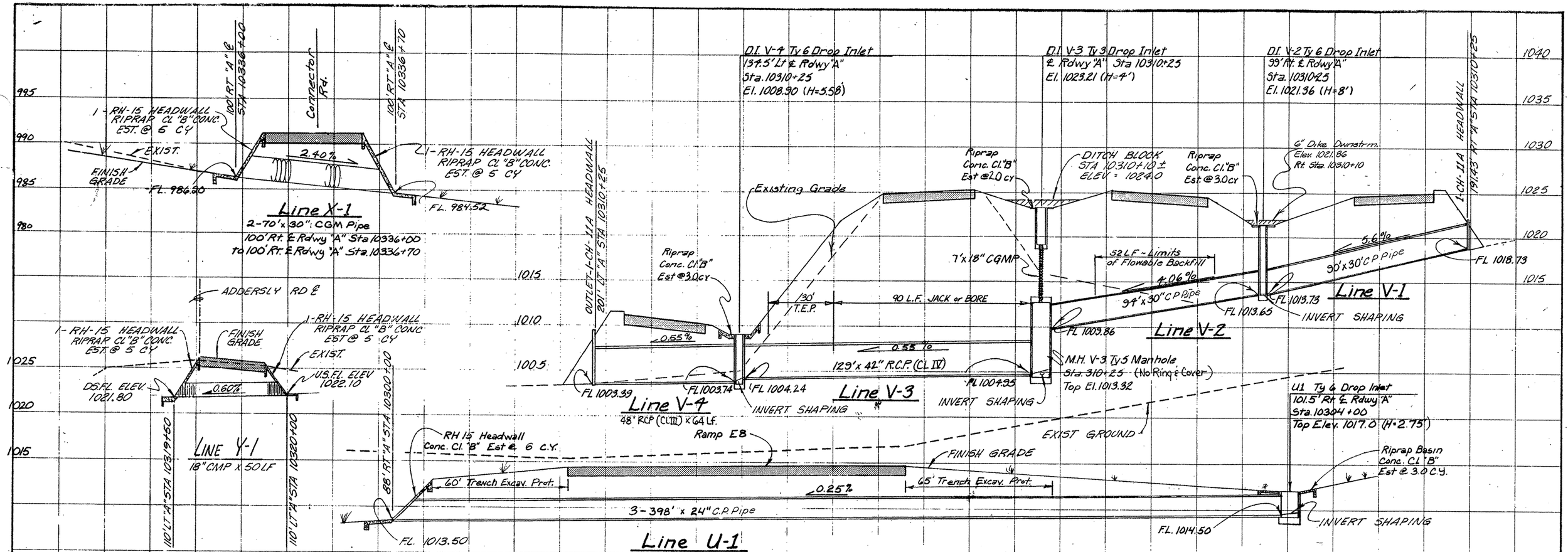
Robert E. Mabers P.E. 9-10-90

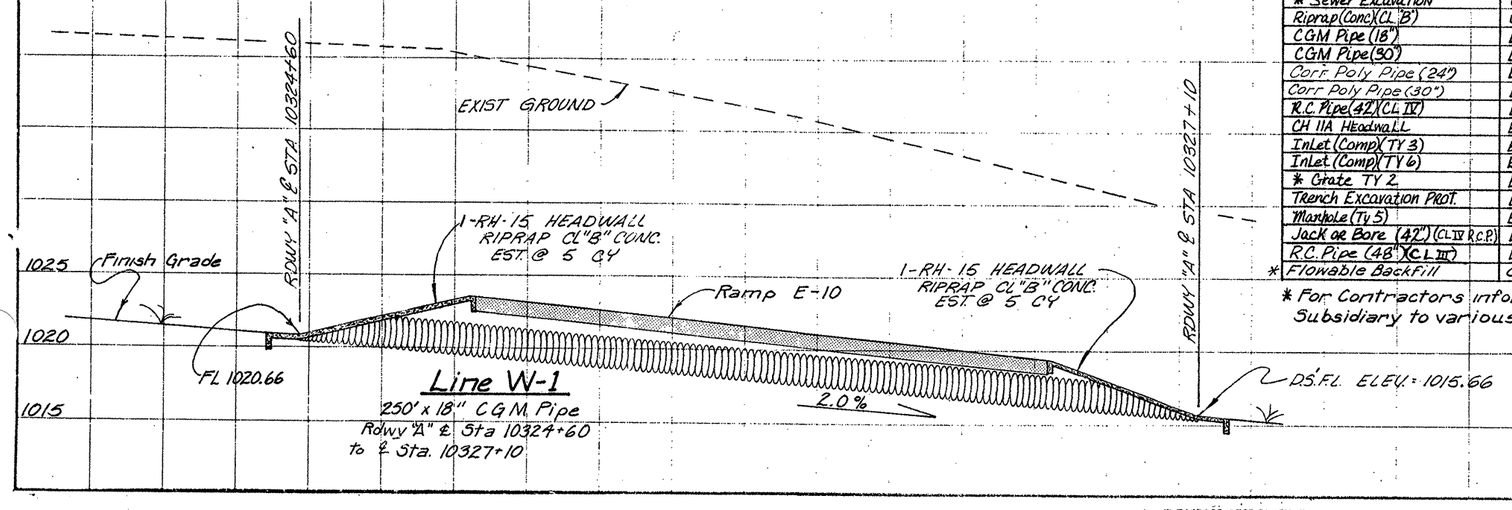
STORM SEWER PROFILES
LINES U, V, W, X & Y

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS		270

STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
	BEXAR	245202	023	LP1604	

CULVERT CROSS SECTION SHEET





Estimated Quantities

ITEMS	Unit	Line #	Line # U-1	Line # V-1	Line # V-2	Line # V-3	Line # V-4	Line # W-1	Line # X-1	Line # Y-1	TOTAL
* Sewer Excavation	CY		740		70	615	20	65		30	1540
Riprap (Conc) (CL "B")	CY		9		3	2	3	10	10	10	47
CGM Pipe (18")	LF					7.0		250		50	307
CGM Pipe (30")	LF								140		140
Corr. Poly Pipe (24")	LF		1194								1194
Corr. Poly Pipe (30")	LF			90	94						184
R.C. Pipe (42") (CL IV)	LF					9					9
CH IIA Headwall	EA			1			1				2
Inlet (Comp) (TY 3)	EA					1					1
Inlet (Comp) (TY 6)	EA		1		1		1				3
* Grate TY 2	EA		4		4	1	4				13
Trench Excavation Prot.	LF		125			30					155
Manhole (Ty 5)	EA					1					1
Jack or Bore (42") (CL IV R.C.P.)	LF					90					90
R.C. Pipe (48") (CL III)	LF						64				64
* Flowable Backfill	CY				21						21

* For Contractors information only
Subsidiary to various bid items

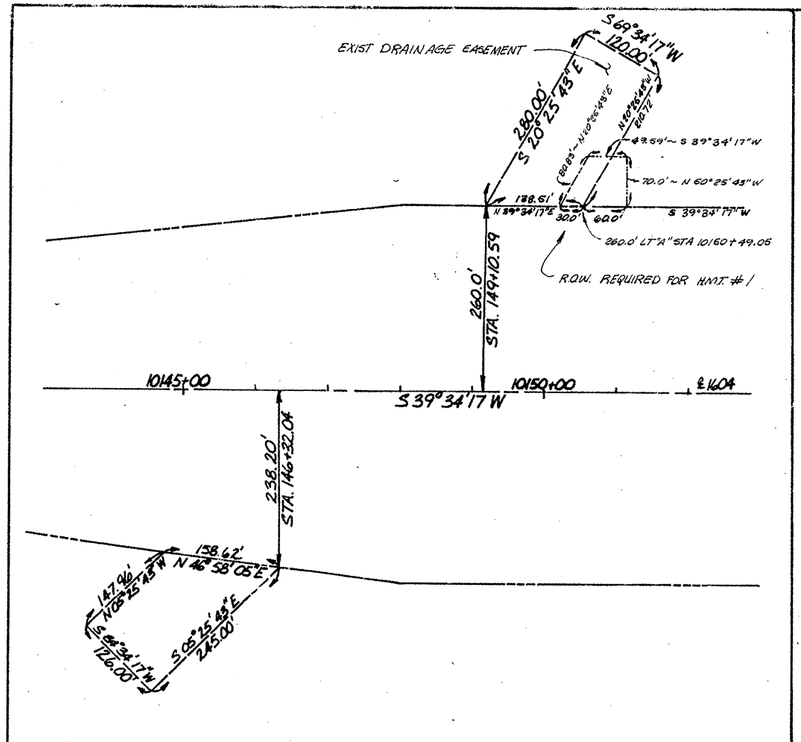
STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

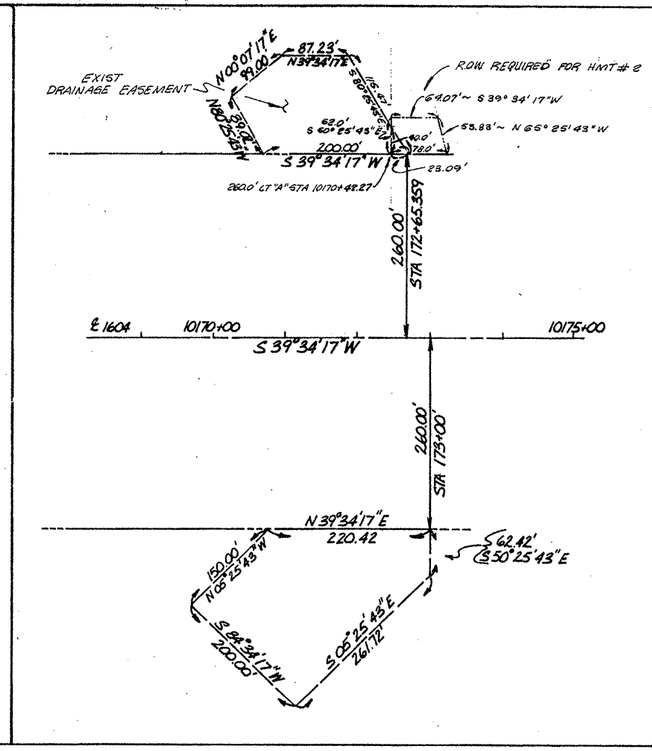
Robert E. Magers P.E. 9-10-90

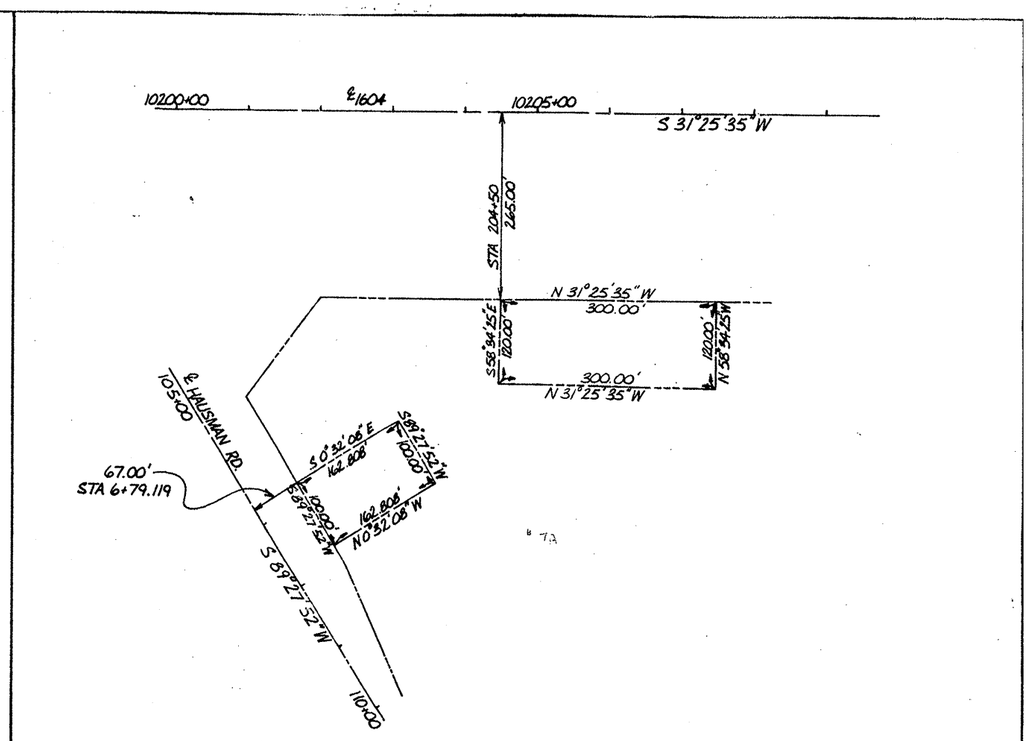
STORM SEWER PROFILES
LINES U,V,W,X & Y

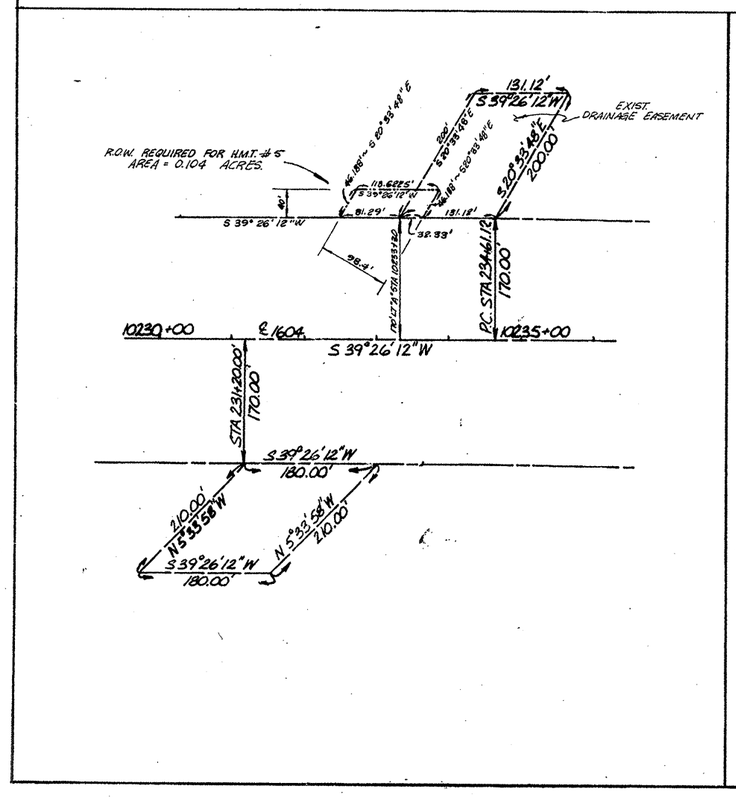
FIELD CHANGE NO. 1

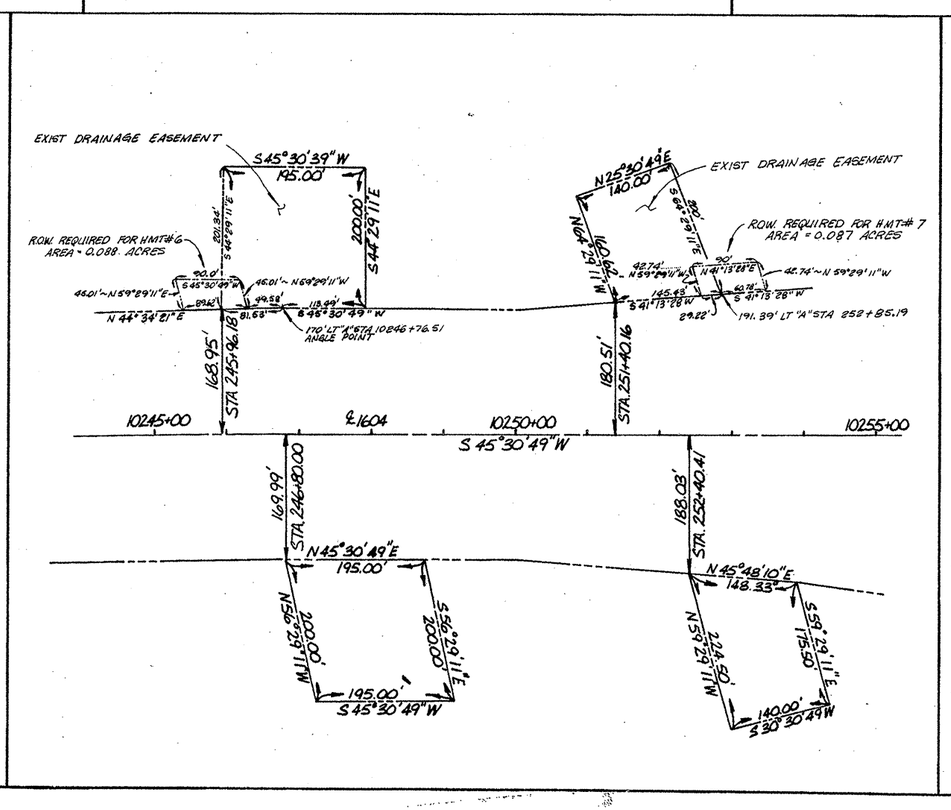
FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS	NH 90(191)M, etc.			270
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
	BEXAR	245202	023	LP1604	

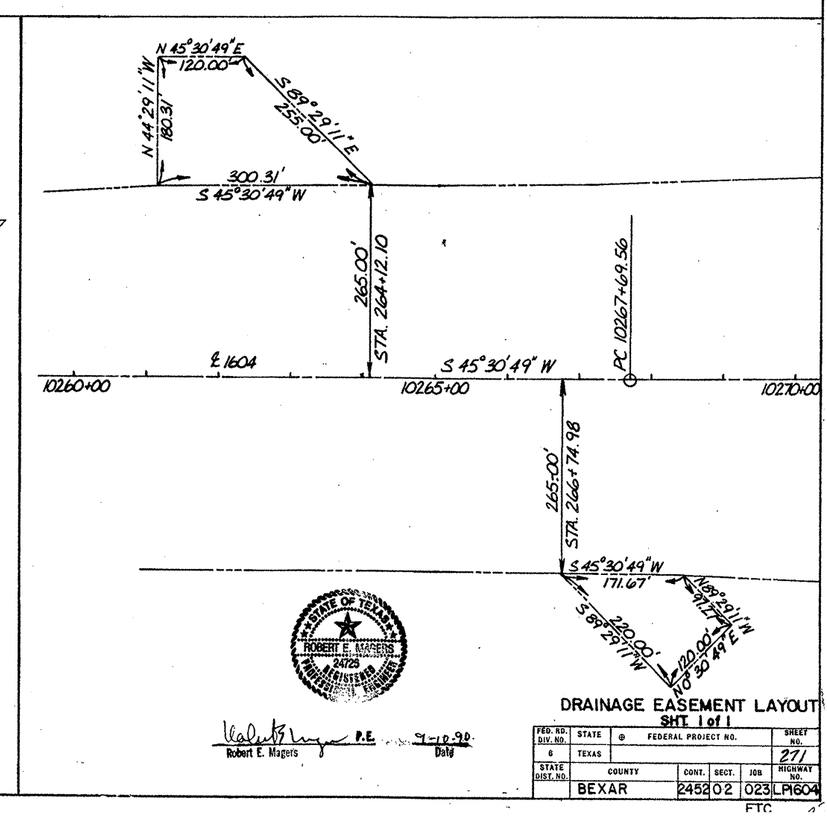












STATE OF TEXAS
ROBERT E. MAGERS
24725
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

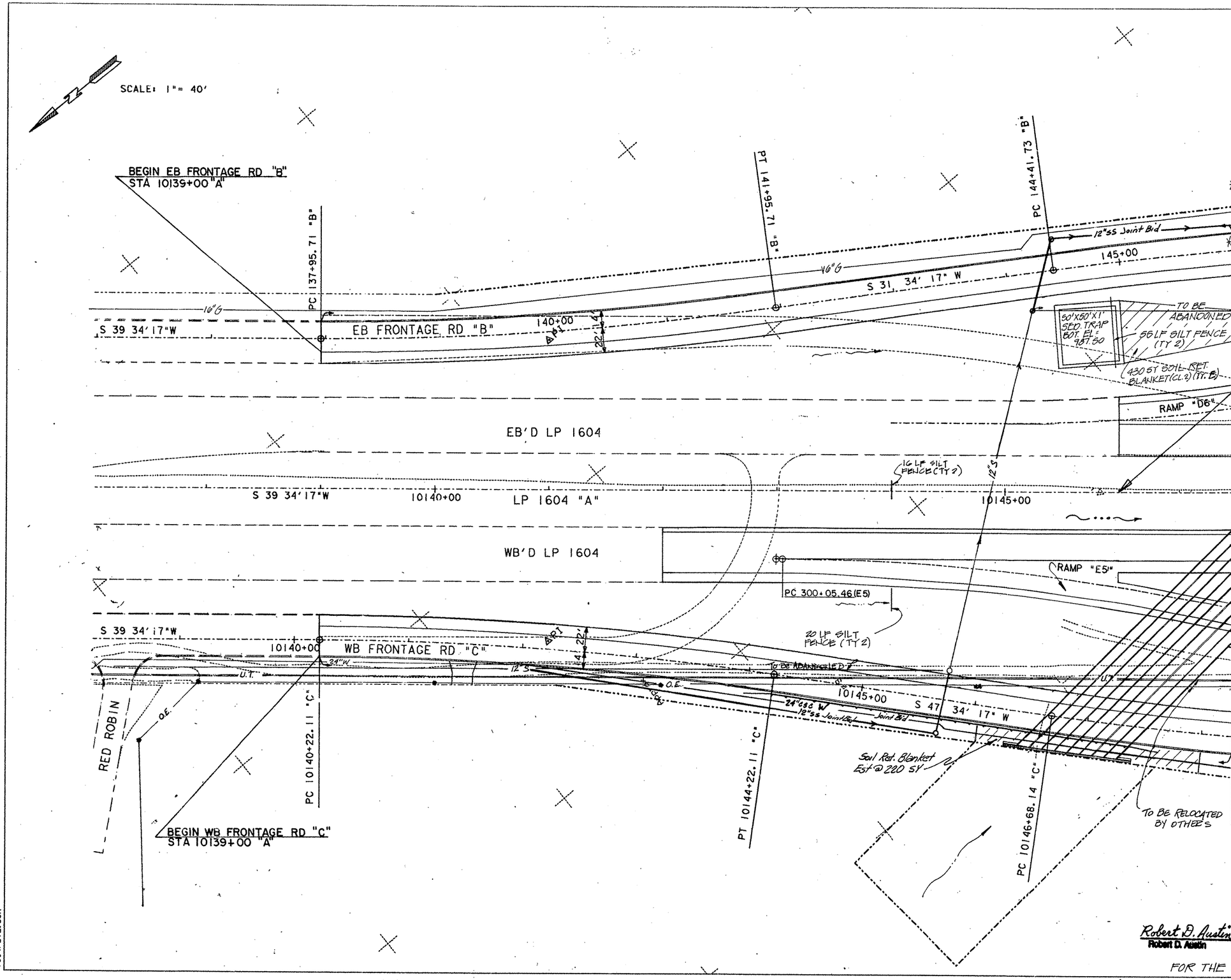
DRAINAGE EASEMENT LAYOUT

SHT. 1 of 1

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.	SHEET NO.
6	TEXAS		271

STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
	BEXAR	2452	02	023	LP1604

ETC.



ESTIMATED QUANTITIES		
ITEM	UNIT	QTY.
SILT FENCE (TY. 2)	LF	91
SILT FENCE (TY. 2) (REM. & REPL.)	LF	91
SILT FENCE (TY. 2) (REM.)	LF	91
SOIL RET. BLANKET (CL. 2) (TY. E)	SY	430
* EXCAVATOR WORK (EROSION CONTROL)	HR	10
FRT. END LDR. WORK (EROSION CONTROL)	HR	5
CONSTRUCTION EXIT (TY. 1)	SY	504
** CONSTRUCTION EXIT (TY. 1) (REM. & REPL.)	SY	504
CONSTRUCTION EXIT (TY. 1) (REM.)	SY.	504

* 50'X10'X1.5' SED. TRAPS EST. @ 2 HR. EXCAVATOR WORK (EROSION CONTROL) & 1 HR. FRT. END LDR. WORK (EROSION CONTROL)

** THE CONSTRUCTION EXITS WERE EST. @ 14'X50' (6 @ 84 SY = 504 SY). THEY SHALL BE LOCATED BY THE CONTRACTOR AS APPROVED BY THE ENGINEER.

NOTE: ALL SEDIMENT TRAPS SHALL HAVE 2:1 SIDE SLOPES UNLESS STATED OTHERWISE ON THE PLANS OR BY THE ENGINEER.

BEGIN PROJECT CRP 90 (191) M
CONTROL 2452-02-023
STA 10146+00

For Joint Bid Utility Adjustments:
Water - See Sheets 348-373
Sewer - See Sheets 340-347

BRIDGE CLASS STRUCTURE #5
8 ~ 8' X 4' MBC

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Date

STATE OF TEXAS
ROBERT D. AUSTIN
67596
REGISTERED PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P

SW3P
STORMDRAIN & UTILITY LAYOUTS

SHEET 1 OF 21

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					272
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP1604	

ETC

1604PL12.DGN

SITE DESCRIPTION

PROJECT LIMITS: Loop 1604 0.30 miles west of Babcock to 1.2 miles south of S.H.16. (Total length = 19,150 feet = 3.625 miles)

PROJECT DESCRIPTION: Construction of the conversion of a non-freeway Facility to a Freeway Facility consisting of Grading, Structures, Base, Surface, and Signing.

MAJOR SOIL DISTURBING ACTIVITIES: Soil Disturbing activities will include Preparing the Right of Way; Grading; Excavation and Embankment for the Roadway; Hazardous Materials traps; Inlet & Storm Sewer Installations; Retaining Walls; Erosion and Sediment Controls; Utilities and Utility Adjustments; and Topsoil Work for final planting and seeding.

TOTAL PROJECT AREA: 210 Acres

TOTAL AREA TO BE DISTURBED: 200 Acres (95%)

WEIGHTED RUNOFF COEFFICIENT (AFTER CONSTRUCTION): 0.75

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER: The existing soil is of the Crawford - Bexar Association (Moderately deep, stony soils over Limestone). Vegetation covers 85% of the project area and is in good condition.

NAME OF RECEIVING WATERS:

There are seven major drainage crossings that receive runoff from the 210 Acres of TxDOT Right of Way. Two of these seven creeks that flow under Loop 1604 are Huesta Creek and French Creek. The other five creeks are not named. All seven creeks ultimately flow into Leon Creek, which is located within stream segment 1906.

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

- ✓ TEMPORARY SEEDING
- ✓ SOIL RETENTION BLANKETS
- ✓ BUFFERS ZONES
- ___ MULCHING
- ✓ PERMANENT PLANTING, SODDING OR SEEDING
- ✓ PRESERVATION OF NATURAL RESOURCES

OTHER: Disturbed areas on which construction activity has ceased (temporarily or permanently) shall be stabilized within 14 days unless activities are scheduled to resume within 21 days.

STRUCTURAL PRACTICES:

- ✓ SEDIMENT TRAPS
- ✓ SILT FENCES
- ✓ ROCK BERMS
- ___ SEDIMENT BASINS
- ✓ CHANNEL LINERS
- ___ SLOPE DRAINS
- ✓ STORM SEWERS
- ✓ CURBS & GUTTERS
- ✓ VELOCITY CONTROL DEVICES
- ✓ STORM INLET SEDIMENT TRAP
- ___ DIVERSION, INTERCEPTOR OR PERIMETER DIKES
- ___ INTERCEPTOR OR PERIMETER SWALES
- ✓ ROCK BEDDING AT CONSTRUCTION EXIT
- ___ TIMBER MATTING AT CONSTRUCTION EXIT
- ___ STONE OUTLET STRUCTURES
- ✓ HAZARDOUS MATERIAL TRAPS

OTHER: Since a portion of project is located over the Edwards Aquifer Recharge Zone, 9 Hazardous Materials Traps (HMTs) will be installed. All precipitation that falls within TxDOT ROW that is located on said Recharge Zone will pass through one of the nine HMTs.

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

The order of activities will be as follows:

1. Install Perimeter Controls.
2. Make required Utility Adjustments and Install new Utilities Including Inlets and Storm Sewers. Install structural controls around all inlets as soon as they are functional.
4. Construct base and pavement section within Phase I limits (excluding final lift of hot mix asphaltic pavement).
5. Repeat steps 2 through 4 for remaining project phases.
6. When all construction activity is complete and the site is stabilized and approved by the project engineer, remove all temporary structural controls and reseed any areas disturbed by their removal.

STORM WATER MANAGEMENT: Storm Water drainage will be provided by grass ditches with typical 6:1 or flatter sideslopes, Drop Inlets, Curb Inlets, and a Storm Sewer System. The system will carry drainage within the R.O.W. to lows in the highway where cross drainage occurs. Velocities will be kept slow through the use of soil stabilization and structural practices mentioned above.

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE: All erosion and sediment controls will be maintained in good working order. If a repair is necessary, it will be done at the earliest date possible, but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. The areas adjacent to creeks and drainageways shall have priority followed by devices protecting storm sewer inlets.

INSPECTION: An inspection will be performed by a TxDOT Inspector every week as well as after every half inch or more of rain (as recorded on a non-freezing rain gauge to be located at the Project Site). An Inspection and Maintenance Report will be made per each inspection. Based on the inspection results, the controls shall be revised per the inspection report.

WASTE MATERIALS: All waste materials will be collected and stored in a securely lidded metal dumpster. The dumpster will meet all state and local city solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied as necessary or as required by local regulation, and the trash will be hauled to a local dump. No construction waste material will be buried on site.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): At a munimum, any products in the following catagories are considered to be hazardous: Paints, Acids for cleaning masonry surfaces, Cleaning Solvents, Asphalt products, Chemical additives for soil stabilization, or Concrete curing compounds and additives. In the event of a spill which may be harardous, the Spill Coordinator should be contacted immediately.

SANITARY WASTE: All sanitary waste will be collected from the portable units as necessary or as required by local regulation by a licensed sanitary waste management contractor.

OFFSITE VEHICLE TRACKING:

- ___ HAUL ROADS DAMPENED FOR DUST CONTROL
- ___ HAUL TRUCKS COVERED WITH TARPAULIN
- ___ EXCESS DIRT ON ROAD REMOVED DAILY
- ✓ STABILIZED CONSTRUCTION EXIT

OTHER:

REMARKS: Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, waterbody or streambed.

Contractor staging areas and vehicle maintenance areas shall be constructed by the Contractor in a manner to minimize the runoff pollutants.

All waterways shall be cleared as soon as practicable of temporary embankment, temporary bridges, matting, falsework piling, debris or other obstructions placed during construction operations that are not a part of the finished work.

Facilities for above-ground or under-ground storage of all static petroleum/hydrocarbon products shall be located out of the Edwards Aquifer Recharge Zone, (southwest of State Highway 16).

STATE OF TEXAS
ROBERT D. AUSTIN
67596
REGISTERED PROFESSIONAL ENGINEER

Robert D. Austin, P.E. 3-31-93
ROBERT D. AUSTIN Date

TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

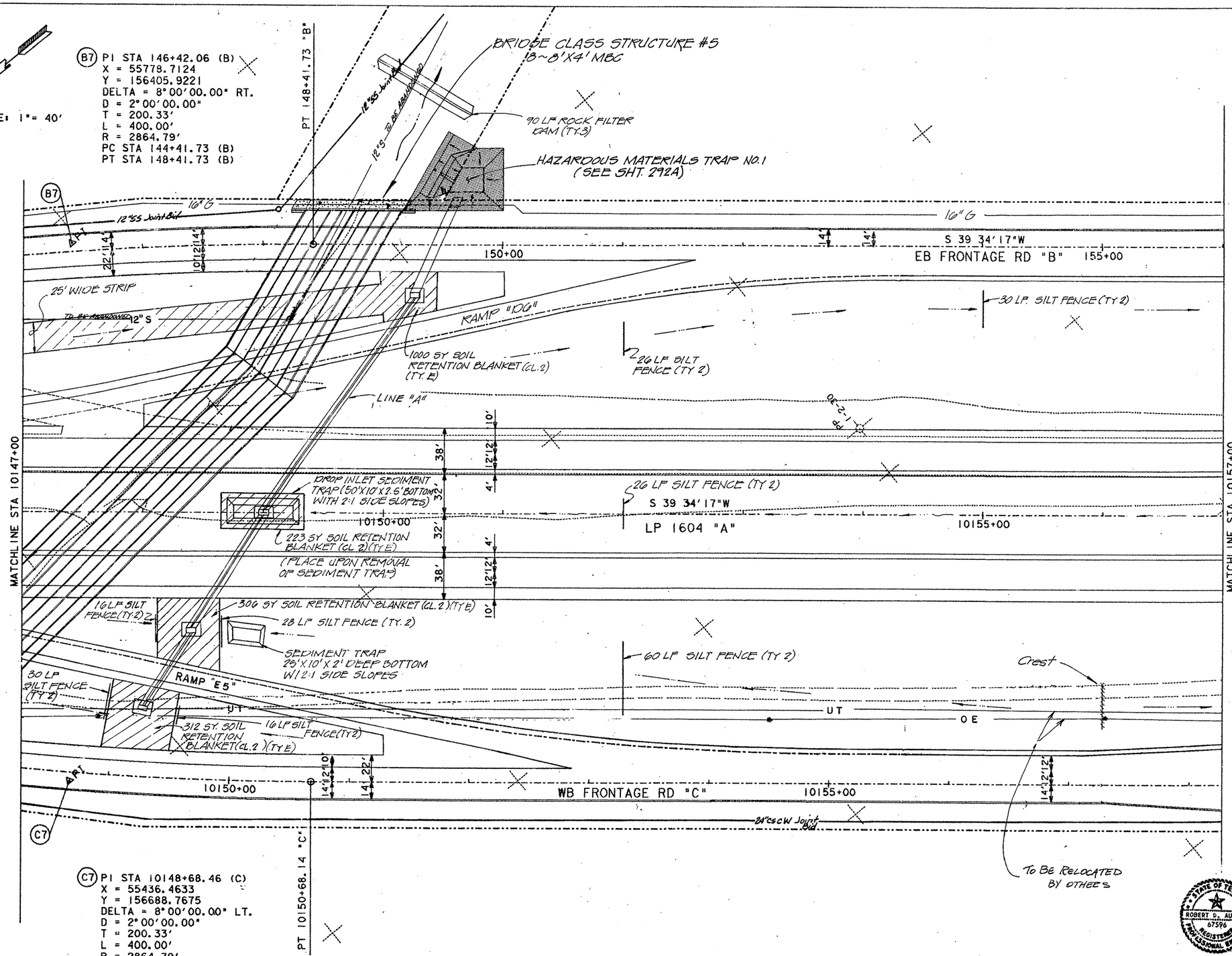
Design: R.D.A.	FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NO.		SHEET NO. 272A
Graphics: R.M.Q.	STATE TEXAS	STATE DIST. NO. 15	COUNTY BEXAR	
Checks	CONT. 2452	SECT. 021	JOB 023	HIGHWAY NO. LP 1604

ETC.

SW3P.DGN

SCALE: 1" = 40'

(B7) PI STA 146+42.06 (B)
X = 55778.7124
Y = 156405.9221
DELTA = 8°00'00.00" RT.
D = 2°00'00.00"
T = 200.33'
L = 400.00'
R = 2864.79'
PC STA 144+41.73 (B)
PT STA 148+41.73 (B)



(C7) PI STA 10148+68.46 (C)
X = 55436.4633
Y = 156688.7675
DELTA = 8°00'00.00" LT.
D = 2°00'00.00"
T = 200.33'
L = 400.00'
R = 2864.79'
PC STA 10146+68.14 (C)
PT STA 10150+68.14 (C)

Estimated Quantities		
Item	Unit	Qty
SILT FENCE (TY 2)	LF	232
SILT FENCE (TY 2) (REM. & REPL.)	LF	232
SILT FENCE (TY 2) (REM.)	LF	232
SOIL RET. BLANKET (CL. 2) (TY E)	SY	1841
EXCAVATOR WORK (EROSION CONTROL)	HR	4
FRT. END LDR. WORK (EROSION CONTROL)	HR	2
ROCK FILTER DAM (TY. 3).	LF	90
ROCK FILTER DAM (TY. 3) (REM.)	LF	90

For Joint Bid Utility Adjustment Details:
Sewer - See Sheets 340-347
Water - See Sheets 348-373

STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

STATE OF TEXAS ROBERT D. AUSTIN 67596 REGISTERED PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D Austin Date

FOR THE SW3P, LINE "A", HMT

SW3P
STORMDRAIN & UTILITY LAYOUTS

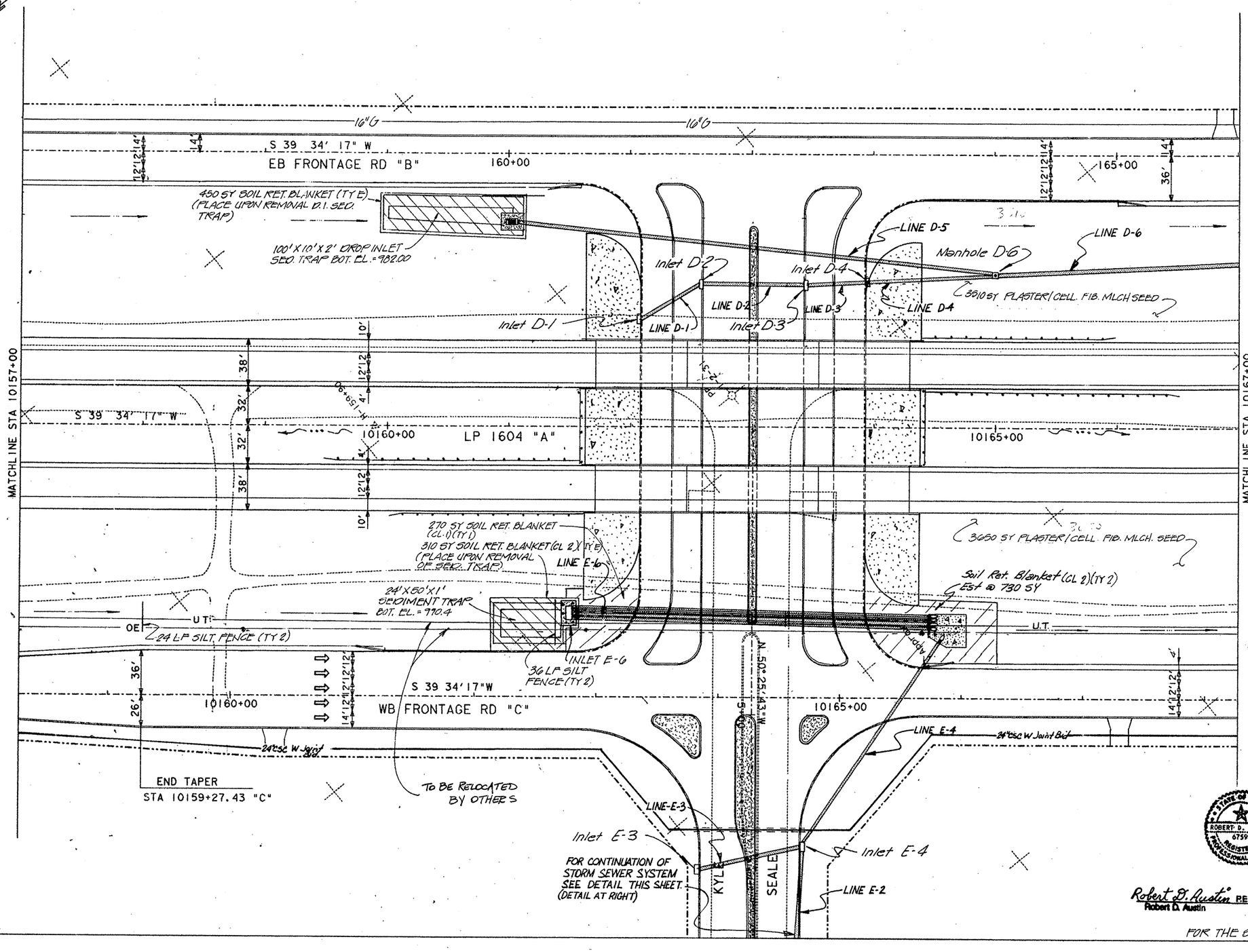
SHEET 2 OF 21

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					273
STATE DIST NO	COUNTY	CONT.	SECT.	JOB		HWY. NO.
15	BEXAR	2452	02	023		LP 1604

ETC.

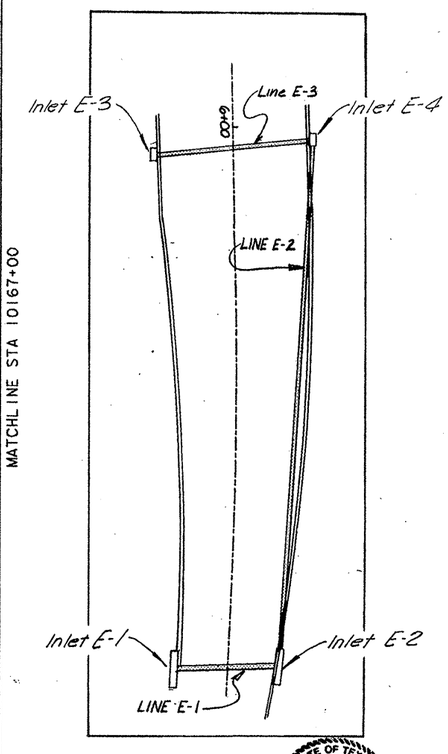
1604PL13.DGN

SCALE: 1" = 40'



ESTIMATED QUANTITIES		
ITEM	UNIT	QTY.
SOIL RET. BLANKET (CL. 1)(TY A)	SY	270
SOIL RET. BLANKET (CL. 2)(TY E)	SY	1490
SILT FENCE (TY 2)	LF	60
SILT FENCE (TY 2)(REM. & REPL.)	LF	60
SILT FENCE (TY 2) (REM)	LF	60
EXCAVATOR WORK (EROSION CONTROL)	HR	6
PRT. END LDR. WORK (EROSION CONTROL)	HR	3
PLASTER/CELL FIB. MLCH. SEED	SY	7160
	SY	7160

For Joint Bid Utility Adjustment Details:
Water - See Sheet 348 - 373



STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

STATE OF TEXAS ROBERT D. AUSTIN 67596 REGISTERED PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P

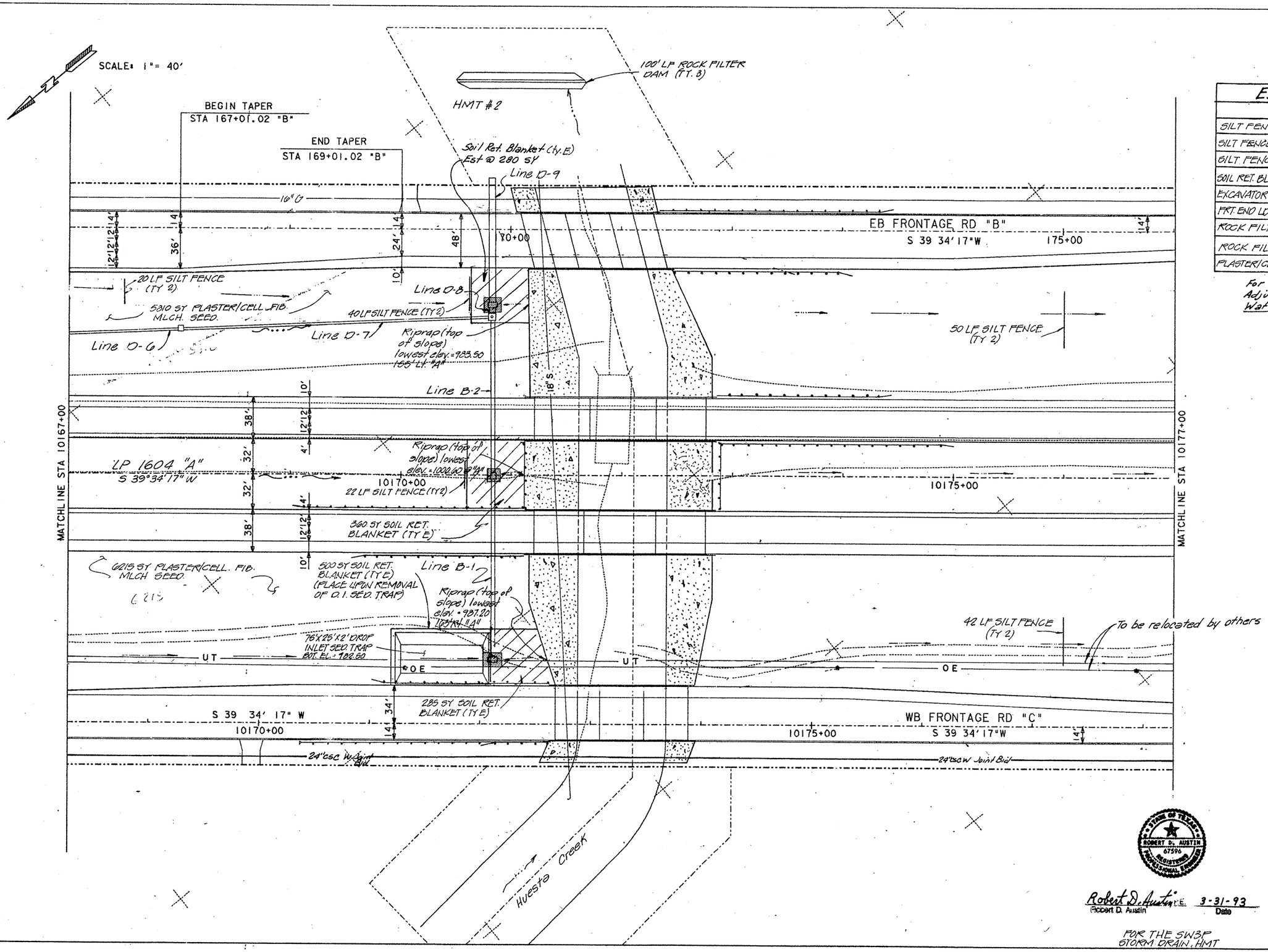
SW3P STORMDRAIN & UTILITY LAYOUTS

SHEET 3 OF 21

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				274
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.
15	BEXAR	2452	02	023	LP1604

1604PL14.DGN

ETC.



Estimated Quantities

Item	Unit	Qty
SILT FENCE (TY 2)	LF	174
SILT FENCE (TY 2) (REM. & REPL)	LF	174
SILT FENCE (TY 2) (REM)	LF	174
SOIL RET. BLANKET (CL. 2) (TY. E)	SY	1425
EXCAVATOR WORK (EROSION CONTROL)	HR	10
FRT. END LDR. WORK (EROSION CONTROL)	HR	5
ROCK FILTER DAM (TY. 3)	LF	100
ROCK FILTER DAM (TY. 3) (REM)	LF	100
PLASTER/CELL. FIB. MLCH. SEED.	SY	12025

For Joint Bid Utility Adjustment Details:
Water - See Sheets 348-373

ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER STATE OF TEXAS

Robert E. Magers P.E. 9-18-90
Robert E. Magers Date

ROBERT D. AUSTIN 67596 REGISTERED PROFESSIONAL ENGINEER STATE OF TEXAS

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P STORM DRAIN, HMT

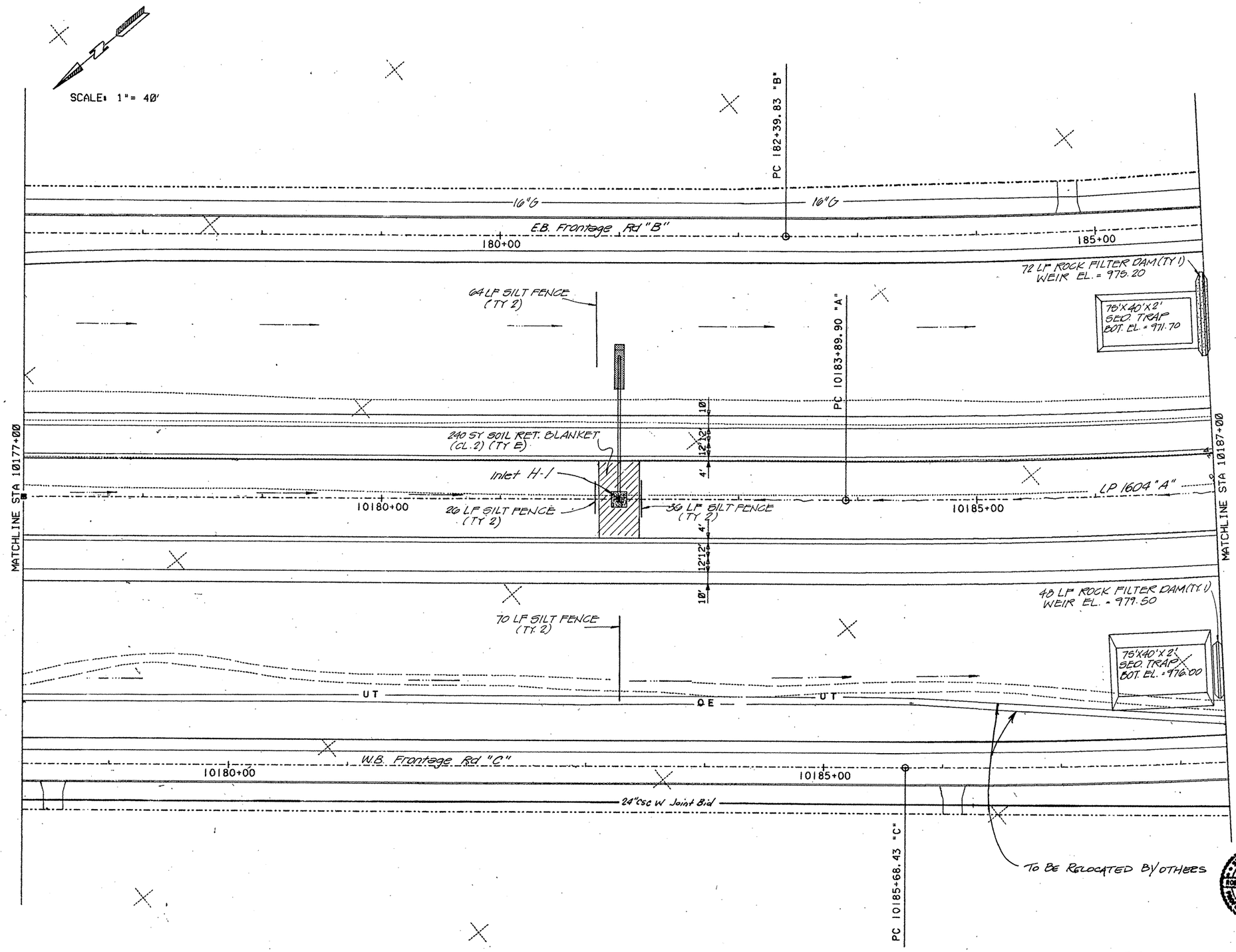
SW3P
STORMDRAIN & UTILITY LAYOUTS

SHEET 4 OF 21

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					275
STATE DIST NO	COUNTY	CONT.	SECT.	JOB		HWY. NO.
15	BEXAR	2452	02	023		LP1604

ETC.

1604PL15.DGN



Estimated Quantities		
Item	Unit	Qty
SILT FENCE (TY 2)	LF	134
SILT FENCE (TY 2) (REM. & REPL.)	LF	134
SILT FENCE (TY 2) (REM)	LF	134
SOIL RET. BLANKET (CL. 2) (TY. E)	SY	240
EXCAVATOR WORK (EROSION CONTROL)	HR	24
PRT. END LOK WORK (EROSION CONTROL)	HR	12
ROCK FILTER DAM (TY 1)	LF	120
ROCK FILTER DAM (TY 1) (REM.)	LF	120

FOR JOINT BID UTILITY ADJUSTMENT DETAILS:
WATER - SEE SHEETS 348-373

STATE OF TEXAS
ROBERT E. MAGERS
64726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

STATE OF TEXAS
ROBERT D. AUSTIN
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PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P

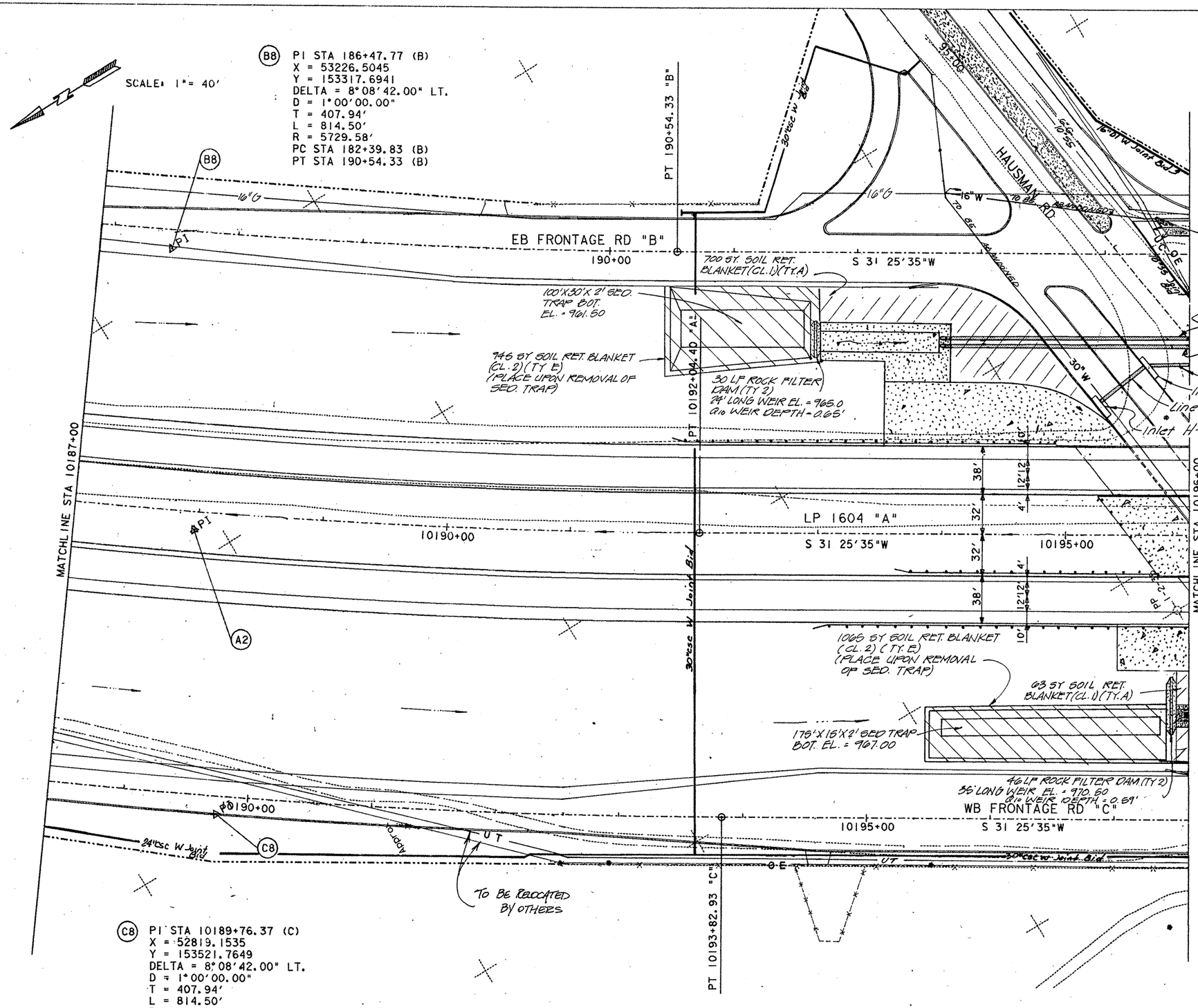
SW3P
STORMDRAIN & UTILITY LAYOUTS

SHEET 5 OF 21

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					276
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP1604	

ETC.

1604PL16.DGN



Estimated Quantities		
Item	Unit	Qty
SOIL RET. BLANKET(CL.1)(TY.A)	SY	763
SOIL RET. BLANKET(CL.2)(TY E)	SY	2010
EXCAVATOR WORK(EROSION CONTROL)	HR	28
PRT. END LOR. WORK(EROSION CONTROL)	HR	14
ROCK FILTER DAM(TY.2)	L.F.	76
ROCK FILTER DAM(TY 2)(REM.)	LF	76

For Joint Bid Utility Adjustment Details:
Water - See Sheets 348-373
Sewer - See Sheets 340-347

A2 PI STA 10187+97.84 (A)
X = 53022.8290
Y = 153419.7295
DELTA = 8°08'42.00" LT.
D = 1°00'00.00"
T = 407.94'
L = 814.50'
R = 5729.58'
PC STA 10183+89.90 (A)
PT STA 10192+04.40 (A)

C8 PI STA 10189+76.37 (C)
X = 52819.1535
Y = 153521.7649
DELTA = 8°08'42.00" LT.
D = 1°00'00.00"
T = 407.94'
L = 814.50'
R = 5729.58'
PC STA 10185+68.43 (C)
PT STA 10193+82.93 (C)

STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

STATE OF TEXAS ROBERT D. AUSTIN 67596 REGISTERED PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P

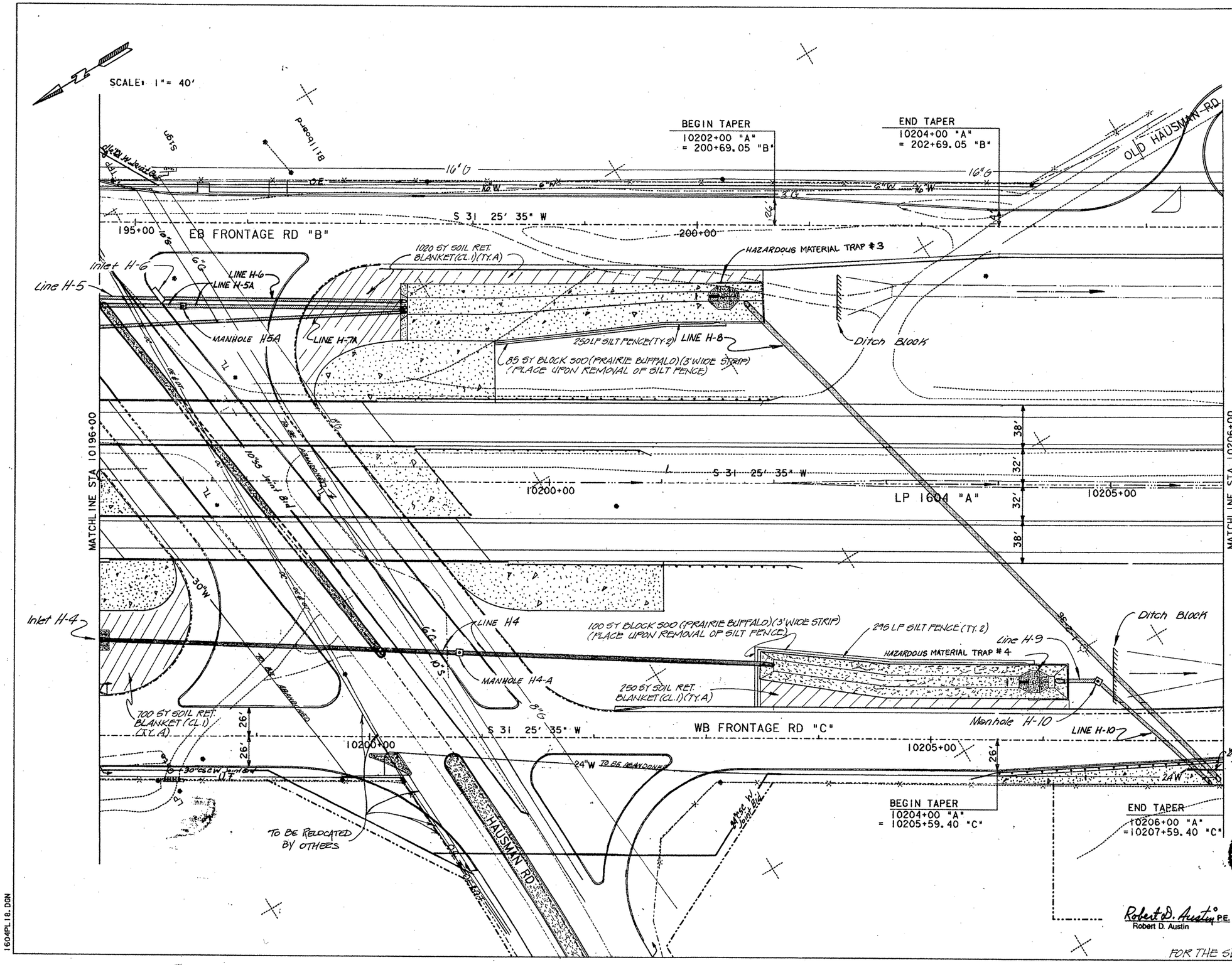
SW3P STORMDRAIN & UTILITY LAYOUTS

SHEET 6 OF 21

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				277
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.
15	BEXAR	2452	02	023	LP1604

1604PL17.DGN

ETC.



Estimated Quantities		
Item	Unit	Qty
SILT FENCE (TY 2)	LF	545
SILT FENCE (TY 2)(REM.)	LF	545
SOIL RET. BLANKET (CL.1)(TY.A)	SY	1970
BLOCK SOD (PRAIRIE BUFFALO)	SY	185

For Joint Bid Utility Adjustment Details:
Sewer - See Sheets 340-347
Water - See Sheets 348-373

STATE OF TEXAS
ROBERT E. MAGERS
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Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

STATE OF TEXAS
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Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P

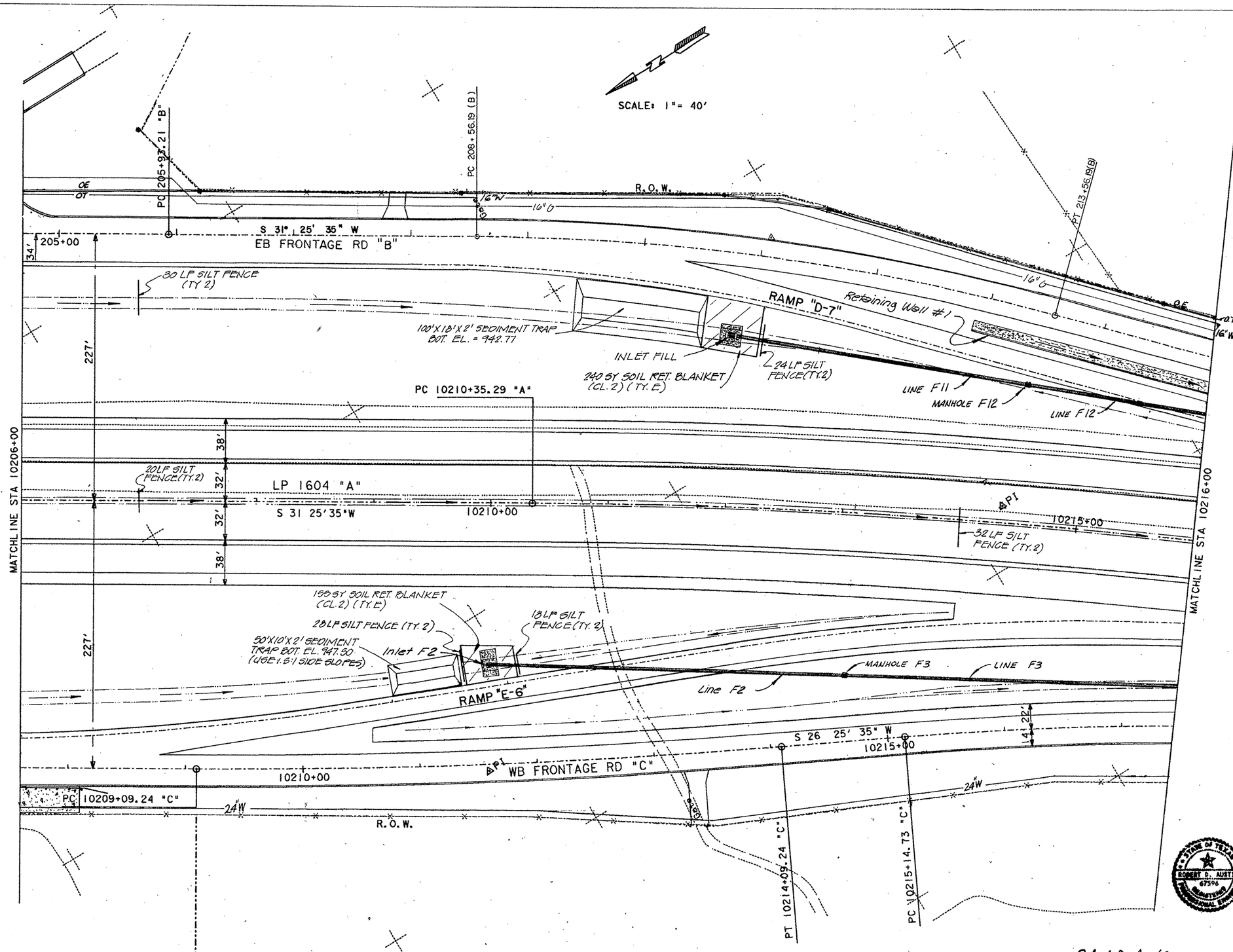
SW3P STORMDRAIN & UTILITY LAYOUTS

SHEET 7 OF 21

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					278
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP1604	

.ETC

1604PL18.DGN



Estimated Quantities		
Item	Unit	Qty
SILT FENCE (TY. 2)	LF	152
SILT FENCE (TY. 2)(REM. & REPL.)	LF	152
SILT FENCE (TY. 2)(REM.)	LF	152
SOIL RET. BLANKET (CL. 2)(TY. E)	SY	396
EXCAVATOR WORK (EROSION CONTROL)	HR	12
PRT. END LOR. WORK (EROSION CONTROL)	HR	6

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P

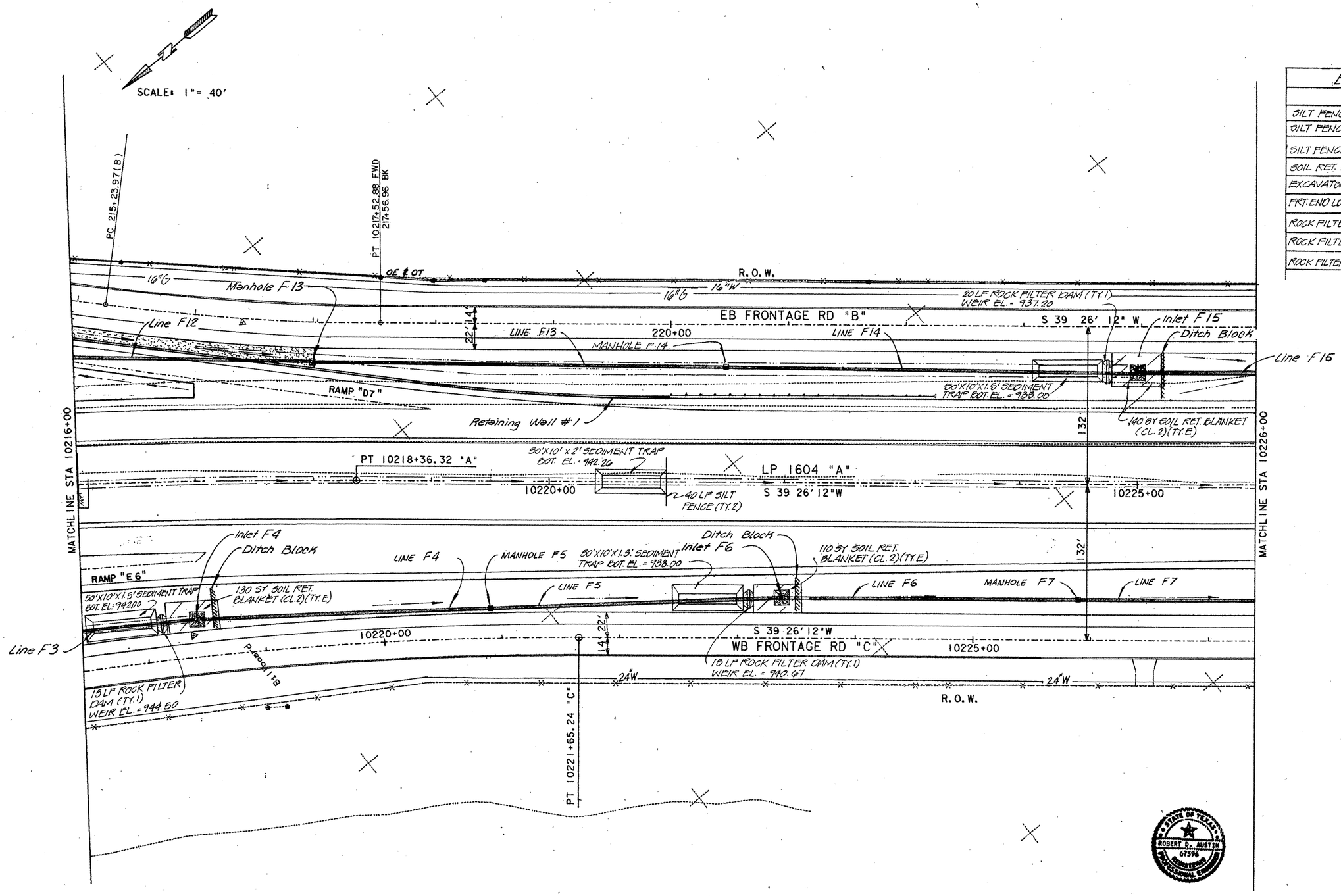
SW3P
STORMDRAIN & UTILITY LAYOUTS

SHEET 8 OF 21

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					279
STATE DIST NO	COUNTY	CONT.	SECT.	JOB		HWY. NO.
15	BEXAR	2452	02	023		LP1604

ETC

1604PL19.DGN



Estimated Quantities		
Item	Unit	Qty
SILT FENCE (TY.2)	LF	40
SILT FENCE (TY.2) (REM. & REPL.)	LF	40
SILT FENCE (TY.2) (REM.)	LF	40
SOIL RET. BLANKET (CL.2) (TY.E)	SY	380
EXCAVATOR WORK (EROSION CONTROL)	HR	8
FRT. END LDR. WORK (EROSION CONTROL)	HR	4
ROCK FILTER DAM (TY.1)	LF	50
ROCK FILTER DAM (TY.1) (REM. & REPL.)	LF	50
ROCK FILTER DAM (TY.1) (REM.	LF	50

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-18-90
Robert E. Magers Date

STATE OF TEXAS
ROBERT D. AUSTIN
67596
REGISTERED
PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P

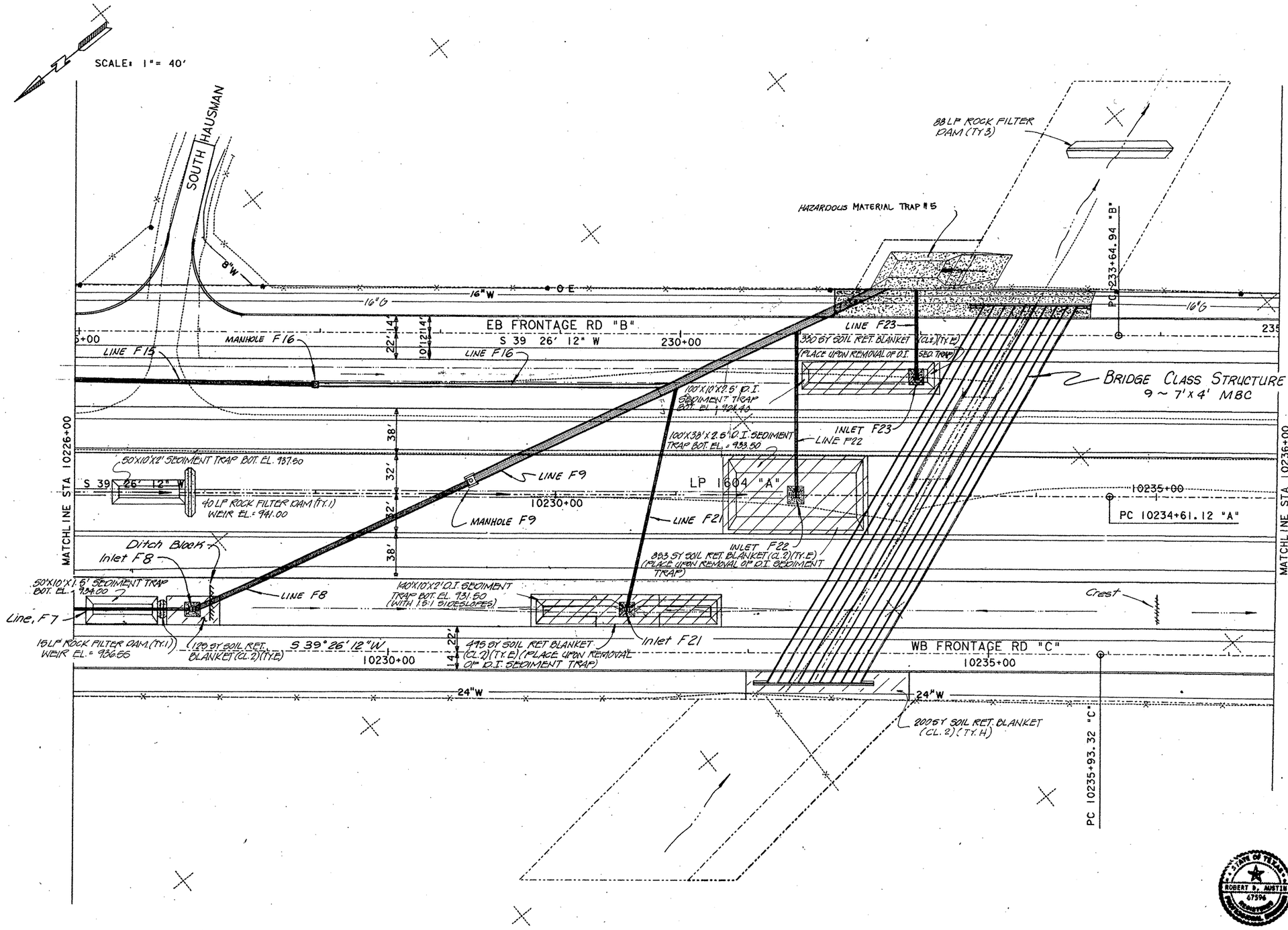
SW3P STORMDRAIN & UTILITY LAYOUTS

SHEET 9 OF 21

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				280
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.
15	BEXAR	2452	02	023	LP1604

FTC

1604P1.20.DGN



Estimated Quantities		
Item	Unit	Qty
SOIL RET. BLANKET (CL.2)(TY.E)	SY	1678
SOIL RET. BLANKET (CL.2)(TY.H)	SY	200
EXCAVATOR WORK (EROSION CONTROL)	HR.	42
PRT. ENQ. LOR. WORK (EROSION CONTROL)	HR.	21
ROCK FILTER DAM (TY.1)	LF	40
ROCK FILTER DAM (TY.1)(REM. & REPL.)	LF	40
ROCK FILTER DAM (TY.1)(REM.)	LF	40
ROCK FILTER DAM (TY.3)	LF	88
ROCK FILTER DAM (TY.3)(REM.)	LF	88

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
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R.E. 9-10-90

STATE OF TEXAS
ROBERT D. AUSTIN
67596
REGISTERED
PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D. Austin — Date

FOR THE SW3P

SW3P
STORMDRAIN & UTILITY LAYOUTS

SHEET 10 OF 21

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS	,				281
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP1604	

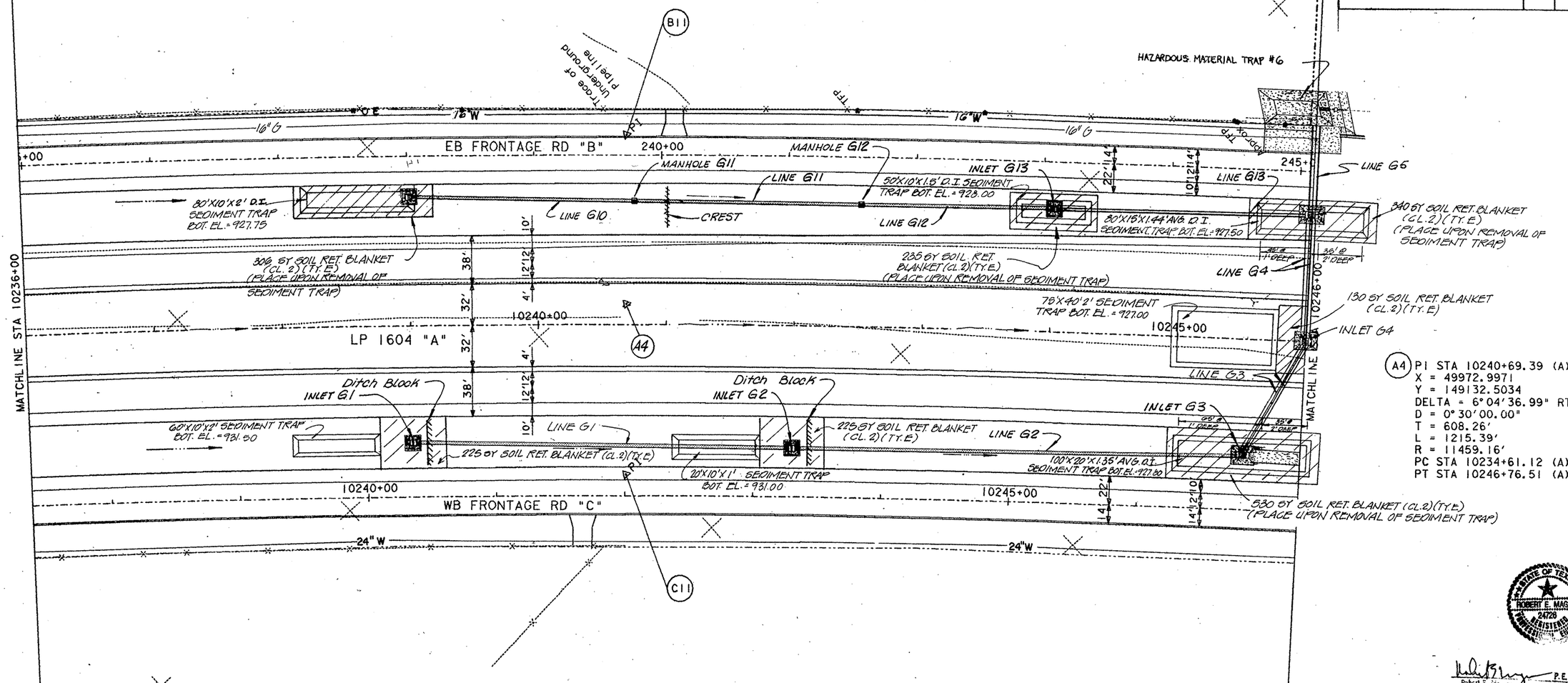
ETC.

1604PL21.DGN

SCALE: 1"= 40'

(B11) PI STA 239+73.20 (B)
X = 50070.4935
Y = 149043.2422
DELTA = 6°04'37.01" RT.
D = 0°30'00.00"
T = 608.27'
L = 1215.39'
R = 11459.16'
PC STA 233+64.94 (B)
PT STA 245+80.32 (B)

Estimated Quantities		
Item	Unit	Qty
SOIL RET. BLANKET (CL.2)(TY.E)	SY	1905
EXCAVATOR WORK (EROSION CONTROL)	HR	36
FRT. END LDR. WORK (EROSION CONTROL)	HR	18



(A4) PI STA 10240+69.39 (A)
X = 49972.9971
Y = 149132.5034
DELTA = 6°04'36.99" RT.
D = 0°30'00.00"
T = 608.26'
L = 1215.39'
R = 11459.16'
PC STA 10234+61.12 (A)
PT STA 10246+76.51 (A)

(C11) PI STA 10242+01.58 (C)
X = 49875.5007
Y = 149221.7646
DELTA = 6°04'36.98" RT.
D = 0°30'00.00"
T = 608.26'
L = 1215.39'
R = 11459.16'
PC STA 10235+93.32 (C)
PT STA 10248+08.70 (C)

STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-91
Date

STATE OF TEXAS ROBERT D. AUSTIN 67394 REGISTERED PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P

SW3P
STORMDRAIN & UTILITY LAYOUTS

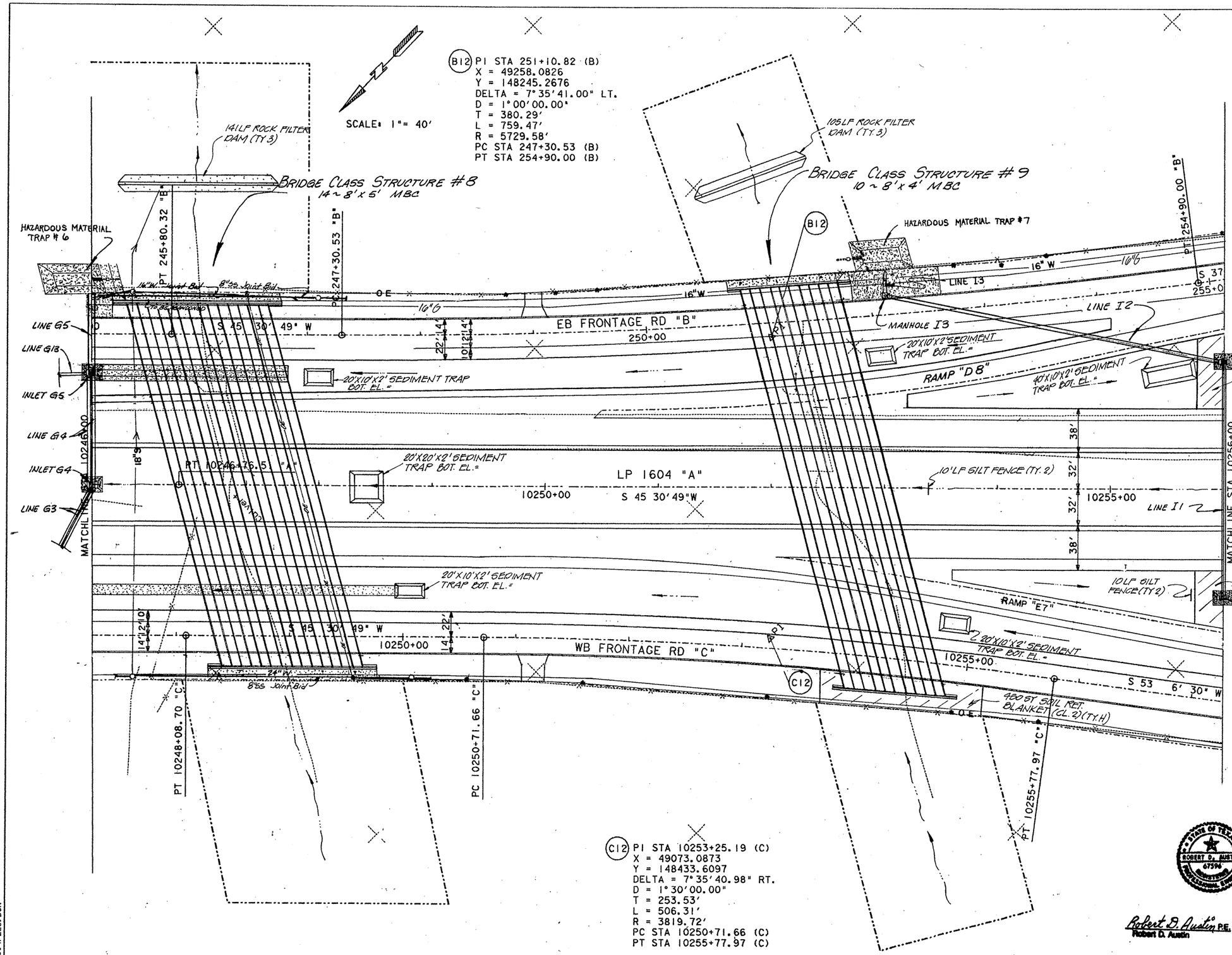
SHEET 11 OF 21

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS	-				282
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP 1604	

1604PL22.DGN

ESTIMATED QUANTITIES		
ITEM	UNIT	QTY.
SILT FENCE (TY. 2)	LF	20
SILT FENCE (TY. 2) (REM. & REPL.)	LF	20
SILT FENCE (TY. 2) (REM.)	LF	20
SOIL RET. BLANKET (CL. 2) (TY. E)	SY	306
SOIL RET. BLANKET (CL. 2) (TY. H)	SY	460
EXCAVATOR WORK (EROSION CONTROL)	HR	4
FRT. END LDR. WORK (EROSION CONTROL)	HR	2
ROCK FILTER DAM (TY. 3)	LF	246
ROCK FILTER DAM (TY. 3) (REM.)	LF	246

For Joint Bid Utility Adjustment Details:
Sewer - See Sheets 340-347
Water - See Sheets 348-373



C12 PI STA 10253+25.19 (C)
X = 49073.0873
Y = 148433.6097
DELTA = 7°35'40.98" RT.
D = 1°30'00.00"
T = 253.53'
L = 506.31'
R = 3819.72'
PC STA 10250+71.66 (C)
PT STA 10255+77.97 (C)

STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

STATE OF TEXAS ROBERT D. AUSTIN 67596 REGISTERED PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P

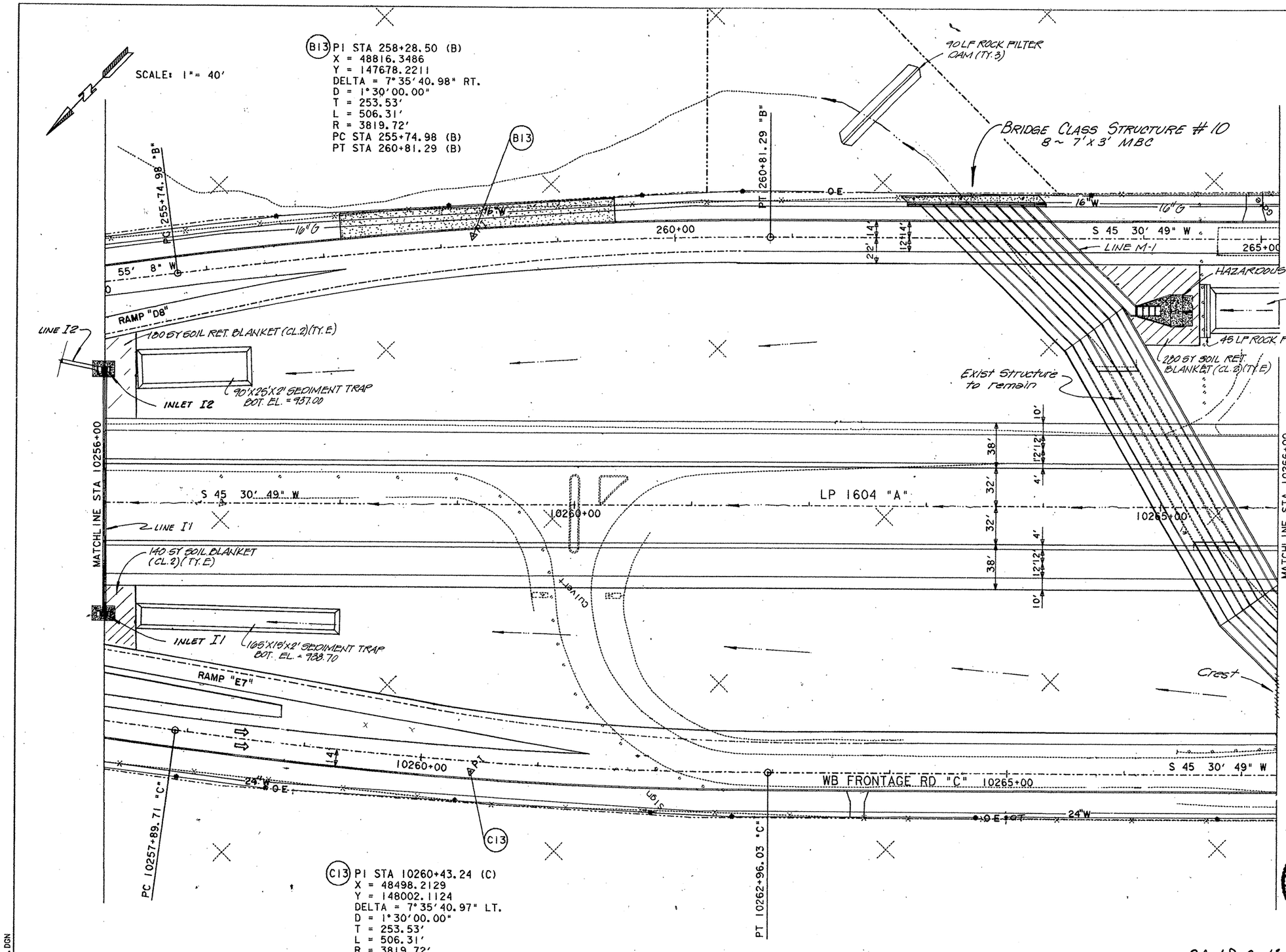
SW3P
STORMDRAIN & UTILITY LAYOUTS

SHEET 12 OF 21

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				283
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HWY. NO.
15	BEXAR	2452	02	023	LP1604

ETC.

1604PL23.DGN



Estimated Quantities

Item	Unit	Qty.
SOIL RET. BLANKET (CL.2)(TY.E)	SY	600
EXCAVATOR WORK (EROSION CONTROL)	HR	21
FRT. END LOR. WORK (EROSION CONTROL)	HR	11
ROCK FILTER DAM (TY.1)	LF	45
ROCK FILTER DAM (TY.1) (REM.&REPL.)	LF	45
ROCK FILTER DAM (TY.1) (REM.)	LF	45
ROCK FILTER DAM (TY.3)	LF	90
ROCK FILTER DAM (TY.3) (REM.)	LF	90

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

STATE OF TEXAS
ROBERT D. AUSTIN
67596
REGISTERED
PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P

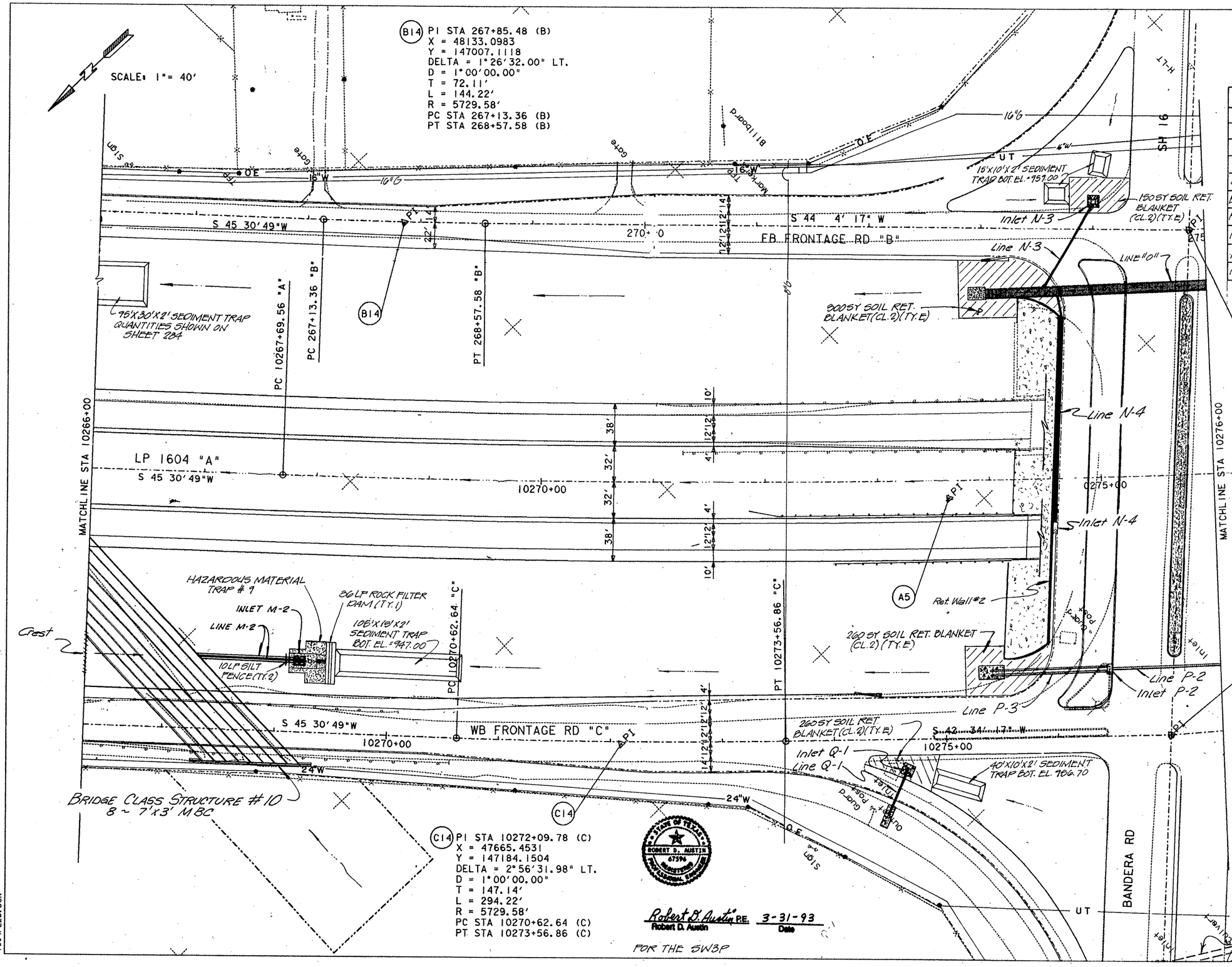
SW3P
STORMDRAIN & UTILITY LAYOUTS

SHEET 13 OF 21

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					284
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP1604	

ETC.

1604PL24.DGN



Estimated Quantities

Item	Unit	Qty
SILT FENCE (TY.2)	LF	10
SILT FENCE (TY.2) (REM.&REPL)	LF	10
SILT FENCE (TY.2) (REM.)	LF	10
SOIL RET. BLANKET (CL.2) (TY.E)	SY	860
EXCAVATOR WORK (EROSION CONTROL)	HR	10
FRT. END LDR. WORK (EROSION CONTROL)	HR	5
ROCK FILTER DAM (TY.1)	LF	36
ROCK FILTER DAM (TY.1) (REM.&REPL)	LF	36
ROCK FILTER DAM (TY.1) (REM.)	LF	36

STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

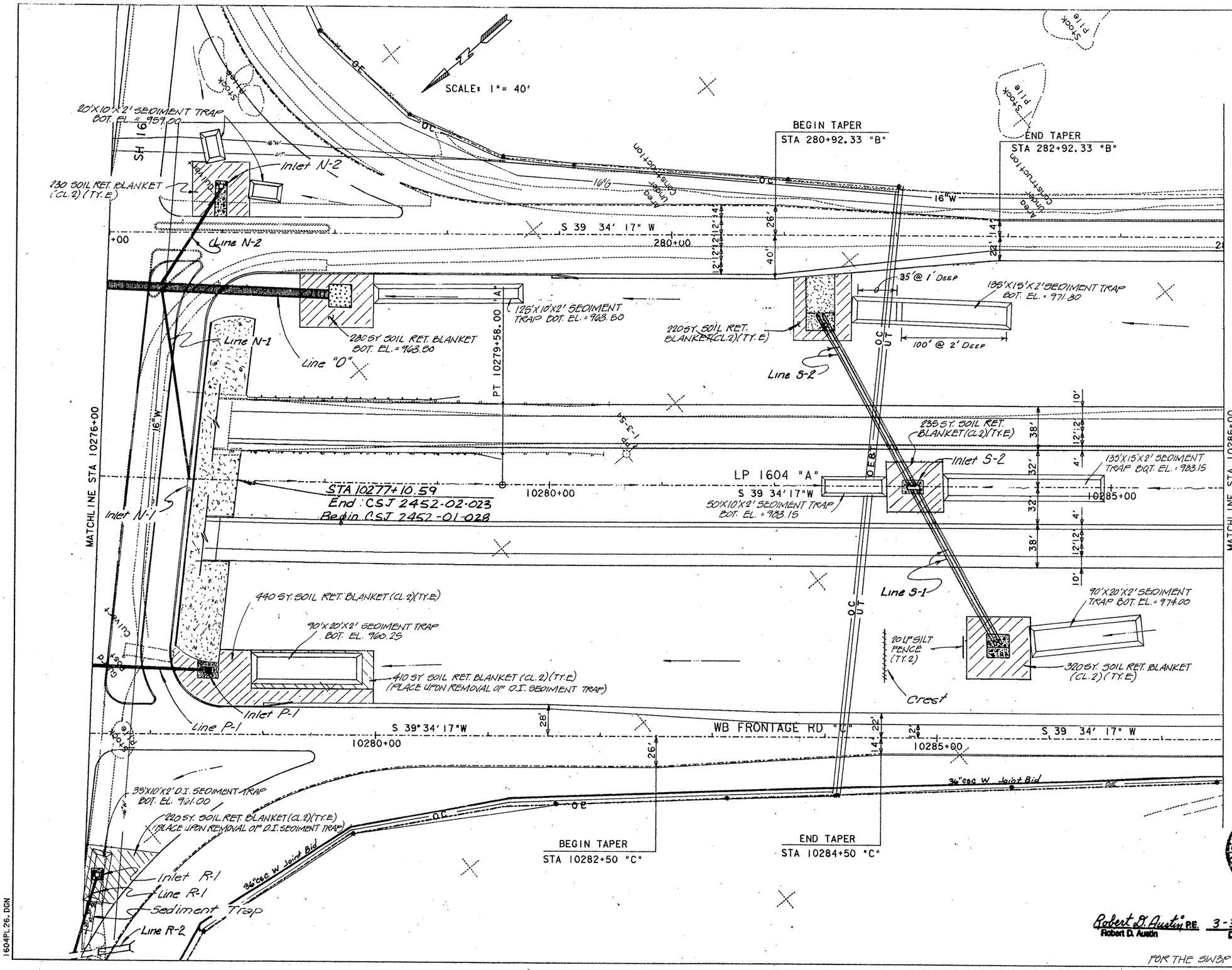
Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

SW3P STORMDRAIN & UTILITY LAYOUTS

SHEET 14 OF 21

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					285
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP1604	

ETC.



Estimated Quantities		
Item	Unit	Qty
SILT FENCE (TY.2)	LF	20
SILT FENCE (TY.2) (REM.&REPL)	LF	20
SILT FENCE (TY.2) (REM.)	LF	20
SOIL RET. BLANKET (CL.2) (TY.E)	SY	2355
EXCAVATOR WORK (EROSION CONTROL)	HR	54
FRT. END LDR. WORK (EROSION CONTROL)	HR	27

For Joint Bid Utility Adjustment Details:
Water - See Sheets 348-373

STATE OF TEXAS
ROBERT E. MAGERS
24728
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P

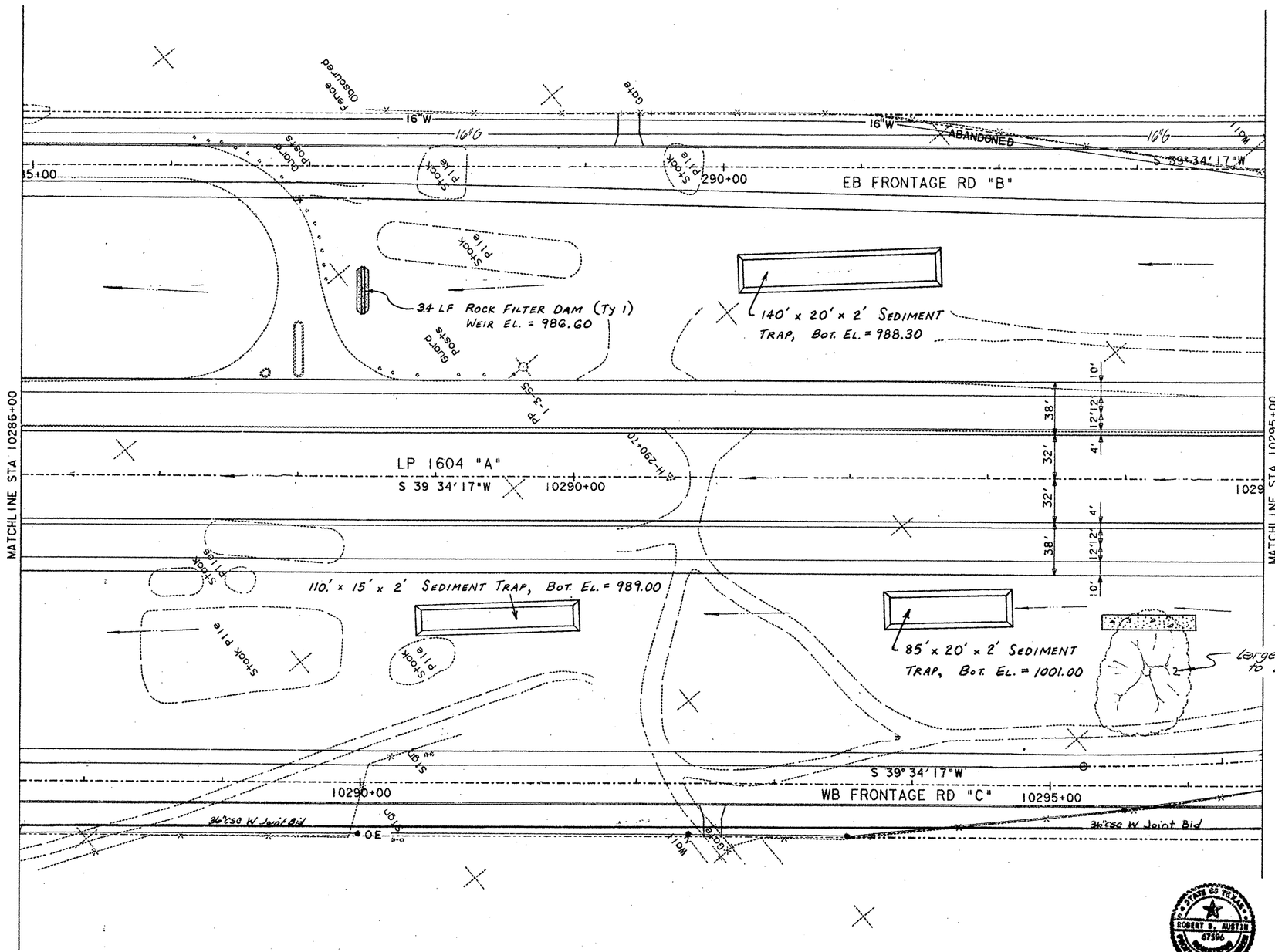
SW3P
STORMDRAIN & UTILITY LAYOUTS

SHEET 15 OF 21

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					286
STATE DIST. NO	COUNTY	CONT.	SECT.	JOB		HWY. NO.
15	BEXAR	2452	02	023		LP1604

1604PL26.DGN

SCALE: 1" = 40'



Estimated Quantities		
Item	Unit	Qty
EXCAVATOR WORK (EROSN CONT.)	HR	32
FRT. END. LDR. WORK (EROSN CONT.)	HR	16
ROCK FILTER DAM (Ty 1)	LF	34
ROCK FILTER DAM (Ty 1) (REM. & RE.)	LF	34
ROCK FILTER DAM (Ty 1) (REM.)	LF	34

For Joint Bid Utility Adjustment Details: Water - See Sheets 348-373

STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

STATE OF TEXAS ROBERT D. AUSTIN 67596 REGISTERED PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P

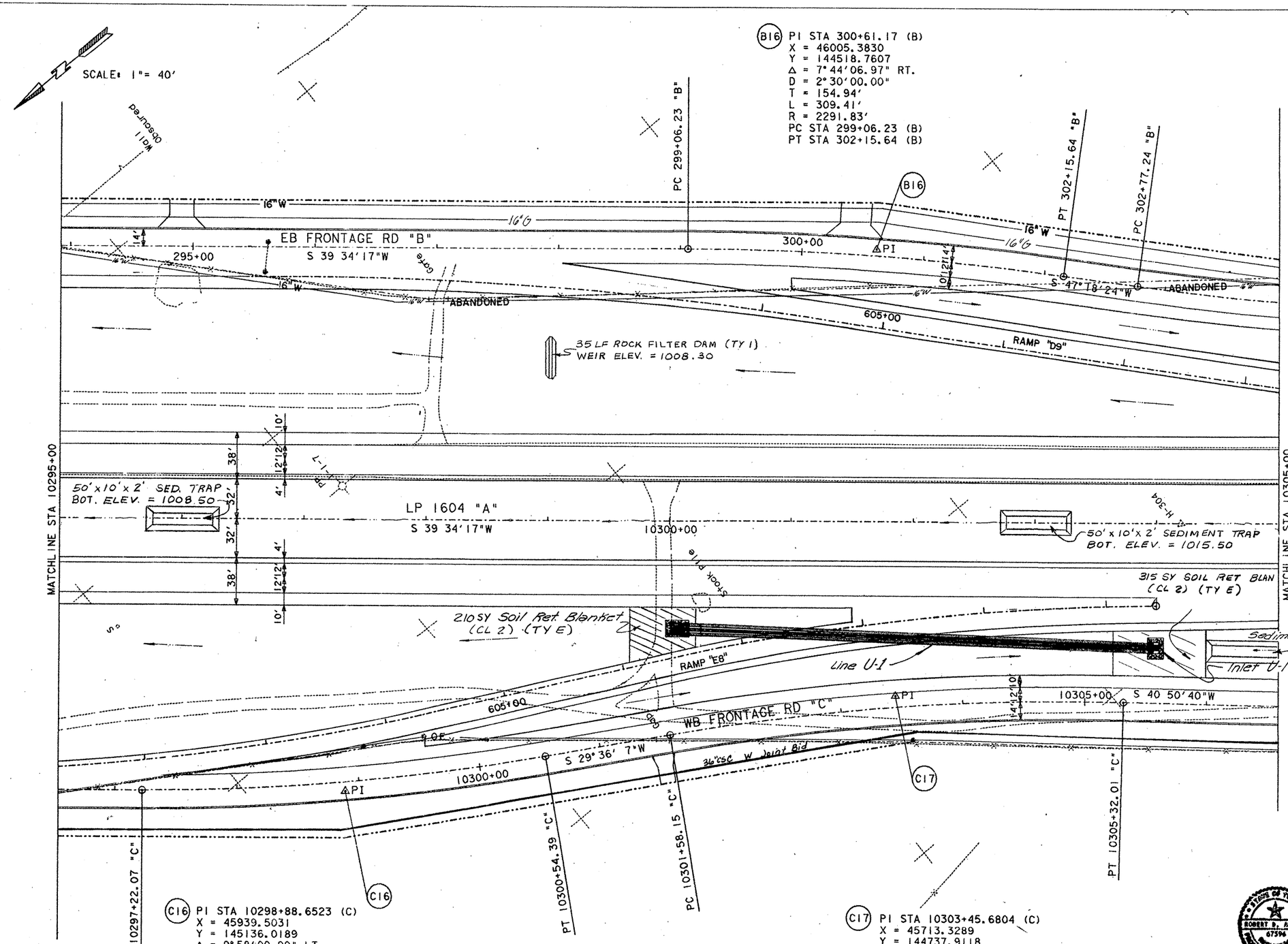
SW3P STORMDRAIN & UTILITY LAYOUTS

SHEET 16 OF 21

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					287
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP1604	

ETC.

1604PL27.DGN



Estimated Quantities		
ITEM	UNIT	QTY
SOIL RET. BLAN. (CL 2)(TY E)	SY	525
EXCAV WORK (EROSN CONT)	HR	14
FRT. END LDR WK (ER. CONT)	HR	7
ROCK FILT. DAM (TY I)	LF	35
ROCK FILT. DAM (TY I) (REM & REPL)	LF	35
ROCK FILT. DAM (TY I) (REM.)	LF	35

For Joint Bid Utility Adjustment Details:
Water - See Sheets 348-373

C16 PI STA 10298+88.6523 (C)
X = 45939.5031
Y = 145136.0189
Δ = 9°58'09.99" LT.
D = 3°00'00.00"
T = 166.58'
L = 332.31'
R = 1909.86'
PC STA 10297+22.0745 (C)
PT STA 10300+54.3892 (C)

C17 PI STA 10303+45.6804 (C)
X = 45713.3289
Y = 144737.9118
Δ = 11°12'56.27" RT.
D = 3°00'00.00"
T = 187.53'
L = 373.85'
R = 1909.86'
PC STA 10301+58.1540 (C)
PT STA 10305+32.0084 (C)

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

STATE OF TEXAS
ROBERT D. AUSTIN
67596
REGISTERED
PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P

SW3P
STORMDRAIN & UTILITY LAYOUTS

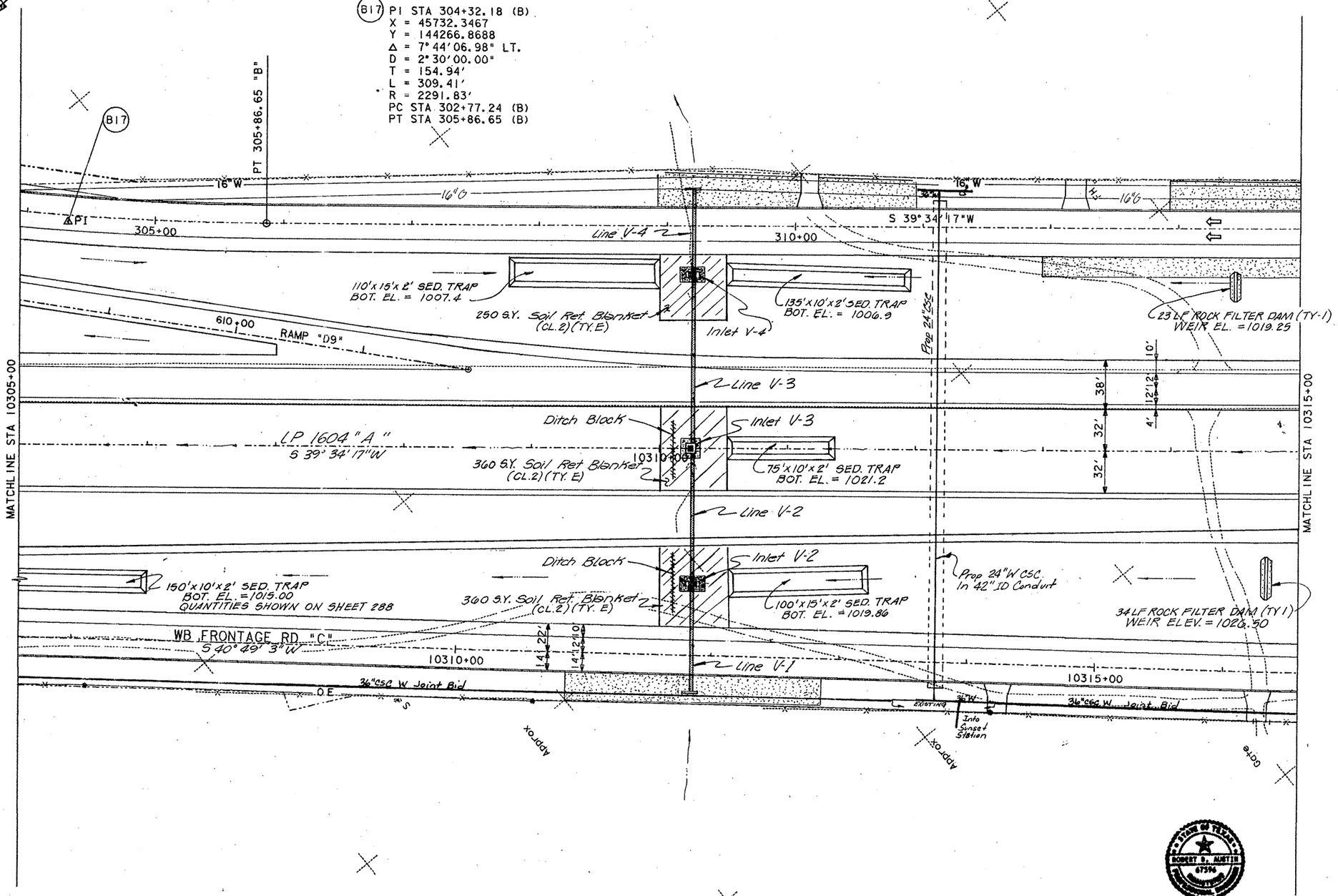
SHEET 17 OF 21

FED RD DIV. NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					288
STATE DIST. NO	COUNTY	CONT.	SECT.	JOB		HWY. NO.
15	BEXAR	2452	02	023		LP 1604

1604PL28.DGN

SCALE: 1" = 40'

(B17) PI STA 304+32.18 (B)
X = 45732.3467
Y = 144266.8688
Δ = 7° 44' 06.98" LT.
D = 2° 30' 00.00"
T = 154.94'
L = 309.41'
R = 2291.83'
PC STA 302+77.24 (B)
PT STA 305+86.65 (B)



Estimated Quantities		
Item	Unit	Qty
SOIL RETENTION BLANKET (CL 2) (TY E)	SY	970
EXCAVATION WORK (EROS. CONT)	HR	28
FRNT. END LDR. WORK (EROSION CONT)	HR	14
ROCK FILTER DAM (TY 1)	LF	57
ROCK FILTER DAM (TY 1) REMOVE & REPLACE	LF	57
ROCK FILTER DAM (TY 1) REMOVE	LF	57

For Joint Bid Utility Adjustment Details: Water - See Sheets 348-373

STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

STATE OF TEXAS ROBERT D. AUSTIN 67596 REGISTERED PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

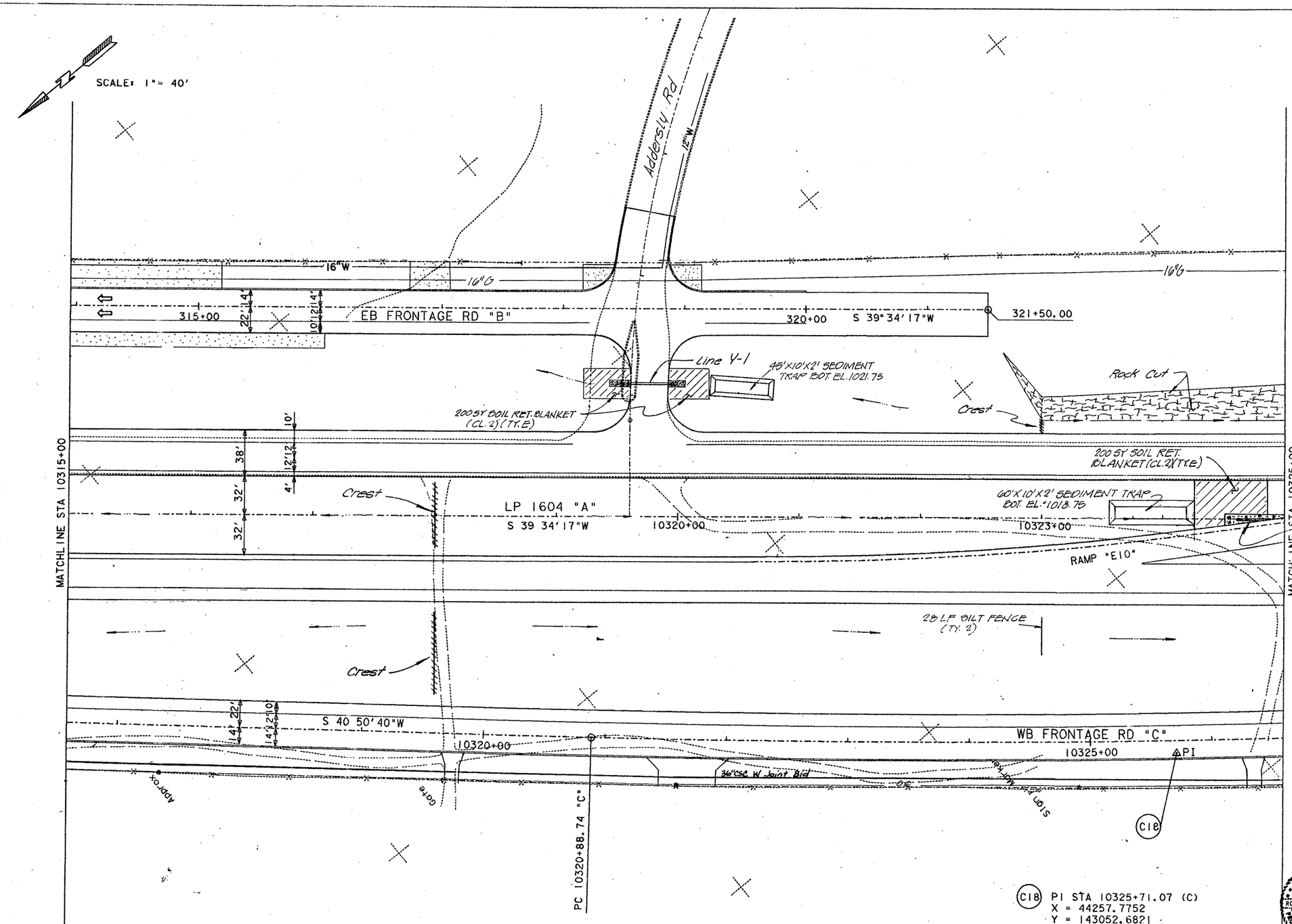
FOR THE SW3P

SW3P
STORMDRAIN & UTILITY LAYOUTS

SHEET 18 OF 21

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				289
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HWY. NO.
15	BEXAR	2452	02	023	LP1604

1604PL29.DGN



Estimated Quantities		
Item	Unit	Qty
SILT FENCE (TY. 2)	LF	28
SILT FENCE (TY. 2) (REM. & REPL.)	LF	28
SILT FENCE (TY. 2) (REM.)	LF	28
SOIL RET. BLANKET (CL. 2) (TY. E)	SY	400
EXCAVATOR WORK (EROSION CONTROL)	HR	6
FRT. END LOR. WORK (EROSION CONTROL)	HR	3

FOR JOINT BID UTILITY ADJUSTMENT DETAILS WATER - SEE SHEETS 348-373

C18 PI STA 10325+71.07 (C)
X = 44257.7752
Y = 143052.6821
Δ = 4° 50' 57.81" LT.
D = 0° 30' 00.00"
T = 485.23'
L = 969.88'
R = 11459.16'
PC STA 10320+85.84 (C)
PT STA 10330+55.72 (C)

STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

STATE OF TEXAS ROBERT D. AUSTIN 67596 REGISTERED PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P

SW3P STORMDRAIN & UTILITY LAYOUTS

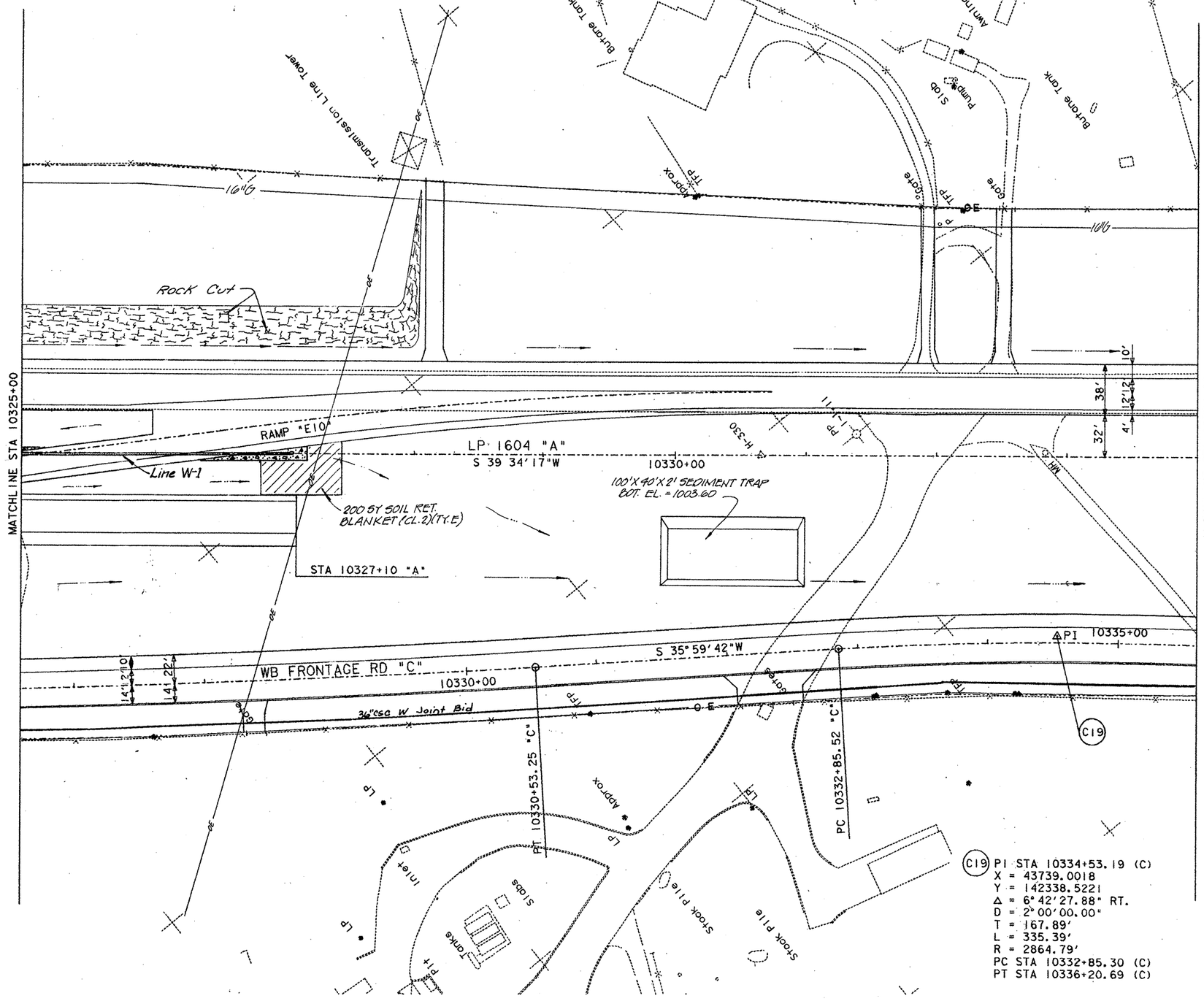
SHEET 19 OF 21

FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					290
STATE DIST NO	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP1604	

1604PL30.DGN

.ETC.

SCALE: 1" = 40'



Estimated Quantities		
Item	Unit	Qty
SOIL RET. BLANKET (CL.2)(TY.E)	SY	200
EXCAVATOR WORK (EROSION CONTROL)	HR	18
FRT. END LDR. WORK (EROSION CONTROL)	HR	9

For Joint Bid Utility Adjustment Details: Water - See Sheets 348-373

(C19) PI STA 10334+53.19 (C)
X = 43739.0018
Y = 142338.5221
Δ = 6° 42' 27.88" RT.
D = 2° 00' 00.00"
T = 167.89'
L = 335.39'
R = 2864.79'
PC STA 10332+85.30 (C)
PT STA 10336+20.69 (C)

STATE OF TEXAS ROBERT E. MAGERS 24726 REGISTERED PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

STATE OF TEXAS ROBERT D. AUSTIN 67596 REGISTERED PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SWBP

STORMDRAIN & UTILITY LAYOUTS

SHEET 20 OF 21

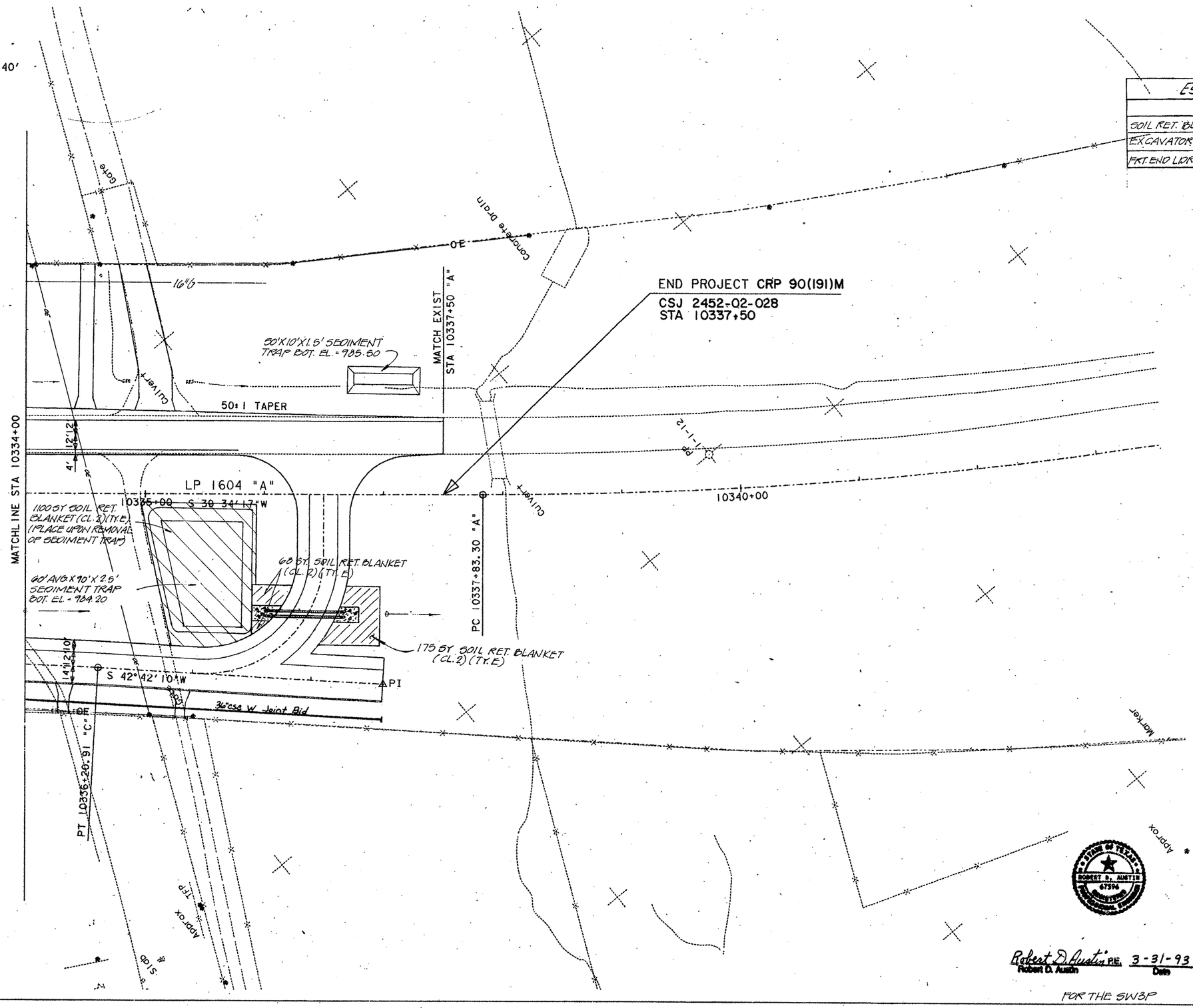
FED RD DIV NO	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					291
STATE DIST NO	COUNTY	CONT.	SECT.	JOB		HWY. NO.
15	BEXAR	2452	02	023		LP1604

1604PL31.DGN

.ETC.

SCALE: 1" = 40'

ESTIMATED QUANTITIES		
ITEM	UNIT	QTY
SOIL RET. BLANKET (CL.2) (TY.E)	SY	1343
EXCAVATOR WORK (EROSION CONTROL)	HR	32
FRT. END LDR. WORK (EROSION CONTROL)	HR	16



For Joint Bid Utility Adjustment Details: Water - See Sheets 368-373

STATE OF TEXAS
ROBERT E. MAGERS
24726
REGISTERED
PROFESSIONAL ENGINEER

Robert E. Magers P.E. 9-10-90
Robert E. Magers Date

STATE OF TEXAS
ROBERT D. AUSTIN
67596
REGISTERED
PROFESSIONAL ENGINEER

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date

FOR THE SW3P

SW3P STORMDRAIN & UTILITY LAYOUTS

SHEET 21 OF 21

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					292
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HWY. NO.	
15	BEXAR	2452	02	023	LP1604	

ETC.

1604PL32.DGN

HMT NO.	AREA acres	t_c	CA	I_{50}	Q_{50}	HMT CAPACITY GAL	$h=\left[\frac{Q}{C \times L}\right]^{2/3}$ C	L	h	WEIR ELEV.	DEPTH OF FLOW @ WEIR	ALLOW. DEPTH OF FLOW OVER WEIR	
1	25.04	21.7	18.47	7.11	135	11,400	3.087	27	1.38	982.00	983.38	987.82	
2	25.05	11.71	16.47	9.61	158.3	10,800	3.087	34	1.32	974.00	975.32	975.50	
3	20.3	17.0	12.78	8.08	103.3	22,700	3.087	20	1.41	958.38	959.79	959.88	
4	16.69	19.0	9.54	7.63	72.8	15,760	3.087	22	1.05	958.00	959.05	962.55	
5	26.86	19.41	16.21	7.55	122.4	12,800	3.087	26.6	1.30	928.20	929.50	931.37	
6	18.23	16.0	11.04	8.32	91.9	11,856	3.087	28	1.04	924.65	925.69	929.64	
7	9.40	10.0	5.64	10.27	57.9	11,856	3.087	28	0.77	932.00	932.77	932.83	
8	38.52	32.0	20.88	5.71	119.2	20,658	3.087	26	1.30	948.13	949.43	951.82	
9	7.63	11.9	4.60	9.55	43.9	13,928	3.087	26	0.67	951.00	951.67	952.00	

NOTE: THE HAZARDOUS MATERIAL TRAP WERE DESIGNED TO HOLD A MINIMUM OF 10,000 GALLONS WITH A DESIRABLE CAPACITY OF 11,000 GALLONS, ALLOWING FOR A 5 HOUR DRAIN TIME. THE WEIR ELEVATION WAS ANALYZED ON A 50 YEAR STORM.

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Gregory A. Biediger, P.E. 61429, on 3-26, 1993

Gregory A. Biediger, P.E.

HAZARDOUS MATERIAL TRAP DESIGN COMPUTATIONS

LP 1604

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				292 E
STATE DIST. NO.	COUNTY	CONT. NO.	SEC. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	1604

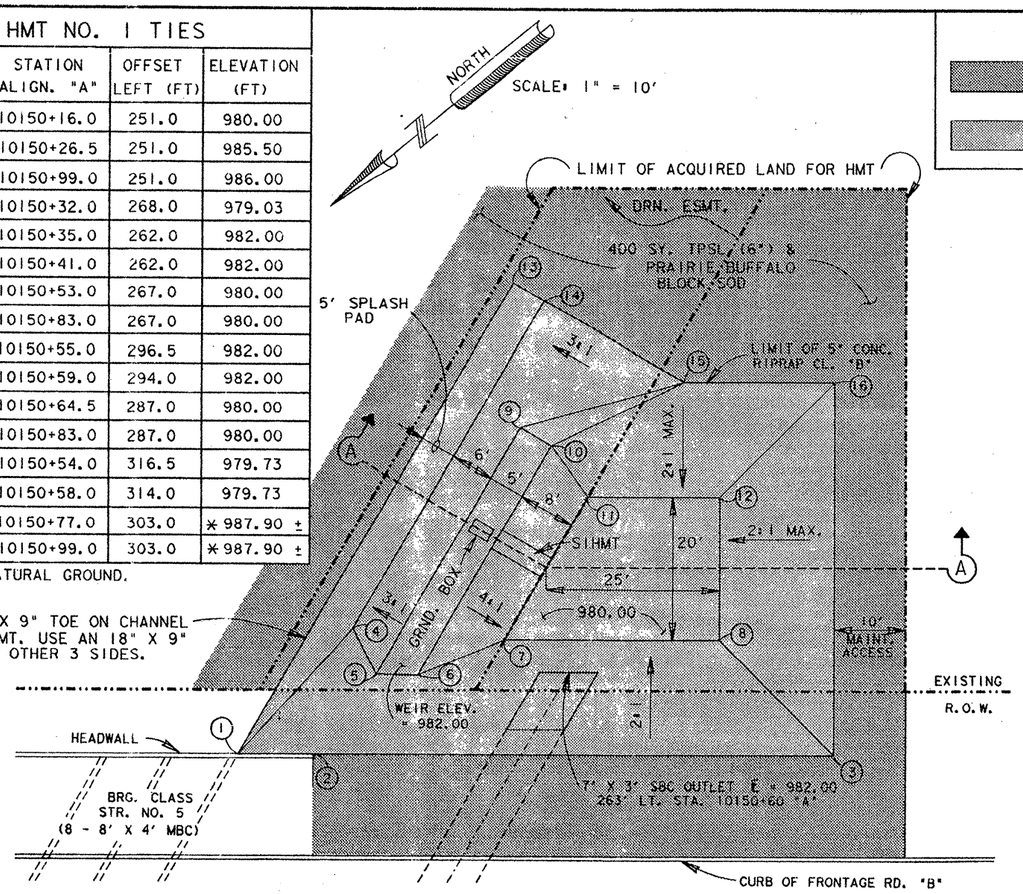
ESQUIVEL SOUTH BEXAR

151p2a: 1604dds.dgn

HMT NO. 1 TIES

POINT #	STATION ALIGN. "A"	OFFSET LEFT (FT)	ELEVATION (FT)
1	10150+16.0	251.0	980.00
2	10150+26.5	251.0	985.50
3	10150+99.0	251.0	986.00
4	10150+32.0	268.0	979.03
5	10150+35.0	262.0	982.00
6	10150+41.0	262.0	982.00
7	10150+53.0	267.0	980.00
8	10150+83.0	267.0	980.00
9	10150+55.0	296.5	982.00
10	10150+59.0	294.0	982.00
11	10150+64.5	287.0	980.00
12	10150+83.0	287.0	980.00
13	10150+54.0	316.5	979.73
14	10150+58.0	314.0	979.73
15	10150+77.0	303.0	* 987.90 ±
16	10150+99.0	303.0	* 987.90 ±

* MATCH NATURAL GROUND.

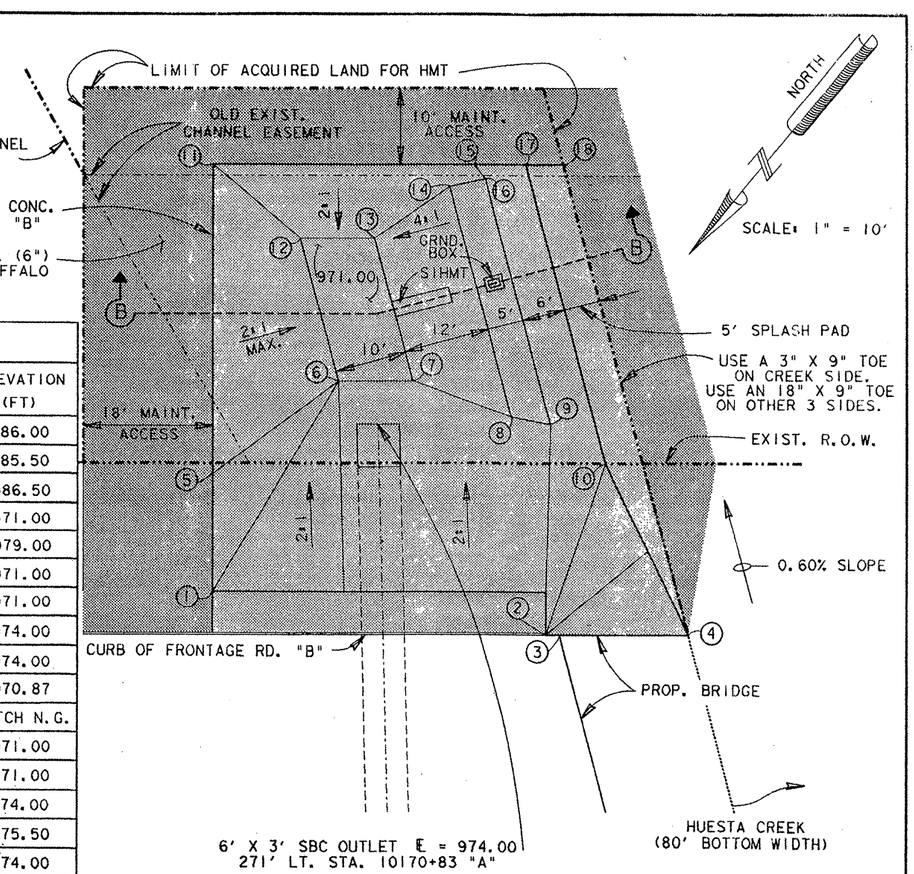


LEGEND

- TPSL (6") & PRAIRIE BUFFALO BLOCK SOD
- CONC. RIPRAP CL. "B"

HMT NO. 2 TIES

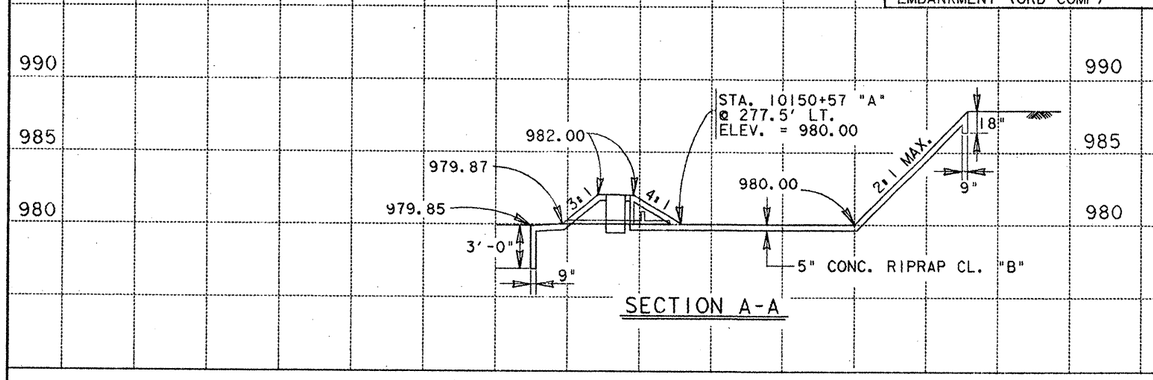
POINT #	STATION ALIGN. "A"	OFFSET LEFT (FT)	ELEVATION (FT)
1	10170+60.0	242.0	986.00
2	10171+06.0	242.0	985.50
3	10171+06.0	236.0	986.50
4	10171+27.0	236.0	971.00
5	10170+60.0	259.0	979.00
6	10170+78.0	271.0	971.00
7	10170+88.0	271.0	971.00
8	10171+02.0	267.0	974.00
9	10171+07.0	266.0	974.00
10	10171+15.0	260.0	970.87
11	10170+60.0	302.0	MATCH N.G.
12	10170+72.0	291.0	971.00
13	10170+82.0	291.0	971.00
14	10170+93.0	298.0	974.00
15	10170+95.0	302.0	975.50
16	10170+98.0	299.0	974.00
17	10171+04.0	302.0	970.62
18	10171+09.0	302.0	970.60



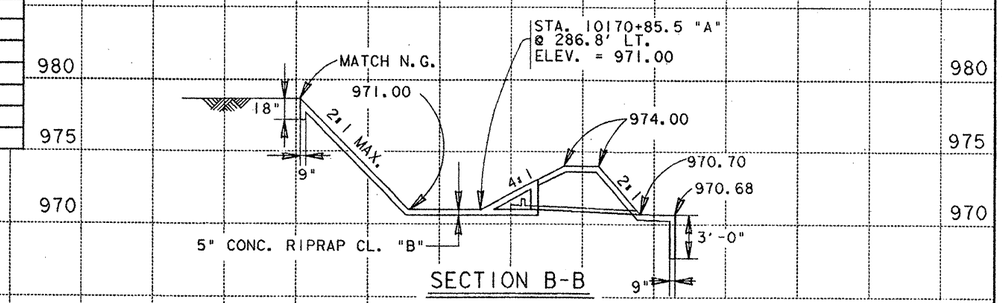
NOTES:
1. SEE SHEET 303B FOR 4" CPVC (SCH. 80) DRAIN LINE AND APPURTENANCE QUANTITIES.
2. EARTHWORK QUANTITIES SHOWN FOR CONTRACTORS INFORMATION ONLY. THESE QUANTITIES HAVE BEEN ADDED TO THE APPROPRIATE PLAN SHEET.
3. SEE SHT. 303 FOR HMT CONC. RIPRAP DETAILS.

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY HMT 1	QUANTITY HMT 2
FURN & PLACE TPSL (6")	SY	400	282
BLOCK SOD (PRAIRIE BUFFALO)	SY	400	282
RIPRAP CL "B" CONC (5")	CY	75	76
SAFETY INLET - HMT	EA	1	1
GROUND BOX (RPM) (122330)	EA	1	1
EXCAVATION (SEE NOTE 2)	CY	460	350
EMBANKMENT (ORD COMP)	CY	0	0



SECTION A-A



SECTION B-B

SCALE: HORIZ. 1"=10'
VERT. 1"=5'

STATE OF TEXAS
ROBERT D. AUSTIN
67596
REGISTERED PROFESSIONAL ENGINEER

Robert D. Austin, P.E. 3-31-93
ROBERT D. AUSTIN Date

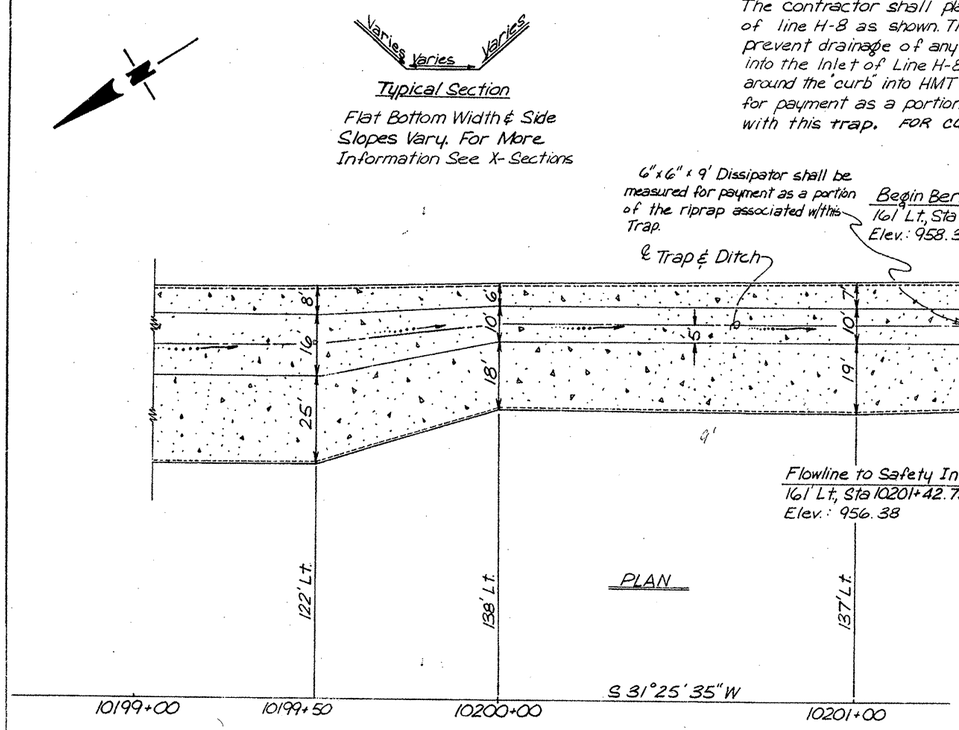
HAZARDOUS MATERIAL TRAPS NO. 1 & 2 PLAN & PROFILE

DESIGN:	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
RDA	6		292F

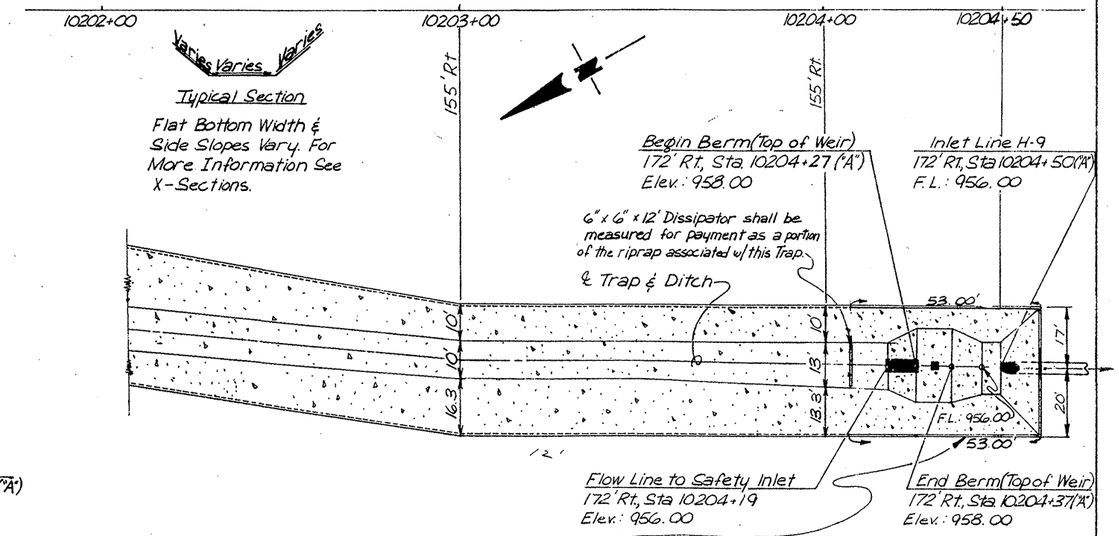
GRAPHICS:	STATE	STATE DIST. NO.	COUNTY
RG	TEXAS	15	BEXAR

CHECK:	CONT.	SECT.	JOB	HIGHWAY NO.
NDS	2452	02	023 ETC	LP 1604

HMT.DGN



The contractor shall place a 6" "curb" around the inlet of line H-8 as shown. The purpose of this "Curb" is to prevent drainage of any hazardous material spills directly into the Inlet of Line H-8, but rather that they should drain around the "curb" into HMT #3. This "curb" shall be measured for payment as a portion of the riprap associated with this trap. FOR CURB DETAIL, SEE SHT # 303

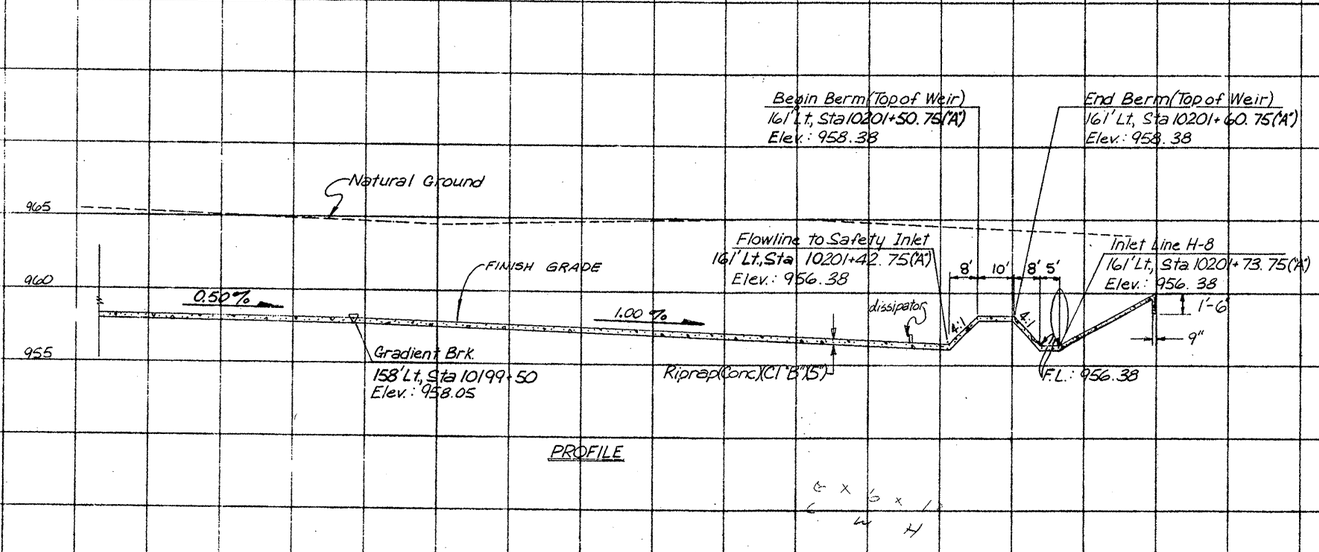


The contractor shall place a 6" "curb" around the inlet of Line H-9 as shown. The purpose of this "curb" is to prevent drainage of any hazardous material spills directly into the inlet of Line H-9, but rather that they should drain around the "curb" into HMT #4. This "curb" shall be measured for payment as a portion of the riprap associated with this trap. FOR CURB DETAIL, SEE SHT # 303

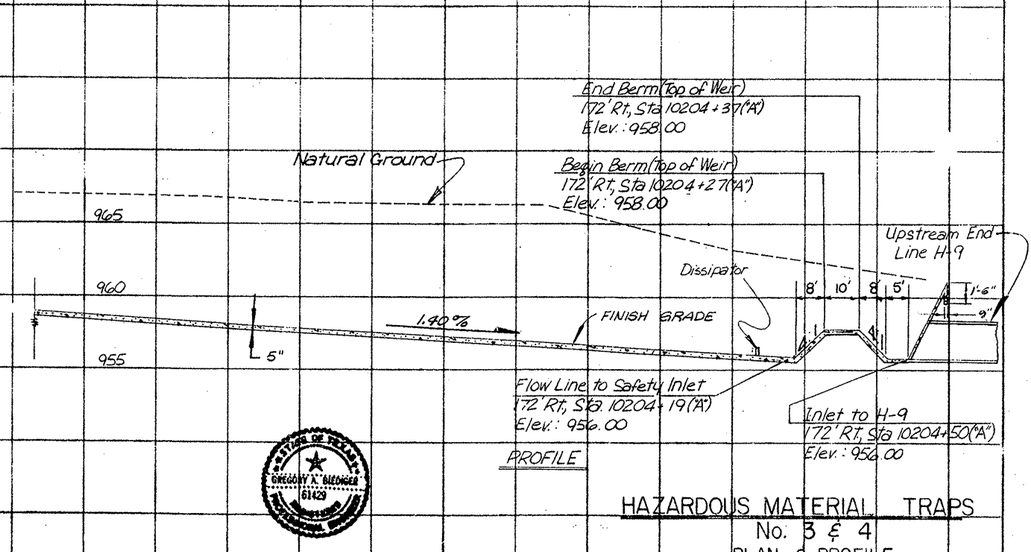
ESTIMATED QUANTITIES				
ITEM	UNIT	TRAP #3	TRAP #4	TOTAL
Riprap(Conc)(Cl "B")(5")	CY	288	234	522
Inlet(Comp)(Ty I Safety)	EA	1	1	2
Ground Box(RPM)(TY X)(22330)	EA	1	1	2
Drain Line(CPVC)(4")(Sch 80)	LF	22.25	22.25	44.50
Excavation	CY	✱	✱	

✱ Excavation Required for this Trap included in Roadway Excavation Quantities on the Appropriate Plan Sheet(s).

HAZARDOUS MATERIAL TRAP No. 3



HAZARDOUS MATERIAL TRAP No. 4



STATE OF TEXAS
GREGORY A. BIEDIGER
61429
PROFESSIONAL ENGINEER

Gregory A. Biediger P.E. Nov 26, 1993

SCALE: 1"20' HORZ.
1"5' VERT.

HAZARDOUS MATERIAL TRAPS No. 3 & 4
PLAN & PROFILE

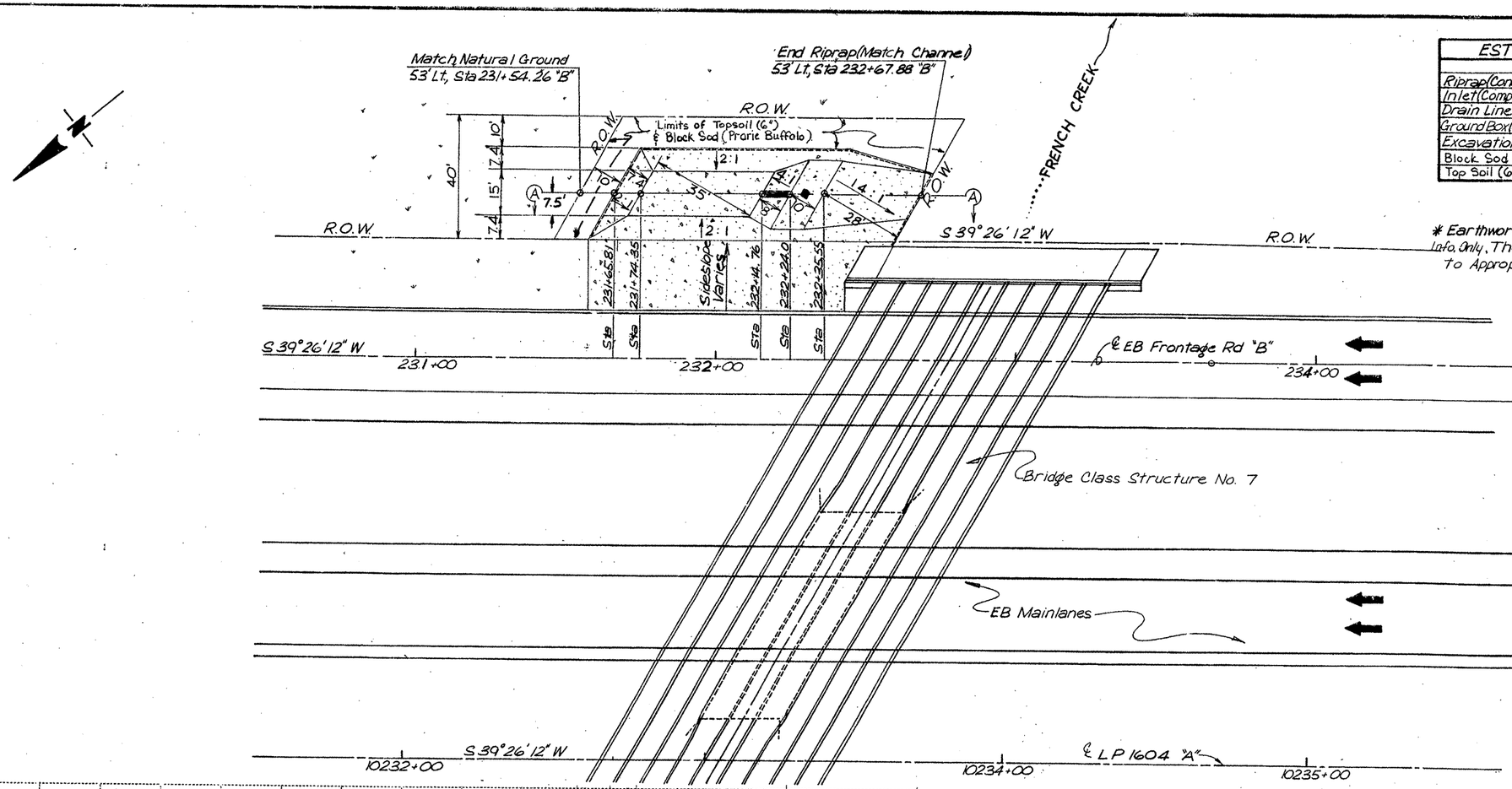
SHEET OF SHEETS

DRAWN	FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CHECKED	6	TEXAS					LP1604
TRACED	STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CHECKED	15	BEXAR	2452	02	023		292 G

Eto

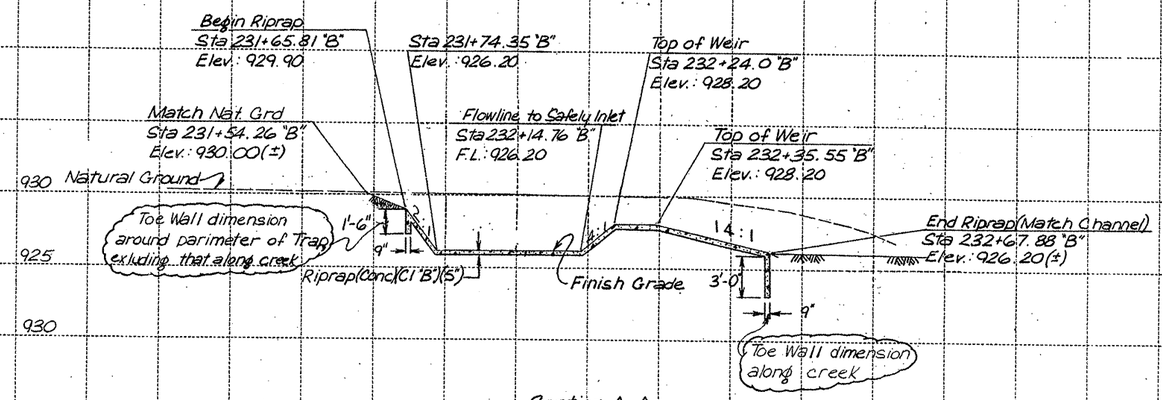
ESTIMATED QUANTITIES		
ITEM	UNIT	QTY
Riprap(Conc)(Cl 'B')(5")	CY	89
Inlet(Comp)(Ty I Safety)	EA	1
Drain Line(CPVC 4")(Sch 80)	LF	43.33
Ground Box(RPM)(Ty X)(122330)	EA	1
Excavation *	CY	285
Block Sod (Prarie Buffalo)	SY	611
Top Soil (6")	SY	611

* Earthwork Quantities Shown for Contractors Info. Only. These Quantities Have Been added to Appropriate Plan Sheet.



PLAN

HAZARDOUS MATERIALS TRAP No. 5



Section A-A

Bearing along Section: S 39°26'12" W

Gregory A. Biedger P.E. Mar 20, 1993

HAZARDOUS MATERIAL TRAP No. 5

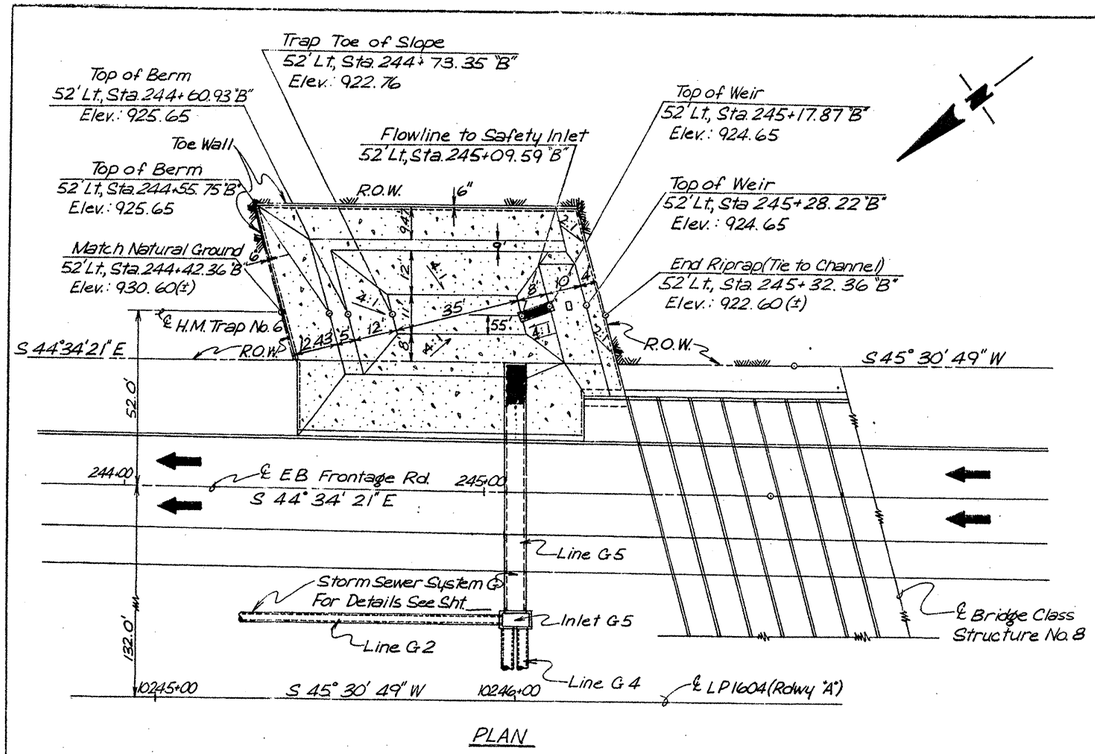
PLAN & PROFILE

SCALE:
1" = 20' HORIZ.
1" = 5' VERT.

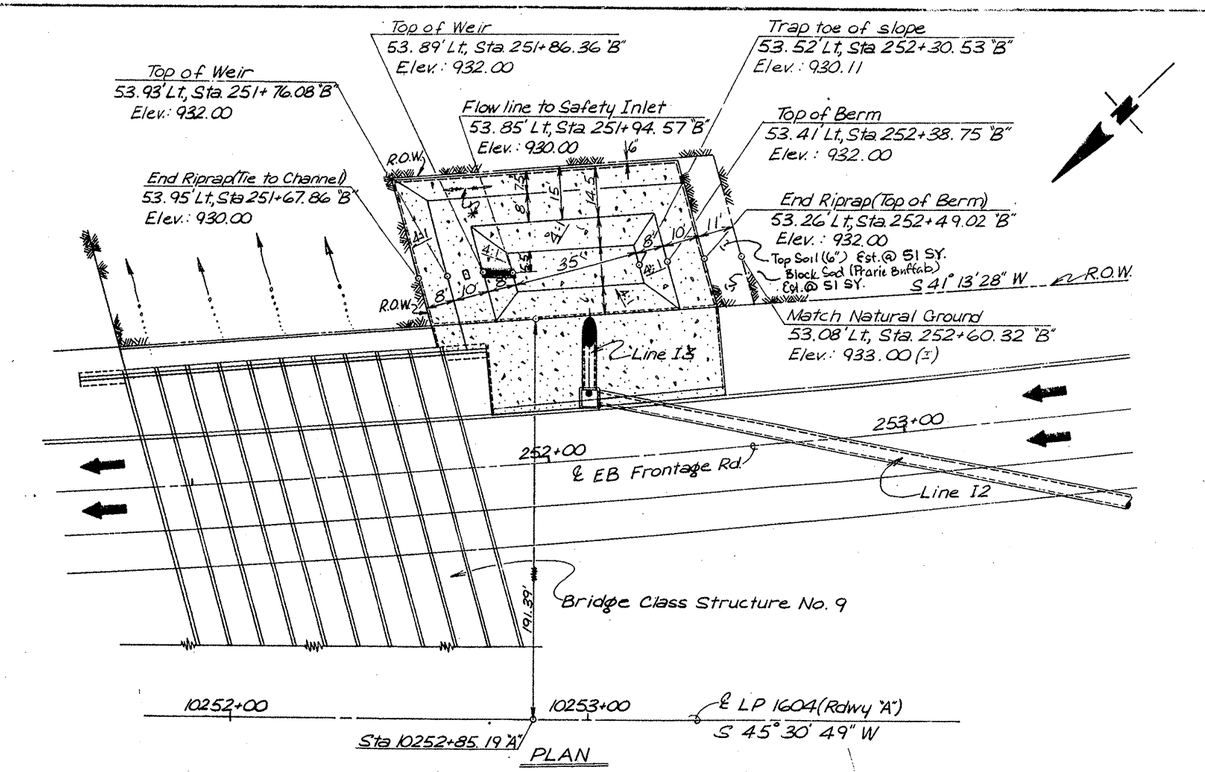
SHEET OF SHEETS

PREPARED BY AND FOR USE OF TEXAS SDH&PT

ORIGNL. DRWNG. DATE:		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.:	REVISIONS	15	6		292 H
CK.:		COUNTY		CONTROL / SECT. / JOB	HIGHWAY
DW.:		BEXAR		2452 / 02 / 023	LP1604
CK.:					



PLAN



PLAN

HAZARDOUS MATERIAL TRAP No. 6

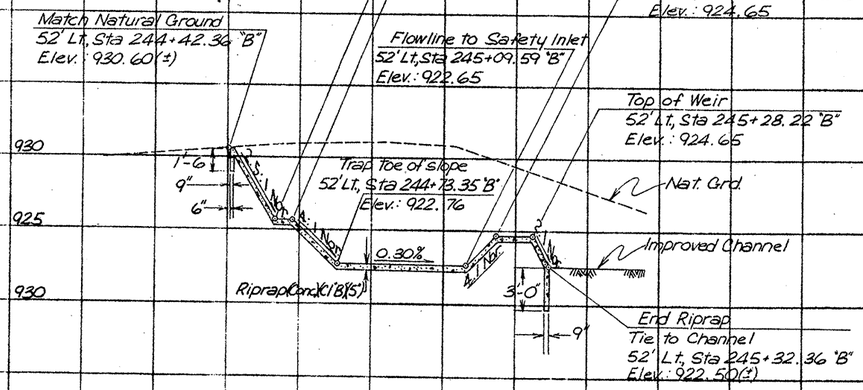
ESTIMATED QUANTITIES				
ITEM	UNIT	Trap #6	Trap #7	Totals
Riprap(Conc)(C1'B')(5")	CY	102	103	205
Inlet(Compl)(Ty 1 Safety)	EA	1	1	2
Ground Box(RPM)(Ty X)(122330)	EA	1	1	2
# Excavation	CY	2369	83	2452
# Embank(Ord Comp)(Ty B)	CY	–	55	55
Drain Line(CPVC 4")(Sch 80)	LF	17.75	17.75	35.5
Furn & Plac Top Soil 6"	SY	–	51	51
Block Sod (Prarie Buffalo)	SY	–	51	51

Earthwork Quantities Shown For Contractors Info. Only. These Quantities Have Been Added To The Appropriate Plan Sht.

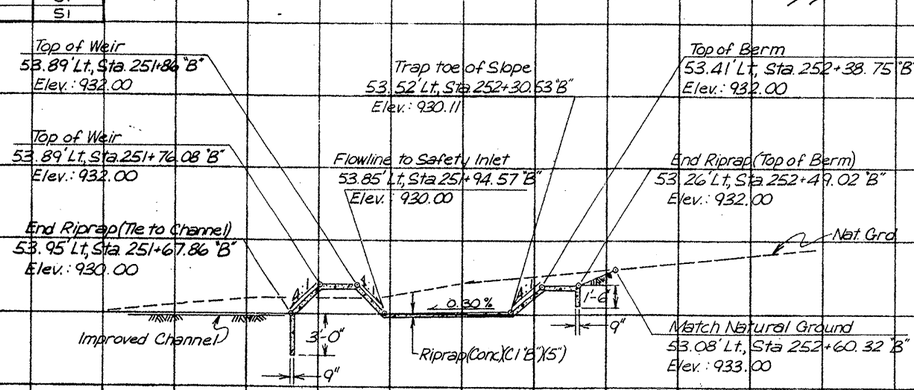
HAZARDOUS MATERIAL TRAP No. 7

STATE OF TEXAS
GREGORY A. BLACKLEY
61629

Gregory A. Blackley P.E. Mar 26, 1993



PROFILE



PROFILE

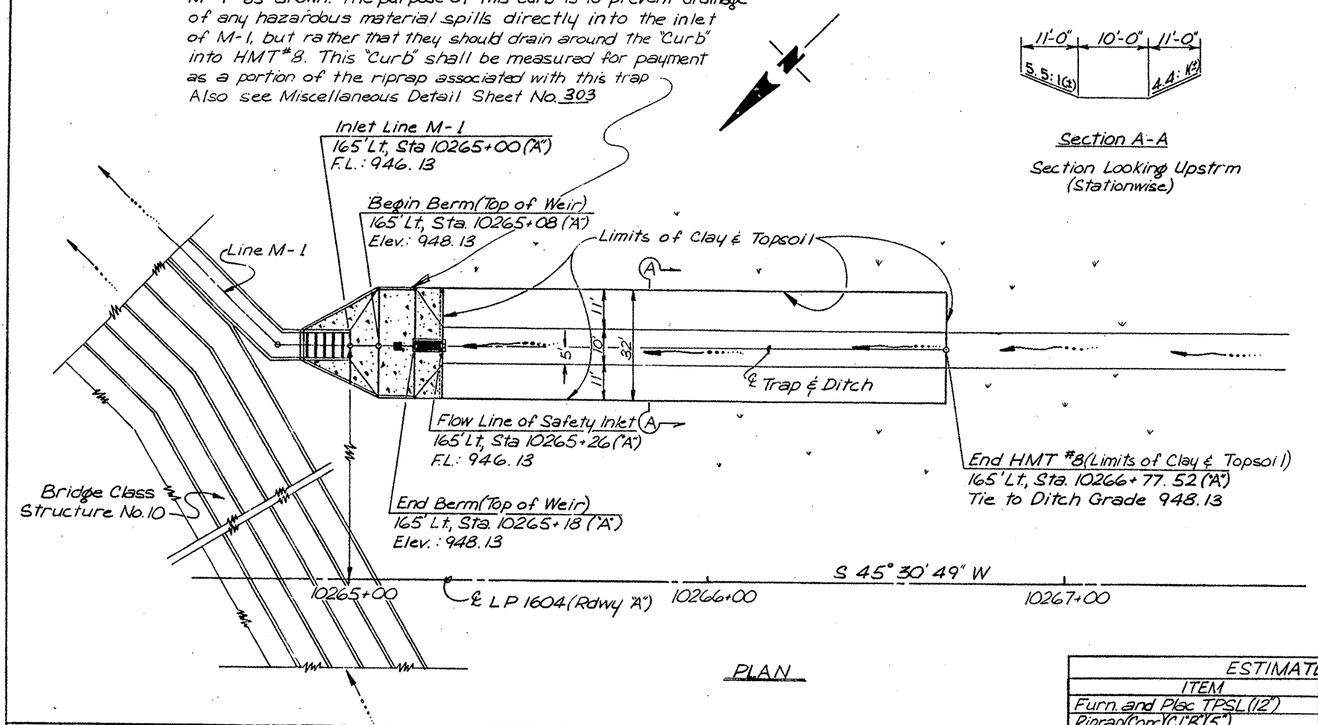
Scale: 1" = 20' H
1" = 5' V

HAZARDOUS MATERIAL TRAPS No. 6 & 7
PLAN & PROFILE

SHEET OF SHEETS

DRAWN	FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CHECKED	6	TEXAS					292 I
TRACED	STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.	
CHECKED	15	BEXAR	2452	02	023	LP1604 Etc	

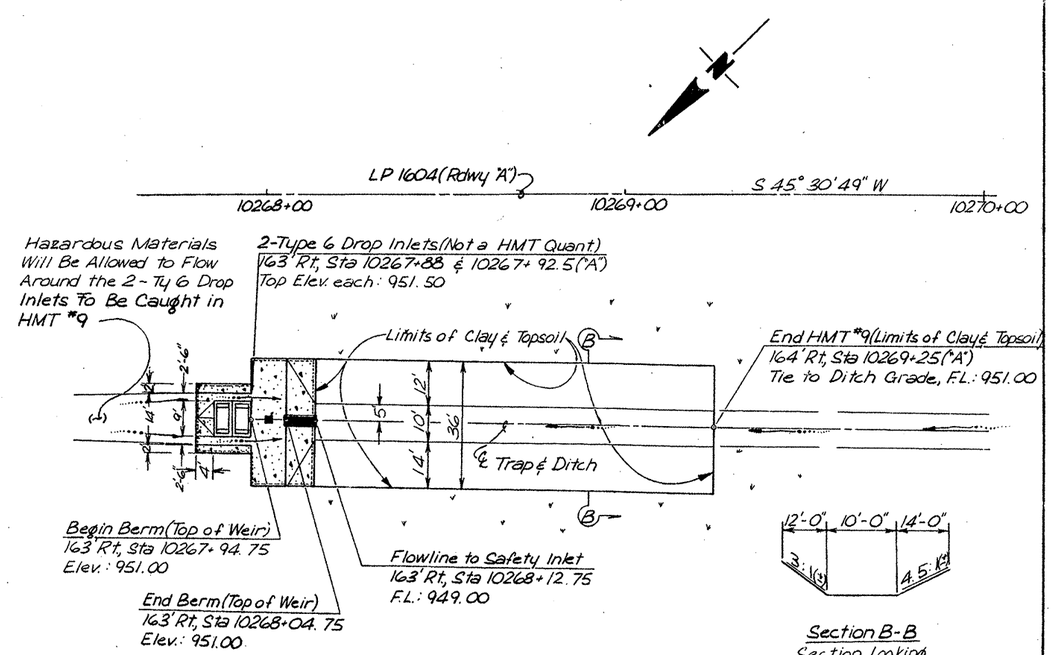
The contractor shall place a 6" "Curb" around the inlet of line M-1 as shown. The purpose of this "Curb" is to prevent drainage of any hazardous material spills directly into the inlet of M-1, but rather that they should drain around the "Curb" into HMT #8. This "Curb" shall be measured for payment as a portion of the riprap associated with this trap. Also see Miscellaneous Detail Sheet No. 303



PLAN

Section A-A

Section Looking Upstrm (Stationwise)



Section B-B

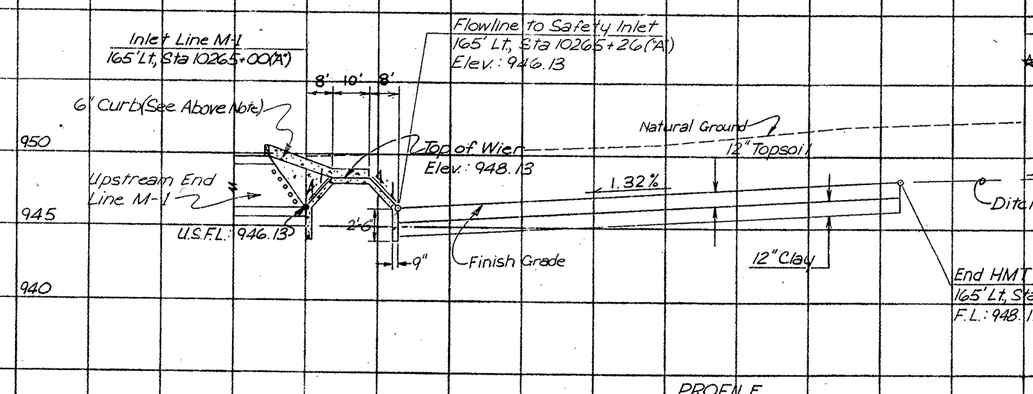
Section Looking Upstrm. (Stationwise)

PLAN

ESTIMATED QUANTITIES				
ITEM	UNIT	TRAP #8	TRAP #9	TOTAL
Furn. and Plac TPSL (12")	SY	540	452	992
Riprap (Cond) (C1'B'5")	CY	15	18	33
Inlet (Comp) (Ty 1 Safety)	EA	1	1	2
Ground Box (RPM) (Ty X) (122330)	EA	1	1	2
Excavation	CY	☆	☆	—
Embank (Ord Comp) (Ty C)	CY	180	151	331
Block Sod (Prairie Buffalo)	SY	540	452	992
Drain Line (CPVC 4") (Sch 80)	LF	22.25	14.25	36.5

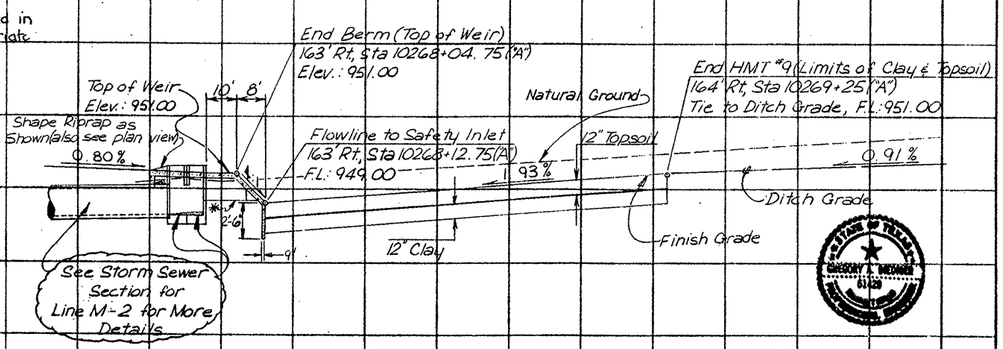
☆ Excavation Required for This Trap Included in Rdwy Excavation Quantities On The Appropriate Plan Sheet(s).

HAZARDOUS MATERIAL TRAP No. 8



PROFILE

HAZARDOUS MATERIAL TRAP No. 9



PROFILE

* The Hazardous Materials Trap plumbing assembly shall outfall to the last drop inlet of Line M-2. The contractor shall allow for the placement of the 4" CPVC drain pipe. Work & Materials required shall be considered subsidiary to the various bid items.

10265+00 10266+00 10267+00 10268+00 10269+00

Scale: 1" = 20' H
1" = 5' V

STATE OF TEXAS
GREGORY A. BAKER
61429

Gregory A. Baker P.E. 11-26-1993

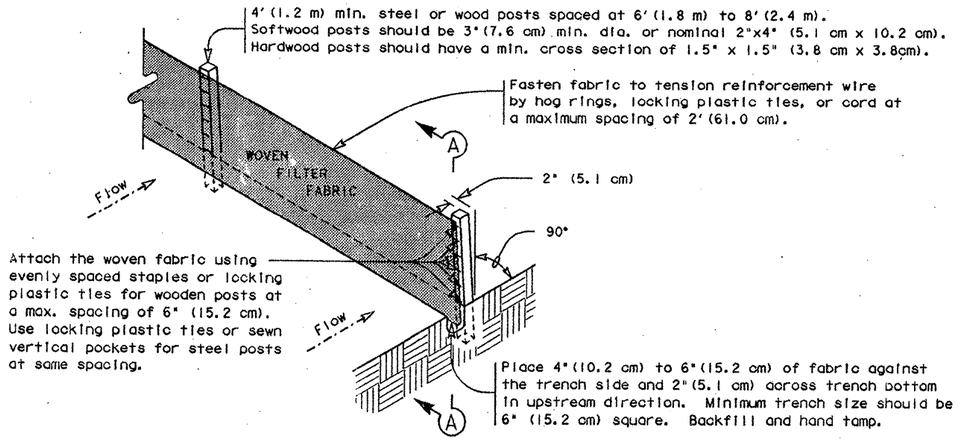
HAZARDOUS MATERIAL TRAPS No. 8 & 9

PLAN & PROFILE

SHEET OF SHEETS

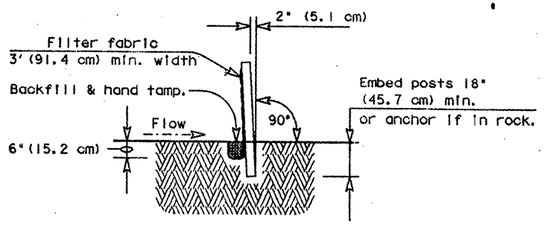
DRAWN	FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CHECKED	6	TEXAS					LP1604
TRACED	STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CHECKED	15	BEXAR	2452	02	023		292 J

Etc.



SILT FENCE (TYPE 1)

SF1



SECTION A-A

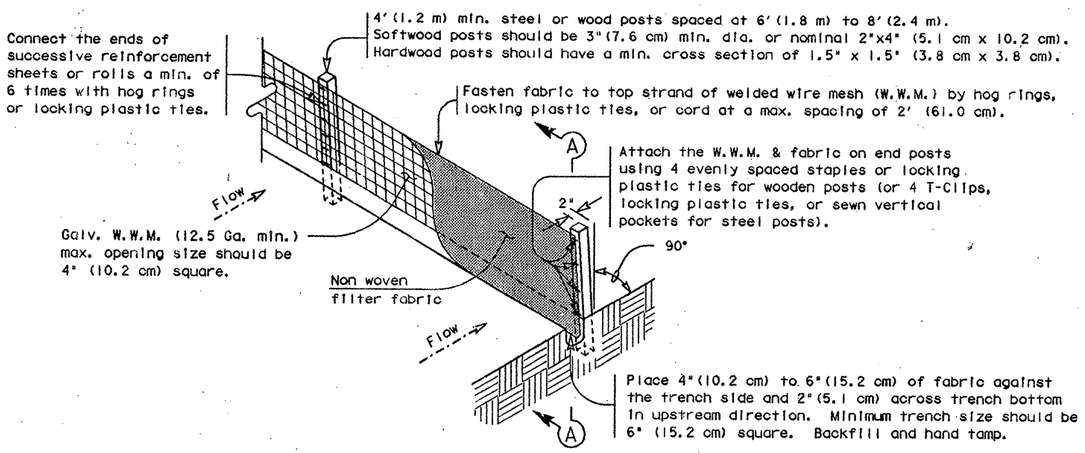
SILT FENCE USAGE GUIDELINES

A silt fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Silt Fence Type 1 should be sized to filter a max. flow thru rate of 40 GPM/FT^2. Silt Fence Type 1 may be used only where:

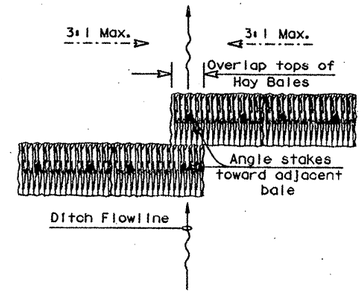
1. The runoff approaching the silt fence flows over disturbed soil for less than 100' (30.5m),
2. The disturbed embankment is less than 20' (6.1m) in height,
3. The slopes are 3:1 or flatter, and
4. The fence will be required for less than 6 months.

Silt Fence Type 2 should be sized to filter a max. flow thru rate of 100 GPM/FT^2. Silt Fence Type 2 may be used at all locations but neither type is recommended to control erosion from a drainage area larger than 2 acres.

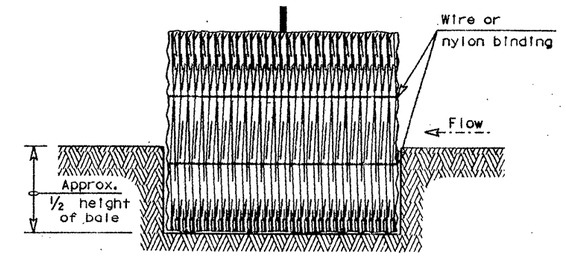


SILT FENCE (TYPE 2)

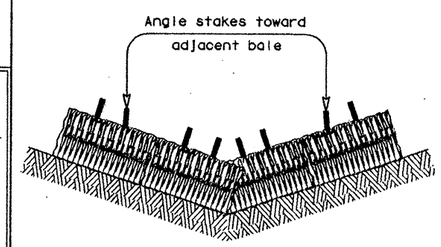
SF2



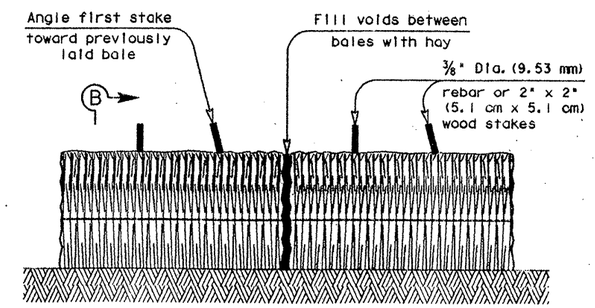
PLAN VIEW



SECTION B-B



PROFILE VIEW



BALED HAY

BH

BALED HAY USAGE GUIDELINES

A Baled Hay installation may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered. The installation should be sized to filter a maximum flow thru rate of 5 GPM/FT^2 of cross sectional area. Baled Hay may be used at the following locations:

1. Where the runoff approaching the baled hay flows over disturbed soil for less than 100' (30.5 m). If the slope of the disturbed soil exceeds 10%, the length of slope upstream of the baled hay should be less than 50' (15.2 m).
2. Where the installation will be required for less than 3 months.
3. Where the contributing drainage area is less than ½ acre.

For Baled Hay installations in small ditches, the additional following considerations apply:

1. The ditch sideslopes should be graded as flat as possible to maximize the drainage flowrate thru the hay.
2. The ditch should be graded large enough to contain the overtopping drainage when sediment has filled to the top of the baled hay.

Bales should be replaced usually every 2 months or more often during wet weather when loss of structural integrity is accelerated.

GENERAL NOTES

1. Hay bales should be a minimum of 30" (76.2 cm) in length and weigh a minimum of 50 Lbs. (22.7 kilo.).
2. Hay bales should be bound by either wire or nylon or polypropylene string. The bales should be composed entirely of vegetable matter.
3. Hay bales should be embedded in the soil a minimum of 4" and where possible, half the height of the bale.
4. Hay bales should be placed in a row with ends tightly abutting the adjacent bales. The bales should be placed with bindings parallel to the ground.
5. Hay bales should be securely anchored in place with ⅜" (9.53 mm) Dia. rebar stakes, driven through the bales. The first stake should be angled towards the previously laid bale to force the bales together.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

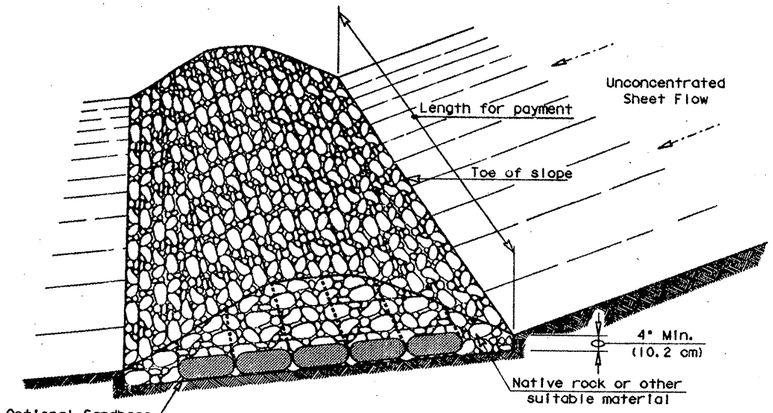
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL STANDARD EC(1)-93

(DISTRICT 15 STANDARD)

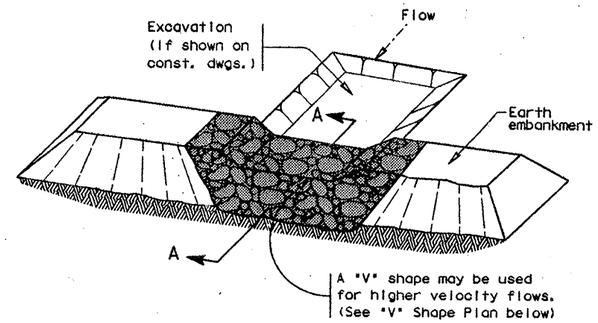
SILT FENCE & BALED HAY

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			236N
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	Bexar	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604



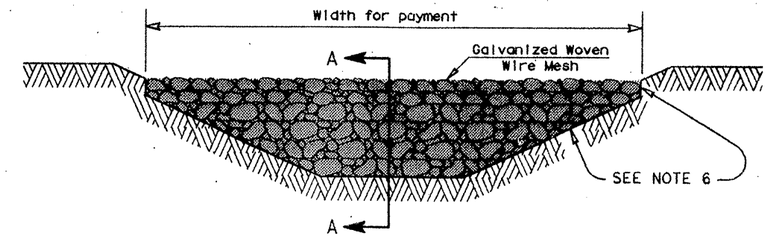
FILTER DAM AT TOE OF SLOPE

RFD1



FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



FILTER DAM AT CHANNEL SECTIONS

RFD2 OR RFD3

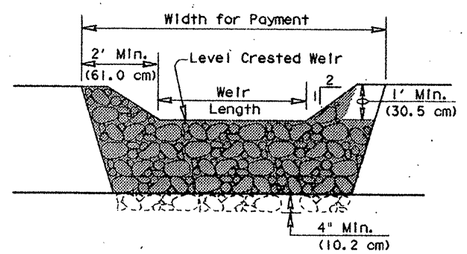
ROCK FILTER DAM USAGE GUIDLINES

Rock Filter Dams (RFDs) should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow thru rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

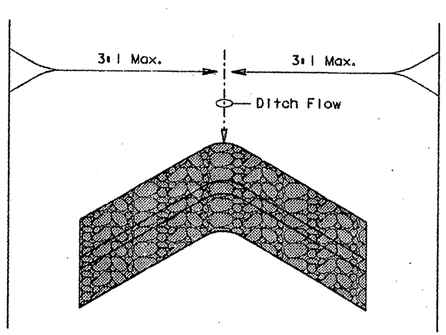
Type 1 (18" high with no wire mesh): RFD1s may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of RFD is recommended to control erosion from a drainage area of 5 acres or less. RFD1s may not be used in concentrated high velocity flows (approx. 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh): RFD2s may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh): RFD3s may be used in stream flow and should be secured to the stream bed.

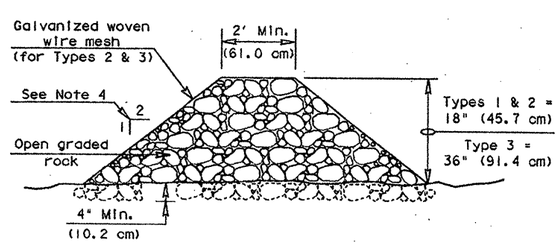


PROFILE



"V" SHAPE

(Plan View)



SECTION A-A

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone should have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' (30.5 cm) between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" (10.2 cm) into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown in the plans.
8. Rock filter dam types 2 & 3 should be secured with 20 gauge galvanized woven wire mesh with 1" (2.5 cm) diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh should be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties, hog rings, or locking plastic ties. In stream use the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Outlet onto a stabilized area (vegetation, rock, etc.).
10. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

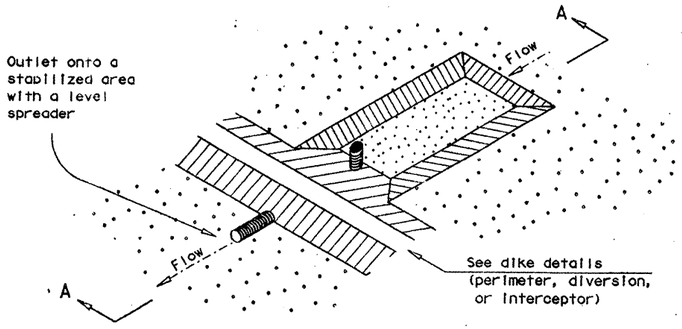
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL STANDARD EC(2)-93

(DISTRICT 15 STANDARD)

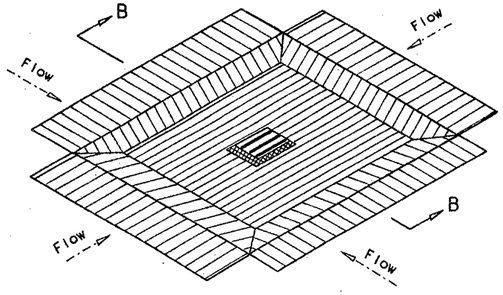
ROCK FILTER DAMS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			2320
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	Bexar	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604



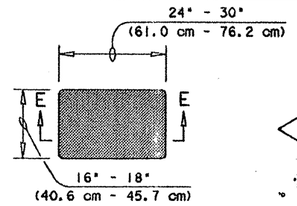
SEDIMENT BASIN AND/OR TRAP WITH PIPE OUTLET

(ST/PO)

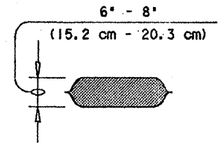


DROP INLET SEDIMENT TRAP

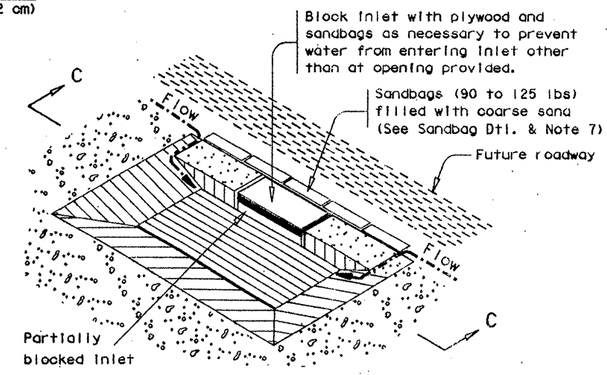
(ST-DI)



SANDBAG DETAIL

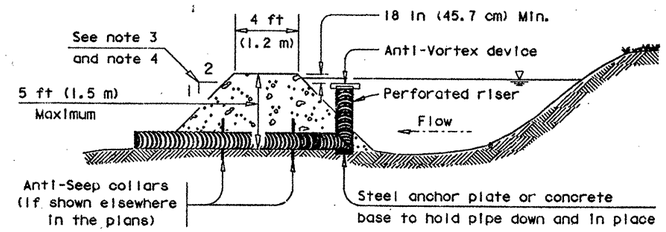


SECTION E-E

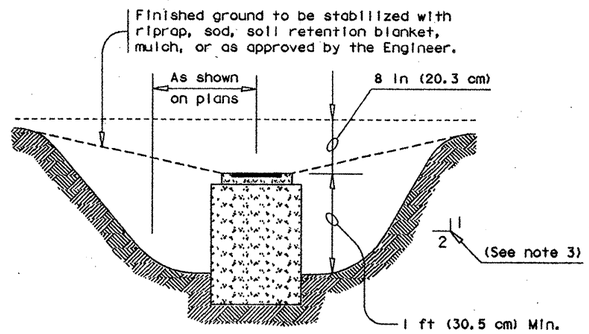


CURB INLET SEDIMENT TRAP

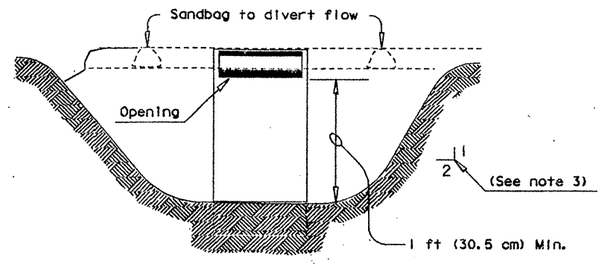
(ST-CI)



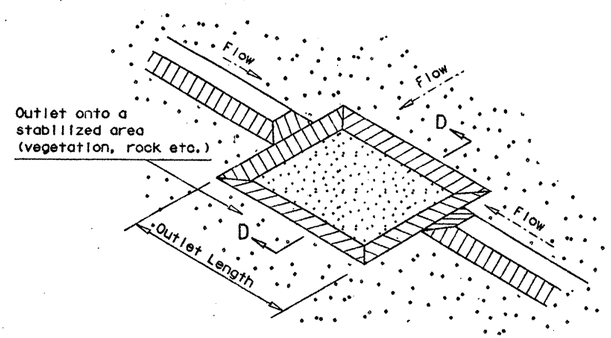
SECTION A-A



SECTION B-B

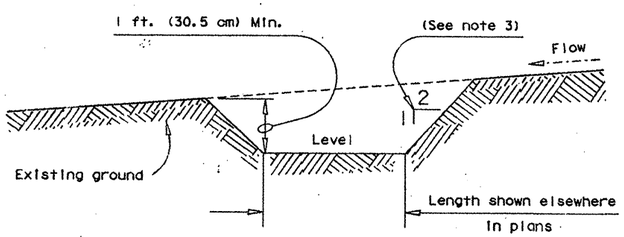


SECTION C-C



SEDIMENT TRAP WITH LEVEL STABILIZED OUTLET

(ST)



SECTION D-D

SEDIMENT BASIN & TRAP USAGE GUIDELINES

A sediment basin and/or trap may be used to precipitate sediment out of runoff draining from an unstabilized area.

Basins: The drainage area for a sediment basin should not exceed 100 acres. The basin capacity should be at least 1800 CF/Acre of drainage area (0.5" over the drainage area). If the disturbed area draining to the basin is larger than 10 acres, the basin capacity should be 3600 CF/Acre (1.0" over the drainage area).

The basin should have a 40 hour draw-down time with an emergency spillway. The spillway may be designed to pass the peak rate of runoff from a 25 year frequency storm. The 100 year storm should be investigated to assure no loss of life or property is possible.

The entrance into the basin should be protected from erosion. The basin should be cleaned when the capacity has been reduced by 1/3.

Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Sediment traps should be placed in the following locations:
1. Within drainage ditches spaced @ 500'± (152.4m±) on center
2. Immediately preceeding ditch inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way

The trap outlet may either be through a perforated riser and pipe assembly designed to achieve a 40 hour draw-down time or over a level stabilized area (vegetation, rock, etc.).

The trap should be cleaned when the capacity has been reduced by 1/2 or the sediment has accumulated to a depth of 1' (30.5 cm), whichever is less.

GENERAL NOTES

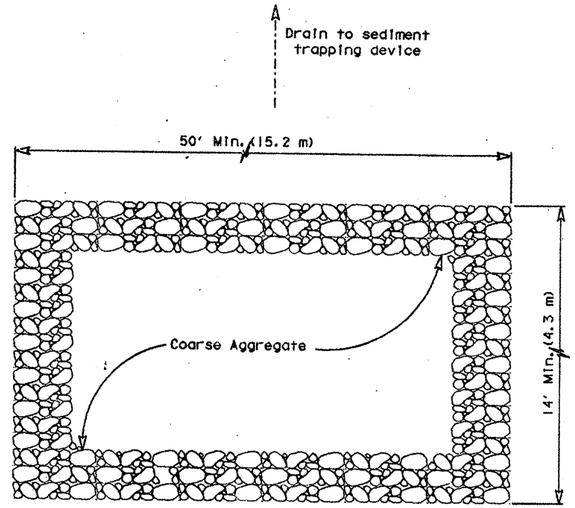
1. Pipe outlet material shall conform to the item "Pipe Underdrains" or as accepted by the Engineer.
2. All pipe connections shall be watertight.
3. Side slopes within the safety clear zone of a roadway should be 6:1 or flatter. Protect the traveling public from inlet stacks within the clear zone.
4. Sediment basins should have side slopes of 3:1 or flatter.
5. The dimensions and limits of excavation for sediment basins and traps shall be as shown elsewhere in the plans.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. The sandbag material shall be made of polypropylene, polyethylene or polyamide woven fabric, min. unit weight 4 ounces/SY, mullen burst strength exceeding 300 psi and ultraviolet stability exceeding 70%.

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

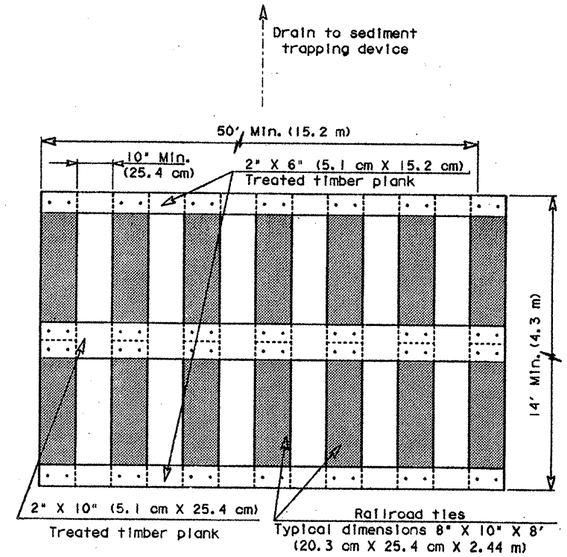
EROSION CONTROL STANDARD EC(6)-93

(DISTRICT 15 STANDARD)
SEDIMENT BASINS & TRAPS
(EARTHWORK FOR EROSION CONTROL)

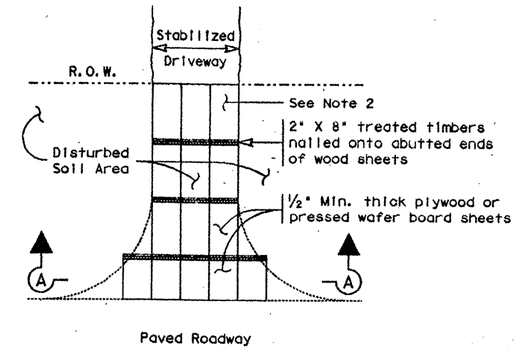
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			292P
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	Bexar	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP1604



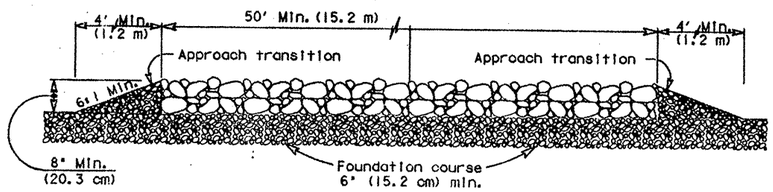
PLAN



PLAN



PLAN



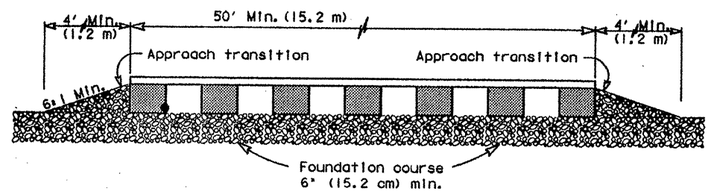
PROFILE

CONSTRUCTION EXIT (TYPE 1)

CE1

GENERAL NOTES

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50' (15.2 m).
2. The coarse aggregate should be open graded with a size of 4" (10.1 cm) to 8" (20.3 cm).
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
5. The construction exit should be graded to allow drainage to a sediment trapping device.



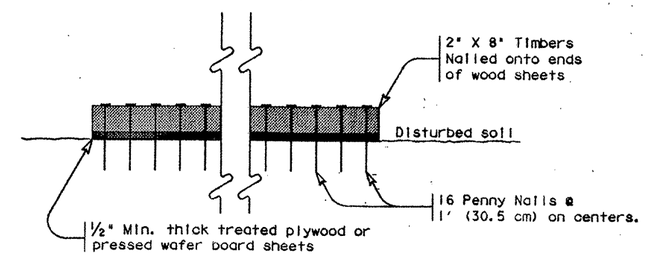
PROFILE

CONSTRUCTION EXIT (TYPE 2)

CE2

GENERAL NOTES

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50' (15.2 m).
2. The treated timber planks should be attached to the railroad ties with ½"x 6" (1.3 cm x 15.2 cm) min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks should be #2 grade min., and should be free from large and loose knots.
4. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

CE3

GENERAL NOTES

1. The length of the type 3 construction exit shall be as shown on the plans or as directed by the Engineer.
2. This type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown in the plans.
3. The treated timber planks should be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

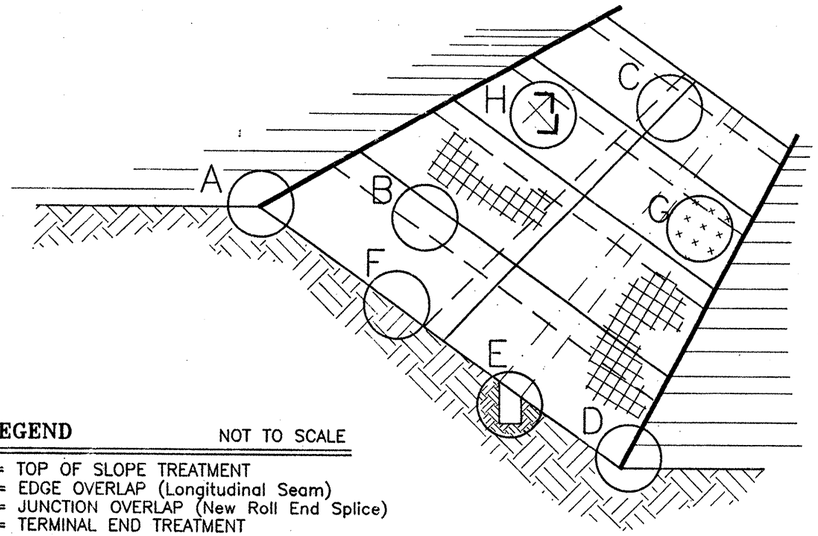
EROSION CONTROL STANDARD EC(9)-93

(DISTRICT 15 STANDARD)

CONSTRUCTION EXIT

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			2929
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	Bexar	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

CLASS 1 – SLOPE PROTECTION APPLICATIONS



LEGEND NOT TO SCALE

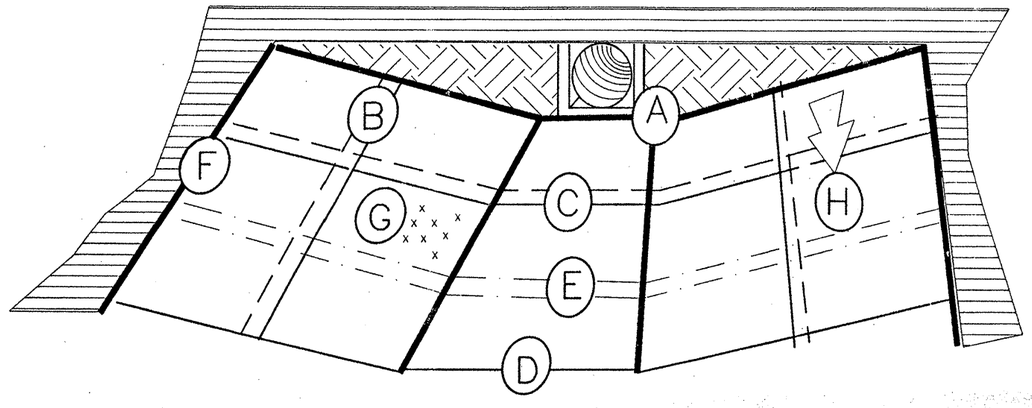
A = TOP OF SLOPE TREATMENT
B = EDGE OVERLAP (Longitudinal Seam)
C = JUNCTION OVERLAP (New Roll End Splice)
D = TERMINAL END TREATMENT
E = TRANSVERSE CHECK SLOTS
F = PERIMETER EDGE TREATMENT
G = STAPLE/STAKING PATTERN
H = REMARKS

TYPICAL SLOPE PROTECTION APPLICATION

CLASS 1, TYPE A = Slopes of 3:1 or Flatter – Clay Soils
CLASS 1, TYPE B = Slopes of 3:1 or Flatter – Sandy Soils
CLASS 1, TYPE C = Slopes Steeper than 3:1 – Clay Soils
CLASS 1, TYPE D = Slopes Steeper than 3:1 – Sandy Soils

REFER TO SHEETS SRB (2–7) – 93 FOR INSTALLATION REQUIREMENTS OF PRODUCTS CURRENTLY APPROVED FOR USE ON SLOPE PROTECTION APPLICATIONS.

CLASS 2, FLEXIBLE CHANNEL LINER APPLICATIONS



LEGEND NOT TO SCALE

A = TOP OF CHANNEL TREATMENT
B = EDGE OVERLAP (Longitudinal Seam)
C = JUNCTION OVERLAP (New Roll End Splice)
D = END OF CHANNEL TREATMENT
E = TRANSVERSE CHECK SLOTS
F = PERIMETER EDGE TREATMENT
G = STAPLE/STAKING PATTERN
H = REMARKS

TYPICAL FLEXIBLE CHANNEL LINER APPLICATION

CLASS 2, TYPE E = Short Term Protection – Shear Stress (td) < 1.0 Lbs/Sq Ft
CLASS 2, TYPE F = Short Term Protection – Shear Stress (td) 1.0 – 2.0 Lbs/Sq Ft
CLASS 2, TYPE G = Long Term Protection – Shear Stress (td) > 2.0 < 5.0 Lbs/Sq Ft
CLASS 2, TYPE H = Long Term Protection – Shear Stress (td) 5.0 Lbs/Sq Ft or Greater

REFER TO SHEETS SRB(8–10) – 93 FOR INSTALLATION REQUIREMENTS OF PRODUCTS CURRENTLY APPROVED FOR USE ON FLEXIBLE CHANNEL LINER APPLICATIONS.

The Contractor has the option of selecting an approved Soil Retention Blanket provided the selection conforms to the list of CURRENTLY APPROVED PRODUCTS for Slope Protection and for Flexible Channel Liner applications, and to the Type and Class as shown on the plans. Prequalification procedures and a list of currently prequalified materials may be obtained by writing to the Director, Maintenance and Operations Division, 125 E. 11th Street, Austin, TX 78701–2483.

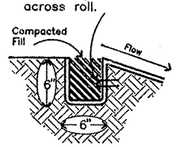
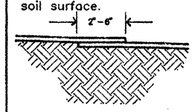
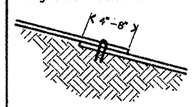
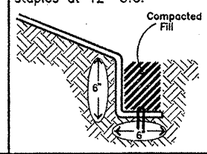
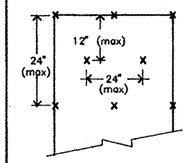
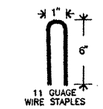
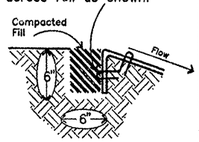
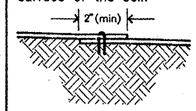
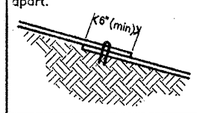
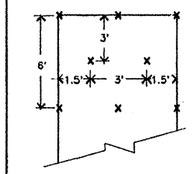
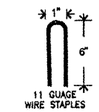
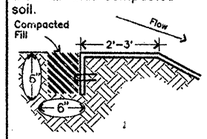
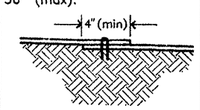
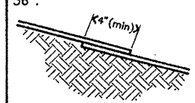
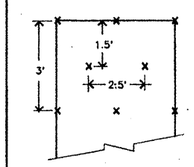
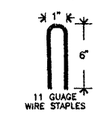
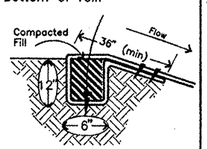
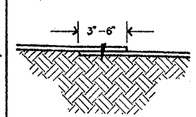
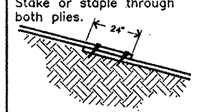
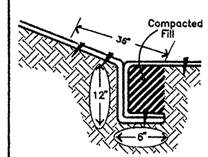
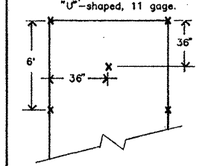
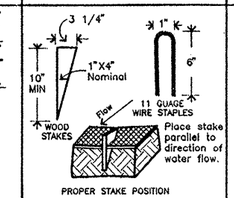
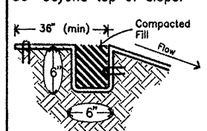
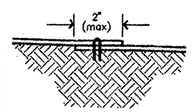
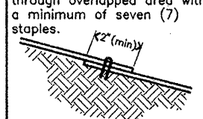
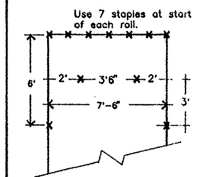
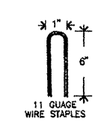
STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION
SOIL RETENTION BLANKET (SRB) STANDARDS

SCHEMATIC OF CRITICAL INSTALLATION POINTS FOR SOIL RETENTION BLANKETS

SRB(1) – 93

ORIGINAL DRAWING DATE: 2/1/93		STATE DISTRICT	FEDERAL REGION	PROJECT NUMBER		SHEET
DN1: PEN	REVISIONS	15	6	NH 90(191)M, Etc.		292 R
CHK1:		COUNTY		CONTROL	SECT	JOB	HWY
ISSUE DATE: 2/1/93		Bexar		2452	2	23 Etc.	Lp 410
		DIVISION OF MAINTENANCE AND OPERATIONS					

SRB193.DWG

PRODUCT NAME	A TOP OF SLOPE	B EDGE OVERLAP	C JUNCT OVERLAP	D TERMINAL END	E TNSV CHECK	F PERIMETER EDGE	G STAPLE PATTERN	G1 STAPLE TYPE	REMARKS
Antiwash/Geojute Soil Saver	Reinforce with row of staples spaced 12" O.C. across roll. 	Edge overlap shall be 2" (min)–6" (max). Staple through both plies with staples driven flush with soil surface. 	On the end of each roll, fold back 4" (min)–8" (max) of end of each roll. Overlap over start of next roll. Staple through both plies, shingle downstream. 	Bring roll down to level area before termination. Fold 6" under and secure with staples at 12" O.C. 	Not Required	Not Required		 Staples shall be 1"x6" "U"–shaped, 11 guage minimum.	Install product in direction of water flow. Prepare the soil by grading or raking area free of clods and large stones. Do not compact. Fertilizer should be added prior to installing blanket. Seed as specified should be applied to the area prior to installing blanket. Additional seed may be broadcast over the blanket in the event of poor germination.
North American Green S75 North American Green S150 North American Green SC150	Reinforce with row of staples spaced 12" O.C. across roll as shown. 	Edge overlap shall be 2" (min). Staple through both plies with staples flush with surface of the soil. 	When blankets must be spliced down the slope, place blankets end over end (shingle style) with 6" (min) overlap. Staple through overlapped area approx 12" apart. 	Standard Stapling Only	Not Required	Not Required		 Staples shall be 1"x6" "U"–shaped, 11 guage minimum.	Prepare soil before installing blankets, including the application of fertilizer and seed as specified. Blankets shall be installed in the direction of water flow.
POLYJUTE 407GT TerraJute	Extend blanket 2'–3' past top of slope. Dig 6"x6" anchor slot, staple as shown then fill with compacted soil. 	Overlap edges of blanket at least 4" and in the direction of water flow. Staple centerline of overlap every 36" (max). 	Overlap edges of blanket at least 4" and in the direction of water flow. Staple centerline of overlap every 36". 	Standard Stapling Only	Not Required	Not Required		 Staples shall be 1"x6" "U"–shaped, 11 guage minimum.	Blankets may be installed either parallel with the slope, or in the direction of water flow. Prepare and grade seedbed including fertilizer and seed as specified before installing the blanket.
Greenstreak PEC–MAT	3 Stakes or staples shall be spaced evenly across bottom of roll. 	Edge overlap shall be 3" (min)–6" (max), stapled or staked through both plies. 	When splicing in a new roll that does not coincide with a transverse check slot, use a 24" (min) overlap and shingle downstream. Stake or staple through both plies. 	Staple or stake as shown. 	Not Required	Not Required	Staples shall be 1" x 6" "U"–shaped, 11 gage. 		Install product in the direction of water flow. Grade surface of installation area shaping and smoothing the soil. Fill in all holes with appropriate fill. Apply fertilizer and seed as specified prior to the installation of the blankets. Insure blanket is in contact with the soil and that it is not in tension.
verdyol ERO–MAT	At the top of each roll, anchor blanket with row of not less than seven (7) staples. Extend blanket 36" beyond top of slope. 	Edge overlap shall be 2" (max), stapled securely through centerline of overlap. 	When blankets must be spliced down the slope, place blankets end over end shingle style with approx. 2 1/2" overlap. Staple through overlapped area with a minimum of seven (7) staples. 	Standard Stapling Only	Not Required	Not Required	Use 7 staples at start of each roll. 	 Staples shall be 1"x6" "U"–shaped, 11 guage minimum.	Blankets shall be installed in the direction of water flow. Prepare soil to include removal of clods, large stones or other obstructions. Fertilizer and seed as specified is to be applied prior to the installation of the blanket. Unroll the blanket with the netting on top and with the straw fibers in contact with the soil. Each staple must engage a portion of the plastic netting and be set flush with the soil surface.

STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION

SOIL RETENTION BLANKET (SRB) STANDARDS

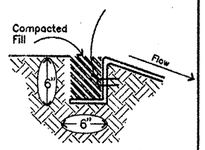
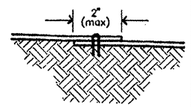
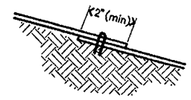
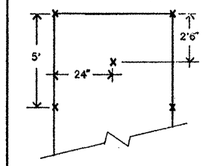
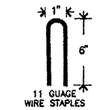
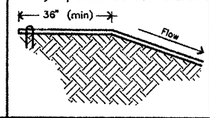
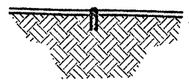
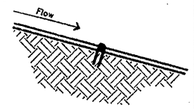
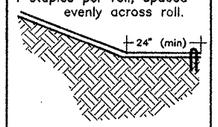
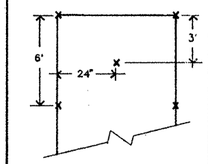
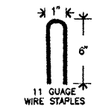
SLOPE PROTECTION APPLICATIONS
CLASS 1, TYPE A
Slopes 3:1 or Flatter – Clay Soils

SRB(2) – 93

ORIGINAL DRAWING DATE: 2/1/93		STATE DISTRICT	FEDERAL REGION	PROJECT NUMBER			SHEET
DN1: PEN	REVISIONS	15	6	NH 90(191)M, Etc.			2925
CHK1:		COUNTY		CONTROL	SECT	JOB	HWY
ISSUE DATE: 2/1/93		Bexar		2462	2	23	Lpkt

DIVISION OF MAINTENANCE AND OPERATIONS

SRB293.DWG

PRODUCT NAME	A TOP OF SLOPE	B EDGE OVERLAP	C JUNCT OVERLAP	D TERMINAL END	E TNSV CHECK	F PERIMETER EDGE	G STAPLE PATTERN	G1 STAPLE TYPE	G REMARKS
Xcel Regular Contech Standard Green Triangle Regular Xcel Superior Contech Standard Plus Green Triangle Superior	Reinforce with row of staples spaced 12" across roll. 	Edge overlap shall be 2" (max), stapled 12" O.C. along centerline of overlap. 	Junction overlap shall be 2"(max). Staple junction overlap with staples 12" O.C. along centerline of overlap. 	Standard Stapling Only	Not Required	Not Required		 Staples shall be 1"x6" "U"-shaped, 11 guage	Install products in direction of water flow. Seeding and fertilizer, as specified, shall be applied prior to the installation of the blanket. The blanket shall be in contact with the soil over the entire area. Insure that netting is on top of the excelsior fiber.
Curlex (standard)	Blankets should extend a minimum of 36" over crest of slope. Anchor blankets at top of each roll by using a minimum of 4 staples evenly spaced across blanket 	Butt adjacent rolls together without overlap and use a common row of 1"x6" 11 guage staples evenly spaced along centerline of joint. 	Butt ends of rolls together without overlap and use a common row of 1"x6" 11 guage staples evenly spaced along centerline of joint. 	Bring blanket to level area and extend 24"(min) as shown. Terminal end shall be anchored with a minimum of 4 staples per roll, spaced evenly across roll. 	Not Required	Not Required		 Staples shall be 1"x6" "U"-shaped, 11 guage	Install products in direction of water flow. All fertilizer and seeding as specified shall be performed prior to the install-ation of the blanket. During installation, insure that netting is on top and that the fibers are in direct contact with the soil.
Airtrol	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	~~Airtrol Plaster is a cementious gypsym binder applied in conjunction with an approved cellulose fiber mulch through a hydroseeding process. Cellulose Fiber Mulch shall be applied at 2,500 lbs/ac. Airtrol Plaster rates shall be as follows:~~ ~~HYDROSEEDER CAPACITY (GAL) / WATER (GAL) / MINIMUM PLASTER (LBS)~~ ~~900 / 800 / 1,200~~ ~~1,500 / 1,350 / 2,000~~ ~~3,000 / 2,700 / 4,000~~
									Airtrol® Plaster is a cementious gypsum binder applied in conjunction with an approved cellulose fiber mulch through a hydraulic seeding process. The product shall be applied as follows: Hydroseeder Capacity (Gal) / Water (Gal) / Plaster (Lbs) / Cellulose Fiber Mulch (Lbs) / Coverage (Acres) 900 / 800 / 1200 / 320 / 0.20 1100 / 975 / 1450 / 400 / 0.25 1500 / 1350 / 2000 / 540 / 0.33 3000 / 2700 / 4000 / 1080 / 0.66 For every 100 gallons of water, add 150 Lbs of **Airtrol® Plaster** and 40 Lbs of an approved cellulose fiber mulch for a coverage rate of 0.025 Acres/100 Gallons of slurry.

STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION

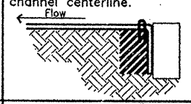
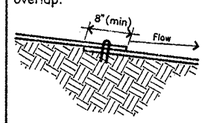
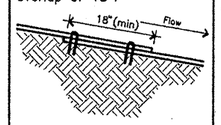
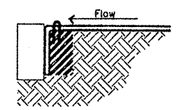
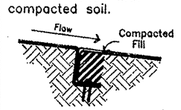
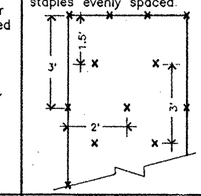
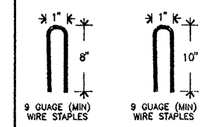
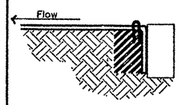
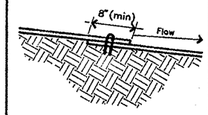
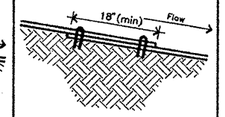
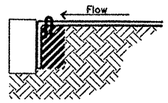
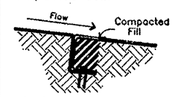
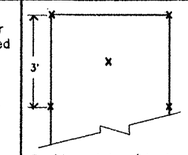
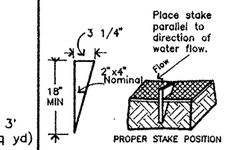
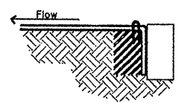
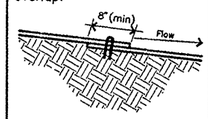
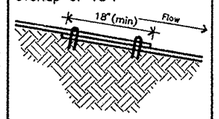
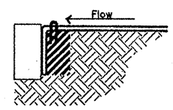
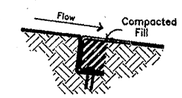
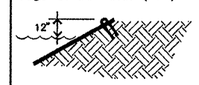
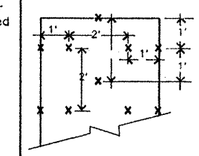
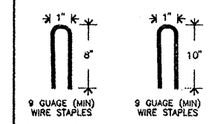
SOIL RETENTION BLANKET (SRB) STANDARDS

SLOPE PROTECTION APPLICATIONS
CLASS 1, TYPE A (CONTINUED)
Slopes of 3:1 or Flatter – Clay Soils
SRB(3) – 93

ORIGINAL DRAWING DATE: 2/1/93		STATE DISTRICT	FEDERAL REGION	PROJECT NUMBER			SHEET
DN1: PEN	REVISIONS	15	6	NH 90(191)M, Etc.			292T
CHK1:		COUNTY		CONTROL	SECT	JOB	HWY
ISSUE DATE: 2/1/93		Bexar		2452	2	23, etc.	

DIVISION OF MAINTENANCE AND OPERATIONS

SRB393.DWG

NAME OF APPROVED BRAND	A TOP OF CHNL	B EDGE OVERLAP	C JUNCT OVERLAP	D END OF CHNL	E CHECK SLOTS	F JUNCT OVERLAP	G STAPLE PATTERN	G-1 STAPLE TYPE	REMARKS
HI-VELOCITY CURLEX	Bury blanket in 10" deep x 6" (min) trench and compact. Start with 4 staples evenly spaced across roll. When using 2 or more blankets in channgl bottom, do not place seams in channel centerline. 	If adjacent rolls are required, overlap shall be 8"(min) (shingle style), staked through centerline of overlap. 	When a roll terminates, it shall be staked over the new roll with a minimum overlap of 18". 	At end of channel, bury blanket in a 10"x6" (min) trench. Staple with 4 staples spaced evenly across roll. 	Install 6"(min) width x 12" (max) depth transverse check slots at 25' O.C. Staple with 4 staples spaced evenly across roll, then fill trench with compacted soil. 	Blankets shall extend 12" (min) above level of water flow at maximum estimated depth. Staple perimeter edge at 36" O.C. (min). 	Start each roll with 4 staples evenly spaced. 		Blankets shall be installed in the direction of water flow. When using two blankets side by side in a channel, do not place the seams in the center of the channel. Offset seams 6" minimum.
GEOCOIR/DeKoWe 900	Blury blanket in 10" deep x 6" wide (min) trench. Staple and compact securely. 	If adjacent rolls are required, overlap shall be 8"(min) (shingle style), staked through centerline of overlap. 	When a roll terminates, it shall be staked over the new roll with a minimum overlap of 18". 	At end of channel, bury blanket in a 10"x6" (min) trench. Staple with 4 staples spaced evenly across roll. 	Install 6"(min) width x 12" (max) depth transverse check slots at 25' O.C. Staple with 4 staples spaced evenly across roll, then fill trench with compacted soil. 	Blankets shall extend 12" (min) above level of water flow at maximum estimated depth. Staple perimeter edge at 36" O.C. (min). 	 Position stakes/staples 3' apart (maximum) (3/sq yd) domino pattern.		Blankets shall be installed in the direction of water flow. If wooden stakes are not appropriate for the project, use 9 guage (minimum) staples, 1"x10" (minimum), fitted with a metal washer.
XCEL SUPER DUTY CONTECH SUPER PLUS	Blury blanket in 10" deep x 6" wide (min) trench. Staple and compact securely. 	If adjacent rolls are required, overlap shall be 8"(min) (shingle style), staked through centerline of overlap. 	When a roll terminates, it shall be staked over the new roll with a minimum overlap of 18". 	At end of channel, bury blanket in a 10"x6" (min) trench. Staple with 4 staples spaced evenly across roll. 	Install 6"(min) width x 12" (max) depth transverse check slots at 25' O.C. Staple with 4 staples spaced evenly across roll, then fill trench with compacted soil. 	Blankets shall extend 12" (min) above level of water flow at maximum estimated depth. Staple perimeter edge at 36" O.C. (min). 			Blankets shall be installed in the direction of water flow. Blanket should be in contact with the soil over the entire area. Blanket should be installed over a properly prepared, fertilized and seeded area.

STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION

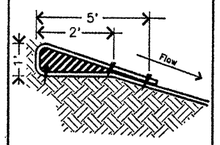
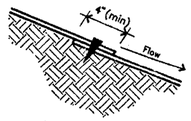
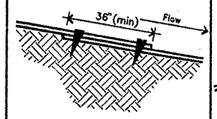
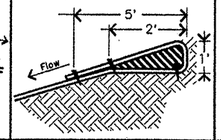
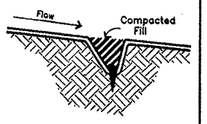
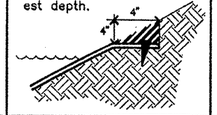
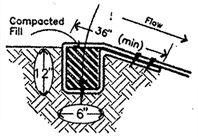
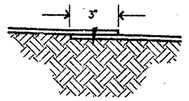
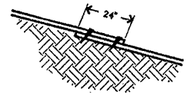
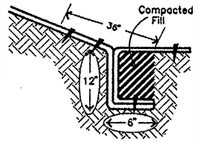
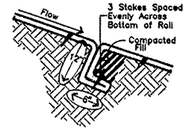
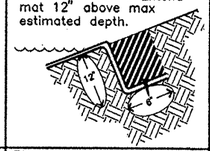
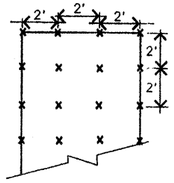
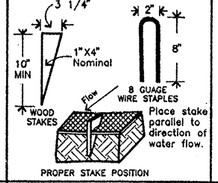
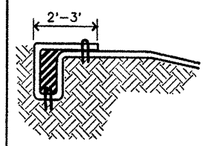
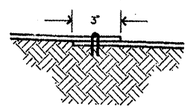
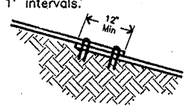
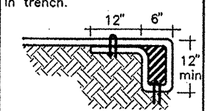
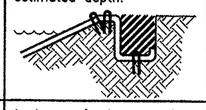
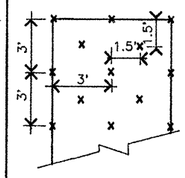
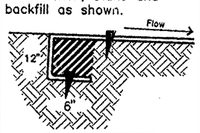
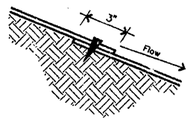
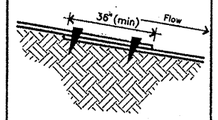
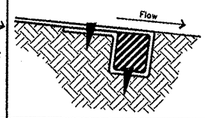
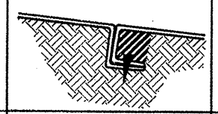
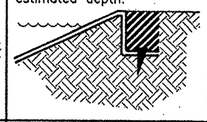
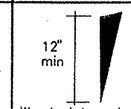
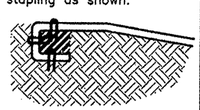
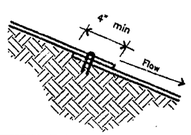
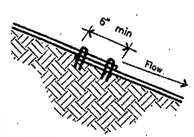
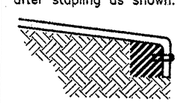
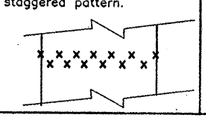
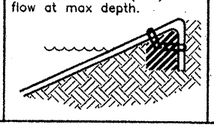
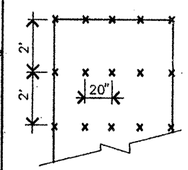
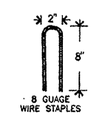
SOIL RETENTION BLANKET (SRB) STANDARDS

FLEXIBLE CHANNEL LINER APPLICATIONS
CLASS 2, TYPE E & F
SHEAR STRESS UP TO 2.0 LB./SQ FT

SRB(8) – 93

ORIGINAL DRAWING DATE: 2/1/93		STATE DISTRICT	FEDERAL REGION	PROJECT NUMBER			SHEET
DN1: PEN	REVISIONS	15	6	NH 90(91)M, Etc.			292 et
CHK1:		COUNTY		CONTROL	SECT	JOB	HWY
ISSUE DATE: 2/1/93		Bexar		2452	2	23, etc.	
		DIVISION OF MAINTENANCE AND OPERATIONS					

SRB893.DWG

PRODUCT NAME	A TOP OF CHNL	B EDGE OVERLAP	C JUNCT OVERLAP	D END OF CHNL	E TNSV CHECK	F PERIMETER EDGE	G STAPLE PATTERN	G1 STAPLE TYPE	REMARKS
Enkamat 7020	Bury blanket to 12" depth to prevent "underflow". Stake as shown. 	Blankets shall be overlapped 4"(min) and staked at 3'-5' intervals. 	When a roll terminates, it shall be staked over the new roll, with a minimum overlap of 36". 	Bury blanket to 12" at lower terminal end to prevent "waterfall". Stake as shown. 	Install 6"(min)-12"(max) deep transverse trench at 25' O.C. Stake at overlap and blanket centers. 	Place blanket into a 4" (min) ledge, stake at 3'-5' intervals, and backfill with compacted fill. Extend blanket 12 (min) above level of maximum est depth. 	Stake overlaps and edges of blanket at 3'-5' intervals along length of channel. Stake remainder of blanket every 3'-5'.	 Use diagonal-cut wood survey stakes, 10" minimum in length.	Surface must be smooth and free of ruts and rocks prior to placement of blanket. Peaked side of the blanket must be DOWN during installation. Stretch blanket approximately 5% before staking (blanket edges should curl up). After installation, proceed with seeding activities as specified.
Greenstreak PEC-MAT	Install blanket into a 12" x 6" trench, stake as shown, and backfill with compacted fill. 	Center first roll on the ditch center-line. If additional rolls are required, overlap new roll by 3" minimum. Stake through center of both plies. 	When splicing in a new roll that does not coincide with a transverse check slot, use a 24" (min) overlap, shingled downstream. Stake as shown. 	Staple or stake as shown. 	Transverse check slots shall be 6" wide (min) x 12" deep (min), installed 25' O.C. maximum. 	All perimeter edges shall be secured within a 12" deep x 6" wide trench and staked as shown. Extend mat 12" above max estimated depth. 			Grade surface, shaping and smoothing the soil. Fill in all holes and compact. Transverse check slots generally run 90 degrees to the flow. Dress site by removing rocks, dirt, clumps, stumps, trash vehicle imprints, etc. Fertilize and seed area as specified prior to installing blanket. Insure blanket is rolled down-stream and that it is not in tension.
LANDLOK **ECRM** 450	Anchor slot shall be 12" deep (min) x 6" wide (min) staked or stapled as shown 	Center first roll on the ditch center-line. If additional rolls are required, overlap new roll by 3" minimum. Stake through center of both plies. 	Shingle-lap roll ends by a minimum of 12" with upstream mat on top, or begin new rolls in tnsv check slot. Staple with two rows of staples 1' apart on 1' intervals. 	Beginning at downstream end and in center of channel, place end of first roll in anchor trench and staple at 12" intervals. Matting will initially be upside down in trench. 	Excavate transverse check slots 6" deep (min) x 6" wide (min), at 30' O.C. Staple at 1' intervals, fill with soil and compact. 	Place edges of outside mats in previously excavated longitudinal slots, 4" deep (min) x 4" wide (min). Anchor with staples and fill with compacted soil. Extend mat 12" min above max estimated depth. 		U-shaped wire staples shall be 2"x8" 8 gauge min. Metal stake pins shall be 3/16" diameter with a 1 1/2" steel washer at the head of the pin. Wooden stakes shall be 3"x 1 1/2" triangular wooden survey stakes. Two inches of wood staking shall remain above the soil surface. All anchors shall be 8" long minimum.	Grade and compact area of installation. Prepare seed-bed by loosening 2'-3" of topsoil above final grade. Incorporate fertilizer if required. Remove all rocks, clods vegetation or other obstruction that will prevent direct contact with the soil. Seeding should occur prior to installation of mats for erosion control and revegetation. When seeding prior to installation, all check slots and other areas disturbed during installation shall be reseeded. Do not mulch areas where mat is to be placed. **Installation shall begin at the DOWNSTREAM end of the channel.**
MIRAMAT 1000	Center mat in ditch bottom and unroll starting at upper end of ditch. Anchor mat in 12"(min) deep x 6" (min) wide trench; stake and backfill as shown. 	Roll adjacent widths of mat overlapping side edges by 3" (min). Stake overlaps longitudinally at 3'-5' O.C. 	Overlap roll ends which do not coincide with check slot by 36" (min), with upslope mat on top. Stake as shown. 	Bury terminal end of mat in trench to a minimum of 12" deep and 6" wide. Fill with compacted fill and stake as shown. 	Transverse check slots shall be 6"x6"(minimum), spaced 25' O.C. Stake and fill with compacted fill as shown. 	Anchor perimeter edge in 12"(min)x6"(min) trench. Stake at 3'-5' intervals. Blanket shall extend 12" (min) above maximum estimated depth. 	Stake overlaps and edges of blanket at 3'-5' intervals along length of channel. Stake remainder of blanket every 3'-5'.	 Wood stakes shall be 1"x3" nominal stock cut in a triangular shape. Stakes shall be 12" minimum in length. Drive stakes to within 3" of surface. Do not drive flush with ground.	Grade surface so that ground is smooth and compact. Remove all rock, dirt clods, grass clumps, trash and other obstructions that will prevent mat from lying in direct contact with soil surface. Seed and fertilizer as specified may be applied before or after installation of the mat. Center first mat in ditch bottom. Do not strech mat during installation.
North American Green P300P	Begin at the top of the channel by anchoring the blanket in a 6" deep (min) x 6" wide (min) trench. Backfill and compact after stapling as shown. 	Blankets on side slopes shall be overlapped 4" minimum and stapled. 	Place blankets end over end (shingle style) with 6" min overlap. Use double row of staggered staples 4" apart. 	The terminal end of the blanket shall be anchored in a 6" deep (min) x 6" wide (min) trench. Backfill and compact trench after stapling as shown. 	Staple check slots shall be installed at 30' O.C. Use a row of staples 4" apart over entire width of channel. Place a second row 4" below the first row in a staggered pattern. 	Full length of blanket at top of side slopes shall be anchored in a 6"x6"(min) trench. Fill with compacted soil after stapling. Blanket shall extend 12" (min) above flow at max depth. 			Place initial blanket in the centerline of the channel. Remove all rocks, clods, trash or other obstructions which will prevent close contact with the soil. Prepare soil and apply fertilizer and seed as specified prior to installing blankets.

STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION

SOIL RETENTION BLANKET (SRB) STANDARDS

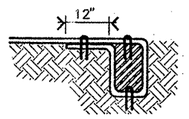
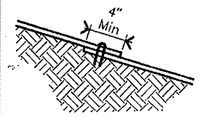
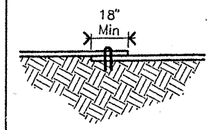
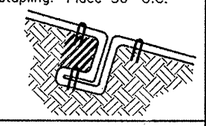
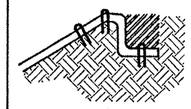
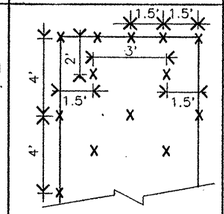
Flexible Channel Liner Applications
Class 2, Types G & H
Shear Stress Greater than 2.0 Lbs/Sq Ft

SRB(9) - 93

ORIGINAL DRAWING DATE: 2/1/93		STATE DISTRICT	FEDERAL REGION	PROJECT NUMBER			SHEET
DN1: PEN	REVISIONS	15	6	NH 90(191)H, Etc.			292V
CHK1:		COUNTY		CONTROL	SECT	JOB	HWY
ISSUE DATE: 2/1/93		Bexar		2452	2	23, etc.	

DIVISION OF MAINTENANCE AND OPERATIONS

SRB993.DWG

PRODUCT NAME	A TOP OF SLOPE	B EDGE OVERLAP	C JUNCT OVERLAP	D TERMINAL END	E TNSV CHECK	F PERIMETER EDGE	G STAPLE PATTERN	G1 STAPLE TYPE	REMARKS
TENSAR Erosion Blanket TB-1000 BonTerra SFB12	Bury the blanket in a 6" wide (min) x 12" deep (min) trench. Fill with compacted soil after stapling as shown. 	Overlap adjacent edges of blanket by 4" (minimum) and anchor as shown. 	At the end of a roll, overlap the blankets by 18" (minimum) shingle style and staple as shown. 	Bury the blanket in a 6" wide (min) x 12" deep (min) trench. Fill with compacted soil after stapling as shown. 	Install blanket in transverse check slots cut accros channel bottom and up the channel sides. Minimum trench shall be 6"x6". Fill with compacted soil after stapling. Place 30' O.C. 	Place the edge of the blanket into a 4" deep (min) x 4" wide (min) trench. Fill with compacted soil after stapling as shown. 		Staples shall be heavy-duty pins or U-shaped wire staples. Pins shall be 3/16" min diameter steel with 1 1/2" dia steel washer secured at head. Staples shall be a minimum of 8 gauge. All anchors, whether pins or staples, shall be 8" minimum in length. Wooden stakes or light duty wire staples (e.g. 11 gauge) are not permitted.	Smooth grade and compact all areas to be covered with blanket. Remove all rocks, dirt clods, vegetation, trash or other obstructions that may cause blanket to bridge ground surface. Fertilizer and seeding as specified should be performed prior to placing mat. Blankets should lay flat, but SHOULD NOT BE PULLED TAUT. Initial blanket roll should be centered along the center-line of the channel. For particularly harsh sites, hydraulic mulch may be used prior to blanket placement for added protection and germination enhancement.

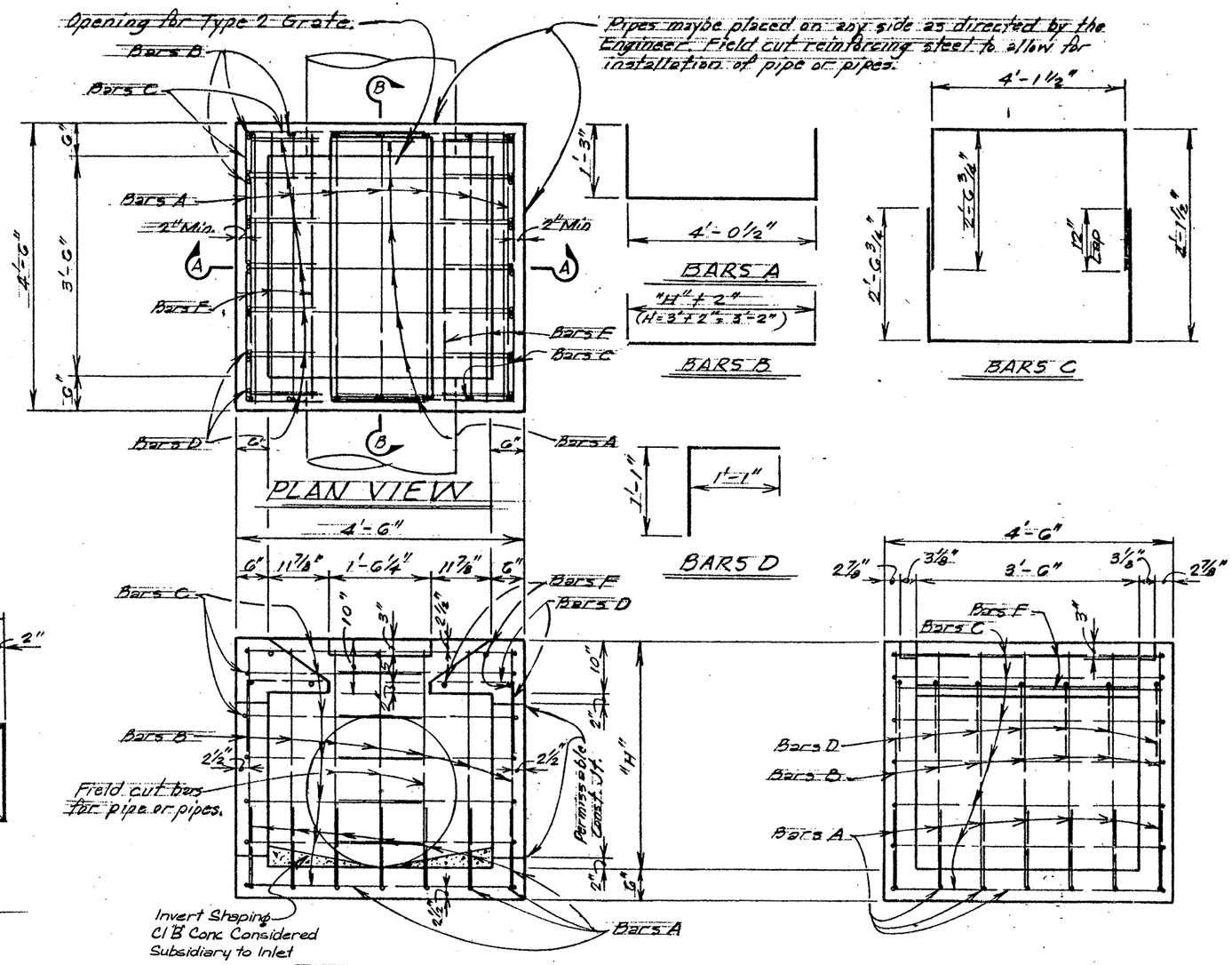
STANDARD PLANS TEXAS DEPARTMENT OF TRANSPORTATION

SOIL RETENTION BLANKET (SRB) STANDARDS

Flexible Channel Liner Applications
Class 2, Types G & H (Continued)
Shear Stress Greater than 2.0 Lbs/Sq Ft

SRB(10) – 93

ORIGINAL DRAWING DATE: 2/1/93		STATE DISTRICT	FEDERAL REGION	PROJECT NUMBER	SHEET
DN1: PEN	REVISIONS 4-5-93	15	6	NH 90(191)M, ETC.	292W
CHK1:		COUNTY		CONTROL / SECT / JOB	HWY
ISSUE DATE: 2/1/93		Bexar		2457 / 2 / 23, ETC. / Lp604	
		DIVISION OF MAINTENANCE AND OPERATIONS			



*Note: For Contractors information only.

"H" = 3' ESTIMATED QUANTITIES *

REINFORCING STEEL					
Bar	No.	Size	Spacing	Length	Weight
A	14	#4	8" ±	6'-6 1/2	61
B	24	#4	8" ±	Varies 3'Ht = 3'-2"	51
C	Varies 3'Ht = 7	#4	8" ±	18'-6"	87
D	14	#4	8" ±	2'-2"	20
F	6	#5	As Shown	4'-2"	26
Total Reinforcing Steel (3'H")					245 Lbs.
Cl A Concrete = 1.30 C.Y. (3'Ht.)					
Grate Type 2 = 1 Ea.					

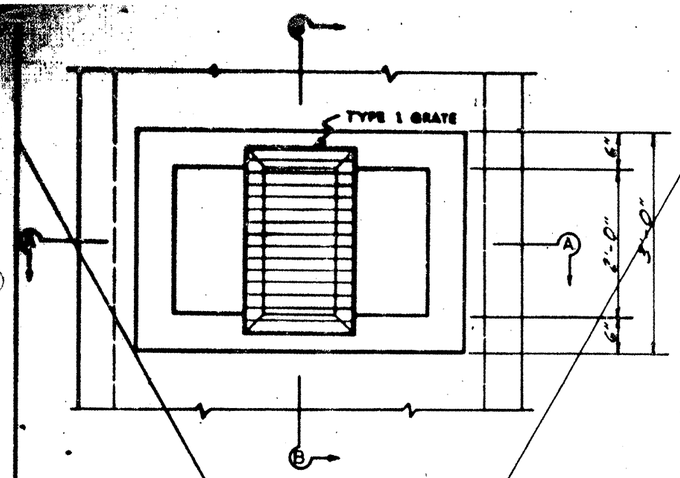
Quantities varies with height of "H"

DROP INLET TYPE 3

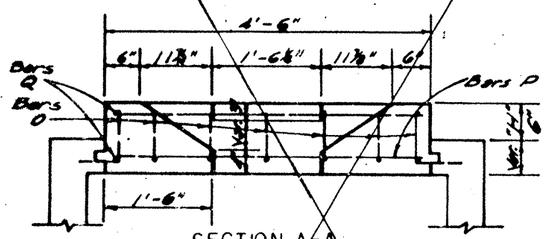
DISTRICT STANDARD

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			294
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023 etc	LP1604

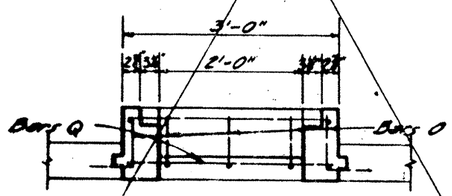
AD-88-0



PLAN

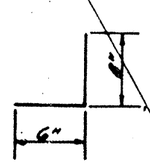


SECTION A-A

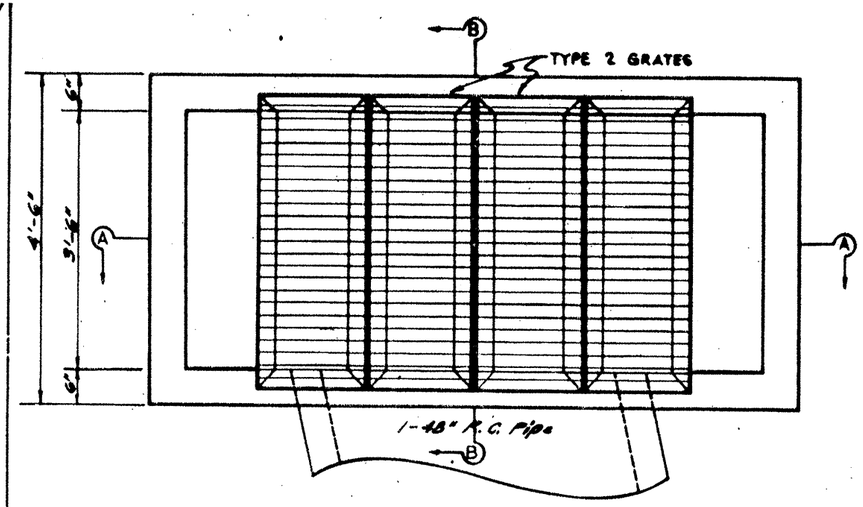


SECTION B-B

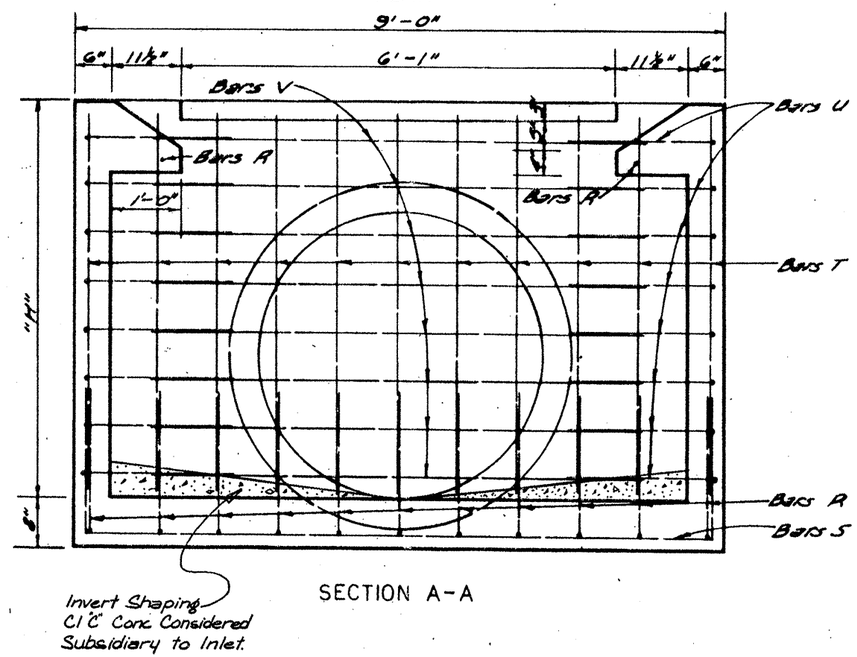
REINFORCING STEEL					
Bar	No.	Size	Spacing	Length	Weight
O	16	#4	9"	1'-2"	12
P	4	#4	9"	4'-2"	11
Q	4	#4	9"	2'-8"	7
Total Weight = 30					



BARS O

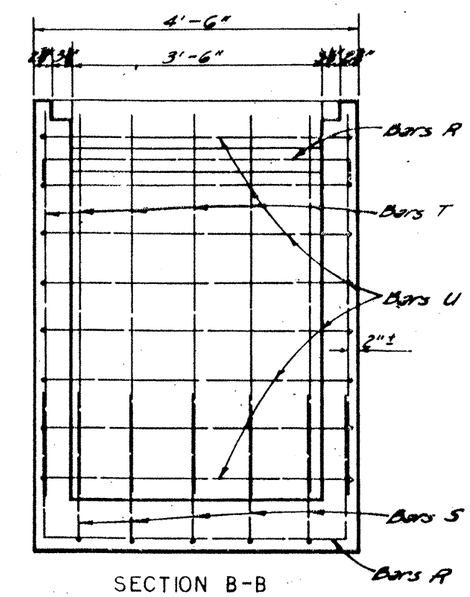


PLAN

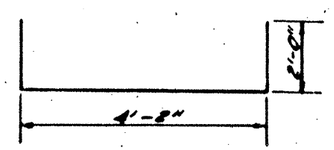


SECTION A-A

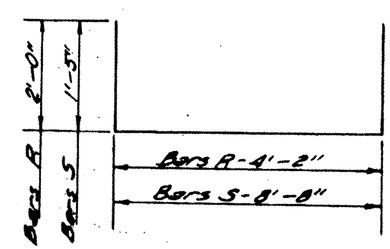
REINFORCING STEEL					
Bar	No.	Size	Spacing	Length	Weight
R	13	#4	9"±	8'-2"	71
S	5	#4	9"±	11'-6"	38
T	32	#4	9"±	Varies	Varies
U	Varies	#4	9"±	8'-2"	Varies
V	Varies	#4	9"±	6'-10"	Varies



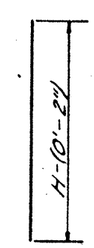
SECTION B-B



BARS U



BARS R&S



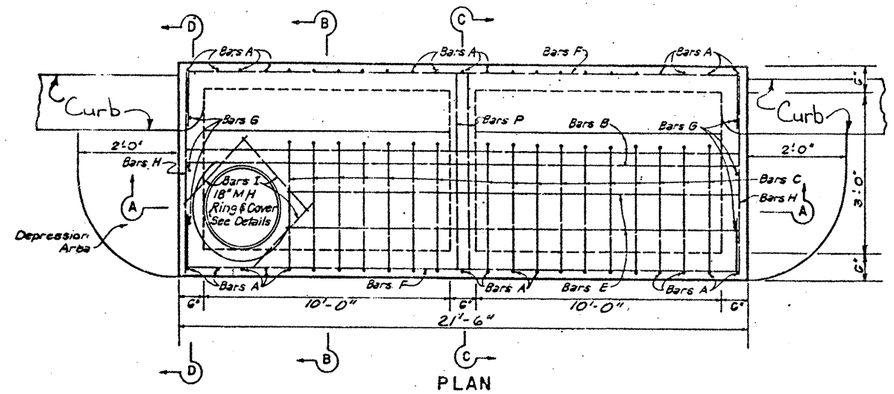
BARS T

DISTRICT STANDARD

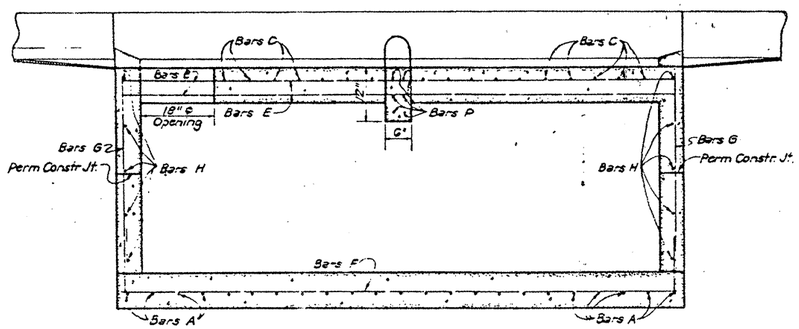
DROP INLET DETAILS

DROP INLET TYPE 6

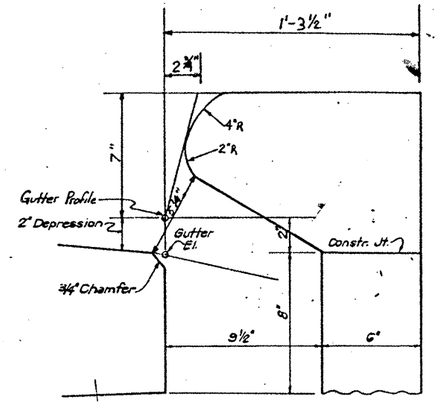
4					296
16	BEXAR	2452	012	023	LP1604



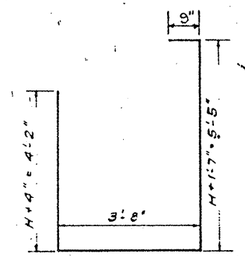
PLAN
SHOWING TOP SLAB, BEAM AND WALL STEEL



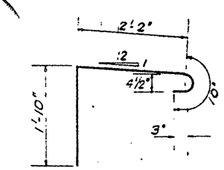
SECTION A-A



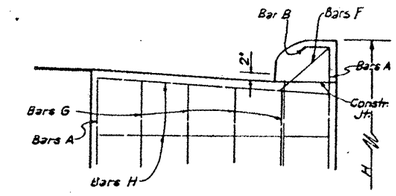
THROAT DETAIL



BAR A



BAR C

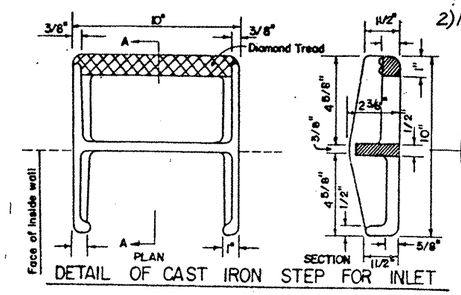


SECTION D-D

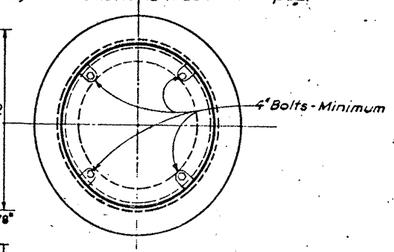
BILL OF REINFORCING STEEL

ESTIMATED QUANTITIES - TYPE "C-1" INLET					
BAR	NO	SIZE	SPAC	LENGTH	WEIGHT
A	23	#4	6"	10'-7"	204
B	4	#5	3"	21'-2"	47
C	17	#5	6"	4'-10"	86
E	2	#4	8"	19'-3"	12
F	17	#4	11"	23'-10"	157
G	6	#4	11"	4'-2"	17
H	10	#4	11"	3'-8"	24
I	3	#4	~	1'-10"	4
J	23	#4	6"	4'-4"	67
M	21	#4	6"	2'-11"	41
N	2	#4	~	3'-0"	4
P	6	#5	~	3'-8"	23
Total - Reinf. Steel - Lbs.					555
Total - Class "A" Conc. - C.Y.					4.25

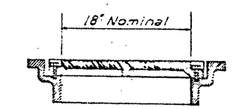
1). Quantities Based Upon an "H" of 3'-10" and a Length of 21'-6". Actual Inlet Depths & Length May Vary. For Contractors Info. Only.
2) No Deductions Made For Pipes.



DETAIL OF CAST IRON STEP FOR INLET



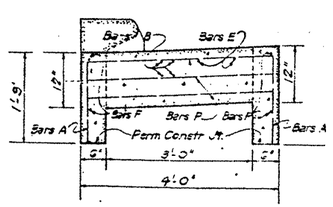
PLAN



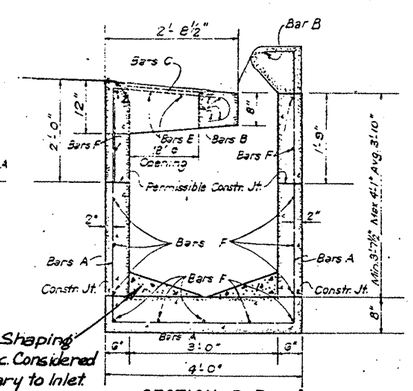
Note: Ring and Cover shall be designed for heavy Duty Roadway Service

SECTION

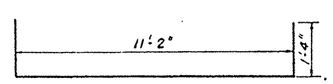
18" C. I. MANHOLE
RING AND BOLTED COVER



SECTION C-C
BEAM DETAIL



SECTION B-B



BAR F

BAR DETAILS

GENERAL NOTES:

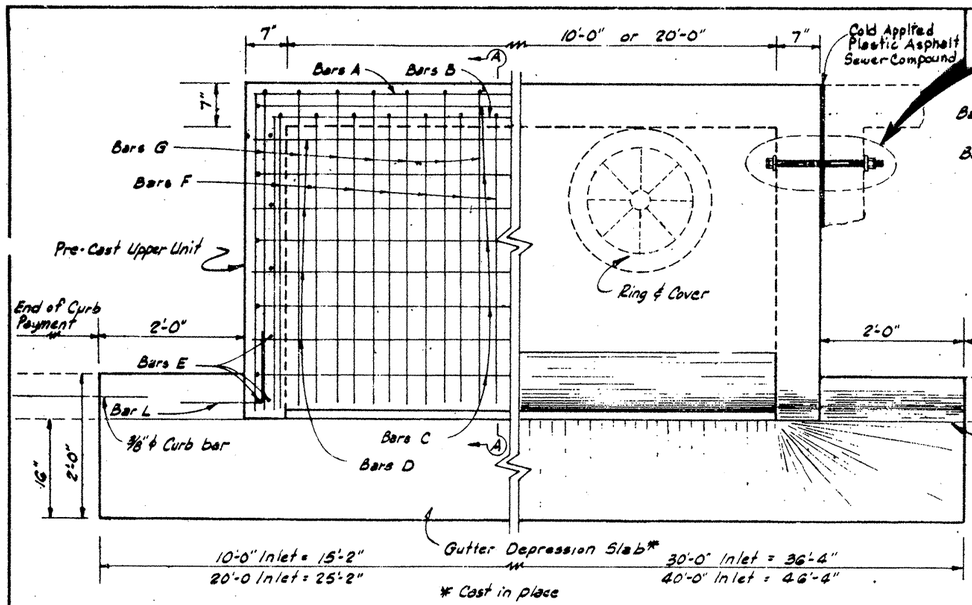
~~Additional reinforcing steel required in Traffic Barrier at each Inlet shall be included in the Unit Price Bid for each Type Inlet.~~

Cast Iron steps spaced at 15" and located as directed by the Engineer shall be provided and installed in all inlets where the depth exceeds 5'-0". The cost of such steps shall be included in the unit price bid per each "inlet".

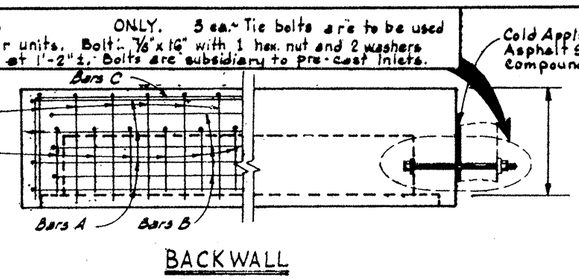
TYPE C INLET DETAILS

DISTRICT STANDARD

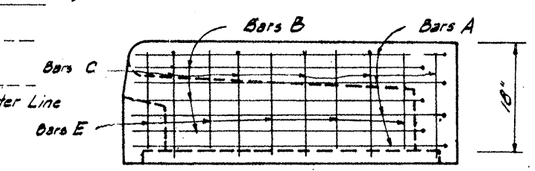
STATE	PROJECT NO.	SHEET No.
TEXAS		298
COUNTY	CONT. SECT. JOB	HIGHWAY
15 BEXAR	2452 01 023	LP(Loop)



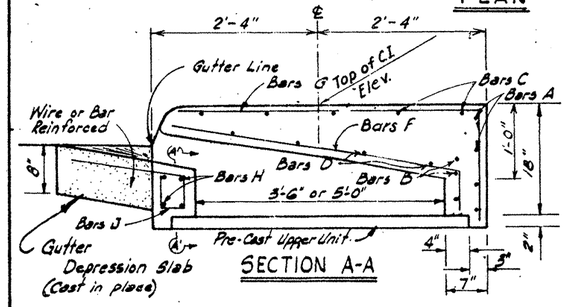
PLAN



BACKWALL

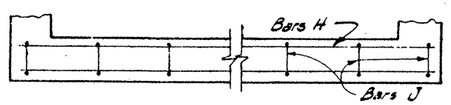


END WALL

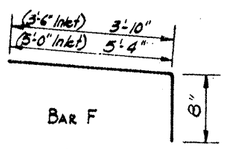


SECTION A-A

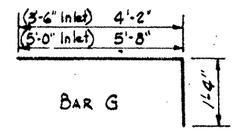
For Ring & Cover Detail See Sheet 300 (24")



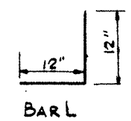
SECTION A'-A'



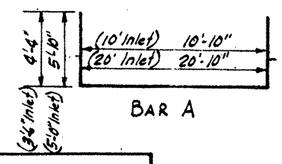
BAR F



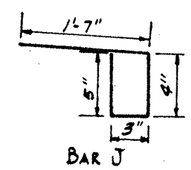
BAR G



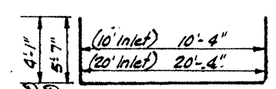
BAR L



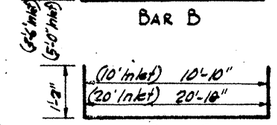
BAR A



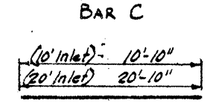
BAR J



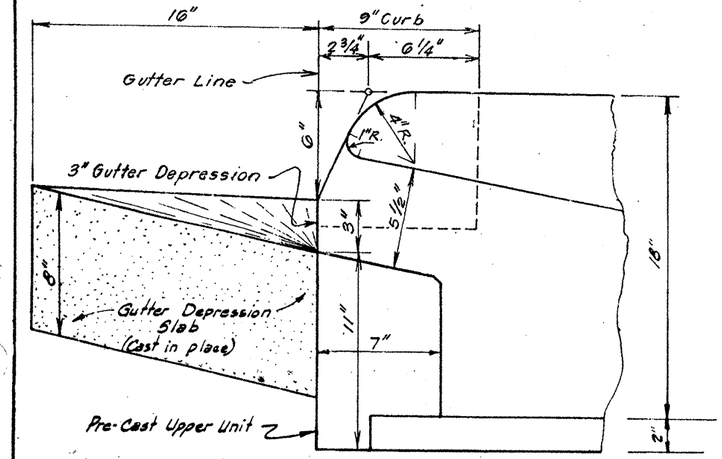
BAR B



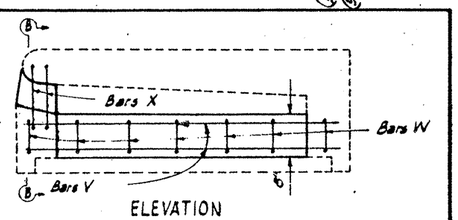
BAR C



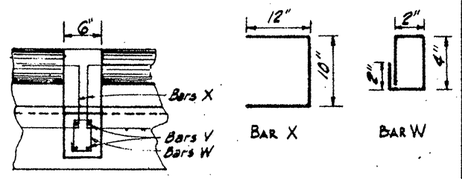
BAR D



INLET OPENING DETAIL



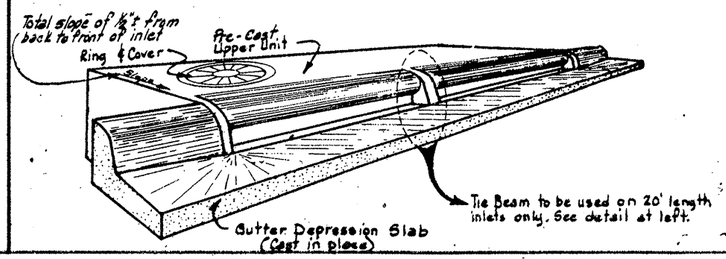
ELEVATION



SECTION B-B

NOTE: Tie Beam is to be used on 20' length inlets
Beams will be located in the center of 20' length inlets.

TIE - BEAM



BILLS OF REINFORCING STEEL

UPPER UNIT (PRE-CAST) 20'x5' (Ty. 4)						
BAR	SHAPE	No.	SIZE	SPAC.	LENGTH	WEIGHT
A		4	#4	5"	32'-6"	67
B		3	#4	5"	31'-6"	63
C		7	#4	11"	25'-2"	108
D		6	#4	11"	20'-10"	63
E		16	#4	11"	1'-2"	13
F		41	#4	6"	6'-0"	164
G		42	#4	6"	7'-0"	196
H		4	#4	~	20'-10"	56
J		22	#4	12"	2'-7"	38
L		4	#4	~	2'-0"	5
V		4	#4	~	5'-10"	16
W		10	#4	8"±	1'-2"	8
X		4	#4	~	2'-10"	8
TOTAL WEIGHT					845 Lbs.	

UPPER UNIT (PRE-CAST) ~ 20'x3'-6" (Ty. 3)						
BAR	SHAPE	No.	SIZE	SPAC.	LENGTH	WEIGHT
A		4	#4	5"	25'-6"	79
B		3	#4	5"	28'-6"	67
C		5	#4	11"	25'-2"	77
D		4	#4	11"	20'-10"	56
E		12	#4	11"	1'-2"	9
F		41	#4	6"	4'-6"	123
G		42	#4	6"	5'-6"	154
H		4	#4	~	20'-10"	56
J		22	#4	12"	2'-7"	38
L		4	#4	~	2'-0"	5
V		4	#4	~	4'-4"	12
W		7	#4	8"±	1'-2"	5
X		4	#4	~	2'-10"	8
TOTAL WEIGHT					679 Lbs.	

UPPER UNIT (PRE-CAST) ~ 10'x5' (Ty. 2)						
BAR	SHAPE	No.	SIZE	SPAC.	LENGTH	WEIGHT
A		4	#4	5"	22'-6"	60
B		3	#4	5"	21'-6"	43
C		7	#4	11"	13'-2"	62
D		6	#4	11"	10'-10"	43
E		16	#4	11"	1'-2"	13
F		21	#4	6"	6'-0"	84
G		22	#4	6"	7'-0"	103
H		4	#4	~	10'-10"	29
J		12	#4	12"	2'-7"	21
L		4	#4	~	2'-0"	5
TOTAL WEIGHT					463 Lbs	

UPPER UNIT (PRE-CAST) ~ 10'x3'-6" (Ty. 1)						
BAR	SHAPE	No.	SIZE	SPAC.	LENGTH	WEIGHT
A		4	#4	5"	19'-6"	52
B		3	#4	5"	18'-6"	37
C		5	#4	11"	13'-2"	44
D		4	#4	11"	10'-10"	29
E		12	#4	11"	1'-2"	9
F		21	#4	6"	4'-6"	63
G		22	#4	6"	5'-6"	81
H		4	#4	~	10'-10"	29
J		12	#4	12"	2'-7"	21
L		4	#4	~	2'-0"	5
TOTAL WEIGHT					370 Lbs	

TY 5 = Ty 1 & Ty 3 Bolted Together

TYG = 2 ~ Ty 3 Bolted Together

TY 7 = Ty 2 & Ty 4 Bolted Together

PRE-CAST CONCRETE QUANTITIES

UPPER UNIT (ONLY)	C.Y.
20' x 5'-0" (Includes Tie-Beams)	3.8
20' x 3'-6" (Includes Tie-Beams)	3.0
10' x 5'-0"	2.1
10' x 3'-6"	1.6

CAST IN PLACE CONCRETE QUANTITIES

GUTTER DEPRESSION SLAB	C.Y.
20' Inlet	1.0
10' Inlet	0.6

GENERAL NOTES:

All bars intercepting Manhole Ring & Cover shall be field cut.

All concrete shall be Class "A".

All dimensions relating to reinforcing steel are to center of bars.

All exposed corners shall be chamfered 3/4".

Ring & Cover location will be determined according to Pipe Blockout locations.

Gutter depression slabs to be subsidiary to the Pre-cast Inlets.

Bolts, nuts & washers shall be galvanized.

Quantities shown are for contractors information only.

Upper unit is to receive a Grade 1 concrete finish.

Gutter depression slab is to receive a wood float concrete finish.

Inlet shall be installed sloping toward gutter.

The Contractor shall provide an adequate means to lift and place the inlets subject to approval of the Engineer.

See "JOINT DETAIL" on sheet 2 of 2 for fit between upper and lower units.

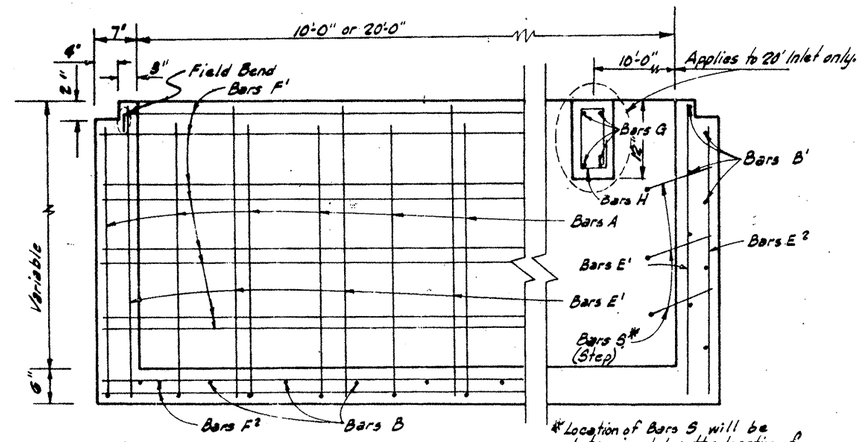
Payment will be made at the Unit Price Bid for "Curb Inlet (Each)" which shall be full compensation for the inlets shown.

CURB INLET UPPER UNIT

SHEET 1 OF 2

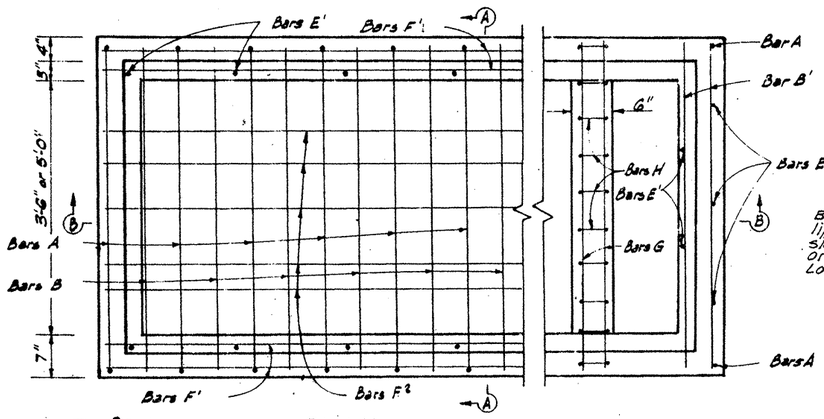
DISTRICT STANDARD

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS	—		1		299
STATE DIST. NO.	COUNTY					
15	BEXAR					



*Location of Bars S will be determined by the location of Ring & Cover.

SECTION B-B



PLAN

BILLS OF REINFORCING STEEL

LOWER UNIT (PRE-CAST) 20'x5'-0" (Ty. 4)						
BAR	SHAPE	No.	SIZE	SPAC.	LENGTH	WEIGHT
A	⊔	22	#4	12"	Varies	
B	—	21	#4	12"	5'-10"	82
B'	—	Varies	#4	12"	5'-10"	
E'	—	36	#4	18"	Varies	
E²	—	8	#4	18"±	Varies	
F'	—	Varies	#4	12"±	20'-10"	
F²	—	11	#4	~	20'-10"	153
G	—	4	#4	~	5'-10"	16
H	□	13	#4	6"	2'-1"	18
S	⊓	Varies	#6	18"	2'-6"	
J	—	Varies	#4	~	2'-0"	

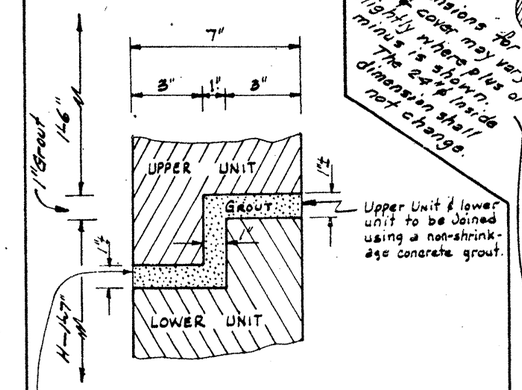
LOWER UNIT (PRE-CAST) 20'x3'-6" (Ty. 3)						
BAR	SHAPE	No	SIZE	SPAC.	LENGTH	WEIGHT
A	⊔	22	#4	12"	Varies	
B	—	21	#4	12"	4'-4"	61
B'	—	Varies	#4	12"	4'-4"	
E'	—	34	#4	18"	Varies	
E²	—	6	#4	18"±	Varies	
F'	—	Varies	#4	12"±	20'-10"	
F²	—	9	#4	~	20'-10"	125
G	—	4	#4	~	4'-4"	12
H	□	10	#4	6"	2'-1"	14
S	⊓	Varies	#6	18"	2'-6"	
J	—	Varies	#4	~	2'-0"	

LOWER UNIT (PRE-CAST) 10'x5'-0" (Ty. 2)						
BAR	SHAPE	No.	SIZE	SPAC.	LENGTH	WEIGHT
A	⊔	12	#4	12"	Varies	
B	—	11	#4	12"	5'-10"	43
B'	—	Varies	#4	12"	5'-10"	
E'	—	22	#4	18"±	Varies	
E²	—	8	#4	18"±	Varies	
F'	—	Varies	#4	12"±	10'-10"	
F²	—	11	#4	~	10'-10"	80
S	⊔	Varies	#6	18"	2'-6"	
J		Varies	#4	~	2'-0"	

LOWER UNIT (PRE-CAST) 10'x3'-6" (Ty. 1)						
BAR	SHAPE	No	SIZE	SPAC.	LENGTH	WEIGHT
A	⊔	12	#4	12"	Varies	
B	—	11	#4	12"	4'-4"	32
B'	—	Varies	#4	12"	4'-4"	
E'	—	20	#4	18"	Varies	
E²	—	6	#4	18"±	Varies	
F'	—	Varies	#4	12"±	10'-10"	
F2	—	9	#4	~	10'-10"	65
S	⊔	Varies	#6	18"	2'-6"	
J		Varies	#4	~	2'-0"	

TYG = 2~Ty 4 Bolted Together

TY 5 = Ty 1 & Ty 3 Bolted Together

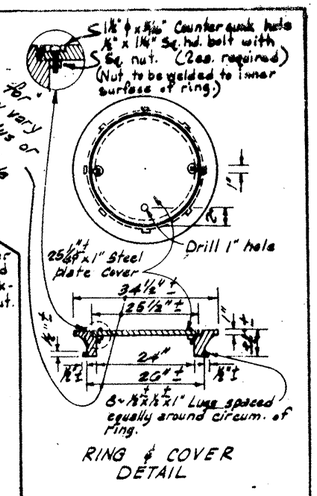


Upper Unit & lower unit to be Joined using a non-shrinkage concrete grout.

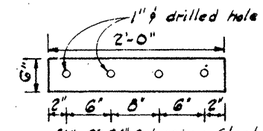
JOINT DETAIL

This space is provided for the specific purpose of making minor horizontal and vertical adjustments as may be needed to accomodate a fit between the upper and lower unit that allows for a matching line and grade between the roadway curb and the upper unit of the inlet.

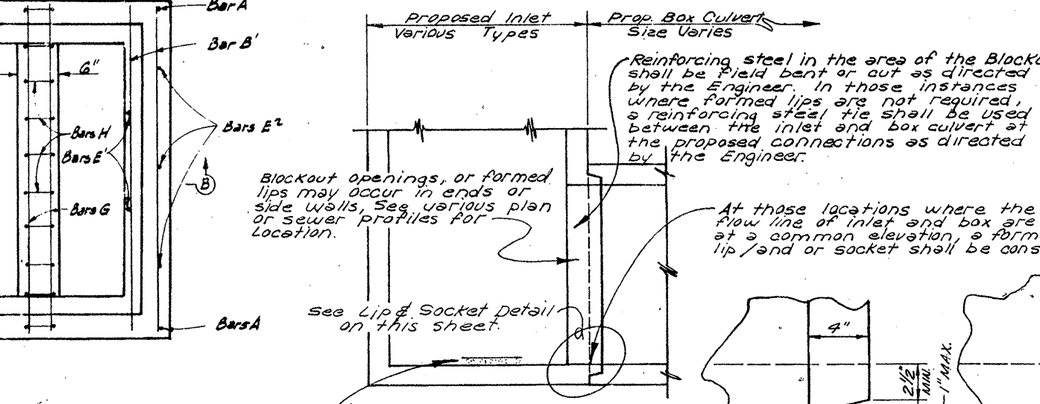
Dimensions "for" ring & cover may vary slightly where plus or minus is shown. The 24" & 18" inside dimension shall not change.



RING & COVER DETAIL



PLATE

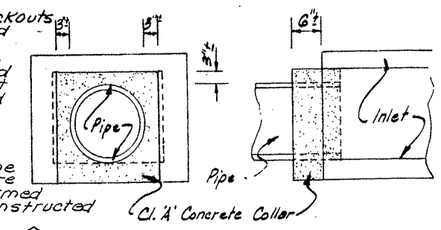


Reinforcing steel in the area of the Blockouts shall be field bent or cut as directed by the Engineer. In those instances where formed lips are not required, a reinforcing steel tie shall be used between the inlet and box culvert at the proposed connections as directed by the Engineer.

At those locations where the flow line of inlet and box are at a common elevation, a formed lip and or socket shall be constructed

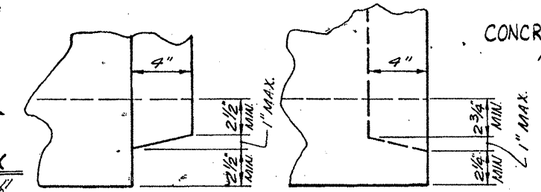
SECTION THRU INLET AND BOX

Invert concrete shaping shall be provided when flowline of outlet structure would create standing water within an inlet.



Cl. 'A' Concrete Collar

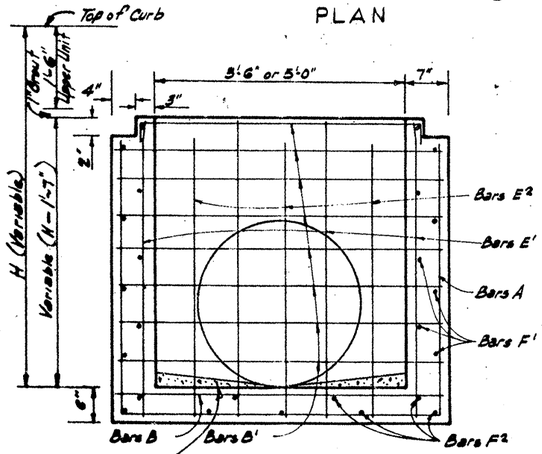
CONCRETE COLLAR AT INLETS



LIP DETAIL

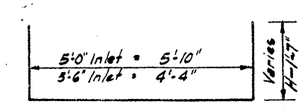
SOCKET DETAIL

NOTE: The lip and slope distances shown above may be varied slightly upon written approval by the Engineer.

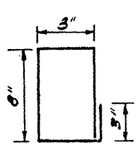


Invert Shaping Cl. 'B' Conc. Considered Subsidiary to Inlet.

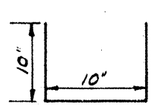
SECTION A-A



BAR A



BAR H



BAR S (Steps)

GENERAL NOTES:

All concrete shall be Class "A".

All dimensions relating to reinforcing steel are to center of bars.

Quantities shown are for contractors information only.

Bolts, nuts, washers and plates are to be galvanized

Bolts, nuts, washers, plates and gaskets shall be subsidiary to Pre-cast inlets.

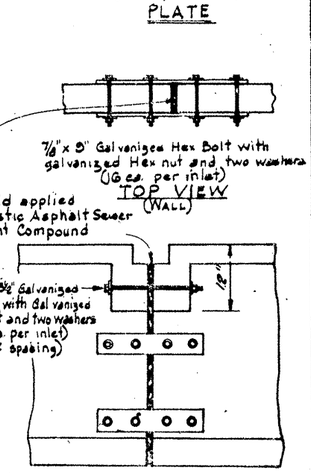
The contractor shall provide an adequate means to lift and place the inlets subject to approval of the Engineer.

All bars intercepting blockout locations shall be field cut.

When crossing or paralleling the existing utilities, it shall be the contractors responsibility to protect and maintain these utility lines.

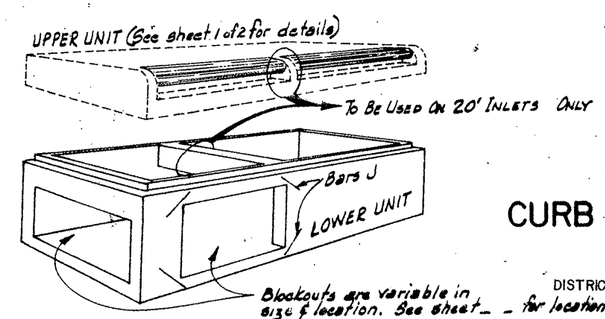
All Pre-cast lower units shall receive invert mortar shaping as directed by the Engineer.

Normal size for pipe blockouts in inlet boxes shall not exceed 3" beyond the outter shell of the RC Pipe, taking into account the skew widths of the pipe as necessary.



SIDE VIEW

Note: To be used on INLET NO. 6 ONLY.
Bolts, nuts, washers, plates and gaskets to be subsidiary to Pre-cast inlets.



Revised 18" Manhole Cover to 24" 6/28/80

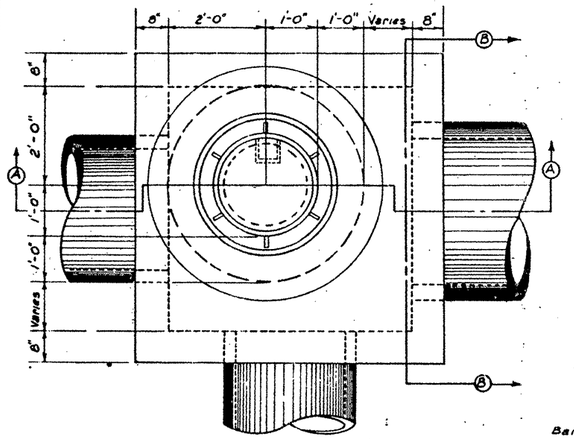
PRE-CAST CURB INLET & MANHOLE

LOWER UNIT

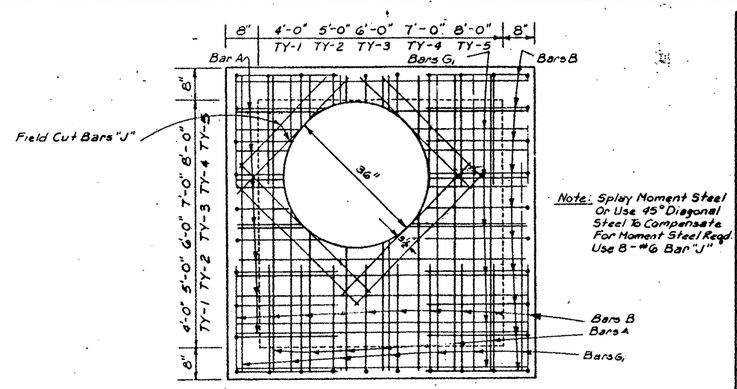
SHEET 2 OF 2

DISTRICT STANDARD

PER. NO. / BRG. NO.	STATE	FEDERAL PROJECT NO.				SHT.
6	TEXAS					300
STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY
15	BEXAR		2457	02	013	IH 410 etc.



PLAN
SCALE 3/4" = 1'-0"



Note: Splay Moment Steel Or Use 45° Diagonal Steel To Compensate For Moment Steel Reqd. Use 8-#6 Bar "J"

PLAN
JUNCTION BOX TOP SLAB SHOWING STEEL
SCALE 3/4" = 1'-0"

BILL OF REINF STEEL FOR A 4'x4' MANHOLE (TY 1)						
SHAPE	BAR	NO.	SIZE	SPAC	LEN	WGT
	A	16	4	9"	5'-1"	55
	B	32	5	8"	6'-6"	217
	C	32	5	8"	4'-3"	147
	D	16	4	9"	5'-1"	55
	E	20	3	12"	3'-11"	30
	G	20	4	12"	5'-0"	67
	G1	24	4	12"	5'-0"	80
	H	20	3	12"	4'-5"	33
	J	8	6	3½"	3'-9"	46
Total Reinf Steel					Lbs	730*
* Total Cl. A Conc.					C.Y.	3.35*

BILL OF REINF STEEL FOR A 5'x5' MANHOLE (TY 2)						
SHAPE	BAR	NO	SIZE	SPAC.	LEN	WGT
	A	18	4	9"	6'-1"	74
	B	40	5	8"	7'-6"	313
	C	40	5	8"	4'-3"	177
	D	18	4	9"	6'-1"	74
	E	24	3	12"	4'-11"	45
	G	24	4	12"	6'-0"	97
	G1	28	4	12"	6'-0"	112
	H	24	3	12"	5'-5"	49
	J	8	6	3½"	3'-9"	46
Total Reinf Steel					Lbs	987*
* Total Cl. A Conc.					C.Y.	4.96*

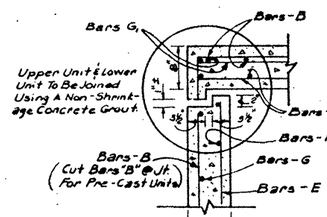
BILL OF REINF STEEL FOR A 6'x6' MANHOLE (TY 3)						
SHAPE	BAR	NO.	SIZE	SPAC.	LEN.	WGT
	A	20	4	9"	7'-1"	95
	B	44	5	8"	8'-6"	391
	C	44	5	8"	4'-3"	196
	D	20	4	9"	7'-1"	95
	E	28	3	12"	5'-11"	63
	G	28	4	12"	7'-0"	131
	G1	32	4	12"	7'-0"	150
	H	28	3	12"	6'-5"	67
	J	8	6	3½"	3'-9"	46
Total Reinf Steel					Lbs	1234*
* Total Cl. A Conc.					C.Y.	6.87*

BILL OF REINF STEEL FOR A 7'x7' MANHOLE (TY 4)						
SHAPE	BAR	NO.	SIZE	SPAC	LEN	WGT
	A	24	4	9"	8'-1"	128
	B	52	5	8"	10'-6"	569
	C	52	5	8"	5'-3"	285
	D	24	4	9"	8'-1"	128
	E	32	4	12"	6'-11"	148
	G	32	4	12"	8'-0"	172
	G1	36	4	12"	8'-0"	192
	H	32	3	12"	7'-5"	89
	J	8	6	3½"	3'-9"	46
Total Reinf Steel					Lbs	1757*
* Total Cl. A Conc.					C.Y.	9.09*

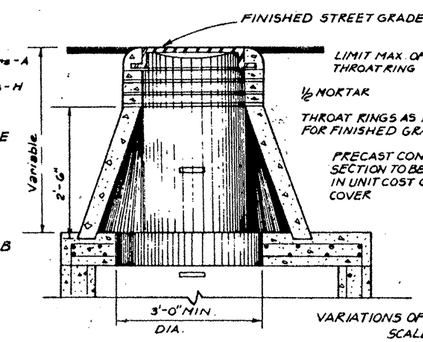
Class A Conc. Quantities Allow For 2' Dia Opening For Manhole Access

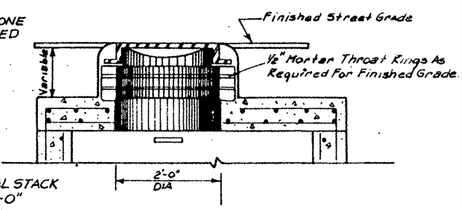
BILL OF REINF STEEL FOR A 8'x8' MANHOLE (TY 5)						
SHAPE	BAR	NO.	SIZE	SPAC	LEN	WGT.
	A	26	5	9"	9'-1"	247
	B	56	5	8"	11'-6"	672
	C	56	5	8"	5'-3"	307
	D	26	5	9"	9'-1"	247
	E	36	4	12"	7'-11"	191
	G	36	4	12"	9'-0"	217
	G1	40	4	12"	9'-0"	240
	H	36	4	12"	8'-5"	202
	J	8	6	3½"	3'-9"	46
Total Reinf. Steel					Lbs	2369 *
* Total Cl A. Conc.					C.Y.	11.62 *

* Quantities are for Contractors Information Only



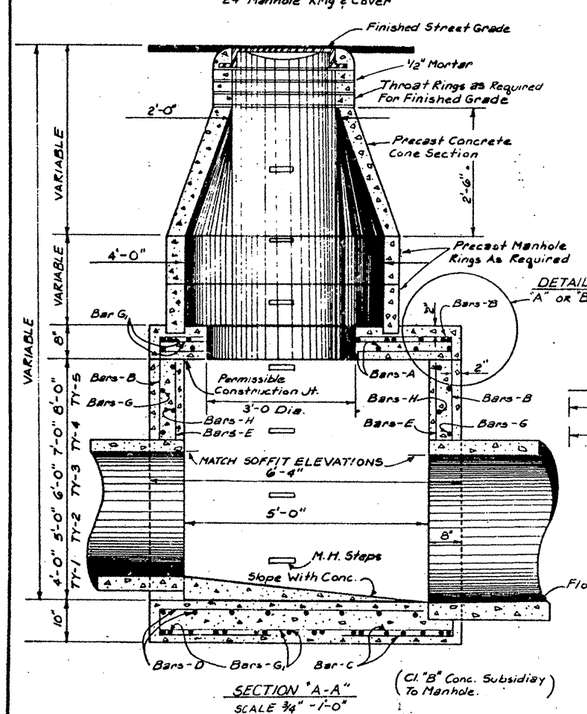
DETAIL "A"
PRE-CAST UPPER & LOWER UNIT



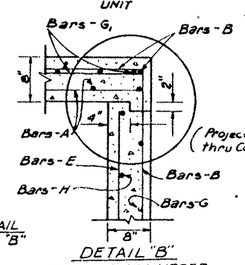


VARIATIONS OF VERTICAL STACK
SCALE 3/4" = 1'-0"

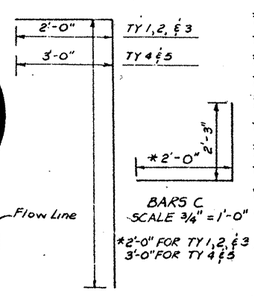
VERTICAL STACK DESIGN SHALL BE GOVERNED BY THE DEPTH THE TOP OF THE JUNCTION BOX BELOW THE FINISHED STREET GRADE.



SECTION "A-A"
SCALE 3/4" = 1'-0"

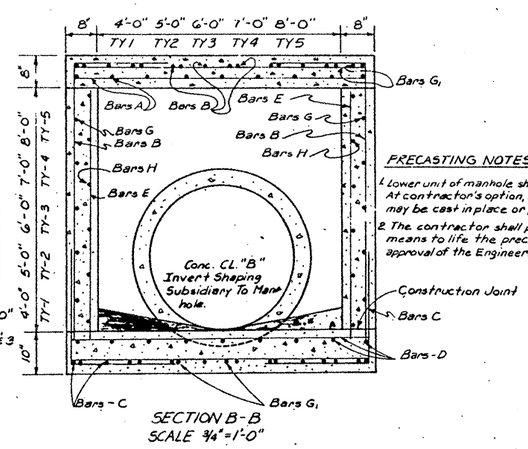


DETAIL "B"
CAST IN PLACE UPPER UNIT PRE-CAST LOWER UNIT



BARS C
SCALE 3/4" = 1'-0"
*2'-0" FOR TY 1,2, & 3
3'-0" FOR TY 4 & 5

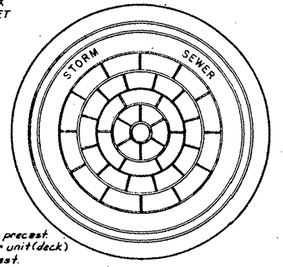
BARS B
SCALE 3/4" = 1'-0"

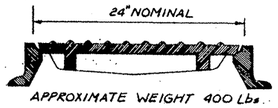


SECTION B-B
SCALE 3/4" = 1'-0"

PRECASTING NOTES:

1. Lower unit of manhole shall be precast. At contractor's option, upper unit (deck) may be cast in place or precast.
2. The contractor shall provide an adequate means to lift the precast unit, subject to approval of the Engineer.





APPROXIMATE WEIGHT 400 Lbs.

TYPICAL DETAIL
24" HEAVY CAST IRON MANHOLE RING & COVER

Note
General Notes

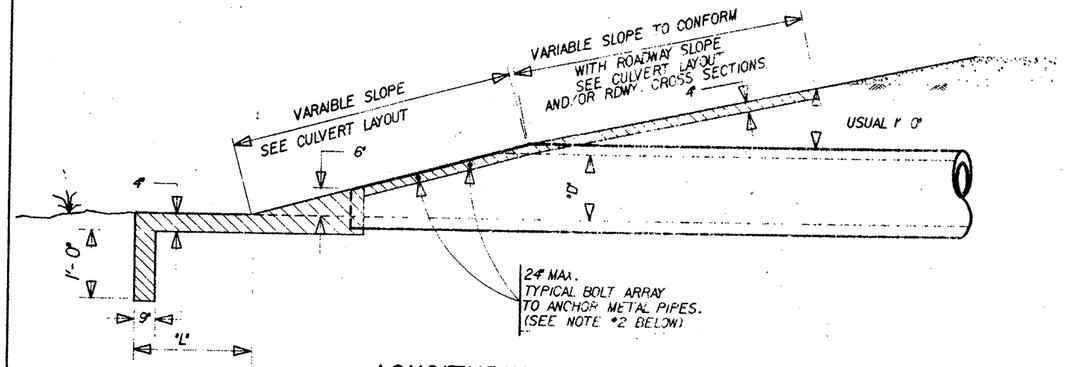
All concrete shall be Class "A" All exposed corners shall be chamfered 3/4". Dimensions relating to reinforcing steel are to center of bars.
All bars intercepting manhole and pipe sewer openings shall be field cut. Quantities shown in the Table of estimated quantities are for the average depth manhole as shown and are for the information of the bidder.
When crossing or paralleling existing sanitary sewers, it shall be the Contractor's responsibility to protect and maintain these sanitary sewer lines.
Payment will be made at the Unit Price Bid for each Type Manhole included in the contract which shall be full compensation for each depth shown. Manhole Steps spaced at 15" and located as directed by the Engineer shall be provided and installed in all manholes.

where the depth exceeds 4'-0" Manhole ring and covers shall be designed for heavy duty roadway service, and shall include a locking device for covers.

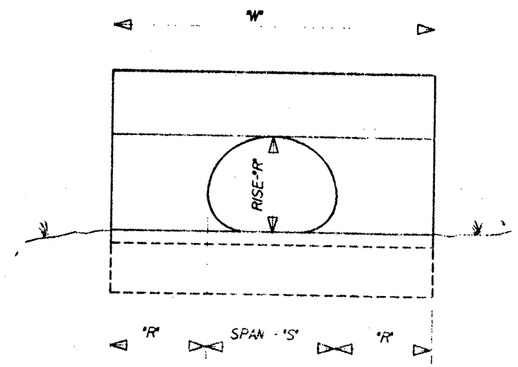
MANHOLE DETAILS

DISTRICT STANDARD

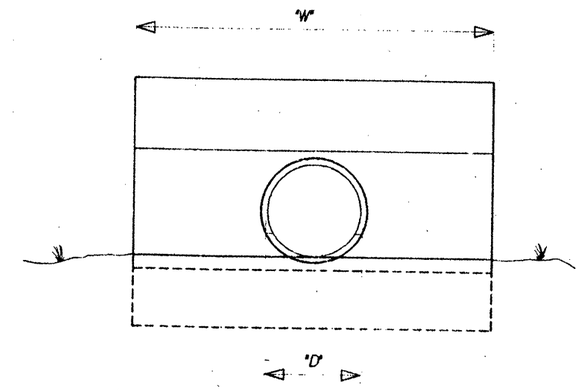
FED. RD. DIV. NO.	STATE	PROJECT NO.	SHEET NO.
6	TEXAS		301
STATE DIST. NO.	COUNTY	CONT. SECT. JOB	HIGHWAY NO.
15	BEXAR	0452-02-023	IH 10



LONGITUDINAL SECTION FOR CIRCULAR & ARCH PIPES



SINGLE C.G.M. ARCH PIPE CULVERTS

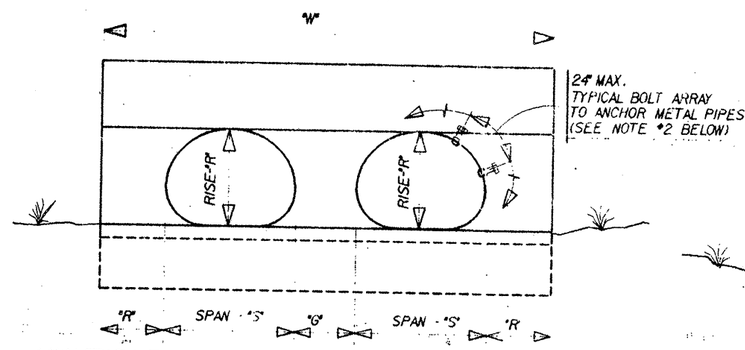


SINGLE CIRCULAR PIPE CULVERTS

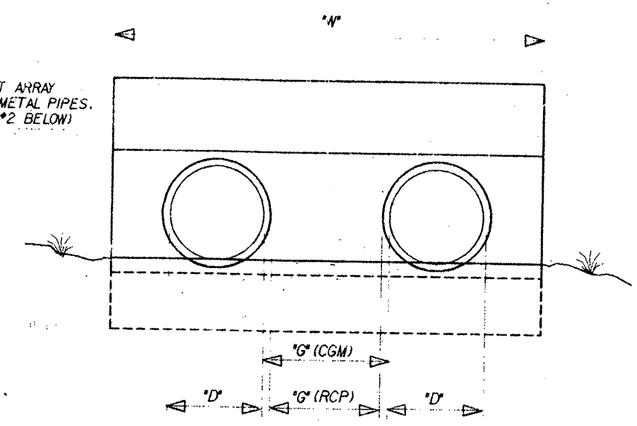
(CGM or RCP)

DIMENSIONS FOR CIRCULAR (CGM and RCP) PIPE CULVERTS

"D" INSIDE DIA. of PIPE	"L"	"G"		SINGLE	DOUBLE	TRIPLE	QUADRUPLE
		CGM	RCP	"W"			
18"	2'-0"	1'-2"	0'-9"	4'-6"	7'-2"	9'-10"	12'-6"
21"	2'-6"	1'-3"	0'-10"	5'-3"	8'-4"	11'-4"	13'-4"
24"	3'-0"	1'-5"	0'-11"	6'-0"	9'-5"	12'-10"	16'-3"
30"	4'-0"	1'-8"	1'-1"	7'-6"	11'-8"	15'-10"	20'-0"
36"	5'-0"	1'-11"	1'-3"	9'-0"	13'-11"	18'-10"	23'-9"
42"	6'-0"	2'-2"	1'-5"	10'-6"	16'-2"	21'-10"	27'-6"
48"	7'-0"	2'-5"	1'-7"	12'-0"	18'-5"	24'-10"	31'-3"
54"	8'-0"	2'-10"	1'-11"	13'-6"	20'-10"	28'-2"	35'-6"
60"	9'-0"	3'-2"	2'-0"	15'-0"	23'-2"	31'-4"	39'-5"



MULTIPLE C.G.M. ARCH PIPE CULVERTS



MULTIPLE CIRCULAR PIPE CULVERT

(CGM or RCP)

DIMENSIONS FOR C.G.M. ARCH PIPE CULVERTS

DESIGN SIZE	APPROX. ARCH DIM.		"L"	"G"	SINGLE	DOUBLE	TRIPLE	QUADRUPLE
	SPAN "S"	RISE "R"			"W"			
1	17"	13"	2'-0"	1'-0"	3'-7"	6'-0"	8'-5"	10'-10"
2	21"	15"	2'-0"	1'-2"	4'-3"	7'-2"	10'-1"	13'-0"
3	28"	20"	3'-0"	1'-5"	5'-8"	9'-5"	13'-2"	16'-11"
4	35"	24"	4'-0"	1'-8"	6'-11"	11'-6"	16'-1"	20'-8"
5	42"	29"	5'-0"	1'-11"	8'-4"	13'-9"	19'-2"	24'-7"
6	49"	33"	6'-0"	2'-2"	9'-7"	15'-10"	22'-1"	28'-4"
7	57"	38"	7'-0"	2'-5"	11'-1"	18'-3"	25'-5"	32'-7"
8	64"	43"	8'-0"	2'-10"	12'-5"	20'-8"	28'-10"	37'-0"
9	71"	47"	9'-0"	3'-2"	13'-9"	22'-10"	31'-11"	41'-0"

BASED ON 2-2/3" X 1/2" CORRUGATION

NOTES:

1.) FOR RIPRAP QUANTITIES AND SLOPES, SEE CULVERT LAYOUT SHEET.

2.) ALL METAL PIPES (CGM AND/OR ARCH) SHALL HAVE 5/8" X 6" GALVANIZED BOLTS WITH 2 HEX NUTS AT 24" CENTERS TO ANCHOR THE PIPE TO THE CONCRETE. THIS WORK WILL BE SUBSIDIARY TO THE RIPRAP HEADWALL ITEM.

3.) FOR CONCRETE ARCH PIPES, THE ABOVE DIMENSIONS WILL HAVE TO BE ADJUSTED FOR THE PIPE WALL THICKNESS.

4.) FOR PIPES LARGER THAN SHOWN ABOVE, USE THE CLEAR DISTANCE BETWEEN PIPES SHOWN IN ITEMS 460 AND/OR 464.

DISTRICT STANDARD

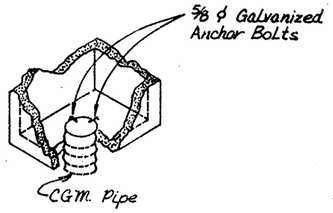
RH-15

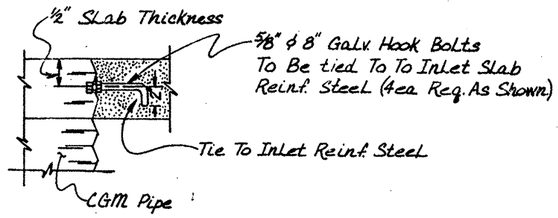
(RIPRAP HEADWALLS FOR PIPE CULVERTS)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			302
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.

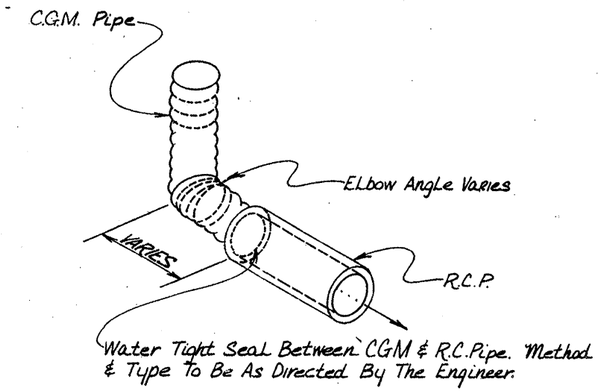
ORIGINAL

PLAN

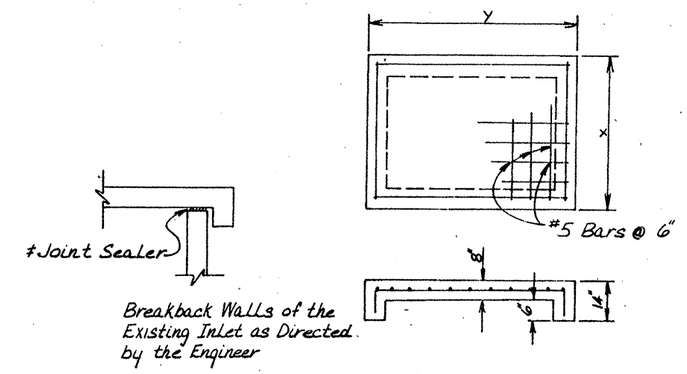




CGM ANCHOR DETAILS



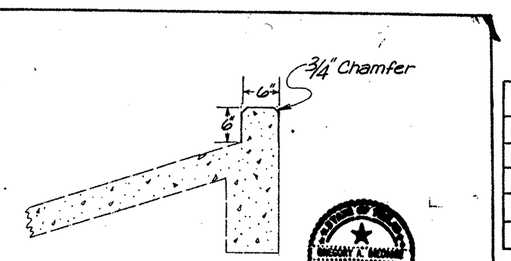
ELBOW STACK DETAILS



*Joint Sealer and Consruction methods shall conform to the Item Reinforced Concrete Pipe Culverts. The Contractor Shall Have Option of Using Joint Materials Covered Therein.

CAP DETAILS FOR DROP INLETS

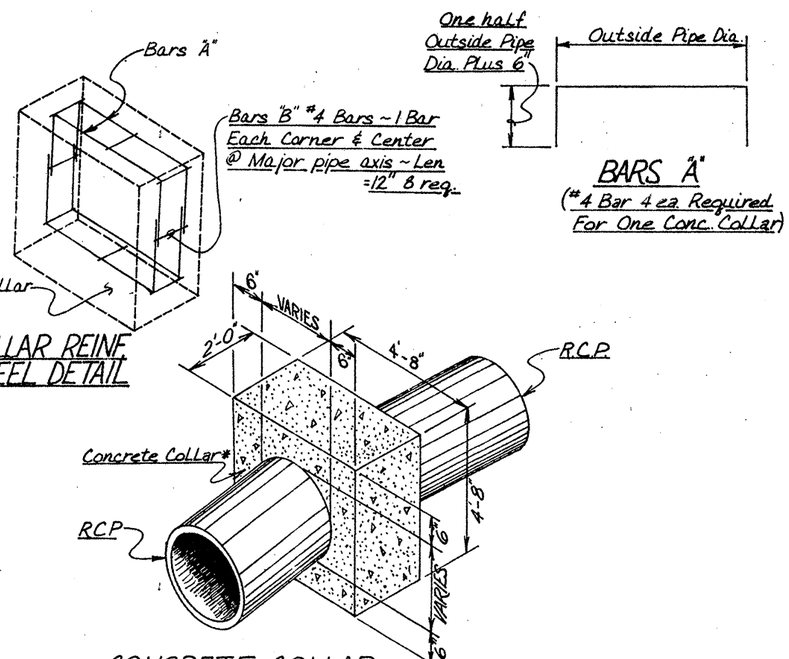
(X & Y Dimenions to be Determined at Each Individual Inlet)



◇H.M.T. "CURB" DETAIL ◇

I.D.I. TYPE	RIPRAP (CONC. C.T.) (CL "B")
3	2.0
4	2.0
6	3.0

TYPICAL



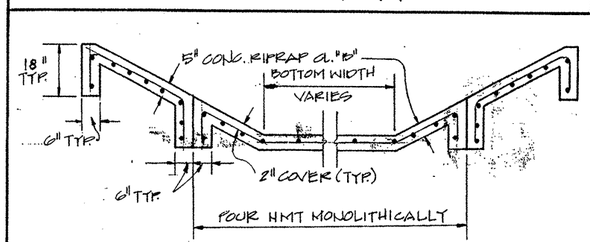
COLLAR REINF. STEEL DETAIL

BARS "A"

(#4 Bar 4 ea Required For One Conc. Collar)

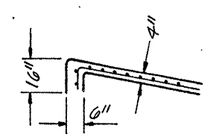
CONCRETE COLLAR DETAIL

*Use Class "A" Conc. Materials & Labor Considered Subsidiary to Pipe.

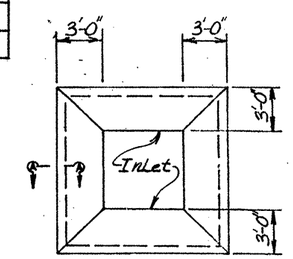


HAZARDOUS MATERIALS TRAP CONCRETE DETAILS

Robert D. Austin P.E. 3-31-93
Robert D. Austin Date



SECTION A-A



DROP INLET RIPRAP DETAIL

Robert E. Magers P.E. 9-10-92
Robert E. Magers Date

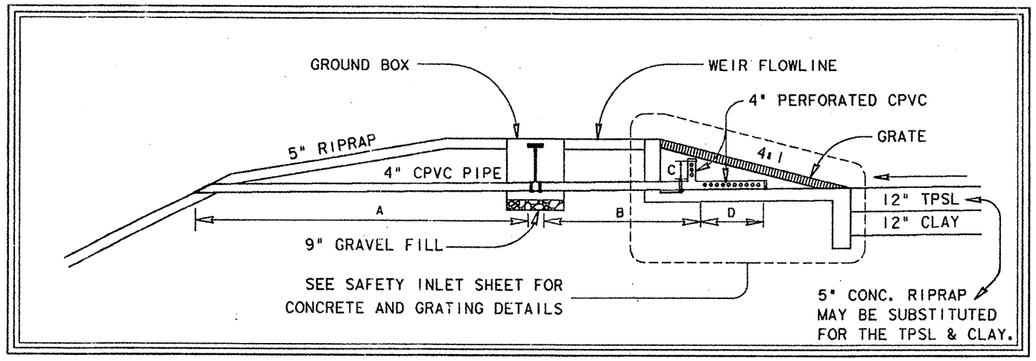
MISC. STORM DRAIN DETAILS

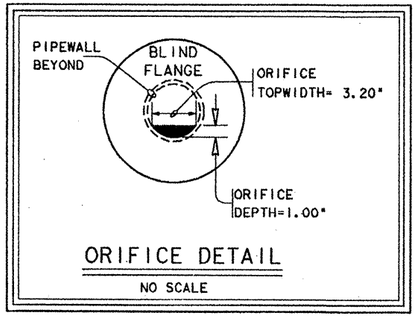
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			303
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, etc.	LP1604

FILM DWT 134436 PAPER DWT 134435

PLUMBING TABLE - VARIABLE DIMENSIONS AND MATERIALS

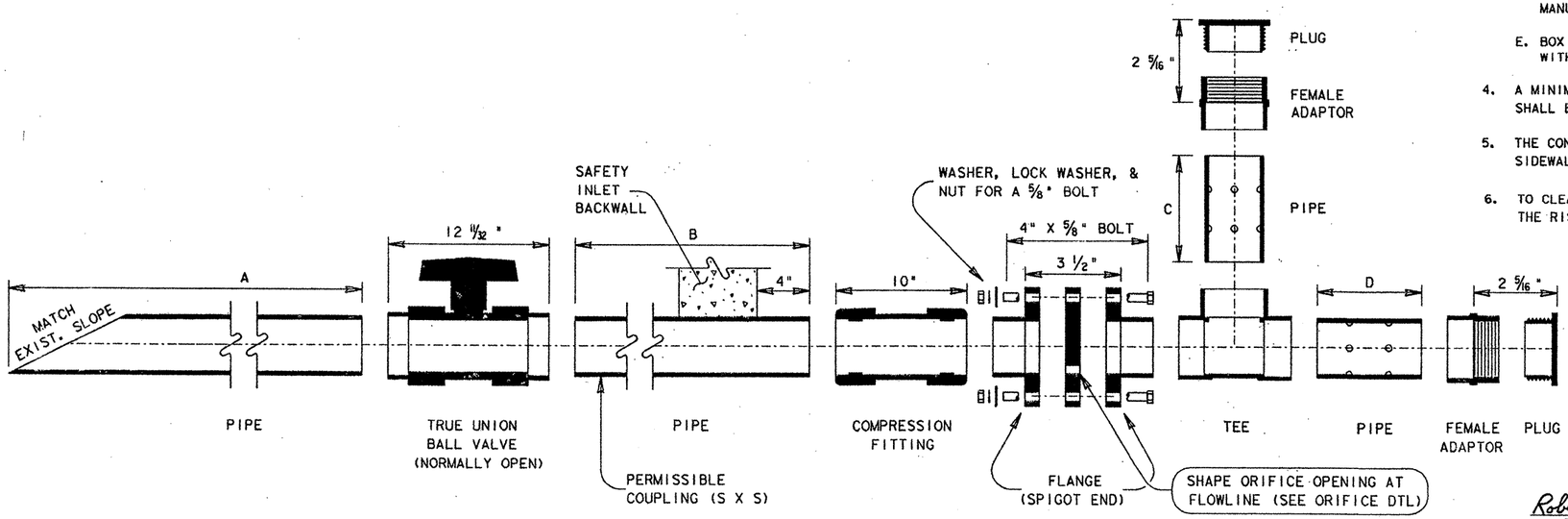
VARIABLE PIPE DIMENSIONS						MATERIALS (FOR CONTRACTOR'S INFORMATION ONLY)													
H. M. T. NO.	A 4" CPVC (FT - IN)	B 4" CPVC (FT - IN)	C 4" CPVC (FT - IN)	D 4" CPVC (FT - IN)	TOTAL 4" CPVC: (FT - IN)	4" CPVC TRUE UNION BALL VALVE (EACH)	BALL VALVE EXTENSION HANDLE (EACH)	4" PVC COMPRESSION FITTING (EACH)	4" CPVC FLANGE (SPIGOT END) (EACH)	4" CPVC BLIND FLANGE (EACH)	4" CPVC TEE (S X S X S) (EACH)	4" CPVC FEMALE ADAPTOR (EACH)	4" CPVC PLUG (FIPT) (EACH)						
1	9 - 0	6 - 0	0 - 9	3 - 0		1	1	1	2	1	1	2	2						
2	8 - 0	6 - 0	0 - 9	3 - 0		1	1	1	2	1	1	2	2						
3	13 - 6	5 - 0	0 - 9	3 - 0		1	1	1	2	1	1	2	2						
4	13 - 6	5 - 0	0 - 9	3 - 0		1	1	1	2	1	1	2	2						
5	33 - 0	6 - 9	0 - 9	3 - 0		1	1	1	2	1	1	2	2						
6	9 - 0	5 - 0	0 - 9	3 - 0		1	1	1	2	1	1	2	2						
7	13 - 6	5 - 0	0 - 9	3 - 0		1	1	1	2	1	1	2	2						
8	13 - 6	5 - 0	0 - 9	3 - 0		1	1	1	2	1	1	2	2						
9	5 - 6	5 - 0	0 - 9	3 - 0		1	1	1	2	1	1	2	2						
TOTALS:	118 - 6	48 - 9	6 - 9	27 - 0	201 - 0	9	9	9	18	9	9	18	18						





GENERAL NOTES:

1. ALL PVC & CPVC SHALL BE SCH. 80 GRADE. JOINTS SHALL BE CLEAN AND GLUED OR SCREWED AIR TIGHT. PERFORATIONS SHALL BE DRILLED ½" DIA. AT 4/ROW AROUND THE PIPE & AT 3" O.C. ALONG THE PIPE. THE CONTRACTOR SHALL VERIFY ALL PIPE DIMENSIONS.
2. THE BALL VALVE WITH EXTENSION HANDLE, FITTINGS, GLUE, DRILLING, AND ANY OTHER PLUMBING APPURTENANCES AND LABOR NECESSARY TO COMPLETE THE WORK SHALL BE SUBSIDIARY TO THE 4" CPVC PIPE, ITEM 582.
3. GROUND BOXES (ITEM 624) SHALL MEET THE FOLLOWING REQUIREMENTS:
   - A. GROUND BOXES SHALL BE MANUFACTURED FROM REINFORCED POLYMER CONCRETE (RPM) COMPOSED OF BOROSILICATE GLASS FIBER, A CATALYZED POLYESTER RESIN, AND AN AGGREGATE.
   - B. MINIMUM INSIDE DIMENSIONS SHALL BE AS FOLLOWS:
     - TYPE X SHALL BE 12" WIDE X 23" LONG X 30" HIGH, (122330)
     - TYPE Y SHALL BE 12" WIDE X 23" LONG X 42" HIGH, (122342)
   - C. BOTTOM EDGE OF GROUND BOX SHALL BE FOOTED (2 ½" FLANGE).
   - D. THE GROUND BOXES AND COVERS SHALL BE PERMANENTLY MARKED WITH MANUFACTURER'S NAME OR LOGO AND MODEL NUMBER.
   - E. BOX COVERS SHALL BE HOT DIPPED GALVANIZED STEEL AND IMPRINTED WITH THE WORDS "HAZARDOUS SPILL VALVE" IN MINIMUM 2" LETTERS.
4. A MINIMUM GRAVEL FILL OF 9" SHALL BE PLACED UNDER EACH GROUND BOX AND SHALL BE SUBSIDIARY TO THE GROUND BOX.
5. THE CONTRACTOR MAY PREFORM OR CUT THE NECESSARY PIPE HOLES IN THE BOX SIDEWALLS. HOLES SHALL BE NO LARGER THAN 2" GREATER THAN THE PIPE O.D.
6. TO CLEAN THE ORIFICE OPENING, UNSCREW THE COMPRESSION FITTING AND REMOVE THE RISER PIPE ASSEMBLY. RESCREW THE COMPRESSION FITTING HAND-TIGHT.



STATE OF TEXAS
ROBERT D. AUSTIN
67596
REGISTERED PROFESSIONAL ENGINEER

HAZARDOUS MATERIALS TRAP PLUMBING DETAILS

Robert D. Austin, P.E. 3-31-93
ROBERT D. AUSTIN DATE

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			303A
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

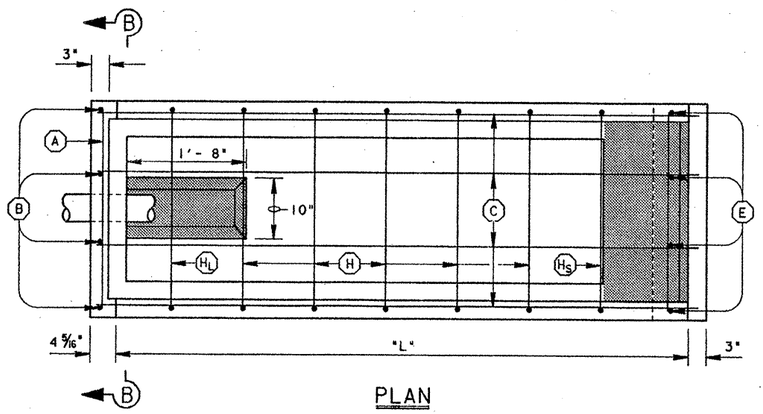
BILL OF REINFORCING STEEL

TABLE OF DIMENSIONS			#4 BARS (A) AS SHOWN			#4 BARS (B) @ 11" O.C.			#4 BARS (C) @ 11" O.C.			#4 BARS (D) AS SHOWN			#4 BARS (E) @ 11" O.C.			#4 BARS (H) LENGTHS						#4 BARS (L) LENGTHS						TOTAL QUANTITIES REINF STEEL	CONC	NUMBER OF
SLOPE	"H"	"L"	No	Length	Wt	No	Length	Wt	No	Length	Wt	No	Length	Wt	No	Length	Wt	No	Spc	H_S	H_L	H_{AVG}	Wt	No	Spc	L_S	L_L	L_{AVG}	Wt	Lbs	CY	GRATES
4:1	2'-0"	8'-0"	7	2'-9"	13	4	2'-3"	6	4	8'-4"	22	2	8'-7"	11	4	4'-0"	11	7	12"	3'-9"	6'-9"	5'-3"	25	4	12"±	2'-0"	5'-4"	3'-8"	10	98	1.0	4
4:1	2'-6"	10'-0"	7	2'-9"	13	4	2'-9"	7	4	10'-4"	28	2	10'-8"	14	4	4'-0"	11	9	12"	3'-9"	7'-9"	5'-9"	35	4	12"±	2'-0"	6'-6"	4'-3"	11	119	1.4	5
4:1	3'-0"	12'-0"	8	2'-9"	15	4	3'-3"	9	4	12'-4"	33	2	12'-9"	17	4	4'-0"	11	11	12"	3'-9"	8'-9"	6'-3"	46	6	12"±	2'-0"	9'-3"	5'-8"	23	154	1.7	6
4:1	3'-6"	14'-0"	8	2'-9"	15	4	3'-9"	10	4	14'-4"	38	2	14'-9"	20	4	4'-0"	11	13	12"	3'-9"	9'-9"	6'-9"	59	6	12"±	2'-0"	10'-8"	6'-4"	25	178	2.1	7
4:1	4'-0"	16'-0"	9	2'-9"	17	4	4'-3"	11	4	16'-4"	44	2	16'-10"	22	4	4'-0"	11	15	12"	3'-9"	10'-9"	7'-3"	73	8	12"±	2'-0"	13'-3"	7'-8"	41	219	2.5	8
6:1	2'-0"	12'-0"	7	2'-9"	13	4	2'-3"	6	4	12'-4"	33	2	12'-6"	17	4	4'-0"	11	11	12"	3'-9"	6'-11"	5'-4"	39	4	12"±	3'-0"	8'-3"	5'-8"	15	134	1.4	6
6:1	2'-4"	14'-0"	7	2'-9"	13	4	2'-7"	7	4	14'-4"	38	2	14'-7"	19	4	4'-0"	11	13	12"	3'-9"	7'-3"	5'-6"	48	4	12"±	3'-0"	9'-3"	6'-2"	16	152	1.7	7
6:1	2'-8"	16'-0"	7	2'-9"	13	4	2'-11"	8	4	16'-4"	44	2	16'-7"	22	4	4'-0"	11	15	12"	3'-9"	7'-7"	5'-8"	57	4	12"±	3'-0"	10'-3"	6'-8"	18	173	2.0	8
6:1	3'-0"	18'-0"	8	2'-9"	15	4	3'-3"	9	4	18'-4"	49	2	18'-7"	25	4	4'-0"	11	17	12"	3'-9"	7'-11"	5'-10"	66	6	12"±	3'-0"	14'-0"	8'-6"	34	209	2.4	9
6:1	3'-4"	20'-0"	8	2'-9"	15	4	3'-7"	10	4	20'-4"	54	2	20'-8"	28	4	4'-0"	11	19	12"	3'-9"	8'-3"	6'-0"	76	6	12"±	3'-0"	15'-3"	9'-2"	37	231	2.7	10
6:1	3'-8"	22'-0"	8	2'-9"	15	4	3'-11"	10	4	22'-4"	60	2	22'-8"	30	4	4'-0"	11	21	12"	3'-9"	8'-7"	6'-2"	87	6	12"±	3'-0"	16'-8"	9'-10"	39	252	3.1	11
6:1	4'-0"	24'-0"	9	2'-9"	17	4	4'-3"	11	4	24'-4"	65	2	24'-8"	33	4	4'-0"	11	23	12"	3'-9"	8'-11"	6'-4"	97	8	12"±	3'-0"	19'-11"	11'-5"	61	295	3.5	12

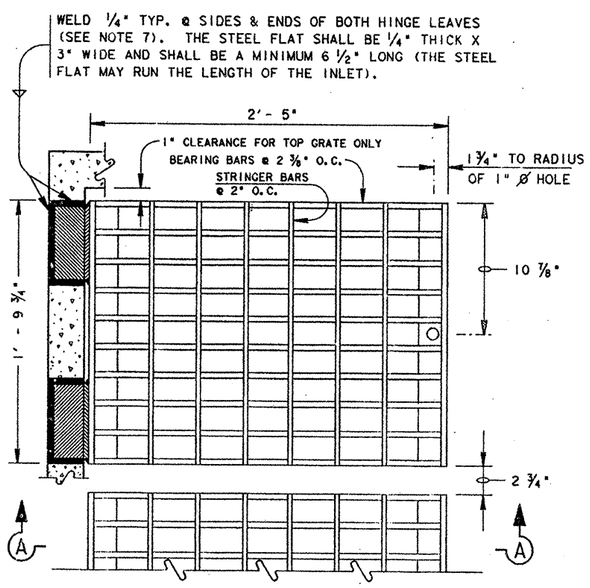
BAR SUBSCRIPTS S & L INDICATE THE SHORTEST & LONGEST LENGTHS.

BILL OF MATERIALS FOR ONE GRATE

Bar	Size	No	Spc	Length	Wt
BEARING	3" X 3/8"	10	2 3/8"	2'-4 1/4"	90
STRINGER	1" X 1/4"	6	4"	1'-9 3/4"	9
SIDERAIL	∠3 1/2" X 2 1/2" X 3/8"	2	~	1'-9 3/4"	26
Total Weight (Lbs.) for one Grate = 125					



PLAN



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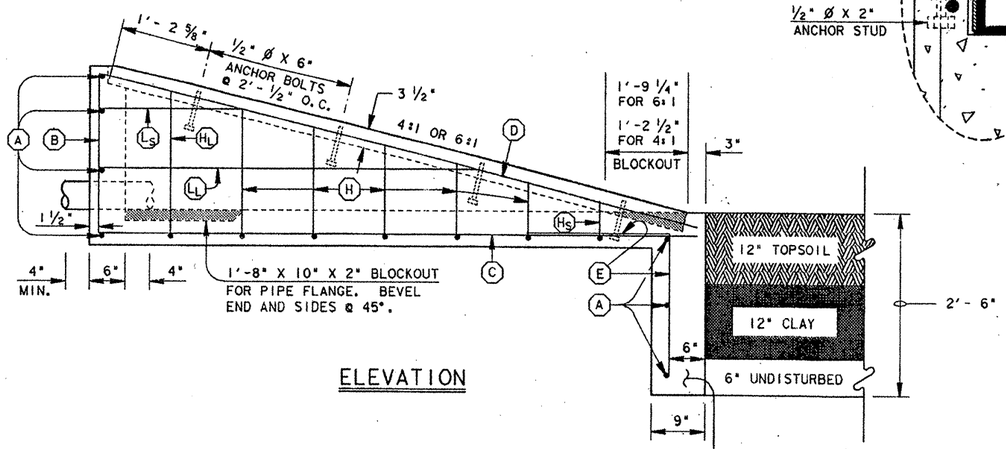
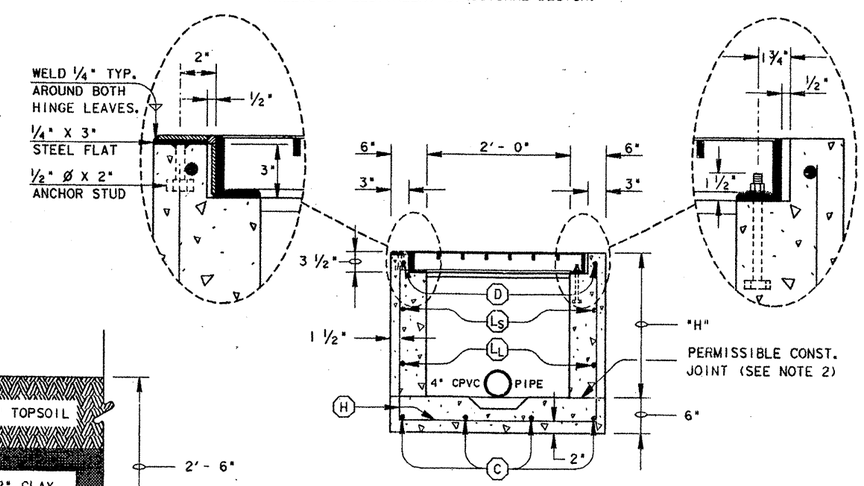
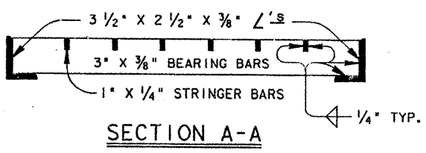


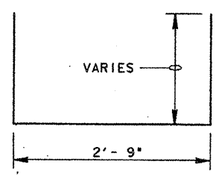
ELEVATION



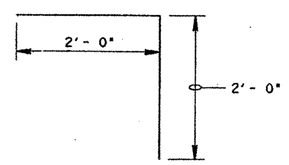
SECTION B-B



SECTION A-A



BARS H



BARS E

NOTE: IF THE HMT SPECIFIED ON THE PLANS IS TO BE CONCRETE IN LIEU OF THE TPSL & CLAY, THEN THE CONTRACTOR MAY PROVIDE DOWELS IN PLACE OF THE TOEDOWN. USE 4 - 12" X #4 DOWEL BARS @ 11" O.C. PROVIDE 2" CONCRETE COVER MINIMUM OVER THE DOWELS.

GENERAL NOTES:

1. QUANTITIES SHOWN HEREON ARE FOR CONTRACTOR'S INFORMATION ONLY.
2. ALL CONCRETE SHALL BE CLASS A. CHAMFER EXPOSED CORNERS 3/4". IF INLET IS NOT PRECAST MONOLITHIC, CONSTRUCTION JOINTS SHALL BE MADE WATER TIGHT AS DIRECTED BY THE ENGINEER.
3. THE CPVC PIPE SHALL BE CAST IN THE INLET BACKWALL.
4. ALL DIMENSIONS RELATING TO REINFORCING STEEL ARE TO CENTERS OF BARS.
5. IN AREAS OF CONFLICT BETWEEN REINFORCING STEEL, BLOCKOUTS, PIPES, ANCHOR STUDS/BOLTS, OR OTHER REINFORCING STEEL, THE REINFORCEMENT SHALL BE BENT OR ADJUSTED TO CLEAR AS DIRECTED BY THE ENGINEER.
6. GRATES SHALL MEET THE REQUIREMENTS OF ITEM 471 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR EACH INLET.
7. THE 6" X 6" STEEL WELDING HINGES SHALL BE HEAVY BLANKS (NO HOLES) WITH A 1/2" Ø RIVETED STEEL PIN. THEY SHALL HAVE A MINIMUM THICKNESS OF 0.20". ALL GRATES SHALL BE HINGED ON SAME SIDE OF INLET.
8. ALL GRATE MATERIAL SHALL BE GALVANIZED (THIS INCLUDES NUTS, ANCHOR STUDS & BOLTS, WASHERS, AND HINGES) AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR EACH INLET. ONE ANCHOR BOLT AND TWO ANCHOR STUDS ARE REQUIRED PER GRATE.
9. THE CONTRACTOR SHALL PROVIDE AN ADEQUATE MEANS TO LIFT AND PLACE THE INLET, SUBJECT TO THE APPROVAL OF THE ENGINEER.
10. THE INLET AND GRATING HAS BEEN DESIGNED FOR HS-20 LOADING.
11. ALTERNATE DESIGN DRAWINGS BEARING THE SEAL OF A REGISTERED PROFESSIONAL ENGINEER WILL BE ACCEPTABLE FOR PRECAST CONSTRUCTION OF INLETS. SHOP DRAWINGS WILL NOT BE REQUIRED.
12. THE CONTRACTOR MAY WITH THE APPROVAL OF THE ENGINEER FURNISH INLETS OF EQUIVALENT STRUCTURAL DESIGN.

STATE OF TEXAS — ROBERT D. AUSTIN — 67596 — REGISTERED PROFESSIONAL ENGINEER

SAFETY INLET FOR A HAZARDOUS MATERIALS TRAP

Robert D. Austin, P.E.
ROBERT D. AUSTIN

3-31-93
DATE

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		303B

STATE	STATE DIST. NO.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP 1604

STHMT1604.DGN

BILLS OF REINFORCING STEEL - FOR 44' CLEAR WIDTH - BARRELS ONLY

2 SPAN 7'x3'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	Z
NUMBER	110	146	146	73	73	19	8	17	4	32	46
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7½"	~	18"	~	~	12"	12"
LENGTH	15'-2"	5'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	15'-2"	3'-11"	7'-8"
WEIGHT	1740	569	398	622	622	572	241	512	41	84	236

3 SPANS 7'x3'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	Z
NUMBER	110	146	146	146	146	29	12	25	4	48	92
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7½"	~	18"	~	~	12"	12"
LENGTH	22'-8"	5'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	22'-8"	3'-11"	7'-8"
WEIGHT	2601	569	398	1243	1243	873	361	753	61	126	471

4 SPANS 7'x3'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	Z
NUMBER	110	146	146	219	219	39	16	33	4	62	138
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7½"	~	18"	~	~	12"	12"
LENGTH	30'-2"	5'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	30'-2"	3'-11"	7'-8"
WEIGHT	3461	569	398	1865	1865	1174	482	993	81	162	707

5 SPANS 7'x3'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	Z
NUMBER	110	146	146	292	292	49	20	41	4	78	184
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7½"	~	18"	~	~	12"	12"
LENGTH	37'-8"	5'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	37'-8"	3'-11"	7'-8"
WEIGHT	4322	569	398	2487	2487	1475	602	1234	101	204	943

6 SPANS 7'x3'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	Z
NUMBER	110	146	146	365	365	59	24	49	4	92	230
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7½"	~	18"	~	~	12"	12"
LENGTH	45'-2"	5'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	45'-2"	3'-11"	7'-8"
WEIGHT	5182	569	398	3108	3108	1776	722	1475	121	241	1178

2 SPANS 7'x4'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	Z
NUMBER	110	146	146	73	73	19	12	17	4	32	46
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7½"	~	16"	~	~	12"	12"
LENGTH	15'-2"	6'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	15'-2"	3'-11"	9'-8"
WEIGHT	1740	666	398	622	622	572	361	512	41	84	297

3 SPANS 7'x4'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	Z
NUMBER	110	146	146	146	146	29	18	25	4	48	92
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7½"	~	16"	~	~	12"	12"
LENGTH	22'-8"	6'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	22'-8"	3'-11"	9'-8"
WEIGHT	2601	666	398	1243	1243	873	542	753	61	126	594

4 SPANS 7'x4'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	Z
NUMBER	110	146	146	219	219	39	24	33	4	62	138
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7½"	~	16"	~	~	12"	12"
LENGTH	30'-2"	6'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	30'-2"	3'-11"	9'-8"
WEIGHT	3461	666	398	1865	1865	1174	722	993	81	162	891

5 SPANS 7'x4'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	Z
NUMBER	110	146	146	292	292	49	30	41	4	78	184
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7½"	~	16"	~	~	12"	12"
LENGTH	37'-8"	6'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	37'-8"	3'-11"	9'-8"
WEIGHT	4322	666	398	2487	2487	1475	903	1234	101	204	1189

6 SPANS 7'x4'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	Z
NUMBER	110	146	146	365	365	59	36	49	4	92	230
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7½"	~	16"	~	~	12"	12"
LENGTH	45'-2"	6'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	45'-2"	3'-11"	9'-8"
WEIGHT	5182	666	398	3108	3108	1776	1084	1475	121	241	1486

2 SPANS 7'x5'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	110	146	146	73	73	19	24	17	4	32	62	46	46
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7½"	~	15"	~	~	12"	18"	12"	12"
LENGTH	15'-5"	7'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	15'-5"	3'-11"	4'-11"	3'-5"	10'-11"
WEIGHT	1769	764	398	622	622	572	722	512	41	84	204	105	336

3 SPANS 7'x5'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	110	146	146	146	146	29	32	25	4	48	62	92	92
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7½"	~	15"	~	~	12"	18"	12"	12"
LENGTH	23'-0"	7'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	23'-0"	3'-11"	4'-11"	3'-5"	10'-11"
WEIGHT	2639	764	398	1243	1243	873	963	753	61	126	204	210	671

4 SPANS 7'x5'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	110	146	146	219	219	39	40	33	4	62	62	138	138
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7½"	~	15"	~	~	12"	18"	12"	12"
LENGTH	30'-7"	7'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	30'-7"	3'-11"	4'-11"	3'-5"	10'-11"
WEIGHT	3508	764	398	1865	1865	1174	1204	993	82	162	204	315	1007

5 SPANS 7'x5'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	110	146	146	292	292	49	48	41	4	78	62	184	184
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7½"	~	15"	~	~	12"	18"	12"	12"
LENGTH	38'-2"	7'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	38'-2"	3'-11"	4'-11"	3'-5"	10'-11"	
WEIGHT	4379	764	398	2487	2487	1475	1445	1234	102	204	204	420	1342

6 SPANS 7'x5'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	110	146	146	365	365	59	56	49	4	92	62	230	230
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7½"	~	15"	~	~	12"	18"	12"	12"
LENGTH	45'-9"	7'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-9"	3'-11"	4'-11"	3'-5"	10'-11"	
WEIGHT	5249	764	398	3108	3108	1776	1686	1475	122	241	204	526	1678

2 SPANS 7'x6'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	110	146	146	73	78	19	24	17	4	32	62	46	46
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7"	~	18"	~	~	12"	18"	12"	12"
LENGTH	15'-5"	8'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	15'-5"	3'-11"	4'-11"	3'-5"	10'-11"
WEIGHT	1769	861	398	622	664	572	722	512	41	84	245	105	397

3 SPANS 7'x6'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	110	146	146	146	156	29	32	25	4	48	62	92	92
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½	7½"	7"	~	18"	~	~	12"	18"	12"	12"
LENGTH	23'-0"	8'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	23'-0"	3'-11"	5'-11"	3'-5"	12'-11"
WEIGHT	2639	861	398	1243	1329	873	963	753	61	126	245	210	794

4 SPANS 7'x6'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	110	146	146	219	234	39	40	33	4	62	62	138	138
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7"	~	18"	~	~	12"	18"	12"	12"
LENGTH	30'-7"	8'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	30'-7"	3'-11"	5'-11"	3'-5"	12'-11"
WEIGHT	3508	861	398	1865	1993	1174	1204	993	82	162	245	315	1191

5 SPANS 7'x6'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	110	146	146	292	312	49	48	41	4	78	62	184	184
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7"	~	18"	~	~	12"	18"	12"	12"
LENGTH	38'-2"	8'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	38'-2"	3'-11"	5'-11"	3'-5"	12'-11"
WEIGHT	4379	861	398	2487	2657	1475	1445	1234	102	204	245	420	1588

6 SPANS 7'x6'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	110	146	146	365	390	59	56	49	4	92	62	230	230
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	10"	7½"	7½"	7½"	7"	~	18"	~	~	12"	18"	12"	12"
LENGTH	45'-9"	8'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	45'-9"	3'-11"	5'-11"	3'-5"	12'-11"
WEIGHT	5249	861	398	3108	3321	1776	1686	1475	122	241	245	526	1985

2 SPANS 7'x7'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K'	M	Y	Z
NUMBER	110	168	168	73	78	19	30	17	4	32	62	46	46
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	10"	6½"	6½"	7½"	7"	~	17"	~	~	12"	18"	12"	12"
LENGTH	15'-5"	9'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	15'-5"	3'-11"	6'-11"	3'-5"	14'-11"
WEIGHT	1769	1103	458	622	664	572	903	512	41	84	287	105	458

3 SPANS 7'x7'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K'	M	Y	Z
NUMBER	110	168	168	146	156	29	40	25	4	48	62	92	92
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	10"	6½"	6½"	7½"	7"	~	17"	~	~	12"	18"	12"	12"
LENGTH	23'-0"	9'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	23'-0"	3'-11"	6'-11"	3'-5"	14'-11"
WEIGHT	2639	1103	458	1243	1329	873	1204	753	61	126	287	210	917

4 SPANS 7'x7'

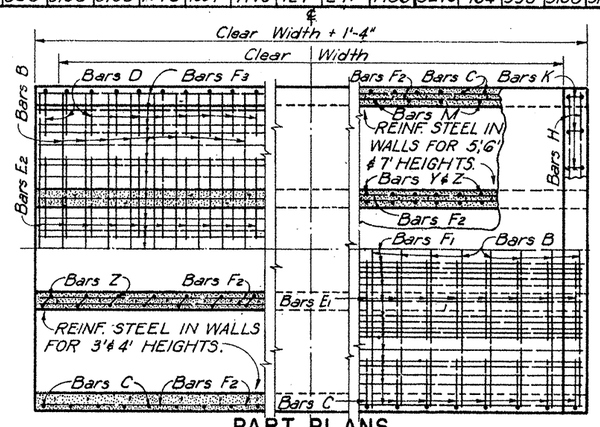
MARK	B	C	D	E1	E2	F1	F2	F3	H	K'	M	Y	Z
NUMBER	110	168	168	219	234	39	50	33	4	62	62	138	138
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	10"	6½"	6½"	7½"	7"	~	17"	~	~	12"	18"	12"	12"
LENGTH	30'-7"	9'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	30'-7"	3'-11"	6'-11"	3'-5"	14'-11"
WEIGHT	3508	1103	458	1865	1993	1174	1505	993	82	162	287	315	1375

5 SPANS 7'x7'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K'	M	Y	Z
NUMBER	110	168	168	292	312	49	60	41	4	78	62	184	184
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	10"	6½"	6½"	7½"	7"	~	17"	~	~	12"	18"	12"	12"
LENGTH	38'-2"	9'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	38'-2"	3'-11"	6'-11"	3'-5"	14'-11"
WEIGHT	4379	1103	458	2487	2657	1475	1806	1234	102	204	287	420	1834

6 SPANS 7'x7'

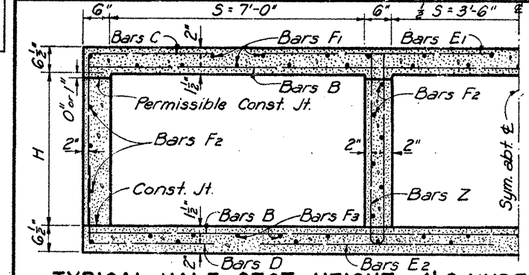
MARK	B	C	D	E1	E2	F1	F2	F3	H	K'	M	Y	Z
NUMBER	110	168	168	365	390	59	70	49	4	92	62	230	230
SIZE	#5	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	10"	6½"	6½"	7½"	7"	~	17"	~	~	12"	18"	12"	12"
LENGTH	45'-9"	9'-10"	4'-1"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	45'-9"	3'-11"	6'-11"	3'-5"	14'-11"
WEIGHT	5249	1103	458	3108	3321	1776	2107	1475	122	241	287	526	2292



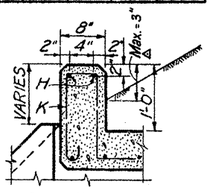
PART PLANS

BOTTOM SLAB — TOP SLAB

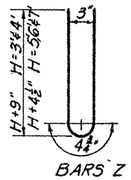
NOTE: TOP & BOTTOM SLAB REINFORCING STEEL SIMILAR FOR CULVERT SIZES SHOWN ON THIS SHEET.



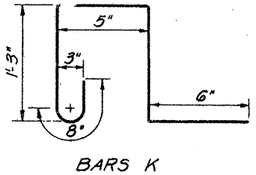
TYPICAL HALF SECT.-HEIGHT = 4' & UNDER



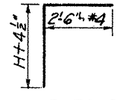
SECTION THRU CURB



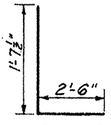
BARS Z



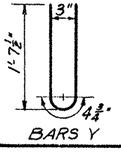
BARS K



BARS C



BARS D



BARS Y

BARREL QUANTITIES FOR 44' CLEAR WIDTH

CULVERT SIZE S	H	NO. OF SPANS	LENGTH OF STRUCT.	* BARREL QUANTITIES CONC. CU. YD.	* BARREL QUANTITIES STEEL LB.	QUANTITIES P.L.F. BBL. CONC. CU. YD.	QUANTITIES P.L.F. BBL. STEEL LB.
7'	3'	2	15'-6"	36.53	5637	0.789	120.91
		3	23'-0"	53.04	8699	1.145	186.76
		4	30'-6"	69.60	11757	1.502	252.60
		5	38'-0"	86.11	14822	1.858	318.44
		6	45'-6"	102.61	17878	2.214	384.28
7'	4'	2	15'-6"	39.03	5915	0.844	127.06
		3	23'-0"	56.40	9100	1.219	195.57
		4	30'-6"	73.77	12278	1.594	264.10
		5	38'-0"	91.14	15466	1.969	332.61
		6	45'-6"	108.51	18645	2.344	401.11
7'	5'	2	15'-9"	44.12	6751	0.956	145.34
		3	23'-4"	63.17	10148	1.368	218.52
		4	30'-11"	82.27	13541	1.781	291.70
		5	38'-6"	101.32	16941	2.193	364.90
		6	46'-1"	120.37	20335	2.605	438.06
7'	6'	2	15'-9"	47.06	6992	1.021	150.69
		3	23'-4"	67.11	10495	1.455	226.17
		4	30'-11"	87.16	13991	1.889	301.66
		5	38'-6"	107.17	17495	2.322	377.16
		6	46'-1"	127.21	20993	2.756	452.64
7'	7'	2	15'-9"	50.01	7578	1.086	163.64
		3	23'-4"	71.01	11203	1.541	241.78
		4	30'-11"	92.06	14820	1.997	319.95
		5	38'-6"	113.06	18446	2.452	398.13
		6	46'-1"	134.10	22065	2.908	476.27

* These quantities do not include toe walls or wings.

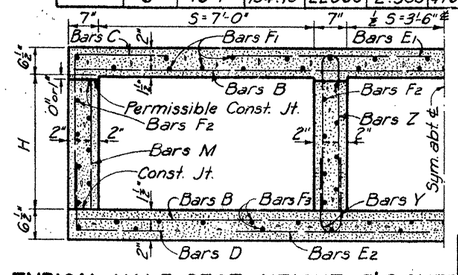
△GENERAL NOTES:

Designed for HS20 Loading and maximum fill heights shown.

The bottom edge of the top slab shall be chamfered 3 inches at the entrance. Reinforcing bars shall be adjusted to provide a minimum of 1½ inches clear cover. Headwall heights will be reduced, if necessary, to provide a maximum of 3 inches projection above the roadway slope. No increase or decrease will be made in plan quantity of concrete or reinforcing steel for this work.

Construction joints shown at the flow line may be raised a maximum of 6 inches at the Contractor's option. Bars M may be cut off or raised, bars C and D may be reversed (D on top) and bars Y and Z may be reversed (Y on top).

All reinforcing steel shall be Grade 60.



TYPICAL HALF SECT.-HEIGHT = 5' & OVER

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

MULTIPLE BOX CULVERTS

SIZES 7'x3', 7'x4', 7'x5', 7'x6' & 7'x7'

4'-1" TO 6'-0" FILL

Rev. 8-87 (Gen. Note)

MC7-3

DN.: W.H.	DRAWING	DATE	FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.		SHEET NO.
CK. DN.: R.M.M.	Original	JAN. 1958	6	TEXAS			30A
DW.: M.D.A.	Rev. Jan. 1959		STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
CK. DW.: K.M.	Rev. Nov. 1964						
TR.: C.W.W.	Rev. Nov. 1967		15	BEXAR	2457	2	23	410
CK. TR.: M.D.A.	Rev. Mar. 1977						

BILLS OF REINFORCING STEEL ~ FOR 44' CLEAR WIDTH ~ BARRELS ONLY

2 SPANS 8' × 4'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	Z
NUMBER	182	182	182	78	91	21	12	19	4	36	46
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4
SPACING	6"	6"	6"	7"	6"	–	16"	–	–	12"	12"
LENGTH	17'-2"	6'-11"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	17'-2"	4'-2"	10'-0"
WEIGHT	2087	841	507	664	775	632	361	572	46	100	307

2 SPANS 8' × 5'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	182	182	78	91	21	24	19	4	36	62	46	46
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	6"	6"	7"	6"	–	15"	–	–	12"	18"	12"	12"
LENGTH	17'-5"	7'-1"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	17'-5"	4'-2"	4'-1"	3'-7"	11'-1"
WEIGHT	2118	963	507	664	775	632	722	572	47	100	204	110	340

2 SPANS 8' × 6'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	182	182	78	91	21	24	19	4	36	62	46	46
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	6"	6"	7"	6"	–	18"	–	–	12"	18"	12"	12"
LENGTH	17'-5"	8'-11"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	17'-5"	4'-2"	5'-1"	3'-7"	13'-1"
WEIGHT	2118	1084	507	664	775	632	722	572	47	100	245	110	402

2 SPANS 8' × 7'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	198	198	78	91	21	30	19	4	36	62	46	46
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	5½"	5½"	7"	6"	–	17"	–	–	12"	18"	12"	12"
LENGTH	17'-5"	9'-1"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	17'-5"	4'-2"	6'-1"	3'-7"	15'-1"
WEIGHT	2118	1312	552	664	775	632	903	572	47	100	287	110	463

3 SPANS 8' × 4'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	Z
NUMBER	182	182	182	156	182	32	18	28	4	54	92
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4
SPACING	6"	6"	6"	7"	6"	–	16"	–	–	12"	12"
LENGTH	25'-8"	6'-11"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	25'-8"	4'-2"	10'-0"
WEIGHT	3121	841	507	1328	1550	963	542	843	69	150	615

3 SPANS 8' × 5'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	182	182	156	182	32	32	28	4	54	62	92	92
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	6"	6"	7"	6"	–	15"	–	–	12"	18"	12"	12"
LENGTH	26'-0"	7'-1"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	26'-0"	4'-2"	4'-1"	3'-7"	11'-1"
WEIGHT	3161	963	507	1328	1550	963	963	843	69	150	204	220	681

3 SPANS 8' × 6'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	182	182	156	182	32	32	28	4	54	62	92	92
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	6"	6"	7"	6"	–	18"	–	–	12"	18"	12"	12"
LENGTH	26'-0"	8'-11"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	26'-0"	4'-2"	5'-1"	3'-7"	13'-1"
WEIGHT	3161	1084	507	1328	1550	963	963	843	69	150	245	220	804

3 SPANS 8' × 7'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	198	198	156	182	32	40	28	4	54	62	92	92
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	5½"	5½"	7"	6"	–	17"	–	–	12"	18"	12"	12"
LENGTH	26'-0"	9'-1"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	26'-0"	4'-2"	6'-1"	3'-7"	15'-1"
WEIGHT	3161	1312	552	1328	1550	963	1204	843	69	150	287	220	927

4 SPANS 8' × 4'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	Z
NUMBER	182	182	182	234	273	43	24	37	4	70	138
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4
SPACING	6"	6"	6"	7"	6"	–	16"	–	–	12"	12"
LENGTH	34'-2"	6'-11"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	34'-2"	4'-2"	10'-0"
WEIGHT	4154	841	507	1993	2325	1294	722	1114	91	195	922

4 SPANS 8' × 5'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	182	182	234	273	43	40	37	4	70	62	138	138
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	6"	6"	7"	6"	–	15"	–	–	12"	18"	12"	12"
LENGTH	34'-7"	7'-1"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	34'-7"	4'-2"	4'-1"	3'-7"	11'-1"
WEIGHT	4204	963	507	1993	2325	1294	1204	1114	92	195	204	330	1021

4 SPANS 8' × 6'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	182	182	234	273	43	40	37	4	70	62	138	138
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	6"	6"	7"	6"	–	18"	–	–	12"	18"	12"	12"
LENGTH	34'-7"	8'-11"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	34'-7"	4'-2"	5'-1"	3'-7"	13'-1"
WEIGHT	4204	1084	507	1993	2325	1294	1204	1114	92	195	245	330	1206

4 SPANS 8' × 7'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	198	198	234	273	43	50	37	4	70	62	138	138
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	5½"	5½"	7"	6"	–	17"	–	–	12"	18"	12"	12"
LENGTH	34'-7"	9'-1"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	34'-7"	4'-2"	6'-1"	3'-7"	15'-1"
WEIGHT	4204	1312	552	1993	2325	1294	1505	1114	92	195	287	330	1390

5 SPANS 8' × 4'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	Z
NUMBER	182	182	182	312	364	54	30	46	4	88	184
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4
SPACING	6"	6"	6"	7"	6"	–	16"	–	–	12"	12"
LENGTH	42'-8"	6'-11"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	42'-8"	4'-2"	10'-0"
WEIGHT	5187	841	507	2657	3100	1625	903	1385	114	245	1229

5 SPANS 8' × 5'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	182	182	312	364	54	48	46	4	88	62	184	184
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	6"	6"	7"	6"	–	15"	–	–	12"	18"	12"	12"
LENGTH	43'-2"	7'-1"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	43'-2"	4'-2"	4'-1"	3'-7"	11'-1"
WEIGHT	5248	963	507	2657	3100	1625	1445	1385	115	245	204	440	1362

5 SPANS 8' × 6'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	182	182	312	364	54	48	46	4	88	62	184	184
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	6"	6"	7"	6"	–	18"	–	–	12"	18"	12"	12"
LENGTH	43'-2"	8'-11"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	43'-2"	4'-2"	5'-1"	3'-7"	13'-1"
WEIGHT	5248	1084	507	2657	3100	1625	1445	1385	115	245	245	440	1608

5 SPANS 8' × 7'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	198	198	312	364	54	60	46	4	88	62	184	184
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	5½"	5½"	7"	6"	–	17"	–	–	12"	18"	12"	12"
LENGTH	43'-2"	9'-1"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	43'-2"	4'-2"	6'-1"	3'-7"	15'-1"
WEIGHT	5248	1312	552	2657	3100	1625	1806	1385	115	245	287	440	1854

6 SPANS 8' × 4'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	Z
NUMBER	182	182	182	390	455	65	36	55	4	104	230
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4
SPACING	6"	6"	6"	7"	6"	–	16"	–	–	12"	12"
LENGTH	51'-2"	6'-11"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	51'-2"	4'-2"	10'-0"
WEIGHT	6221	841	507	3321	3875	1957	1084	1656	137	290	1536

6 SPANS 8' × 5'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	182	182	390	455	65	56	55	4	106	62	230	230
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	6"	6"	7"	6"	–	15"	–	–	12"	18"	12"	12"
LENGTH	51'-9"	7'-1"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	51'-9"	4'-2"	4'-1"	3'-7"	11'-1"
WEIGHT	6292	963	507	3321	3875	1957	1686	1656	138	295	204	550	1702

6 SPANS 8' × 6'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	182	182	390	455	65	56	55	4	106	62	230	230
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	6"	6"	7"	6"	–	18"	–	–	12"	18"	12"	12"
LENGTH	51'-9"	8'-11"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	51'-9"	4'-2"	5'-1"	3'-7"	13'-1"
WEIGHT	6292	1084	507	3321	3875	1957	1686	1656	138	295	245	550	2010

6 SPANS 8' × 7'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	198	198	390	455	65	70	55	4	106	62	230	230
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	5½"	5½"	7"	6"	–	17"	–	–	12"	18"	12"	12"
LENGTH	51'-9"	9'-1"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	51'-9"	4'-2"	6'-1"	3'-7"	15'-1"
WEIGHT	6292	1312	552	3321	3875	1957	2107	1656	138	295	287	550	2317

2 SPANS 8' × 8'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	198	198	78	91	21	30	19	4	36	62	46	46
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	5½"	5½"	7"	6"	–	19"	–	–	12"	18"	12"	12"
LENGTH	17'-8"	10'-1"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	17'-8"	4'-2"	7'-1"	3'-7"	17'-1"
WEIGHT	2148	1444	552	664	775	632	903	572	47	100	328	110	525

3 SPANS 8' × 8'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	198	198	156	182	32	40	28	4	54	62	92	92
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	5½"	5½"	7"	6"	–	19"	–	–	12"	18"	12"	12"
LENGTH	26'-4"	10'-1"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	26'-4"	4'-2"	7'-1"	3'-7"	17'-1"
WEIGHT	3201	1444	552	1328	1550	963	1204	843	70	150	328	220	1050

4 SPANS 8' × 8'

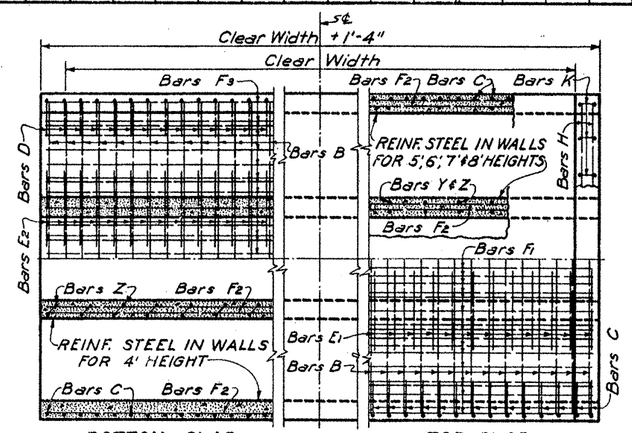
MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	198	198	234	273	43	50	37	4	72	62	138	138
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	5½"	5½"	7"	6"	–	19"	–	–	12"	18"	12"	12"
LENGTH	35'-0"	10'-1"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	35'-0"	4'-2"	7'-1"	3'-7"	17'-1"
WEIGHT	4255	1444	552	1993	2325	1294	1505	1114	94	201	328	330	1574

5 SPANS 8' × 8'

MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	198	198	312	364	54	60	46	4	90	62	184	184
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	5½"	5½"	7"	6"	–	19"	–	–	12"	18"	12"	12"
LENGTH	43'-8"	10'-1"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	43'-8"	4'-2"	7'-1"	3'-7"	17'-1"
WEIGHT	5309	1444	552	2657	3100	1625	1806	1385	117	251	328	440	2099

6 SPANS 8' × 8'

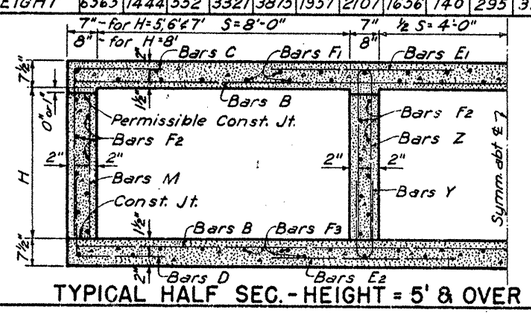
MARK	B	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
NUMBER	182	198	198	390	455	65	70	55	4	106	62	230	230
SIZE	#4	#4	#4	#6	#6	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	6"	5½"	5½"	7"	6"	–	19"	–	–	12"	18"	12"	12
LENGTH	52'-4"	10'-1"	4'-2"	5'-8"	5'-8"	45'-0"	45'-0"	45'-0"	52'-4"	4'-2"	7'-1"	3'-7"	17'-1"
WEIGHT	6363	1444	552	3321	3875	1957	2107	1656	140	295	328	550	2624



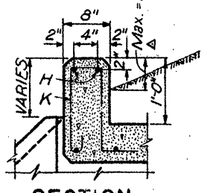
BOTTOM SLAB TOP SLAB

PART PLANS

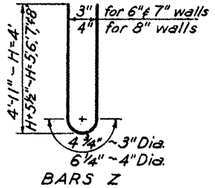
NOTE: TOP & BOTTOM SLAB REINF. STEEL SIMILAR FOR CULVERT SIZES SHOWN ON THIS SHEET



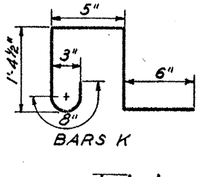
TYPICAL HALF SEC. - HEIGHT = 5' & OVER



SECTION THRU CURB



BARS Z



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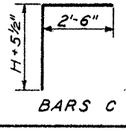

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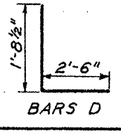

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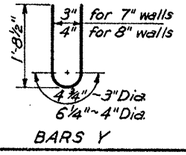
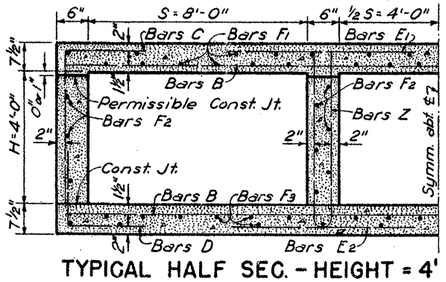


BARS Y



TYPICAL HALF SEC. - HEIGHT = 4'

BARREL QUANTITIES FOR 44' CLEAR WIDTH

CULV. SIZE S × H	NO. OF SPANS	LENGTH OF STRUCT.	* BARREL QUANTITIES CONC. Cu. Yds.	* BARREL QUANTITIES STEEL Lbs.	QUANTITIES P.L.F. BBL. CONC. Cu. Yds.	QUANTITIES P.L.F. BBL. STEEL Lbs.
8' × 4'	2	17'-6"	47.65	6892	1.032	148.52
	3	26'-0"	69.28	10529	1.500	226.89
	4	34'-6"	90.92	14158	1.968	305.27
	5	43'-0"	112.51	17793	2.435	383.65
	6	51'-6"	134.15	21425	2.903	462.02
8' × 5'	2	17'-9"	52.83	7754	1.146	167.37
	3	26'-4"	76.15	11602	1.651	250.42
	4	34'-11"	99.51	15446	2.157	333.47
	5	43'-6"	122.83	19296	2.662	416.52
	6	52'-1"	146.14	23146	3.167	499.57
8' × 6'	2	17'-9"	55.78	7978	1.211	172.27
	3	26'-4"	80.09	11887	1.738	256.65
	4	34'-11"	104.40	15793	2.265	341.04
	5	43'-6"	128.72	19704	2.792	425.43
	6	52'-1"	153.03	23616	3.319	509.81
8' × 7'	2	17'-9"	58.68	8535	1.275	184.60
	3	26'-4"	83.99	12566	1.824	271.65
	4	34'-11"	109.30	16593	2.373	358.71
	5	43'-6"	134.57	20626	2.921	445.77
	6	52'-1"	159.88	24659	3.470	532.83
8' × 8'	2	18'-0"	65.53	8800	1.426	190.41
	3	26'-8"	93.12	12903	2.025	279.02
	4	35'-4"	120.65	17009	2.623	367.64
	5	44'-0"	148.24	21113	3.222	456.26
	6	52'-8"	175.82	25212	3.821	544.87

* These quantities do not include toe walls or wings.

△ GENERAL NOTES:

Designed for HS20 Loading and maximum fill heights shown.

The bottom edge of the top slab shall be chamfered 3 inches at the entrance. Reinforcing bars shall be adjusted to provide a minimum of 1¼ inches clear cover. Headwall heights will be reduced, if necessary, to provide a maximum of 3 inches projection above the roadway slope. No increase or decrease will be made in plan quantity of concrete or reinforcing steel for this work.

Construction joints shown at the flow line may be raised a maximum of 6 inches at the Contractor's option. Bars M may be cut off or raised, bars C and D may be reversed (D on top) and bars Y and Z may be reversed (Y on top).

All reinforcing steel shall be Grade 60.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

MULTIPLE BOX CULVERTS

SIZES 8'×4', 8'×5', 8'×6', 8'×7', 8'×8' 4'-1" TO 6'-0" FILL

MC8-3

Rev. 8-87 (Gen. Note)

DN: MDA	DRAWING	DATE	FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.		SHEET NO.
CK. DN: WH	Original	JAN. 1958	6	TEXAS			205
DN: KM	Rev. Jan. 1959		STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
CK. DN: MDA	Rev. Nov. 1964		15	BEXAR	2802	2	23	Loop 410
TR: AOB	Rev. Nov. 1967						
CK. TR: MDA	Rev. May 1977						

PROFILE — SURVEYED ..... PLOTTED ..... ALIGNMENT CHECKED ..... RT. OF WAY CHECKED ..... NOTE BOOK ..... GRADES CHECKED ..... B.M. NOTED ..... ESTIMATES/QUANTITIES CHKD. ..... NO. ..... BY ..... DATE .....

PLAN — SURVEYED ..... PLOTTED ..... ALIGNMENT CHECKED ..... RT. OF WAY CHECKED ..... NOTE BOOK ..... NO. ..... BY ..... DATE .....

BILLS OF REINFORCING STEEL ~ 44' CLEAR WIDTH ~ BARRELS ONLY

9'x5'

MARK	A	B1	B2	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
2 SPANS 9'x5'															
NUMBER	61	60	73	156	156	60	78	27	24	19	4	40	62	46	46
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7½"	7"	7"	9"	7"	~	15"	~	~	12"	18"	12"	12"
LENGTH	19'-8"	19'-5"	19'-5"	7'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	19'-5"	4'-1"	4'-11"	3'-6"	11'-0"
WEIGHT	802	778	947	825	435	334	434	813	722	572	52	109	204	108	338
3 SPANS 9'x5'															
NUMBER	61	60	73	156	156	120	156	41	32	28	4	60	62	92	92
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7½"	7"	7"	9"	7"	~	15"	~	~	12"	18"	12"	12"
LENGTH	29'-6"	29'-0"	29'-0"	7'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	29'-0"	4'-1"	4'-11"	3'-6"	11'-0"
WEIGHT	1202	1162	1414	825	435	667	867	1234	963	843	77	164	204	215	676
4 SPANS 9'x5'															
NUMBER	61	60	73	156	156	180	234	55	40	37	4	78	62	138	138
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7½"	7"	7"	9"	7"	~	15"	~	~	12"	18"	12"	12"
LENGTH	39'-4"	38'-7"	38'-7"	7'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	38'-7"	4'-1"	4'-11"	3'-6"	11'-0"
WEIGHT	1603	1546	1881	825	435	1001	1301	1656	1204	1114	103	213	204	323	1014
5 SPANS 9'x5'															
NUMBER	61	60	73	156	156	240	312	69	48	46	4	98	62	184	184
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7½"	7"	7"	9"	7"	~	15"	~	~	12"	18"	12"	12"
LENGTH	49'-2"	48'-2"	48'-2"	7'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	48'-2"	4'-1"	4'-11"	3'-6"	11'-0"
WEIGHT	2003	1931	2349	825	435	1334	1734	2077	1445	1385	129	267	204	430	1352
6 SPANS 9'x5'															
NUMBER	61	60	73	156	156	300	390	83	56	55	4	118	62	230	230
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7½"	7"	7"	9"	7"	~	15"	~	~	12"	18"	12"	12"
LENGTH	59'-0"	57'-9"	57'-9"	7'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	57'-9"	4'-1"	4'-11"	3'-6"	11'-0"
WEIGHT	2404	2315	2816	825	435	1668	2168	2498	1686	1656	154	322	204	538	1690

9'x6'

MARK	A	B1	B2	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
2 SPANS 9'x6'															
NUMBER	61	60	73	156	156	60	84	27	24	19	4	40	62	46	46
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7½"	7"	7"	9"	6½"	~	18"	~	~	12"	18"	12"	12"
LENGTH	19'-8"	19'-5"	19'-5"	8'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	19'-5"	4'-1"	5'-11"	3'-6"	13'-0"
WEIGHT	802	778	947	930	435	334	467	813	722	572	52	109	245	108	399
3 SPANS 9'x6'															
NUMBER	61	60	73	156	156	120	168	41	32	28	4	60	62	92	92
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7½"	7"	7"	9"	6½"	~	18"	~	~	12"	18"	12"	12"
LENGTH	29'-6"	29'-0"	29'-0"	8'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	29'-0"	4'-1"	5'-11"	3'-6"	13'-0"
WEIGHT	1202	1162	1414	930	435	667	934	1234	963	843	77	164	245	215	799
4 SPANS 9'x6'															
NUMBER	61	60	73	156	156	180	252	55	40	37	4	78	62	138	138
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7½"	7"	7"	9"	6½"	~	18"	~	~	12"	18"	12"	12"
LENGTH	39'-4"	38'-7"	38'-7"	8'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	38'-7"	4'-1"	5'-11"	3'-6"	13'-0"
WEIGHT	1603	1546	1881	930	435	1001	1401	1656	1204	1114	103	213	245	323	1198
5 SPANS 9'x6'															
NUMBER	61	60	73	156	156	240	336	69	48	46	4	98	62	184	184
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7½"	7"	7"	9"	6½"	~	18"	~	~	12"	18"	12"	12"
LENGTH	49'-2"	48'-2"	48'-2"	8'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	48'-2"	4'-1"	5'-11"	3'-6"	13'-0"
WEIGHT	2003	1931	2349	930	435	1334	1868	2077	1445	1385	129	267	245	430	1598
6 SPANS 9'x6'															
NUMBER	61	60	73	156	156	300	420	83	56	55	4	118	62	230	230
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7½"	7	7"	9"	6½"	~	18"	~	~	12"	18"	12"	12"
LENGTH	59'-0"	57'-9"	57'-9"	8'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	57'-9"	4'-1"	5'-11"	3'-6"	13'-0"
WEIGHT	2404	2315	2816	930	435	1668	2335	2498	1686	1656	154	322	245	538	1997

9'x7'

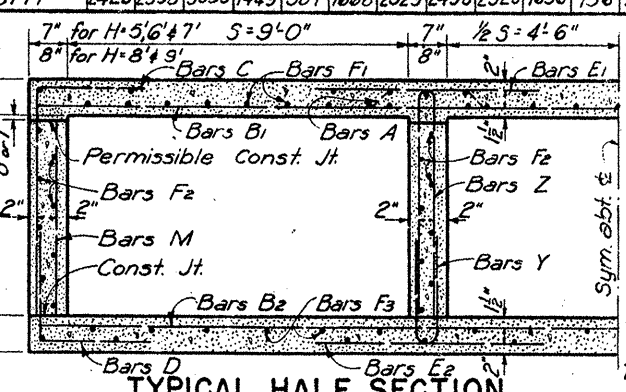
MARK	A	B1	B2	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
2 SPANS 9'x7'															
NUMBER	61	60	73	156	156	60	84	27	30	19	4	40	62	46	46
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7½"	7"	7"	9"	6½"	~	17"	~	~	12"	18"	12"	12"
LENGTH	19'-8"	19'-5"	19'-5"	9'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	19'-5"	4'-1"	6'-11"	3'-6"	15'-0"
WEIGHT	802	778	947	1034	435	334	467	813	903	572	52	109	287	108	461
3 SPANS 9'x7'															
NUMBER	61	60	73	156	156	120	168	41	40	28	4	60	62	92	92
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7½"	7"	7"	9"	6½"	~	17"	~	~	12"	18"	12"	12"
LENGTH	29'-6"	29'-0"	29'-0"	9'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	29'-0"	4'-1"	6'-11"	3'-6"	15'-0"
WEIGHT	1202	1162	1414	1034	435	667	934	1234	1204	843	77	164	287	215	922
4 SPANS 9'x7'															
NUMBER	61	60	73	156	156	180	252	55	50	37	4	78	62	138	138
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7½"	7"	7"	9"	6½"	~	17"	~	~	12"	18"	12"	12"
LENGTH	39'-4"	38'-7"	38'-7"	9'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	38'-7"	4'-1"	6'-11"	3'-6"	15'-0"
WEIGHT	1603	1546	1881	1034	435	1001	1401	1656	1505	1114	103	213	287	323	1383
5 SPANS 9'x7'															
NUMBER	61	60	73	156	156	240	336	69	60	46	4	98	62	184	184
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7½"	7"	7"	9"	6½"	~	17"	~	~	12"	18"	12"	12"
LENGTH	49'-2"	48'-2"	48'-2"	9'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	48'-2	4'-1"	6'-11"	3'-6"	15'-0"
WEIGHT	2003	1931	2349	1034	435	1334	1868	2077	1806	1385	129	267	287	430	1844
6 SPANS 9'x7'															
NUMBER	61	60	73	156	156	300	420	83	70	55	4	118	62	230	230
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7½"	7"	7"	9"	6½"	~	17"	~	~	12"	18"	12"	12"
LENGTH	59'-0"	57'-9"	57'-9"	9'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	57'-9	4'-1"	6'-11"	3'-6"	15'-0"
WEIGHT	2404	2315	2816	1034	435	1668	2335	2498	2107	1656	154	322	287	538	2305

9'x8'

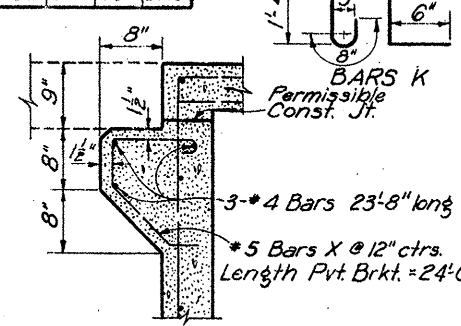
MARK	A	B1	B2	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
2 SPANS 9'x8'															
NUMBER	61	60	78	182	182	60	91	27	30	19	4	42	62	46	46
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7"	6"	6"	9"	6"	~	19"	~	~	12"	18"	12"	12"
LENGTH	19'-11"	19'-8"	19'-8"	10'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	19'-8"	4'-1"	7'-11"	3'-6"	17'-0"
WEIGHT	812	788	1025	1328	507	334	506	813	903	572	53	114	328	108	522
3 SPANS 9'x8'															
NUMBER	61	60	78	182	182	120	182	41	40	28	4	60	62	92	92
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7"	6"	6"	9"	6"	~	19"	~	~	12"	18"	12"	12"
LENGTH	29'-10"	29'-4"	29'-4"	10'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	29'-4"	4'-1"	7'-11"	3'-6"	17'-0"
WEIGHT	1216	1176	1528	1328	507	667	1012	1234	1204	843	78	164	328	215	1045
4 SPANS 9'x8'															
NUMBER	61	60	78	182	182	180	273	55	50	37	4	80	62	138	138
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7"	6"	6"	9"	6"	~	19"	~	~	12"	18"	12"	12"
LENGTH	39'-9"	39'-0"	39'-0"	10'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	39'-0"	4'-1"	7'-11"	3'-6"	17'-0"
WEIGHT	1620	1563	2032	1328	507	1001	1518	1656	1505	1114	104	218	328	323	1567
5 SPANS 9'x8'															
NUMBER	61	60	78	182	182	240	364	69	60	46	4	100	62	184	184
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7"	6"	6"	9"	6"	~	19"	~	~	12"	18"	12"	12"
LENGTH	49'-8"	48'-8"	48'-8"	10'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	48'-8"	4'-1"	7'-11"	3'-6"	17'-0"
WEIGHT	2024	1951	2536	1328	507	1334	2024	2077	1806	1385	130	273	328	430	2090
6 SPANS 9'x8'															
NUMBER	61	60	78	182	182	300	455	83	70	55	4	118	62	230	230
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7"	6"	6"	9"	6"	~	19"	~	~	12"	18"	12"	12"
LENGTH	59'-7"	58'-4"	58'-4"	10'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	58'-4"	4'-1"	7'-11"	3'-6"	17'-0"
WEIGHT	2428	2338	3039	1328	507	1668	2529	2498	2107	1656	156	322	328	538	2612

9'x9'

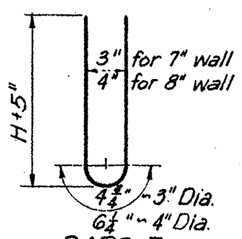
MARK	A	B1	B2	C	D	E1	E2	F1	F2	F3	H	K	M	Y	Z
2 SPANS 9'x9'															
NUMBER	61	60	78	182	182	60	91	27	36	19	4	42	62	46	46
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9'	7"	6"	6"	9"	6"	~	18"	~	~	12"	18"	12"	12"
LENGTH	19'-11"	19'-8"	19'-8"	11'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	19'-8"	4'-1"	8'-11"	3'-6"	19'-0"
WEIGHT	812	788	1025	1449	507	334	506	813	1084	572	53	114	369	108	584
3 SPANS 9'x9'															
NUMBER	61	60	78	182	182	120	182	41	48	28	4	60	62	92	92
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7"	6"	6"	9"	6"	~	18"	~	~	12"	18"	12"	12"
LENGTH	29'-10"	29'-4"	29'-4"	11'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	29'-4"	4'-1"	8'-11"	3'-6"	19'-0"
WEIGHT	1216	1176	1528	1449	507	667	1012	1234	1445	843	78	164	369	215	1168
4 SPANS 9'x9'															
NUMBER	61	60	78	182	182	180	273	55	60	37	4	80	62	138	138
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7"	6"	6"	9"	6"	~	18"	~	~	12"	18"	12"	12"
LENGTH	39'-9"	39'-0"	39'-0"	11'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0	39'-0"	4'-1"	8'-11"	3'-6"	19'-0"
WEIGHT	1620	1563	2032	1449	507	1001	1518	1656	1806	1114	104	218	369	323	1751
5 SPANS 9'x9'															
NUMBER	61	60	78	182	182	240	364	69	72	46	4	100	62	184	184
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7"	6"	6"	9"	6"	~	18"	~	~	12"	18"	12"	12"
LENGTH	49'-8"	48'-8"	48'-8"	11'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	48'-8"	4'-1"	8'-11"	3'-6"	19'-0"
WEIGHT	2024	1951	2536	1449	507	1334	2024	2077	2167	1385	130	273	369	430	2335
6 SPANS 9'x9'															
NUMBER	61	60	78	182	182	300	455	83	84	55	4	118	62	230	230
SIZE	#4	#4	#4	#4	#4	#5	#5	#4	#4	#4	#4	#4	#4	#4	#4
SPACING	9"	9"	7"	6"	6"	9"	6"	~	18"	~	~	12"	18"	12"	12"
LENGTH	59'-7"	58'-4"	58'-4"	11'-11"	4'-2"	5'-4"	5'-4"	45'-0"	45'-0"	45'-0"	58'-4"	4'-1"	8'-11"	3'-6"	19'-0"
WEIGHT	2428	2338	3039	1449	507	1668	2529	2498	2528	1656	156	322	369	538	2919



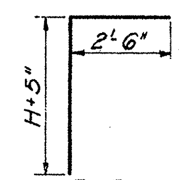
TYPICAL HALF SECTION



PAVEMENT BRACKET
To be used only when called for on plans.



BARS Z



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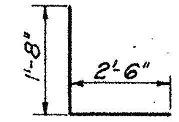
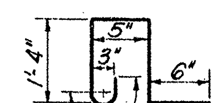


BARS D



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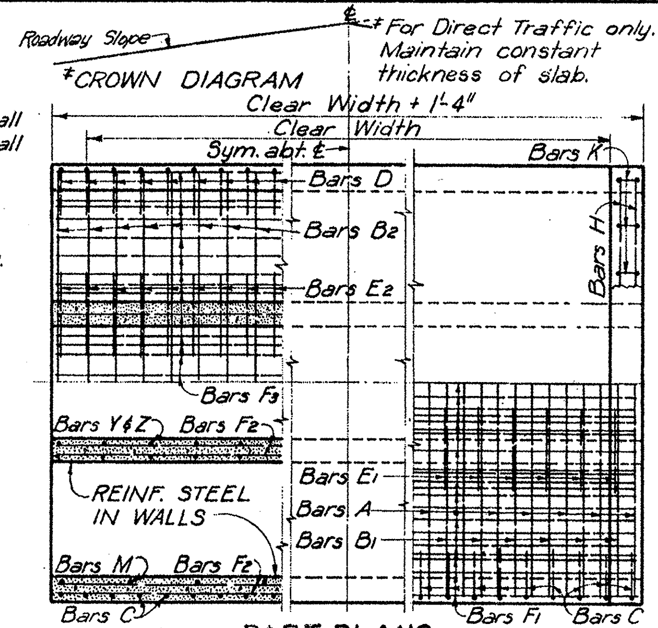
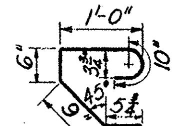
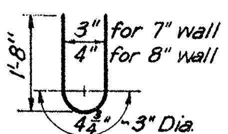


PART PLANS

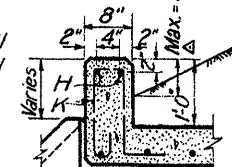
BOTTOM SLAB — TOP SLAB



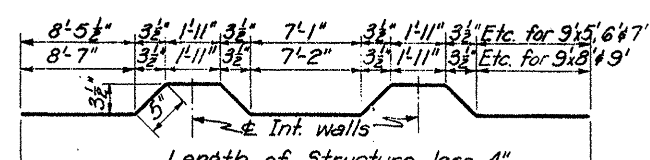
BARS X



BARS Y



CURB SECTION



BARS A

BARREL QUANTITIES FOR 44' CLEAR WIDTH △

CULV. SIZE S H	NO. OF SPANS	LENGTH OF STRUCT.	*BARREL QUANTITES CONC. Cu. Yds.	*BARREL QUANTITES STEEL Lbs.	QUANTITIES P.L.F. BBL. CONC. Cu. Yds.	QUANTITIES P.L.F. BBL. STEEL Lbs.
9'x 5'	2	19'-9"	54.33	7473	1.177	161.02
	3	29'-4"	78.52	10,948	1.700	235.89
	4	38'-11"	102.65	14423	2.222	310.77
	5	48'-6"	126.79	17900	2.744	385.66
	6	58'-1"	150.93	21379	3.266	460.54
9'x 6'	2	19'-9"	57.28	7713	1.242	166.27
	3	29'-4"	82.41	11284	1.786	243.22
	4	38'-11"	107.55	14853	2.330	320.17
	5	48'-6"	132.64	18426	2.873	397.12
	6	58'-1"	157.77	21999	3.417	468.07
9'x 7'	2	19'-9"	60.23	8102	1.307	174.79
	3	29'-4"	86.31	11794	1.872	254.41
	4	38'-11"	112.45	15485	2.438	334.04
	5	48'-6"	138.53	19179	3.003	413.66
	6	58'-1"	164.62	22874	3.568	493.28
9'x 8'	2	20'-0"	67.04	8713	1.457	188.14
	3	29'-8"	95.40	12545	2.072	270.92
	4	39'-4"	123.75	16384	2.687	353.71
	5	49'-0"	152.16	20223	3.303	436.50
	6	58'-8"	180.51	24054	3.918	519.29
9'x 9'	2	20'-0"	70.39	9118	1.531	197.04
	3	29'-8"	99.88	13071	2.171	282.50
	4	39'-4"	129.37	17031	2.811	370.96
	5	49'-0"	158.86	20991	3.451	453.43
	6	58'-8"	188.36	24944	4.091	538.89

* These quantities do not include paving brackets, toe walls or wings.

PV'T. BRKT. QUANT.

2-PV'T BRACKETS 24'-0" Long	
CONC.	STEEL
Cu. Yd.	Lb.
1.19	272

GENERAL NOTES:

Designed for HS20 Loading and maximum fill heights shown.

The bottom edge of the top slab shall be chamfered 3 inches at the entrance. Reinforcing bars shall be adjusted to provide a minimum of 1¼ inches clear cover. Headwall heights will be reduced, if necessary, to provide a maximum of 3 inches projection above the roadway slope. No increase or decrease will be made in plan quantity of concrete or reinforcing steel for this work.

Construction joints shown at the flow line may be raised a maximum of 6 inches at the Contractor's option. Bars M may be cut off or raised, bars C and D may be reversed (D on top) and bars Y and Z may be reversed (Y on top).

All reinforcing steel shall be Grade 60.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

MULTIPLE BOX CULVERTS

SIZES 9'x5', 9'x6', 9'x7', 9'x8' & 9'x9'
DIRECT TRAFFIC TO 2'-0" FILL

MC9-1

Rev. 8-87 (Gen. Note)
Rev. 6-83 Rev. 7-84 Rev. 3-85

DN.: M.D.A.	DRAWING	DATE	FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
CK.DN.: W.H.	Original	JAN. 1958	6	TEXAS				306
DW.: K.M.	Rev. Jan. 1959		STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
CK.DW.: M.D.A.	Rev. Nov. 1964							
TR.: C.W.W.	Rev. Nov. 1967							
CK.TR.: K.M.	△Rev. May 1977		15	BEXAR	2152	2	23	Lp1604

PLAN — NOTE BOOK ___ NO. ___ — SURVEYED ___ PLOTTED ___ ALIGNMENT CHECKED ___ RT. OF WAY CHECKED ___ — BY — DATE

PROFILE — NOTE BOOK ___ NO. ___ — SURVEYED ___ PLOTTED ___ GRADES CHECKED ___ B. M.s NOTED ___ STRUCTURE NOTAT'NS CH'KD ___ — BY — DATE

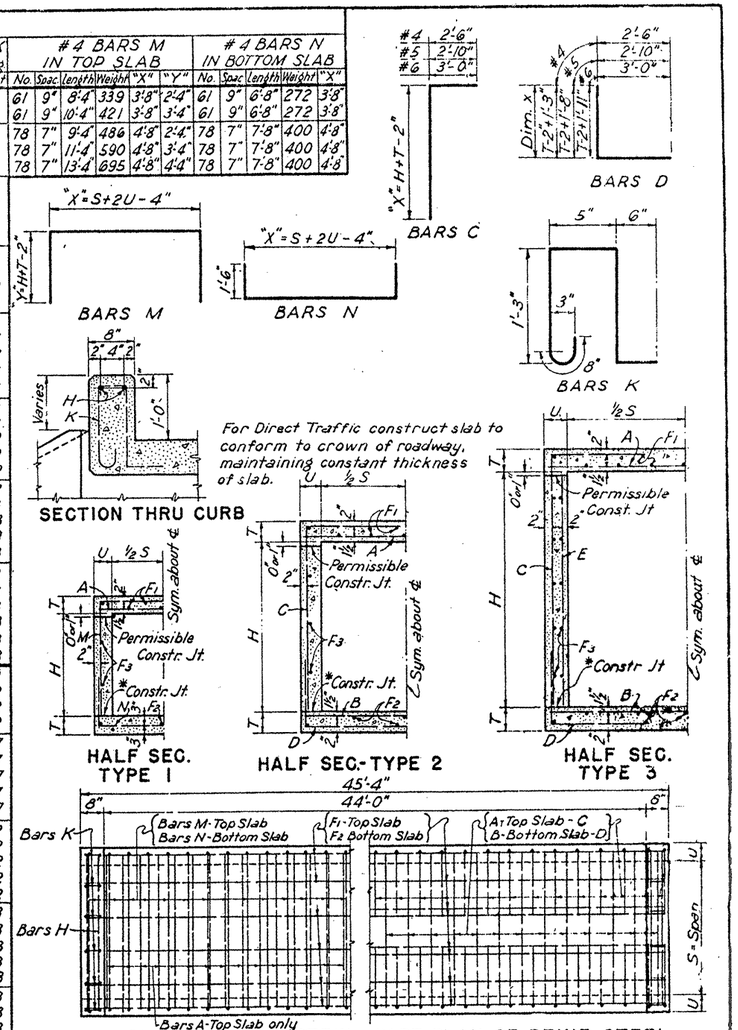
BILLS OF REINFORCING STEEL FOR 44'-0" CLEAR WIDTH

Culvert Size S	Culvert Size H	Type Section	Dimensions T	Dimensions U	Max. Fill	Total Quantities 44' Clear Width Conc.	Total Quantities 44' Clear Width Reinf.	Quantities P.L.F. of Barrel Conc.	Quantities P.L.F. of Barrel Reinf.	Bars A in Top Slab No.	Size	Spac.	Length	Weight	Bars B in Bottom Slab No.	Size	Spac.	Length	Weight	Bars C Walls and Top Corner No.	Size	Spac.	Length	Weight	Dim. X	Bars D in Bottom Corners No.	Size	Spac.	Length	Weight	Dim. X	62-#4 Bars E @ 18" C. to C. Length	Weight	#4 Bars F Length = 45'-1" F1	Spac.	F2	Spac.	F3	Spac.	Total	Weight	Bars H 4-#4 Length	Weight	#4 Bars K @ 12'-3'-11" Lg. No.	Weight	#4 Bars M in Top Slab No.	Spac.	Length	Weight	"X"	"Y"	#4 Bars N in Bottom Slab No.	Spac.	Length	Weight	"X"
3	2	1	6"	6"	14'	10.27	1,259	0.222	26.92	78	#4	7"	3'-8"	191																									7	12½	3	20½	4	10"	14	421	3'-9"	10	10	26	61	9"	8'-4"	339	3'-8"	2'-4"	61	9"	6'-8"	272	3'-8"
3	3	1	6"	6"	14'	11.95	1,341	0.259	28.70	78	#4	7"	3'-8"	191																									7	12½	3	20½	4	14"	14	421	3'-9"	10	10	26	61	9"	10'-4"	421	3'-8"	3'-4"	61	9"	6'-8"	272	3'-8"
4	2	1	6"	6"	12'	12.00	1,726	0.259	37.06	91	#4	6"	4'-8"	284																									9	12½	4	18½	4	10"	17	512	4'-9"	13	12	31	78	7"	9'-4"	486	4'-8"	2'-4"	78	7"	7'-8"	400	4'-8"
4	3	1	6"	6"	12'	13.68	1,830	0.296	39.35	91	#4	6"	4'-8"	284																									9	12½	4	18½	4	14"	17	512	4'-9"	13	12	31	78	7"	11'-4"	590	4'-8"	3'-4"	78	7"	7'-8"	400	4'-8"
4	4	1	6"	6"	12'	15.36	1,995	0.333	42.98	91	#4	6"	4'-8"	284																									9	12½	4	18½	6	15"	19	572	4'-9"	13	12	31	78	7"	13'-4"	695	4'-8"	4'-4"	78	7"	7'-8"	400	4'-8"
5	2	2	6"	6"	8'	13.73	2,086	0.296	44.87	68	#5	8"	5'-8"	402	58	#4	9½	5'-8"	220	136	#4	8"	4'-10"	439	2'-4"	136	#4	8"	4'-1"	371	1'-7"			9	12½	7	18½	4	10"	20	602	5'-9"	15	14	37																		
5	3	2	6"	6"	8'	15.41	2,177	0.333	46.87	68	#5	8"	5'-8"	402	58	#4	9½	5'-8"	220	136	#4	8"	5'-10"	530	3'-4"	136	#4	8"	4'-1"	371	1'-7"			9	12½	7	18½	4	14"	20	602	5'-9"	15	14	37																		
5	4	2	6"	6"	8'	17.09	2,328	0.370	50.21	68	#5	8"	5'-8"	402	58	#4	9½	5'-8"	220	136	#4	8"	6'-10"	620	4'-4"	136	#4	8"	4'-1"	371	1'-7"			9	12½	7	18½	6	15"	22	663	5'-9"	15	14	37																		
5	5	3	6"	7"	8'	20.45	2,942	0.444	63.66	68	#5	8"	5'-10"	413	58	#4	9½	5'-10"	226	136	#4	8"	7'-10"	711	5'-4"	136	#4	8"	4'-1"	371	1'-7"	4'-11"	204	9	12½	7	18½	16	13"	32	964	5'-11"	16	14	37																
6	3	2	6"	6"	8'	17.14	2,726	0.370	58.70	78	#5	7"	6'-8"	543	78	#4	7"	6'-8"	347	168	#4	6¾"	5'-10"	655	3'-4"	168	#4	6¾"	4'-1"	458	1'-7"			10	12½	8	18½	4	14"	22	663	6'-9"	18	16	42																		
6	4	2	6"	6"	8'	18.81	2,898	0.407	62.50	78	#5	7"	6'-8"	543	78	#4	7"	6'-8"	347	168	#4	6¾"	6'-10"	767	4'-4"	168	#4	6¾"	4'-1"	458	1'-7"			10	12½	8	18½	6	15"	24	723	6'-9"	18	16	42																		
6	5	3	6"	7"	8'	22.13	3,538	0.481	76.53	78	#5	7"	6'-10"	556	78	#4	7"	6'-10"	356	168	#4	6¾"	7'-10"	880	5'-4"	168	#4	6¾"	4'-1"	458	1'-7"	4'-11"	204	10	12½	8	18½	16	13"	34	1,024	6'-11"	18	16	42																
6	6	3	6"	7"	8'	24.14	3,691	0.525	79.88	78	#5	7"	6'-10"	556	78	#4	7"	6'-10"	356	168	#4	6¾"	8'-10"	992	6'-4"	168	#4	6¾"	4'-1"	458	1'-7"	5'-11"	245	10	12½	8	18½	16	16"	34	1,024	6'-11"	18	16	42																
7	3	2	6½"	6"	6'	19.98	2,914	0.432	62.69	78	#5	7"	7'-8"	624	91	#4	6"	7'-8"	466	156	#4	7"	5'-10"	608	3'-4"	156	#4	7"	4'-1"	425	1'-7"			11	12½	9	18½	4	14"	24	723	7'-9"	21	18	47																		
7	4	2	6½"	6"	6'	21.66	3,078	0.469	66.32	78	#5	7"	7'-8"	624	91	#4	6"	7'-8"	466	156	#4	7"	6'-10"	712	4'-4"	156	#4	7"	4'-1"	425	1'-7"			11	12½	9	18½	6	15"	26	783	7'-9"	21	18	47																		
7	5	3	6½"	7"	6'	25.05	3,551	0.544	76.76	78	#5	7"	7'-10"	637	91	#4	6"	7'-10"	476	136	#4	8"	7'-10"	711	5'-4"	136	#4	8"	4'-1"	371	1'-7"	4'-11"	204	11	12½	9	18½	16	14"	36	1,084	7'-11"	21	18	47																
7	6	3	6½"	7"	6'	27.01	3,683	0.587	79.65	78	#5	7"	7'-10"	637	91	#4	6"	7'-10"	476	136	#4	8"	8'-10"	802	6'-4"	136	#4	8"	4'-1"	371	1'-7"	5'-11"	245	11	12½	9	18½	16	16"	36	1,084	7'-11"	21	18	47																
7	7	3	6½"	7"	6'	28.97	3,936	0.630	85.22	78	#5	7"	7'-10"	637	91	#4	6"	7'-10"	476	136	#4	8"	9'-10"	893	7'-4"	136	#4	8"	4'-1"	371	1'-7"	6'-11"	287	11	12½	9	18½	20	15"	40	1,204	7'-11"	21	18	47																
8	4	2	6½"	6"	6'	23.53	3,564	0.509	76.92	78	#5	7"	8'-8"	705	68	#5	8"	8'-8"	615	182	#4	6"	6'-10"	830	4'-4"	182	#4	6"	4'-1"	496	1'-7"			12	12½	10	18½	6	14"	28	843	8'-9"	23	20	52																		
8	5	3	6½"	7"	6'	26.92	4,216	0.584	91.22	78	#5	7"	8'-10"	718	68	#5	8"	8'-10"	626	182	#4	6"	7'-10"	952	5'-4"	182	#4	6"	4'-1"	496	1'-7"	4'-11"	204	12	12½	10	18½	16	14"	38	1144	8'-11"	24	20	52																
8	6	3	6½"	7"	6'	28.88	4,379	0.627	94.78	78	#5	7"	8'-10"	718	68	#5	8"	8'-10"	626	182	#4	6"	8'-10"	1,074	6'-4"	182	#4	6"	4'-1"	496	1'-7"	5'-11"	245	12	12½	10	18½	16	16"	38	1144	8'-11"	24	20	52																
8	7	3	6½"	7"	6'	30.84	4,663	0.670	101.02	78	#5	7"	8'-10"	718	68	#5	8"	8'-10"	626	182	#4	6"	9'-10"	1,195	7'-4"	182	#4	6"	4'-1"	496	1'-7"	6'-11"	287	12	12½	10	18½	20	15"	42	1265	8'-11"	24	20	52																
8	8	3	6½"	8"	6'	35.35	5,011	0.770	108.74	78	#5	7"	9'-0"	732	68	#5	8"	9'-0"	638	198	#4	5½"	10'-10"	1,432	8'-4"	198	#4	5½"	4'-1"	540	1'-7"	7'-11"	328	12	12½	10	18½	20	17"	42	1265	9'-1"	24	20	52																
9	5	3	7"	7"	6'	30.21	5,028	0.655	108.99	64	#6	8½"	9'-10"	945	84	#5	6½"	9'-10"	861	128	#5	8½"	8'-3"	1,101	5'-5"	128	#5	8½"	4'-11"	657	2'-1"	4'-11"	204	13	12½	10	18½	16	14"	39	1175	9'-11"	27	22	58																
9	6	3	7"	7"	6'	32.17	5,203	0.699	112.83	64	#6	8½"	9'-10"	945	84	#5	6½"	9'-10"	861	128	#5	8½"	9'-3"	1,235	6'-5"	128	#5	8½"	4'-11"	657	2'-1"	5'-11"	245	13	12½	10	18½	16	16"	39	1175	9'-11"	27	22	58																
9	7	3	7"	7"	6'	34.13	5,498	0.742	119.33	64	#6	8½"	9'-10"	945	84	#5	6½"	9'-10"	861	128	#5	8½"	10'-3"	1,368	7'-5"	128	#5	8½"	4'-11"	657	2'-1"	6'-11"	287	13	12½	10	18½	20	15"	43	1295	9'-11"	27	22	58																
9	8	3	7"	8"	6'	38.66	5,949	0.842	128.47	61	#6	9"	10'-0"	916	61	#6	9"	10'-0"	916	122	#5	9"	11'-3"	1,432	8'-5"	122	#6	9"	5'-4"	977	2'-4"	7'-11"	328	13	12½	10	18½	20	17"	43	1295	10'-1"	27	22	58																
9	9	3	7"	8"	6'	40.90	6,237	0.891	134.81	61	#6	9"	10'-0"	916	61	#6	9"	10'-0"	916	122	#5	9"	12'-3"	1,559	9'-5"	122	#6	9"	5'-4"	977	2'-4"	8'-11"	369	13	12½	10	18½	24	16½"	47	1415	10'-1"	27	22	58																
10	5	3	7"	7"	6'	32.22	5,886	0.699	127.67	68	#6	8"	10'-10"	1,106	68	#6	8"	10'-10"	1,106	156	#5	7"	8'-3"	1,342	5'-5"	156	#5	7"	4'-11"	801	2'-1"	4'-11"	204	14	12½	11	18½	16	14"	41	1235	10'-11"	29	24	63																
10	6	3	7"	7"	6'	34.18	6,090	0.742	132.13	68	#6	8"	10'-10"	1,106	68	#6	8"	10'-10"	1,106	156	#5	7"	9'-3"	1,505	6'-5"	156	#5	7"	4'-11"	801	2'-1"	5'-11"	245	14	12½	11	18½	16	16"	41	1235	10'-11"	29	24	63																
10	7	3	7"	7"	6'	36.14	6,415	0.785	139.27	68	#6	8"	10'-10"	1,106	68	#6	8"	10'-10"	1,106	156	#5	7"	10'-3"	1,668	7'-5"	156	#5	7"	4'-11"	801	2'-1"	6'-11"	287	14	12½	11	18½	20	15"	45	1355	10'-11"	29	24	63																
10	8	3	7"	8"	6'	40.67	7,070	0.885	153.15	73	#6	7½"	11'-0"	1,206	73	#6	7½"	11'-0"	1,206	146	#5	7½"	11'-3"	1,713	8'-5"	146	#6	7½"	5'-4"	1,169	2'-4"	7'-11"	328	14	12½	11	18½	20	17"	45	1355	11'-1"	30	24	63																
10	9	3	7"	8"	6'	42.91	7,384	0.934	160.05	73	#6	7½"	11'-0"	1,206	73	#6	7½"	11'-0"	1,206	146	#5	7½"	12'-3"	1,865	9'-5"	146	#6	7½"	5'-4"	1,169	2'-4"	8'-11"	369	14	12½	11	18½	24	16½"	49	1476	11'-1"	30	24	63																
10	10	3	7"	8"	6'	45.15	7,699	0.984	166.95	73	#6	7½"	11'-0"	1,206	73	#6	7½"	11'-0"	1,206	146	#5	7½"	13'-3"	2,018	10'-5"	146	#6	7½"	5'-4"	1,169	2'-4"	9'-11"	411	14	12½	11	18½	28	16"	53	1596	11'-1"	30	24	63																
6	3	2	6"	6"	10'	17.14	2,813	0.370	60.70	68	#5	8"	6'-8"	473	68	#5	8"	6'-8"	473	182	#4	6"	5'-10"	709	3'-4"	182	#4	6"	4'-1"	496	1'-7"			8	18½	8	18½	4	14"	20	602	6'-9"	18	16	42																		
6	4	2	6"	6"	10'	18.81	2,995	0.407	64.72	68	#5	8"	6'-8"	473	68	#5	8"	6'-8"	473	182	#4	6"	6'-10"	830	4'-4"	182	#4	6"	4'-1"	496	1'-7"			8	18½	8	18½	6	15"	22	663	6'-9"	18	16	42																		
6	5	3	6"	7"	10'	22.13	3,644	0.481	78.95	68	#5	8"	6'-10"	484	68	#5	8"	6'-10"	484	182	#4	6"	7'-10"	952	5'-4"	182	#4	6"	4'-1"	496	1'-7"	4'-11"	204	8	18½	8	18½	16	14"	32	964	6'-11"	18	16	42																
6	6	3	6"	7"	10'	24.14	3,945	0.525	85.65	68	#5	8"	6'-10"	484	68	#5	8"	6'-10"	484	198	#4	5½"	8'-10"	1,168	6'-4"	198	#4	5½"	4'-1"	540	1'-7"	5'-11"	245	8	18½	8	18½	16	16"	32	964	6'-11"	18	16	42																
7	3	2	6½"	6"	8'	19.98	3,130	0.432	67.58	68	#5	8"	7'-8"	544	68	#5	8"	7'-8"	544	198	#4	5½"	5'-10"	771	3'-4"	198	#4	5½"	4'-1"	540	1'-7"			9	18½	9	18½	4	14"	22	663	7'-9"	21	18	47																		
7	4	2	6½"	6"	8'	21.66	3,103	0.469	68.94	68	#5	8"	7'-8"	544	68	#5	8"	7'-8"	544	168	#4	6½"	6'-10"	766	4'-4"	168	#4	6½"	4'-1"	458	1'-7"			9	18½	9	18½	6	14"	24	723	7'-9"	21	18	47																		
7	5	3	6½"	7"	8'	25.05	3,743	0.544	80.97	68	#5	8"	7'-10"	555	68	#5	8"	7'-10"	555	168	#4	6½"	7'-10"	879	5'-4"	168	#4	6½"	4'-1"	458	1'-7"	4'-11"	204	9	18½	9	18½	16	14"	34	1024	7'-11"	21	18	47																
7	6	3	6½"	7"	8'	27.01	4,099	0.587	88.61	73	#5	7½"	7'-10"	596	73	#5	7½"	7'-10"	596	182	#4	6"	8'-10"	1,074	6'-4"	182	#4	6"	4'-1"	496	1'-7"	5'-11"	245	9	18½	9	18½	16	16"	34	1024	7'-11"	21	18	47																
7	7	3	6½"	7"	8'	28.97	4,531	0.630	98.23	73	#5	7½"	7'-10"	596	73	#5	7½"	7'-10"	596	198	#4	5½"	9'-10"	1,300	7'-4"	198	#4	5½"	4'-1"	540	1'-7"	6'-11"	282	9	18½	9	18½	20	15"	38	1144	7'-11"	21	18	47																
8	4	2	7½"	6"	10'	26.05	4,483	0.565	97.05	68	#6	8"	8'-8"	886	68	#6	8"	8'-8"	886	146	#5	7½"	7'-3"	1,104	4'-5"	146	#5	7½"	4'-1"	749	2'-1"			10	18½	10	18½	6	14½"	26	783	8'-9"	23	20	52																		
8	5	3	7½"	7"	10'	29.49	5,036	0.640	109.43	68	#6	8"	8'-10"	902	68	#6	8"	8'-10"	902	136	#5	8"	8'-3"	1,170	5'-5"	136	#5	8"	4'-11"	698	2'-1"	4'-11"	204	10	18½	10	18½	16	14"	36	1084	8'-11"	24	20	52																
8	6	3	7½"	7"	10'	31.44	5,219	0.684	113.45	68	#6	8"	8'-10"	902	68	#6	8"	8'-10"	902	136	#5	8"	9'-3"	1,312	6'-5"	136	#5	8"	4'-11"	698	2'-1"	5'-11"	245	10	18½	10	18½	16	16½"	36	1084	8'-11"	24	20	52																
8	7	3	7½"	7"	10'	33.40	5,682	0.727	123.30	68	#6	8"	8'-10"	902	68	#6	8"	8'-10"	902	146	#5	7½"	10'-3"	1,561	7'-5"	146	#5	7½"	4'-11"	749	2'-1"	6'-11"	287	10	18½	10	18½	20	16"	40	1205	8'-11"	24	20	52																
8	8	3	7½"	8"	10'	37.96	6,078	0.827	132.15	68	#6	8"	9'-0"	919	68	#6	8"	9'-0"	919	156	#5	7"	11'-3"	1,830	8'-5"	156	#5	7"	4'-11"	801	2'-1"	7'-11"	328	10	18½	10	18½	20	18"	40	1205	9'-1"	24	20	52																
9	5	3	8"	7"	10'	33.06	6,013	0.718	130.39	78	#6	7"	9'-10"	1,152	78	#6	7"	9'-10"	1,152	168	#5	6½"	8'-4"	1,460	5'-6"	168	#5	6½"	5'-0"	876	2'-2"	4'-11"	204	10	18½	10	18½	16	14"	36	1084	9'-11"	27	22	58																
9	6	3	8"	7"	10'	35.02	6,229	0.761	135.13	78	#6	7"	9'-10"	1,152	78	#6	7"	9'-10"	1,152	168	#5	6½"	9'-4"	1,635	6'-6"	168	#5	6½"	5'-0"	876	2'-2"	5'-11"	245	10	18½	10	18½	16	16½"	36	1084	9'-11"	27	22	58																
9	7	3	8"	7"	10'	36.97	6,743	0.905	146.43	84	#6	6½"	9'-10"	1,240	84	#6	6½"	9'-10"	1,240	168	#5	6½"	10'-4"	1,810	7'-6"	168	#5	6½"	5'-0"	876	2'-2"	6'-11"	287	10	18½	10	18½	20	16"	40	1205	9'-11"	27	22	58																
9	8	3	8"	8"	10'	41.55	7,003	0.905	152.12	84	#6	6½"	10'-0"	1,262	84	#6	6½"	10'-0"	1,262	168	#5	6½"	11'-4"	1,985	8'-6"	168	#5	6½"	5'-0"	876	2'-2"	7'-11"	328	10	18½	10	18½	20	18"	40	1205	10'-1"	27	22	58																
9	9	3	8"	8"	10'	43.79	7,593	0.955	165.09	84	#6	6½"	10'-0"	1,262	84	#6	6½"	10'-0"	1,262	182	#5	6"	12'-4"	2,341	9'-6"	182	#5	6"	5'-0"	949	2'-2"	8'-11"	369	10	18½	10	18½	24	17"	44	1325	10'-1"	27	22	58																
10	5	3	8½"	7"	10'	36.90	7,117	0.802	154.99	64	#7	8½"	10'-10"	1,417	64	#7	8½"	10'-10"	1,417	136	#6	8"	8'-6"	1,736	5'-6"	136	#6	8"	5'-5"	1,107	2'-5"	4'-11"	204	11	18½	11	18½	16	14"	38	1144	10'-11"	29	24	63																
10	6	3	8½"	7"	10'	38.86	7,539	0.845	164.30	68	#7	8"	10'-10"	1,505	68	#7	8"	10'-10"	1,505	130	#6	8"	9'-6"	1,941	6'-6"	130	#6	8"	5'-5"	1,107	2'-5"	5'-11"	245	11	18½	11	18½	16	16½"	38	1144	10'-11"	29	24	63																
10	7	3	8½"	7"	10'	40.82	7,906	0.888	172.36	68	#7	8"	10'-10"	1,505	68	#7	8"	10'-10"	1,505	136	#6	8"	10'-6"	2,145	7'-6"	136	#6	8"	5'-5"	1,107	2'-5"	6'-11"	287	11	18½	11	18½	20	16"	42	1265	10'-11"	29	24	63																
10	8	3	8½"	8"	10'	45.43	8,200	0.990	178.80	68	#7	8"	11'-0"	1,529	68	#7	8"	11'-0"	1,529	136	#6	8"	11'-6"	2,349	8'-6"	136	#6	8"	5'-5"	1,107	2'-5"	7'-11"	328	11	18½	11	18½	20	18"	42	1265	11'-1"	30	24	63																
10	9	3	8½"	8"	10'	47.67	8,835	1.039	192.24	68	#7	8"	11'-0"	1,529	68	#7	8"	11'-0"	1,529	146	#6	7½"	12'-6"	2,741	9'-6"	146	#6	7½"	5'-5"	1,189	2'-5"	8'-11"	369	11	18½	11	18½	24	17"	46	1385	11'-1"	30	24	63																
10	10	3	8½"	8"	10'	49.90	9,725	1.088	211.62	73	#7	7½"	11'-0"	1,641	73	#7	7½"	11'-0"	1,641	156	#6	7"	13'-6"	3,163	10'-6"	156	#6	7"	5'-5"	1,269	2'-5"	9'-11"	411	11	18½	11	18½	28	16"	50	1506	11'-1"	30	24	63																

SC-NA

SC-NB

SC-NC



△ GENERAL NOTES:

Designed for HS 20 Loading and maximum fill heights shown.

The bottom edge of the top slab shall be chamfered 3 inches at the entrance. Reinforcing bars shall be adjusted to provide a minimum of 1¼ inches clear cover. Headwall heights will be reduced, if necessary, to provide a maximum of 3 inches projection above the roadway slope. No increase or decrease will be made in plan quantities of concrete or reinforcing steel for this work.

Construction joints shown at the flow line may be raised a maximum of 6 inches at the Contractor's option. Bars E may be cut off or raised. Bars M and N may be reversed and bars C and D may be reversed except where bar size is different, in which case bars C may be cut off and bars D extended to provide 30 diameter lap with bar C.

All reinforcing steel shall be Grade 60.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

SINGLE CULVERTS - NORMAL

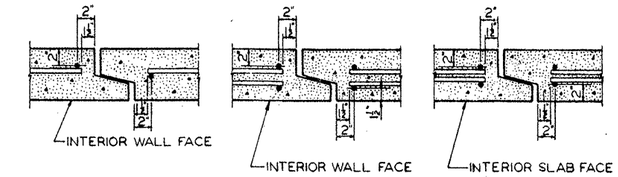
SC-NA SC-NB SC-NC

DN. W.H.	DRAWING	DATE	FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
CK. DN. R.M.M.	ORIGINAL	JAN. 1958	6	TEXAS		307
DW L.B.A.	Rev. Jan. 1959					
CK. DW. W.H.	Rev. Nov. 1964		STATE DIST. NO.	COUNTY	CONTROL NO. / SECTION NO. / JOB NO.	HIGHWAY NO.
TR. O.C.H.	Rev. Nov. 1967		15	BEXAR	2452 / 2 / 23	LP/64
CK. TR. R.M.M.	△ Rev. May 1977					

Rev 8-87 (Gen. Note)

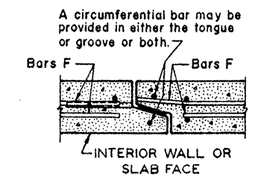
BILL OF REINFORCING STEEL FOR L=8'

CULV. SIZE S	CULV. SIZE H	TYPE SECT.	DIMENSIONS T	DIMENSIONS U	MAX. FILL	TOTAL QUANTITIES FOR L=8' CONC C.Y.	TOTAL QUANTITIES FOR L=8' REINF LBS.	QUANTITIES P.L.F. OF BARREL CONC C.Y.	QUANTITIES P.L.F. OF BARREL REINF LBS	BARS A TOP SLAB NO.	BARS A TOP SLAB SIZE	BARS A TOP SLAB SPA.	BARS A TOP SLAB LG.	BARS A TOP SLAB WT.	BARS B BOTTOM SLAB NO.	BARS B BOTTOM SLAB SIZE	BARS B BOTTOM SLAB SPA.	BARS B BOTTOM SLAB LG.	BARS B BOTTOM SLAB WT.	BARS C NO.	BARS C SIZE	BARS C SPA.	BARS C LG.	BARS C WT.	#4 BARS D @18"± C. TO C. NO.	#4 BARS D LG.	#4 BARS D WT.	#4 BARS F @ 18" MAX. LENGTH L-7" F1	SPA.	F2	SPA.	F3	SPA.	TOTAL	WT.	LIFT. WEIGHT L=8' LBS.
3	2	1	6"	6"	14'	1.778	193	.2222	24.13	9	#4	12"	3'-6"	21						12	#4	8½"	13'-6"	108				3	14"	8	14"	2	15"	13	64	7,330
	3	1	6"	6"	14'	2.074	230	.2592	28.88	9	#4	11½"	3'-6"	21						13	#4	7½"	15'-6"	135				3	14"	8	14"	4	14"	15	74	8,560
4	2	1	6"	6"	12'	2.074	295	.2592	36.88	8	#5	14"	4'-6"	38						11	#5	9"	15'-6"	178				4	18"	10	18"	2	15"	16	79	8,600
	3	1	6"	6"	12'	2.370	346	.2963	43.75	8	#5	12"	4'-6"	38						12	#5	8"	17'-6"	219				4	18"	10	18"	4	14"	18	89	9,840
	4	1	6"	6"	12'	2.667	395	.3333	49.38	9	#5	12"	4'-6"	42						13	#5	7½"	19'-6"	264				4	18"	10	18"	4	18"	18	89	11,070
5	2	2	6"	6"	8'	2.370	385	.2963	48.25	10	#5	10"	5'-6"	57	11	#5	9"	5'-6"	63	9	#5	11"	17'-8"	166				8	17"	10	17"	2	15"	20	99	9,860
	3	2	6"	6"	8'	2.667	426	.3333	53.25	11	#5	9"	5'-6"	63	12	#5	8½"	5'-6"	69	9	#5	12"	19'-8"	185				8	17"	10	17"	4	14"	22	109	11,100
	4	2	6"	6"	8'	2.963	444	.3704	57.00	11	#5	8½"	5'-6"	63	12	#5	7½"	5'-6"	69	9	#5	12"	21'-8"	203				8	17"	10	17"	4	18"	22	109	12,310
	5	3	6"	7"	8'	3.556	548	.4445	68.50	11	#5	9"	5'-8"	65	12	#5	8"	5'-8"	71	8	#5	13"	24'-0"	200	12	5'-6"	44	10	17"	12	17"	12	18"	34	168	14,780
6	3	2	6"	6"	8'	2.963	568	.3704	71.00	14	#5	7"	6'-6"	95	14	#5	7"	6'-6"	95	11	#5	9"	21'-8"	249				10	15"	12	15"	4	14"	26	129	12,390
	4	2	6"	6"	8'	3.259	605	.4074	75.63	15	#5	6½"	6'-6"	102	15	#5	6½"	6'-6"	102	11	#5	9½"	23'-8"	272				10	15"	12	15"	4	18"	26	129	13,620
	5	3	6"	7"	8'	3.852	684	.4815	85.50	14	#5	7"	6'-8"	97	15	#5	6½"	6'-8"	104	10	#5	10"	26'-0"	271	12	5'-6"	44	10	16"	12	16"	12	18"	34	168	16,070
	6	3	6"	7"	8'	4.198	746	.5248	93.25	15	#5	6½"	6'-8"	102	16	#5	6"	6'-8"	111	10	#5	10"	28'-0"	292	12	6'-6"	52	10	16"	12	16"	16	16"	38	189	17,520
7	3	2	6½"	6"	6'	3.457	746	.4321	93.25	11	#6	9"	7'-6"	124	12	#6	8"	7'-6"	135	10	#6	10"	23'-10"	358				10	18"	12	18"	4	14"	26	129	14,520
	4	2	6½"	6"	6'	3.753	778	.4691	97.25	12	#6	8"	7'-6"	135	13	#6	7½"	7'-6"	146	9	#6	11"	25'-10"	349				12	18"	14	18"	4	18"	30	148	15,740
	5	3	6½"	7"	6'	4.350	879	.5438	109.88	11	#6	9"	7'-8"	127	12	#6	8	7'-8"	138	9	#6	11½"	28'-2"	381	12	5'-6"	44	12	17"	14	17"	12	18"	38	189	18,220
	6	3	6½"	7"	6'	4.695	956	.5869	119.50	12	#6	8½"	7'-8"	138	13	#6	8½"	7'-8"	150	9	#6	12"	30'-2"	408	12	6'-6"	52	12	17"	14	17"	16	16"	42	208	19,670
	7	3	6½"	7"	6'	5.041	1011	.6301	126.38	12	#6	8½"	7'-8"	138	13	#6	7½"	7'-8"	150	9	#6	11½"	32'-2"	435	12	7'-6"	60	12	17"	14	17"	20	15"	46	228	21,110
8	4	2	6½"	6"	6'	4.074	979	.5093	122.38	15	#6	6½"	8'-6"	192	14	#6	7"	8'-6"	179	11	#6	9"	27'-10"	460				12	17"	14	17"	4	18"	30	148	17,180
	5	3	6½"	7"	6'	4.671	1050	.5838	131.25	14	#6	7"	8'-8"	182	14	#6	7"	8'-8"	182	10	#6	10"	30'-2"	453	12	5'-6"	44	12	17"	14	17"	12	18"	38	189	19,640
	6	3	6½"	7"	6'	5.017	1107	.6271	138.38	14	#6	7"	8'-8"	182	14	#6	7"	8'-8"	182	10	#6	10"	32'-2"	483	12	6'-6"	52	12	17"	14	17"	16	16"	42	208	21,080
	7	3	6½"	7"	6'	5.362	1178	.6703	147.25	14	#6	7"	8'-8"	182	15	#6	6½"	8'-8"	195	10	#6	10"	34'-2"	513	12	7'-6"	60	12	17"	14	17"	20	15"	46	228	22,530
	8	3	6½"	8"	6'	6.157	1202	.7696	150.25	13	#6	7½"	8'-10"	172	14	#6	7"	8'-10"	186	10	#6	10½"	36'-6"	548	12	8'-6"	68	12	18"	14	18"	20	18"	46	228	25,770
9	5	3	7"	7"	6'	5.242	1222	.6553	152.75	15	#6	6½"	9'-8"	218	15	#6	6½"	9'-8"	218	11	#6	9"	32'-4"	534	12	5'-6"	44	14	17"	16	17"	12	18"	42	208	22,070
	6	3	7"	7"	6'	5.588	1297	.6985	162.13	16	#6	6"	9'-8"	232	15	#6	6½"	9'-8"	218	11	#6	9"	34'-4"	567	12	6'-6"	52	14	17"	16	17"	16	16"	46	228	23,530
	7	3	7"	7"	6'	5.934	1372	.7417	171.50	16	#6	6"	9'-8"	232	16	#6	6"	9'-8"	232	11	#6	9"	36'-4"	600	12	7'-6"	60	14	17"	16	17"	20	15"	50	248	24,980
	8	3	7"	8"	6'	6.733	1399	.8416	174.88	15	#6	6½"	9'-10"	222	15	#6	6½"	9'-10"	222	11	#6	9½"	38'-8"	639	12	8'-6"	68	14	17"	16	17"	20	18"	50	248	28,230
	9	3	7"	8"	6'	7.128	1460	.8909	182.50	15	#6	6½"	9'-10"	222	15	#6	6½"	9'-10"	222	11	#6	9"	40'-8"	672	12	9'-6"	76	14	17"	16	17"	24	17"	54	268	29,880
10	5	3	7"	7"	6'	5.588	1470	.6985	183.75	17	#6	5½"	10'-8"	272	16	#6	6"	10'-8"	256	13	#6	7½"	34'-4"	670	12	5'-6"	44	16	16"	18	16"	12	18"	46	228	23,650
	6	3	7"	7"	6'	5.934	1537	.7417	192.13	17	#6	5½"	10'-8"	272	16	#6	6"	10'-8"	256	13	#6	7½"	36'-4"	709	12	6'-6"	52	16	16"	18	16"	16	16"	50	248	25,090
	7	3	7"	7"	6'	6.279	1604	.7849	200.50	17	#6	5½"	10'-8"	272	17	#6	5½"	10'-8"	256	13	#6	7½"	38'-4"	748	12	7'-6"	60	16	16"	18	16"	20	15"	54	268	26,540
	8	3	7"	8"	6'	7.078	1623	.8848	202.88	17	#6	5½"	10'-10"	277	17	#6	5½"	10'-10"	277	12	#6	8"	40'-8"	733	12	8'-6"	68	16	16"	18	16"	20	18"	54	268	29,790
	9	3	7"	8"	6'	7.473	1686	.9342	210.75	17	#6	5½"	10'-10"	277	17	#6	5½"	10'-10"	277	12	#6	8"	42'-8"	769	12	9'-6"	76	16	16"	18	16"	24	17"	58	287	31,430
	10	3	7"	8"	6'	7.868	1817	.9835	227.13	17	#6	5½"	10'-10"	277	17	#6	5½"	10'-10"	277	13	#6	7½"	44'-8"	872	12	10'-6"	84	16	16"	18	16"	28	16"	62	307	33,120



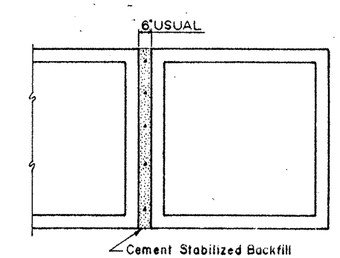
SINGLE MAT PLACEMENT

DOUBLE MAT PLACEMENT

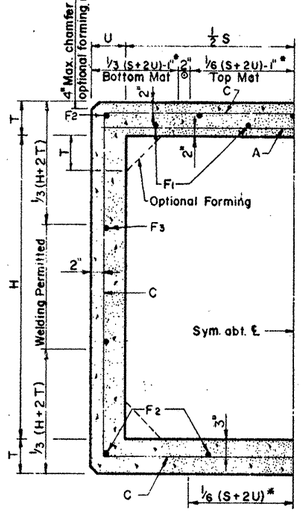


STEEL SUPPORT DETAIL

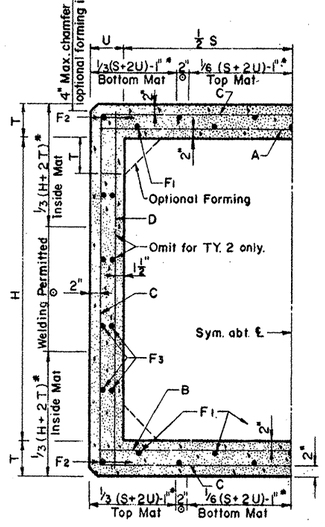
NOTE: As many Bars F as necessary may be extended to end of box to support steel during manufacture. Bars may be slightly bent to clear slope on groove lip as shown in detail. Alternatively the steel may be supported by bar extensions welded to Bars F.



MULTIPLE UNIT PLACEMENT



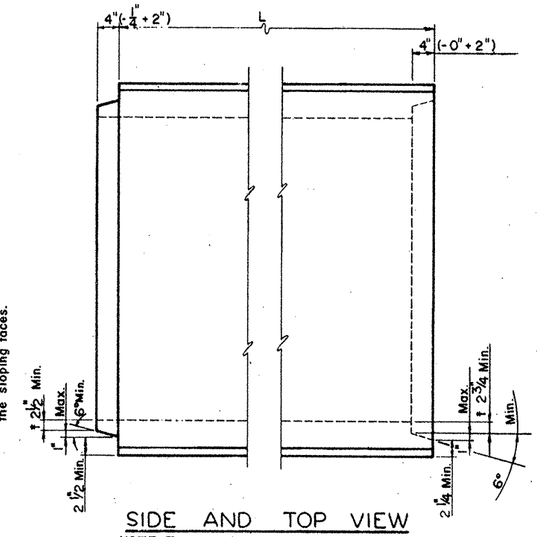
HALF SECTION TYPE 1



HALF SECTION TYPES 2 & 3

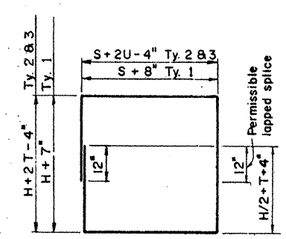
*Permissible tack welding on mats shown.
⊙ Permissible tack welding both mats.

℄ These dimensions shall be sufficiently different to allow a ¼ (± 1/16) nominal space between the sloping faces.



SIDE AND TOP VIEW

NOTE: Tongue and groove dimensional controls shown are intended to allow either a 4" long 1" slope joint, a 6" long 6° slope joint or any joint configuration within these limits.
Dimensions shown as minimums shall be maintained around the perimeter of the box.



BARS C

GENERAL NOTES:

Cement Stabilized Backfill shall be considered subsidiary to the unit price bid for Concrete Box.

All welding to be done by qualified welder.

Additional splices in reinforcing steel not shown hereon, must be submitted to the Bridge Division for approval prior to fabrication.

Grade 60 Bars or Wire Fabric may be used in place of Grade 40 Steel by supplying 82% of the area of steel per linear foot shown in the Tables for Bars A, B, C and D.

Longitudinal steel shall have at least as much area as Bars F and shall be spaced at 18" c.c. maximum.

These designs are adequate for HS 20 live loading and any fill depth from 2'-0" to the maximum shown in the the tables.

△ In lieu of furnishing the designs shown on this detail the contractor may use designs from either Std. PC-3, PC-7 or ASTM C-789, Table I. In either case, the substituted design must equal or exceed the maximum fill height for the maximum fill height for the same sized box in the table on this detail. For boxes reinforced with wire fabric the minimum cover shall be three times the wire diameter but not less than one inch. Placing of reinforcement shall otherwise conform to specification "Reinforcing Steel."

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

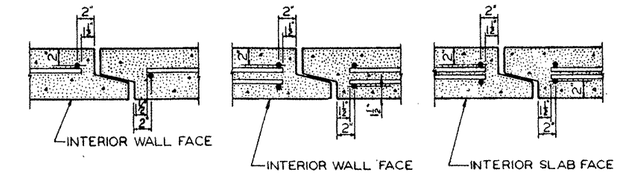
PRECAST CONCRETE BOX CULVERTS

PC-1

ORIGINAL DRAWING DATE MARCH 1983		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
DN.:-ADC	△ REVISIONS	15	6			308
CK.:-CCT	Rev. 1-86 (Gen. Notes)	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DW.:-EDS	△ Rev. 8-86 (Gen. Notes)	BEXAR		2452	2	23	6/164
CK.:-CCT							

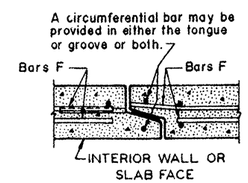
BILL OF REINFORCING STEEL FOR L=8'

CULV. SIZE S	CULV. SIZE H	TYPE SECT.	DIMENSIONS T	DIMENSIONS U	MAX. FILL	TOTAL QUANTITIES FOR L=8' CONC. C.Y.	TOTAL QUANTITIES FOR L=8' REINF. LBS.	QUANTITIES P.L.F. OF BARREL CONC. C.Y.	QUANTITIES P.L.F. OF BARREL REINF. LBS.	BARS A TOP SLAB NO.	BARS A SIZE	BARS A SPA.	BARS A LG.	BARS A WT.	BARS B BOTTOM SLAB NO.	BARS B SIZE	BARS B SPA.	BARS B LG.	BARS B WT.	BARS C NO.	BARS C SIZE	BARS C SPA.	BARS C LG.	BARS C WT.	#4 BARS D @18"± C. TO C. NO.	#4 BARS D LG.	#4 BARS D WT.	#4 BARS F @ 18" MAX. LENGTH=L-7" F1	SPA.	F2	SPA.	F3	SPA.	TOTAL	WT.	LIFT. WEIGHT L=8' LBS.
3	2	1	6"	6"	22'	1.778	245	.2222	30.63	12	#4	8"	3'-6"	28						17	#4	5½"	13'-6"	153				3	14"	8	14"	2	15"	13	64	7,370
	3	1	6"	6"	22'	2.074	279	.2592	34.88	12	#4	8"	3'-6"	28						17	#4	5½"	15'-6"	176				3	14"	8	14"	4	14"	15	75	8,590
4	2	1	6"	6"	18'	2.074	373	.2592	46.63	11	#5	9"	4'-6"	52						15	#5	6½"	15'-6"	242				4	18"	10	18"	2	15"	16	79	8,660
	3	1	6"	6"	18'	2.370	437	.2963	54.63	12	#5	8½"	4'-6"	56						16	#5	6"	17'-6"	292				4	18"	10	18"	4	14"	18	89	9,900
	4	1	6"	6"	18'	2.667	470	.3333	58.75	12	#5	8½"	4'-6"	56						16	#5	6"	19'-6"	325				4	18"	10	18"	4	18"	18	89	11,130
5	2	2	6"	6"	14'	2.370	446	.2963	55.88	12	#5	8"	5'-6"	69	13	#5	7½"	5'-6"	75	11	#5	9"	17'-8"	203				8	17"	10	17"	2	15"	20	100	9,910
	3	2	6"	6"	14'	2.667	490	.3333	61.25	13	#5	7½"	5'-6"	75	14	#5	7"	5'-6"	80	11	#5	9½"	19'-8"	226				8	17"	10	17"	4	14"	22	109	11,140
	4	2	6"	6"	14'	2.963	501	.3704	62.63	14	#5	7"	5'-6"	80	15	#5	6½"	5'-6"	86	10	#5	10"	21'-8"	226				8	17"	10	17"	4	18"	22	109	12,350
	5	3	6"	7"	14'	3.556	623	.4445	77.88	12	#5	8"	5'-8"	71	14	#5	7"	5'-8"	83	10	#5	10½"	24'-8"	257	12	5'-6"	44	10	17"	12	17"	12	18"	34	168	14,830
6	3	2	6"	6"	12'	2.963	639	.3704	79.88	16	#5	6"	6'-6"	108	16	#5	6"	6'-6"	108	13	#5	7½"	21'-8"	294				10	15"	12	15"	4	14"	26	129	12,440
	4	2	6"	6"	12'	3.259	648	.4074	81.00	16	#5	6"	6'-6"	108	17	#5	5½"	6'-6"	115	12	#5	8"	23'-8"	296				10	15"	12	15"	4	18"	26	129	13,650
	5	3	6"	7"	12'	3.852	752	.4815	94.00	15	#5	6½"	6'-8"	104	16	#5	6"	6'-8"	111	12	#5	8½"	26'-0"	325	12	5'-6"	44	10	16"	12	16"	12	18"	34	168	16,120
	6	3	6"	7"	12'	4.198	821	.5248	102.63	11	#6	9½"	6'-8"	110	12	#6	8"	6'-8"	120	12	#5	8"	28'-0"	350	12	6'-6"	52	10	16"	12	16"	16	16"	38	189	17,570
7	3	2	6½"	6"	12'	3.457	875	.4321	109.38	14	#6	7"	7'-6"	158	14	#6	7"	7'-6"	158	12	#6	8"	23'-10"	430				10	18"	12	18"	4	14"	26	129	14,600
	4	2	6½"	6"	12'	3.753	941	.4691	117.63	14	#6	7"	7'-6"	158	15	#6	6½"	7'-6"	169	12	#6	8½"	25'-10"	466				12	18"	14	18"	4	18"	30	148	15,850
	5	3	6½"	7"	12'	4.350	1020	.5438	127.50	13	#6	7½"	7'-8"	150	11	#7	9½"	7'-8"	172	11	#6	9½"	28'-2"	465	12	5'-6"	44	12	17"	14	17"	12	18"	38	189	18,320
	6	3	6½"	7"	12'	4.695	1087	.5869	135.88	10	#7	10"	7'-8"	157	11	#7	9"	7'-8"	172	11	#6	9½"	30'-2"	498	12	6'-6"	52	12	17"	14	17"	16	16"	42	208	19,760
	7	3	6½"	7"	12'	5.041	1142	.6301	142.75	13	#6	7½"	7'-8"	150	15	#6	6½"	7'-8"	173	11	#6	9"	32'-2"	531	12	7'-6"	60	12	17"	14	17"	20	15"	46	228	21,200
8	4	2	6½"	6"	10'	4.074	1314	.5093	164.25	15	#7	6½"	8'-6"	261	16	#7	6"	8'-6"	278	15	#6	6½"	27'-10"	627				12	17"	14	17"	4	18"	30	148	17,400
	5	3	6½"	7"	10'	4.671	1310	.5838	163.75	12	#7	8"	8'-8"	213	13	#7	7½"	8'-8"	230	14	#6	7"	30'-2"	634	12	5'-6"	44	12	17"	14	17"	12	18"	38	189	19,820
	6	3	6½"	7"	10'	5.017	1397	.6271	174.63	12	#7	8"	8'-8"	213	14	#7	7"	8'-8"	248	14	#6	7"	32'-2"	676	12	6'-6"	52	12	17"	14	17"	16	16"	42	208	21,280
	7	3	6½"	7"	10'	5.362	1484	.6703	185.50	13	#7	7½"	8'-8"	230	14	#7	7"	8'-8"	248	14	#6	7"	34'-2"	718	12	7'-6"	60	12	17"	14	17"	20	15"	46	228	22,740
	8	3	6½"	8"	10'	6.157	1461	.7696	182.63	12	#7	8½"	8'-10"	217	13	#7	7½"	8'-10"	235	13	#6	7½"	36'-6"	713	12	8'-6"	68	12	18"	14	18"	20	18"	46	228	25,940
9	5	3	7"	7"	10'	5.242	1602	.6553	200.25	14	#7	7"	9'-8"	277	15	#7	6½"	9'-8"	296	16	#6	6"	32'-4"	777	12	5'-6"	44	14	17"	16	17"	12	18"	42	208	22,340
	6	3	7"	7"	10'	5.588	1717	.6985	214.63	15	#7	6½"	9'-8"	296	16	#7	6"	9'-8"	316	16	#6	6"	34'-4"	825	12	6'-6"	52	14	17"	16	17"	16	16"	46	228	23,820
	7	3	7"	7"	10'	5.934	1793	.7417	221.13	15	#7	6½"	9'-8"	296	16	#7	6"	9'-8"	316	16	#6	6"	36'-4"	873	12	7'-6"	60	14	17"	16	17"	20	15"	50	248	25,270
	8	3	7"	8"	10'	6.733	1846	.8416	230.75	14	#7	7"	9'-10"	281	15	#7	6½"	9'-10"	301	12	#7	8"	38'-8"	948	12	8'-6"	68	14	17"	16	17"	20	18"	50	248	28,540
	9	3	7"	8"	10'	7.128	1923	.8909	240.38	14	#7	7"	9'-10"	281	15	#7	6½"	9'-10"	301	12	#7	8"	40'-8"	997	12	9'-6"	76	14	17"	16	17"	24	17"	54	268	30,200
10	5	3	7"	7"	10'	5.588	2067	.6985	258.38	17	#7	5½"	10'-8"	371	17	#7	5½"	10'-8"	371	15	#7	6½"	34'-4"	1053	12	5'-6"	44	16	16"	18	16"	12	18"	46	228	24,060
	6	3	7"	7"	10'	5.934	2156	.7417	269.50	17	#7	5½"	10'-8"	371	17	#7	5½"	10'-8"	371	15	#7	6½"	36'-4"	1114	12	6'-6"	52	16	16"	18	16"	16	16"	50	248	25,520
	7	3	7"	7"	10'	6.279	2245	.7849	280.63	17	#7	5½"	10'-8"	371	17	#7	5½"	10'-8"	371	15	#7	6½"	38'-4"	1175	12	7'-6"	60	16	16"	18	16"	20	15"	54	268	26,980
	8	3	7"	8"	10'	7.078	2313	.8848	289.13	16	#7	6"	10'-10"	354	17	#7	5½"	10'-10"	376	15	#7	6½"	40'-8"	1247	12	8'-6"	68	16	16"	18	16"	20	18"	54	268	30,260
	9	3	7"	8"	10'	7.473	2401	.9342	300.13	16	#7	6"	10'-10"	354	17	#7	5½"	10'-10"	376	15	#7	6½"	42'-8"	1308	12	9'-6"	76	16	16"	18	16"	24	17"	58	287	31,920
	10	3	7"	8"	10'	7.868	2582	.9835	322.75	16	#7	6"	10'-10"	354	17	#7	5½"	10'-10"	376	16	#7	6"	44'-8"	1461	12	10'-6"	84	16	16"	18	16"	28	16"	62	307	33,650



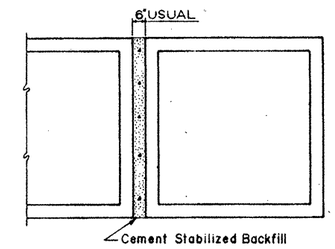
SINGLE MAT PLACEMENT

DOUBLE MAT PLACEMENT

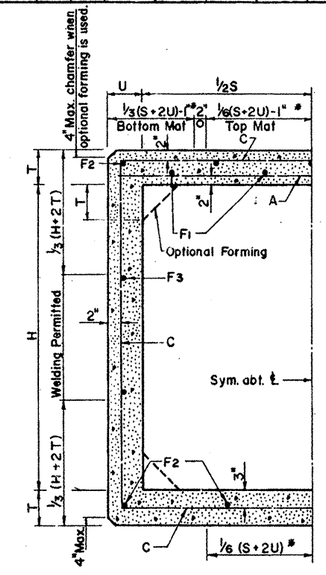


STEEL SUPPORT DETAIL

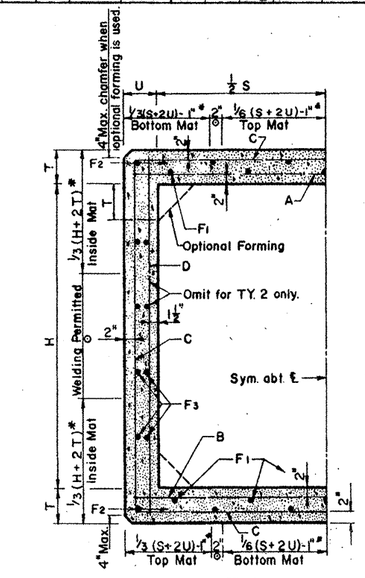
NOTE: As many Bars F as necessary may be extended to end of box to support steel during manufacture. Bars may be slightly bent to clear slope on groove lip as shown in detail. Alternatively the steel may be supported by bar extensions welded to Bars F.



MULTIPLE UNIT PLACEMENT



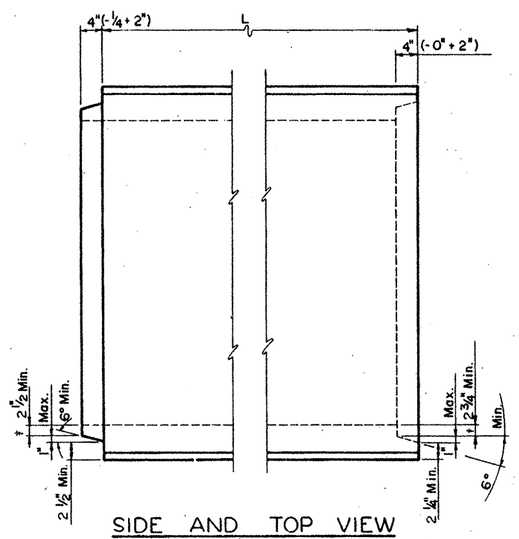
HALF SECTION TYPE 1



HALF SECTION TYPES 2 & 3

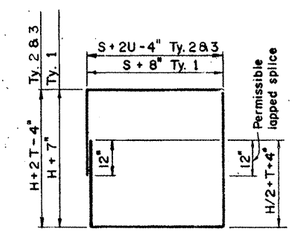
*Permissible tack welding on mats shown.
⊙Permissible tack welding both mats.

‡ These dimensions shall be sufficiently different to allow a ¼" (± 1/16") nominal space between the sloping faces.



SIDE AND TOP VIEW

NOTE: Tongue and groove dimensional controls shown are intended to allow either a 4" long 1" slope joint, a 6" long 6° slope joint or any joint configuration within these limits. Dimensions shown as minimums shall be maintained around the perimeter of the box.



BARS C

GENERAL NOTES:

Cement Stabilized Backfill shall be considered subsidiary to the unit price bid for Concrete Box.

All welding to be done by qualified welder.

Cross sectional area of gasket material shall not be less than 3.25 sq. in.

Additional splices in reinforcing steel not shown hereon, must be submitted to the Bridge Division for approval prior to fabrication.

Grade 60 Bars or Wire Fabric may be used in place of Grade 40 Steel by supplying 82 % of the area of steel per linear foot shown in the Tables for Bars A, B, C and D.

Longitudinal steel shall have at least as much area as Bars F and shall be spaced at 18" c.c. maximum.

These designs are adequate for HS 20 live loading and any fill from 2'-0" to the maximum shown in the tables.

In lieu of furnishing the designs shown on this detail the contractor may use designs from either Std. PC-4, PC-7 or ASTM C-789, Table 1. In either
△ case, the substituted design must equal or exceed the maximum fill height for the same sized box in the table on this detail. For boxes reinforced with wire fabric the minimum cover shall be three times the wire diameter but not less than one inch. Placing of reinforcement shall otherwise conform to specification "Reinforcing Steel".

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

PRECAST CONCRETE BOX CULVERTS

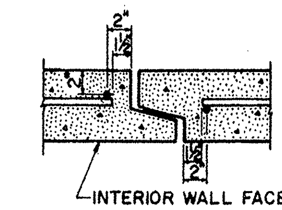
PC-2

ORIGINAL DRAWING DATE: MARCH 1983		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.:-ADC	△ REVISIONS	15	6		309
CK.:-CCT	Rev. 1-86 (Gen. Notes)	COUNTY		CONTROL / SECTION / JOB	HIGHWAY
DW.:-EDS	Rev. 8-86 (Gen. Notes)	BEXAR		2452 / 2 / 23	410
CK.:-CCT					

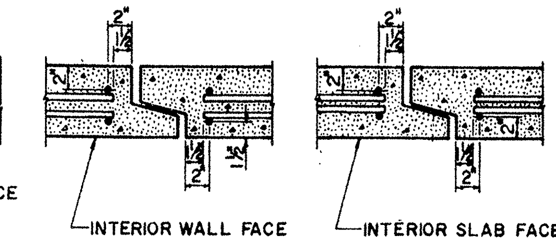
BILL OF REINFORCING STEEL FOR L = 8'

CULV. SIZE S	H	TYPE SECT.	DIMENSIONS T	DIMENSIONS U	MAX. FILL	TOTAL QUANTITIES FOR L=8' CONC. C.Y.	TOTAL QUANTITIES FOR L=8' REINF. LBS.	QUANTITIES P.L.F. OF BARREL CONC. C.Y.	QUANTITIES P.L.F. OF BARREL REINF. LBS.	BARS A TOP SLAB NO.	SIZE	SPA.	LG.	WT.	BARS B BOTTOM SLAB NO.	SIZE	SPA.	LG.	WT.
3	2	1	4"	4"	16'	1.185	204	.1481	25.50										
3	3	1	4"	4"	16'	1.383	253	.1728	31.63										
4	2	1	5"	5"	16'	1.790	322	.2238	40.25										
4	3	1	5"	5"	16'	2.037	398	.2546	49.75										
4	4	1	5"	5"	16'	2.284	493	.2855	61.63										
5	2	2	6"	6"	8'	2.518	385	.3148	48.13	10	#5	10"	5'-6"	57	11	#5	9½"	5'-6"	63
5	3	2	6"	6"	8'	2.815	426	.3519	53.25	11	#5	9½"	5'-6"	63	12	#5	8½"	5'-6"	69
5	4	2	6"	6"	8'	3.111	422	.3889	52.75	11	#5	9"	5'-6"	63	12	#5	8"	5'-6"	69
5	5	3	6"	6"	8'	3.407	533	.4259	66.63	12	#5	8½"	5'-6"	69	13	#5	7½"	5'-6"	75
6	3	2	7"	7"	8'	3.714	498	.4643	62.25	11	#5	9"	6'-8"	76	12	#5	8½"	6'-8"	83
6	4	2	7"	7"	8'	4.060	523	.5075	65.38	12	#5	8½"	6'-8"	83	12	#5	8"	6'-8"	83
6	5	3	7"	7"	8'	4.405	605	.5506	75.63	12	#5	8"	6'-8"	83	13	#5	7½"	6'-8"	90
6	6	3	7"	7"	8'	4.751	656	.5939	82.00	12	#5	8"	6'-8"	83	14	#5	7"	6'-8"	97
7	3	2	8"	8"	6'	4.742	605	.5928	75.63	12	#5	8½"	7'-10"	98	12	#5	8½"	7'-10"	98
7	4	2	8"	8"	6'	5.138	616	.6423	77.00	12	#5	8"	7'-10"	98	13	#5	7½"	7'-10"	106
7	5	3	8"	8"	6'	5.533	716	.6916	89.50	12	#5	8"	7'-10"	98	14	#5	7"	7'-10"	114
7	6	3	8"	8"	6'	5.928	771	.7410	96.38	13	#5	7½"	7'-10"	106	14	#5	7"	7'-10"	114
7	7	3	8"	8"	6'	6.323	827	.7904	103.38	13	#5	7½"	7'-10"	106	15	#5	6½"	7'-10"	123
8	4	2	8"	8"	6'	5.533	798	.6916	99.75	15	#5	6½"	8'-10"	138	15	#5	6½"	8'-10"	138
8	5	3	8"	8"	6'	5.928	873	.7410	109.13	15	#5	6½"	8'-10"	138	16	#5	6"	8'-10"	147
8	6	3	8"	8"	6'	6.323	933	.7904	116.63	16	#5	6"	8'-10"	147	16	#5	6"	8'-10"	147
8	7	3	8"	8"	6'	6.719	994	.8399	124.25	16	#5	6"	8'-10"	147	17	#5	5½"	8'-10"	157
8	8	3	8"	8"	6'	7.114	1025	.8893	128.13	16	#5	6"	8'-10"	147	17	#5	5½"	8'-10"	157
9	5	3	9"	9"	6'	7.222	996	.9028	124.50	15	#5	6½"	10'-0"	156	16	#5	6"	10'-0"	167
9	6	3	9"	9"	6'	7.665	1070	.9581	133.75	16	#5	6"	10'-0"	167	17	#5	5½"	10'-0"	177
9	7	3	9"	9"	6'	8.111	1123	1.014	140.38	16	#5	6"	10'-0"	167	17	#5	5½"	10'-0"	177
9	8	3	9"	9"	6'	8.555	1187	1.069	148.38	12	#6	8½"	10'-0"	180	13	#6	7½"	10'-0"	195
9	9	3	9"	9"	6'	8.999	1256	1.125	157.00	12	#6	8½"	10'-0"	180	14	#6	7"	10'-0"	210
10	5	3	10"	10"	6'	8.640	1223	1.080	152.88	11	#6	9"	11'-2"	184	12	#6	8"	11'-2"	201
10	6	3	10"	10"	6'	9.133	1220	1.142	152.50	12	#6	8½"	11'-2"	201	12	#6	8"	11'-2"	201
10	7	3	10"	10"	6'	9.627	1292	1.203	161.50	12	#6	8"	11'-2"	201	13	#6	7½"	11'-2"	218
10	8	3	10"	10"	6'	10.120	1363	1.265	170.38	12	#6	8"	11'-2"	201	14	#6	7"	11'-2"	235
10	9	3	10"	10"	6'	10.614	1398	1.327	174.75	12	#6	8"	11'-2"	201	14	#6	7"	11'-2"	235
10	10	3	10"	10"	6'	11.108	1470	1.389	183.75	12	#6	8"	11'-2"	201	15	#6	6½"	11'-2"	252

S	H	BARS C NO.	SIZE	SPA.	LG.	WT.	#4 BARS D @18"± C. TO C. NO.	LG.	WT.	#4 BARS F @ 18" MAX. LENGTH L-7" F1	SPA.	F2	SPA.	F3	SPA.	TOTAL	WT.	LIFT. WEIGHT L=8' LBS.
3	2	12	#5	8½"	12'-4"	154						8	14"	2	15"	10	50	4,940
3	3	13	#5	7½"	14'-4"	194						8	14"	4	14"	12	59	5,780
4	2	17	#5	6"	14'-10"	263						10	14"	2	15"	12	59	7,470
4	3	13	#6	7½"	16'-10"	329						10	14"	4	14"	14	69	8,520
4	4	15	#6	6½"	18'-10"	424						10	14"	4	18"	14	69	9,590
5	2	9	#5	11"	17'-8"	166				8	17"	10	17"	2	15"	20	99	10,460
5	3	9	#5	12"	19'-8"	185				8	17"	10	17"	4	14"	22	109	11,700
5	4	8	#5	13"	21'-8"	181				8	17"	10	17"	4	18"	22	109	12,890
5	5	8	#5	14"	23'-8"	197	12	5'-6"	44	8	17"	10	17"	12	17"	30	148	14,170
6	3	9	#5	11"	22'-4"	210				10	16"	12	16"	4	15"	26	129	15,390
6	4	9	#5	12"	24'-4"	228				10	16"	12	16"	4	18"	26	129	16,800
6	5	8	#5	13"	26'-4"	220	12	5'-6"	44	10	16"	12	16"	12	17"	34	168	18,260
6	6	8	#5	13"	28'-4"	236	12	6'-6"	52	10	16"	12	16"	16	16"	38	188	19,690
7	3	10	#5	10"	25'-0"	261				12	16"	14	16"	4	15"	30	148	19,620
7	4	9	#5	11"	27'-0"	253				12	16"	14	16"	6	15"	32	159	21,230
7	5	9	#5	11"	29'-0"	272	12	5'-6"	44	12	16"	14	16"	12	18"	38	188	22,900
7	6	9	#5	12"	31'-0"	291	12	6'-6"	52	12	16"	14	16"	16	17"	42	208	24,540
7	7	9	#5	12"	33'-0"	310	12	7'-6"	60	12	16"	14	16"	20	16"	46	228	26,180
8	4	12	#5	8½"	29'-0"	363				12	18"	14	18"	6	15"	32	159	22,960
8	5	11	#5	9"	31'-0"	356	12	5'-6"	44	12	18"	14	18"	12	18"	38	188	24,610
8	6	11	#5	9½"	33'-0"	379	12	6'-6"	52	12	18"	14	18"	16	17"	42	208	26,250
8	7	11	#5	9½"	35'-0"	402	12	7'-6"	60	12	18"	14	18"	20	16"	46	228	27,900
8	8	11	#5	9½"	37'-0"	425	12	8'-6"	68	12	18"	14	18"	20	18"	46	228	29,520
9	5	12	#5	8"	33'-8"	421	12	5'-6"	44	14	18"	16	18"	12	18"	42	208	29,940
9	6	12	#5	8½"	35'-8"	446	12	6'-6"	52	14	18"	16	18"	16	17"	46	228	31,780
9	7	12	#5	8½"	37'-8"	471	12	7'-6"	60	14	18"	16	18"	20	16"	50	248	33,620
9	8	12	#5	8½"	39'-8"	496	12	8'-6"	68	14	18"	16	18"	20	18"	50	248	35,470
9	9	12	#5	8½"	41'-8"	522	12	9'-6"	76	14	18"	16	18"	24	17"	54	268	37,310
10	5	10	#6	10½"	36'-4"	546	12	5'-6"	44	16	17"	18	17"	16	15"	50	248	35,840
10	6	9	#6	11"	38'-4"	518	12	6'-6"	52	16	17"	18	17"	16	18"	50	248	37,830
10	7	9	#6	11½"	40'-4"	545	12	7'-6"	60	16	17"	18	17"	20	17"	54	268	39,880
10	8	9	#6	11½"	42'-4"	572	12	8'-6"	68	16	17"	18	17"	24	18"	58	287	41,930
10	9	9	#6	11½"	44'-4"	599	12	9'-6"	76	16	17"	18	17"	24	18"	58	287	43,950
10	10	9	#6	11½"	46'-4"	626	12	10'-6"	84	16	17"	18	17"	28	17"	62	307	46,000

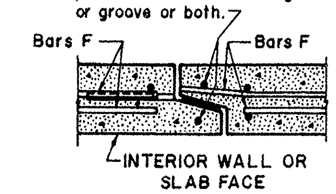


SINGLE MAT PLACEMENT



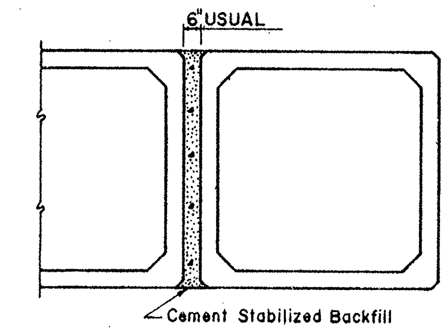
DOUBLE MAT PLACEMENT

A circumferential bar may be provided in either the tongue or groove or both.

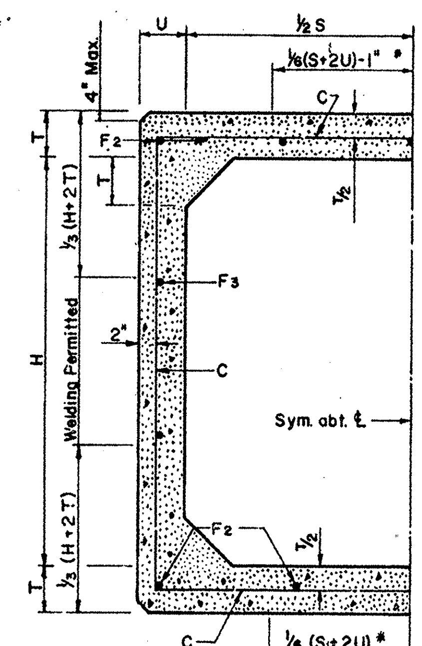


STEEL SUPPORT DETAIL

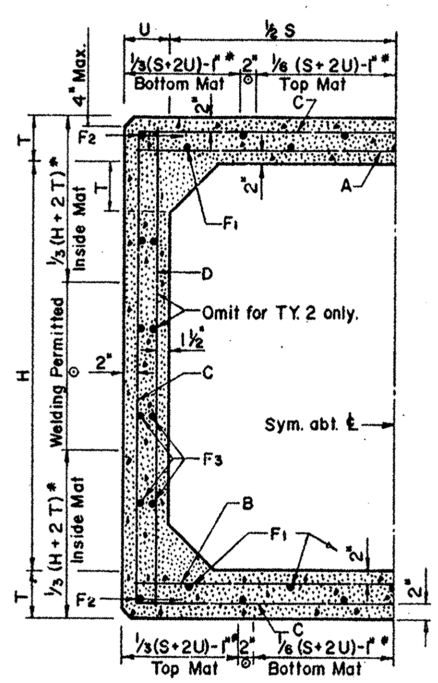
NOTE: As many Bars F as necessary may be extended to end of box to support steel during manufacture. Bars may be slightly bent to clear slope on groove lip as shown in detail. Alternatively the steel may be supported by bar extensions welded to Bars F.



MULTIPLE UNIT PLACEMENT

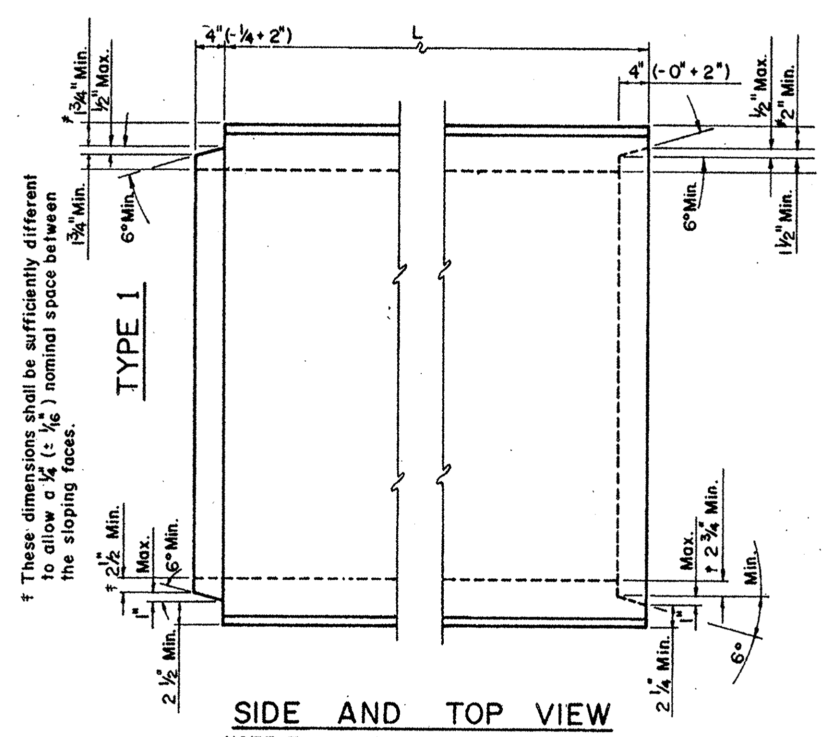


HALF SECTION TYPE 1



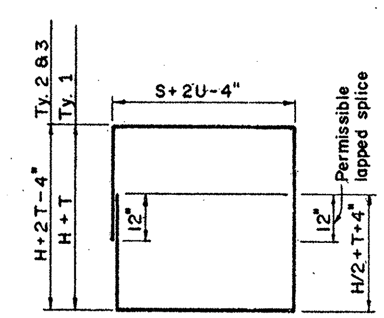
HALF SECTIONS TYPES 2 & 3

*Permissible tack welding on mats shown.
⊙ Permissible tack welding both mats.



SIDE AND TOP VIEW

NOTE: Tongue and groove dimensional controls shown are intended to allow either a 4" long 1" slope joint, a 6" long 6° slope joint or any joint configuration within these limits. Dimensions shown as minimums shall be maintained around the perimeter of the box.



BARS C

GENERAL NOTES:

Cement Stabilized Backfill shall be considered subsidiary to the unit price bid for Concrete Box.

All welding to be done by qualified welder.

Additional splices in reinforcing steel not shown hereon, must be submitted to the Bridge Division for approval prior to fabrication.

Grade 60 Bars or Wire Fabric may be used in place of Grade 40 Steel by supplying 82% of the area of steel per linear foot shown in the Tables for Bars A, B, C and D.

Longitudinal steel shall have at least as much area as Bars F and shall be spaced at 18" c.c. maximum.

These designs are adequate for HS 20 live loading and any fill depth from 2'-0" to the maximum shown in the the tables.

△ In lieu of furnishing the designs shown on this detail the contractor may use designs from either Std. PC-1, PC-7 or ASTM C789, Table I. In either case, the substituted design must equal or exceed the maximum fill height for the same sized box in the table on this detail. For boxes reinforced with wire fabric the minimum cover shall be three times the wire diameter but not less than one inch. Placing of reinforcment shall otherwise conform to specification "Reinforcing Steel."

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

PRECAST CONCRETE BOX CULVERTS

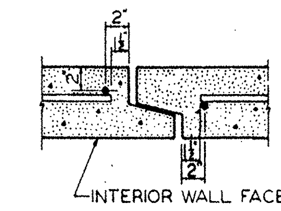
PC-3

ORIGINAL DRAWING DATE: MARCH 1983	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.:- ADC	△ Rev. 1-86 (Gen. Notes)	15	6		310
CK.:- CCT	Rev. 8-86 (Gen Notes)	COUNTY: BEXAR	CONTROL: 2452	SECTION: 2	JOB: 23 / HIGHWAY: LP 1604
DW.:- EDS					
CK.:- CCT					

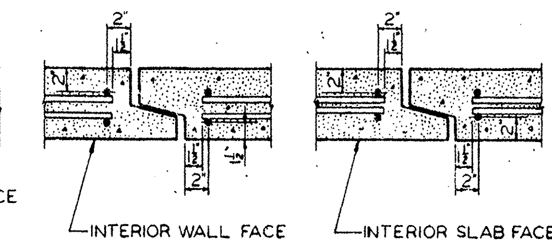
BILL OF REINFORCING STEEL FOR L=8'

CULV. SIZE S	H	TYPE SECT.	DIMENSIONS T	DIMENSIONS U	MAX. FILL	TOTAL QUANTITIES FOR L=8' CONC. C.Y.	TOTAL QUANTITIES FOR L=8' REINF. LBS.	QUANTITIES P.L.F. OF BARREL CONC. C.Y.	QUANTITIES P.L.F. OF BARREL REINF. LBS.	BARS A TOP SLAB NO.	SIZE	SPA.	LG.	WT.	BARS B BOTTOM SLAB NO.	SIZE	SPA.	LG.	WT.
3'	2	1	4"	4"	22'	1.185	243	.1481	30.38										
	3	1	4"	4"	22'	1.383	283	.1728	35.38										
4'	2	1	5"	5"	20'	1.790	349	.2238	43.63										
	3	1	5"	5"	20'	2.037	423	.2546	52.88										
	4	1	5"	5"	20'	2.284	493	.2855	61.63										
5'	2	2	6"	6"	14'	2.518	446	.3148	55.75	12	#5	8"	5'-6"	69	13	#5	7½"	5'-6"	75
	3	2	6"	6"	14'	2.815	469	.3519	58.63	13	#5	7½"	5'-6"	75	14	#5	7"	5'-6"	80
	4	2	6"	6"	14'	3.111	478	.3889	59.75	14	#5	7"	5'-6"	80	15	#5	6½"	5'-6"	86
	5	3	6"	6"	14'	3.407	575	.4259	71.88	13	#5	7½"	5'-6"	75	15	#5	6½"	5'-6"	86
6'	3'	2	7"	7"	12'	3.714	572	.4643	71.50	13	#5	7½"	6'-8"	90	14	#5	7"	6'-8"	97
	4'	2	7"	7"	12'	4.060	609	.5075	76.13	14	#5	7"	6'-8"	97	15	#5	6½"	6'-8"	104
	5'	3	7"	7"	12'	4.405	695	.5506	86.88	14	#5	7"	6'-8"	97	16	#5	6"	6'-8"	111
	6'	3	7"	7"	12'	.4.751	744	.5939	93.00	14	#5	7"	6'-8"	97	16	#5	6"	6'-8"	111
7'	3'	2	8"	8"	12'	4.742	698	.5928	87.25	14	#5	7"	7'-10"	114	15	#5	6½"	7'-10"	123
	4'	2	8"	8"	12'	5.138	751	.6423	93.88	15	#5	6½"	7'-10"	123	16	#5	6"	7'-10"	131
	5'	3	8"	8"	12'	5.533	835	.6916	104.38	16	#5	6"	7'-10"	131	17	#5	5½"	7'-10"	139
	6'	3	8"	8"	12'	5.928	886	.7410	110.75	16	#5	6"	7'-10"	131	17	#5	5½"	7'-10"	139
	7'	3	8"	8"	12'	6.323	937	.7904	117.13	16	#5	6"	7'-10"	131	17	#5	5½"	7'-10"	139
8'	4'	2	8"	8"	10'	5.533	913	.6916	114.13	12	#6	8½"	8'-10"	159	13	#6	7½"	8'-10"	172
	5'	3	8"	8"	10'	5.928	997	.7410	124.63	12	#6	8"	8'-10"	159	14	#6	7"	8'-10"	186
	6'	3	8"	8"	10'	6.323	1052	.7904	131.50	12	#6	8"	8'-10"	159	14	#6	7"	8'-10"	186
	7'	3	8"	8"	10'	6.719	1071	.8399	133.88	12	#6	8"	8'-10"	159	14	#6	7"	8'-10"	186
	8'	3	8"	8"	10'	7.114	1104	.8893	138.00	12	#6	8"	8'-10"	159	14	#6	7"	8'-10"	186
9'	5'	3	9"	9"	10'	7.222	1249	.9028	156.13	14	#6	7"	10'-0"	210	15	#6	6½"	10'-0"	225
	6'	3	9"	9"	10'	7.665	1288	.9581	161.00	14	#6	7"	10'-0"	210	16	#6	6"	10'-0"	240
	7'	3	9"	9"	10'	8.111	1347	1.014	168.38	14	#6	7"	10'-0"	210	16	#6	6"	10'-0"	240
	8'	3	9"	9"	10'	8.555	1402	1.069	175.25	15	#6	6½"	10'-0"	225	16	#6	6"	10'-0"	240
	9'	3	9"	9"	10'	8.999	1446	1.125	180.75	14	#6	7"	10'-0"	210	16	#6	6"	10'-0"	240
10'	5'	3	10"	10"	10'	8.640	1461	1.080	182.63	11	#7	9"	11'-2"	251	12	#7	8½"	11'-2"	274
	6'	3	10"	10"	10'	9.133	1505	1.142	188.13	11	#7	9"	11'-2"	251	12	#7	8"	11'-2"	274
	7'	3	10"	10"	10'	9.627	1572	1.203	196.50	12	#7	8½"	11'-2"	274	13	#7	7½"	11'-2"	297
	8'	3	10"	10"	10'	10.120	1632	1.265	204.00	12	#7	8½"	11'-2"	274	13	#7	7½"	11'-2"	297
	9'	3	10"	10"	10'	10.614	1674	1.327	209.25	12	#7	8½"	11'-2"	274	13	#7	7½"	11'-2"	297
	10'	3	10"	10"	10'	11.108	1735	1.389	216.88	12	#7	8½"	11'-2"	274	13	#7	7½"	11'-2"	297

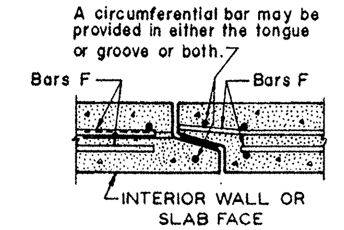
S	H	BARS C NO.	SIZE	SPA.	LG.	WT.	#4 BARS D @18"± C. TO C. NO.	LG.	WT.	#4 BARS F @ 18" MAX. LENGTH L-7" F1	SPA.	F2	SPA.	F3	SPA.	TOTAL	WT.	LIFT. WEIGHT L = 8' LBS.
3'	2	15	#5	6½"	12'-4"	193						8	14"	2	15"	10	50	4,980
	3	15	#5	6½"	14'-4"	224						8	14"	4	14"	12	59	5,810
4'	2	13	#6	7½"	14'-10"	290						10	14"	2	15"	12	59	7,500
	3	14	#6	7"	16'-10"	354						10	14"	4	14"	14	69	8,550
	4	15	#6	6½"	18'-10"	424						10	14"	4	18"	14	69	9,600
5'	2	11	#5	9"	17'-8"	203				8	17"	10	17"	2	15"	20	99	10,510
	3	10	#5	10"	19'-8"	205				8	17"	10	17"	4	14"	22	109	11,720
	4	9	#5	11"	21'-8"	203				8	17"	10	17"	4	18"	22	109	12,930
	5	9	#5	12"	23'-8"	222	12	5'-6"	44	8	17"	10	17"	12	17"	30	148	14,200
6'	3'	11	#5	9"	22'-4"	256				10	16"	12	16"	4	15"	26	129	15,440
	4'	11	#5	9½"	24'-4"	279				10	16"	12	16"	4	18"	26	129	16,860
	5'	10	#5	10"	26'-4"	275	12	5'-6"	44	10	16"	12	16"	12	17"	34	168	18,320
	6'	10	#5	10½"	28'-4"	296	12	6'-6"	52	10	16"	12	16"	16	16"	38	188	19,750
7'	3'	12	#5	8"	25'-0"	313				12	16"	14	16"	4	15"	30	148	19,690
	4'	12	#5	8"	27'-0"	338				12	16"	14	16"	6	15"	32	159	21,330
	5'	11	#5	9"	29'-0"	333	12	5'-6"	44	12	16"	14	16"	12	18"	38	188	22,980
	6'	11	#5	9"	31'-0"	356	12	6'-6"	52	12	16"	14	16"	16	17"	42	208	24,620
	7'	11	#5	9"	33'-0"	379	12	7'-6"	60	12	16"	14	16"	20	16"	46	228	26,260
8'	4'	14	#5	7"	29'-0"	423				12	18"	14	18"	6	15"	32	159	23,040
	5'	13	#5	7½"	31'-0"	420	12	5'-6"	44	12	18"	14	18"	12	18"	38	188	24,700
	6'	13	#5	7½"	33'-0"	447	12	6'-6"	52	12	18"	14	18"	16	17"	42	208	26,330
	7'	12	#5	8"	35'-0"	438	12	7'-6"	60	12	18"	14	18"	20	16"	46	228	27,960
	8'	12	#5	8"	37'-0"	463	12	8'-6"	68	12	18"	14	18"	20	18"	46	228	29,570
9'	5'	16	#5	6"	33'-8"	562	12	5'-6"	44	14	18"	16	18"	12	18"	42	208	30,110
	6'	15	#5	6½"	35'-8"	558	12	6'-6"	52	14	18"	16	18"	16	17"	46	228	31,930
	7'	15	#5	6½"	37'-8"	589	12	7'-6"	60	14	18"	16	18"	20	16"	50	248	33,780
	8'	15	#5	6½"	39'-8"	621	12	8'-6"	68	14	18"	16	18"	20	18"	50	248	35,620
	9'	15	#5	6½"	41'-8"	652	12	9'-6"	76	14	18"	16	18"	24	17"	54	268	37,440
10'	5'	17	#5	5½"	36'-4"	644	12	5'-6"	44	16	17"	18	17"	16	15"	50	248	36,000
	6'	17	#5	5½"	38'-4"	680	12	6'-6"	52	16	17"	18	17"	16	18"	50	248	38,030
	7'	16	#5	6"	40'-4"	673	12	7'-6"	60	16	17"	18	17"	20	17"	54	268	40,070
	8'	16	#5	6"	42'-4"	706	12	8'-6"	68	16	17"	18	17"	24	16"	58	287	42,110
	9'	16	#5	6"	44'-4"	740	12	9'-6"	76	16	17"	18	17"	24	18"	58	287	44,140
	10'	16	#5	6"	46'-4"	773	12	10'-6"	84	16	17"	18	17"	28	17"	62	307	46,180



SINGLE MAT PLACEMENT

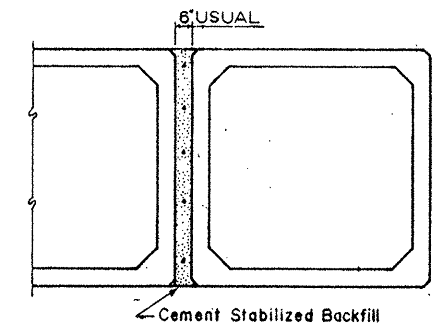


DOUBLE MAT PLACEMENT



STEEL SUPPORT DETAIL

NOTE: As many Bars F as necessary may be extended to end of box to support steel during manufacture. Bars may be slightly bent to clear slope on groove lip as shown in detail. Alternatively the steel may be supported by bar extensions welded to Bars F.



MULTIPLE UNIT PLACEMENT

GENERAL NOTES:

Cement Stabilized Backfill shall be subsidiary to the unit price bid for Concrete Box.

All welding to be done by qualified welder.

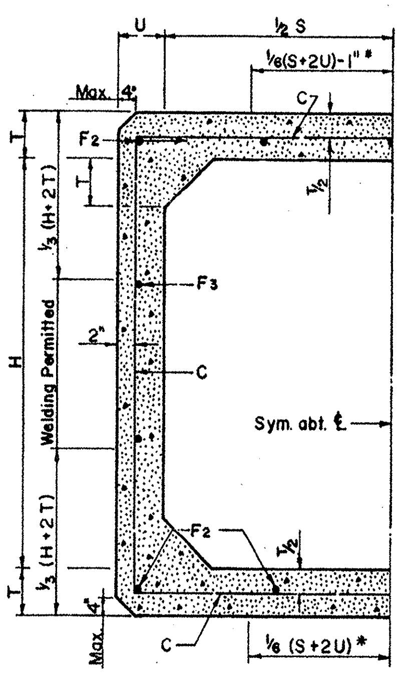
Additional splices in reinforcing steel not shown hereon, must be submitted to the Bridge Division for approval prior to fabrication.

Grade 60 Bars or Wire Fabric may be used in place of Grade 40 Steel by supplying 82% of the area of steel per linear foot shown in the Tables for Bars A, B, C and D.

Longitudinal shall have at least as much area as Bars F and shall be spaced at 18" c.c. maximum.

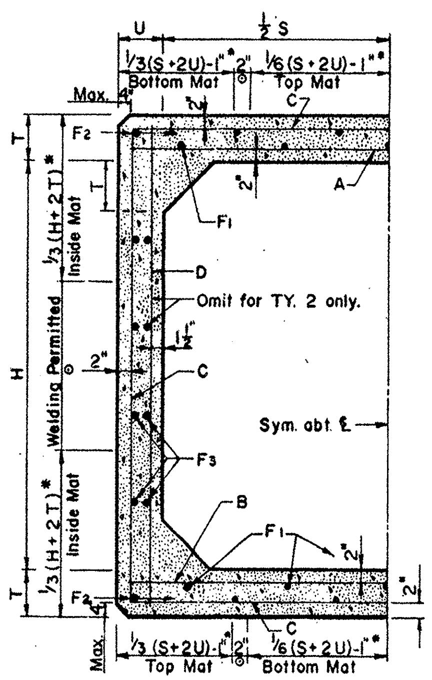
These designs are adequate for HS 20 live loading and any fill from 2'-0" to the maximum shown in the tables.

In lieu of furnishing the designs shown on this detail the contractor may use designs from either Std. PC-2, PC-7 or ASTM C-789, Table I. In either case, △ the substituted design must equal or exceed the maximum fill height for the same sized box in the table on this detail. For boxes reinforced with wire fabric the minimum cover shall be three times the wire diameter but not less than one inch. Placing of reinforcment shall otherwise conform to the specification "Reinforcing Steel"



HALF SECTION

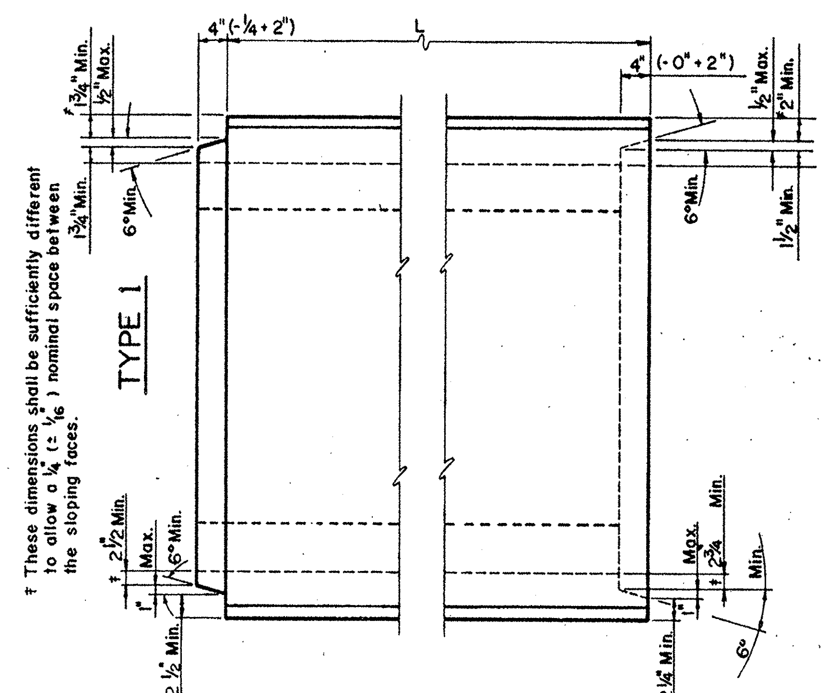
TYPE 1



HALF SECTION

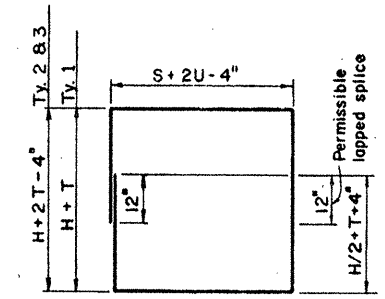
TYPES 2 & 3

*Permissible tack welding on mats shown.
⊙Permissible tack welding both mats.



SIDE AND TOP VIEW

NOTE: Tongue and groove dimensional controls shown are intended to allow either a 4" long 1" slope joint, a 6" long 6° slope joint or any joint configuration within these limits. Dimensions shown as minimums shall be maintained around the perimeter of the box.



BARS C

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

PRECAST CONCRETE BOX CULVERTS

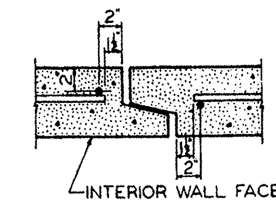
PC-4

ORIGINAL DRAWING DATE: MARCH 1983		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
DN.:-ADC	REVISIONS	15	6				3/1
CK.:-CCT	△ Rev. 1-86 (Gen. Notes)	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DW.:-EDS	△ Rev. 8-86 (Gen. Notes)	BEXAR		2452	2	23	[illegible]
CK.:-CCT							

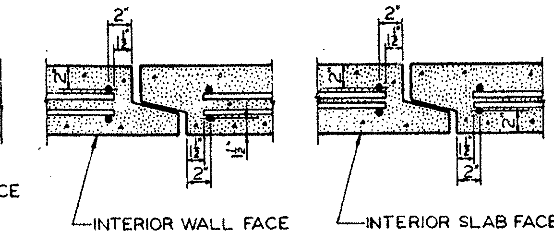
BILL OF REINFORCING STEEL FOR L=8'

CULV. SIZE S	H	TYPE SECT.	DIMENSIONS T	DIMENSIONS U	MAX. FILL	TOTAL QUANTITIES FOR L=8' CONC. C.Y.	TOTAL QUANTITIES FOR L=8' REINF. LBS.	QUANTITIES P.L.F. OF BARREL CONC. C.Y.	QUANTITIES P.L.F. OF BARREL REINF. LBS.	BARS A TOP SLAB NO.	SIZE	SPA.	LG.	WT.
3'	2'	1	4"	4"	26'	1.185	272	.1481	34.00					
	3'	1	4"	4"	26'	1.383	339	.1728	42.38					
4'	2'	1	5"	5"	24'	1.790	393	.2238	49.13					
	3'	1	5"	5"	24'	2.037	474	.2546	59.25					
	4'	1	5"	5"	24'	2.284	522	.2855	65.25					
5'	2'	2	6"	6"	22'	2.518	615	.3148	76.88	10	#7	10½"	5'-6"	112
	3'	2	6"	6"	22'	2.815	652	.3519	81.50	11	#7	9½"	5'-6"	124
	4'	2	6"	6"	22'	3.111	650	.3889	81.25	11	#7	9½"	5'-6"	124
	5'	3	6"	6"	22'	3.407	760	.4259	95.00	11	#7	9½"	5'-6"	124
6'	3'	2	7"	7"	22'	3.714	893	.4643	111.63	12	#7	8½"	6'-8"	164
	4'	2	7"	7"	22'	4.060	909	.5075	113.63	12	#7	8"	6'-8"	164
	5'	3	7"	7"	22'	4.405	988	.5506	123.50	12	#7	8"	6'-8"	164
	6'	3	7"	7"	22'	4.751	1049	.5939	131.13	12	#7	8"	6'-8"	164
7'	3'	2	8"	8"	23'	4.742	1127	.5928	140.88	13	#7	7½"	7'-10"	208
	4'	2	8"	8"	23'	5.138	1159	.6423	144.88	13	#7	7½"	7'-10"	208
	5'	3	8"	8"	23'	5.533	1262	.6916	157.75	14	#7	7"	7'-10"	224
	6'	3	8"	8"	23'	5.928	1283	.7410	160.38	14	#7	7"	7'-10"	224
	7'	3	8"	8"	23'	6.323	1347	.7904	168.38	14	#7	7"	7'-10"	224
8'	4'	2	8"	8"	20'	5.533	1415	.6916	176.88	15	#7	6½"	8'-10"	270
	5'	3	8"	8"	20'	5.928	1489	.7410	186.13	15	#7	6½"	8'-10"	270
	6'	3	8"	8"	20'	6.323	1581	.7904	197.63	16	#7	6"	8'-10"	289
	7'	3	8"	8"	20'	6.719	1673	.8399	209.13	16	#7	6"	8'-10"	289
	8'	3	8"	8"	20'	7.114	1670	.8893	208.75	16	#7	6"	8'-10"	289
9'	5'	3	9"	9"	20'	7.222	1936	.9208	242.00	13	#8	7½"	10'-0"	347
	6'	3	9"	9"	20'	7.665	2003	.9581	250.38	14	#8	7"	10'-0"	374
	7'	3	9"	9"	20'	8.111	2007	1.014	250.88	14	#8	7"	10'-0"	374
	8'	3	9"	9"	20'	8.555	2064	1.069	258.00	14	#8	7"	10'-0"	374
	9'	3	9"	9"	20'	8.999	2141	1.125	267.63	14	#8	7"	10'-0"	374
10'	5'	3	10"	10"	21'	8.640	2300	1.080	287.50	15	#8	6½"	11'-2"	447
	6'	3	10"	10"	21'	9.133	2369	1.142	296.13	15	#8	6½"	11'-2"	447
	7'	3	10"	10"	21'	9.627	2376	1.203	297.00	15	#8	6½"	11'-2"	447
	8'	3	10"	10"	21'	10.120	2460	1.265	307.50	15	#8	6½"	11'-2"	447
	9'	3	10"	10"	21'	10.614	2526	1.327	315.75	15	#8	6½"	11'-2"	447
	10'	3	10"	10"	21'	11.108	2611	1.389	326.38	15	#8	6½"	11'-2"	447

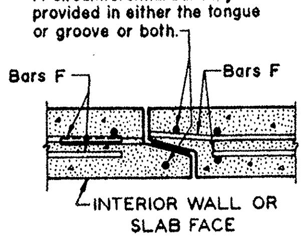
S	H	BARS B BOTTOM SLAB NO.	SIZE	SPA.	LG.	WT.	BARS C NO.	SIZE	SPA.	LG.	WT.	#4 BARS D @18"± C. TO C. NO.	LG.	WT.	#4 BARS F @ 18" MAX. LENGTH L-7" F1	SPA.	F2	SPA.	F3	SPA.	TOTAL	WT.	LIFT. WEIGHT L = 8' LBS.
3'	2'						12	#6	8"	12'-4"	222						8	14"	2	15"	10	50	5,000
	3'						13	#6	7½"	14'-4"	280						8	14"	4	14"	12	59	5,850
4'	2'						15	#6	6½"	14'-10"	334						10	14"	2	15"	12	59	7,530
	3'						16	#6	6"	16'-10"	405						10	14"	4	14"	14	69	8,590
	4'						16	#6	6"	18'-10"	453						10	14"	4	18"	14	69	9,620
5'	2'	10	#7	10"	5'-6"	112	11	#6	9"	17'-8"	292				8	17"	10	17"	2	15"	20	99	10,620
	3'	11	#7	9½"	5'-6"	124	10	#6	10"	19'-8"	295				8	17"	10	17"	4	14"	22	109	11,850
	4'	11	#7	9"	5'-6"	124	9	#6	11"	21'-8"	293				8	17"	10	17"	4	18"	22	109	13,050
	5'	11	#7	9"	5'-6"	124	9	#6	11"	23'-8"	320	12	5'-6"	44	8	17"	10	17"	12	17"	30	148	14,320
6'	3'	12	#7	8"	6'-8"	164	13	#6	7½"	22'-4"	436				10	16"	12	16"	4	15"	26	129	15,660
	4'	13	#7	7½"	6'-8"	177	12	#6	8½"	24'-4"	439				10	16"	12	16"	4	18"	26	129	17,070
	5'	13	#7	7½"	6'-8"	177	11	#6	9"	26'-4"	435	12	5'-6"	44	10	16"	12	16"	12	17"	34	168	18,520
	6'	13	#7	7½"	6'-8"	177	11	#6	9"	28'-4"	468	12	6'-6"	52	10	16"	12	16"	16	16"	38	188	19,970
7'	3'	13	#7	7½"	7'-10"	208	15	#6	6½"	25'-0"	563				12	16"	14	16"	4	15"	30	148	19,980
	4'	14	#7	7"	7'-10"	224	14	#6	7"	27'-0"	568				12	16"	14	16"	6	15"	32	159	21,610
	5'	15	#7	6½"	7'-10"	240	13	#6	7½"	29'-0"	566	12	5'-6"	44	12	16"	14	16"	12	18"	38	188	23,280
	6'	15	#7	6½"	7'-10"	240	12	#6	8"	31'-0"	559	12	6'-6"	52	12	16"	14	16"	16	17"	42	208	24,890
	7'	15	#7	6½"	7'-10"	240	12	#6	8"	33'-0"	595	12	7'-6"	60	12	16"	14	16"	20	16"	46	228	26,540
8'	4'	16	#7	6"	8'-10"	289	16	#6	6"	29'-0"	697				12	18"	14	18"	6	15"	32	159	23,390
	5'	16	#7	6"	8'-10"	289	15	#6	6½"	31'-0"	698	12	5'-6"	44	12	18"	14	18"	12	18"	38	188	25,040
	6'	16	#7	6"	8'-10"	289	15	#6	6½"	33'-0"	743	12	6'-6"	52	12	18"	14	18"	16	17"	42	208	26,700
	7'	17	#7	5½"	8'-10"	307	15	#6	6½"	35'-0"	789	12	7'-6"	60	12	18"	14	18"	20	16"	46	228	28,370
	8'	17	#7	5½"	8'-10"	307	14	#6	7"	37'-0"	778	12	8'-6"	68	12	18"	14	18"	20	18"	46	228	29,960
9'	5'	14	#8	7"	10'-0"	374	14	#7	7"	33'-8"	963	12	5'-6"	44	14	18"	16	18"	12	18"	42	208	30,580
	6'	15	#8	6½"	10'-0"	401	13	#7	7½"	35'-8"	948	12	6'-6"	52	14	18"	16	18"	16	17"	46	228	32,430
	7'	15	#8	6½"	10'-0"	401	12	#7	8"	37'-8"	924	12	7'-6"	60	14	18"	16	18"	20	16"	50	248	34,230
	8'	15	#8	6½"	10'-0"	401	12	#7	8"	39'-8"	973	12	8'-6"	68	14	18"	16	18"	20	18"	50	248	36,070
	9'	15	#8	6½"	10'-0"	401	12	#7	8"	41'-8"	1022	12	9'-6"	76	14	18"	16	18"	24	17"	54	268	37,920
10'	5'	15	#8	6½"	11'-2"	447	15	#7	6½"	36'-4"	1114	12	5'-6"	44	16	17"	18	17"	16	15"	50	248	36,580
	6'	15	#8	6½"	11'-2"	447	15	#7	6½"	38'-4"	1175	12	6'-6"	52	16	17"	18	17"	16	18"	50	248	38,620
	7'	15	#8	6½"	11'-2"	447	14	#7	7"	40'-4"	1154	12	7'-6"	60	16	17"	18	17"	20	17"	54	268	40,630
	8'	15	#8	6½"	11'-2"	447	14	#7	7"	42'-4"	1211	12	8'-6"	68	16	17"	18	17"	24	16"	58	287	42,680
	9'	15	#8	6½"	11'-2"	447	14	#7	7"	44'-4"	1269	12	9'-6"	76	16	17"	18	17"	24	18"	58	287	44,730
	10'	15	#8	6½"	11'-2"	447	14	#7	7"	46'-4"	1326	12	10'-6"	84	16	17"	18	17"	28	17"	62	307	46,790



SINGLE MAT PLACEMENT

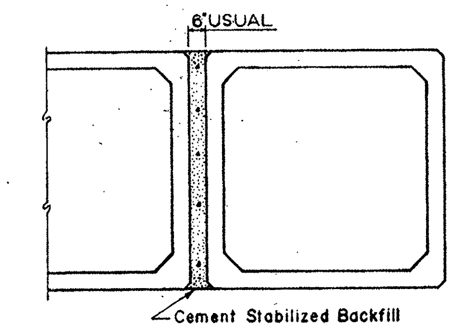


DOUBLE MAT PLACEMENT

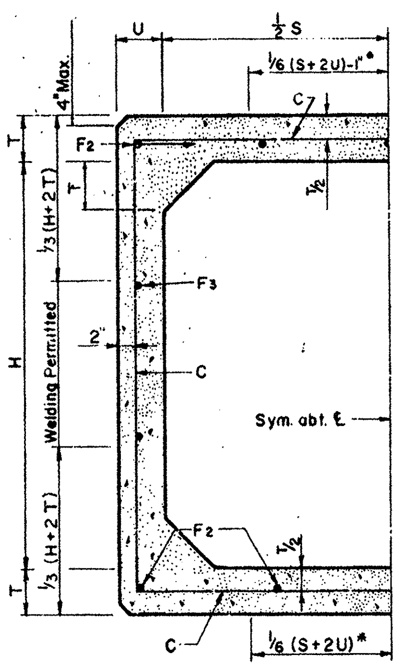


STEEL SUPPORT DETAIL

NOTE: As many Bars F as necessary may be extended to end of box to support steel during manufacture. Bars may be slightly bent to clear slope on groove lip as shown in detail. Alternatively the steel may be supported by bar extensions welded to Bars F.

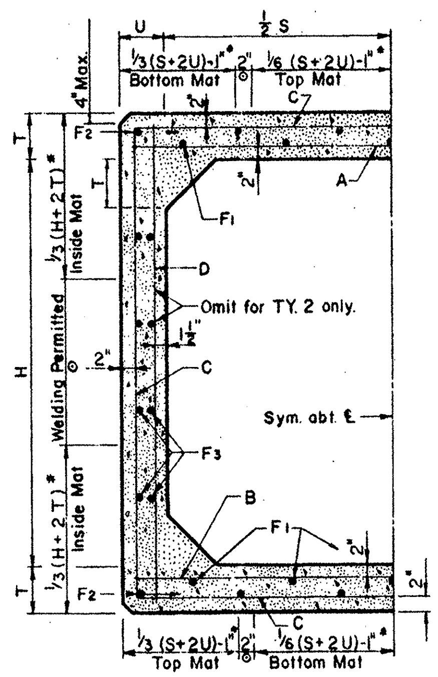


MULTIPLE UNIT PLACEMENT



HALF SECTION

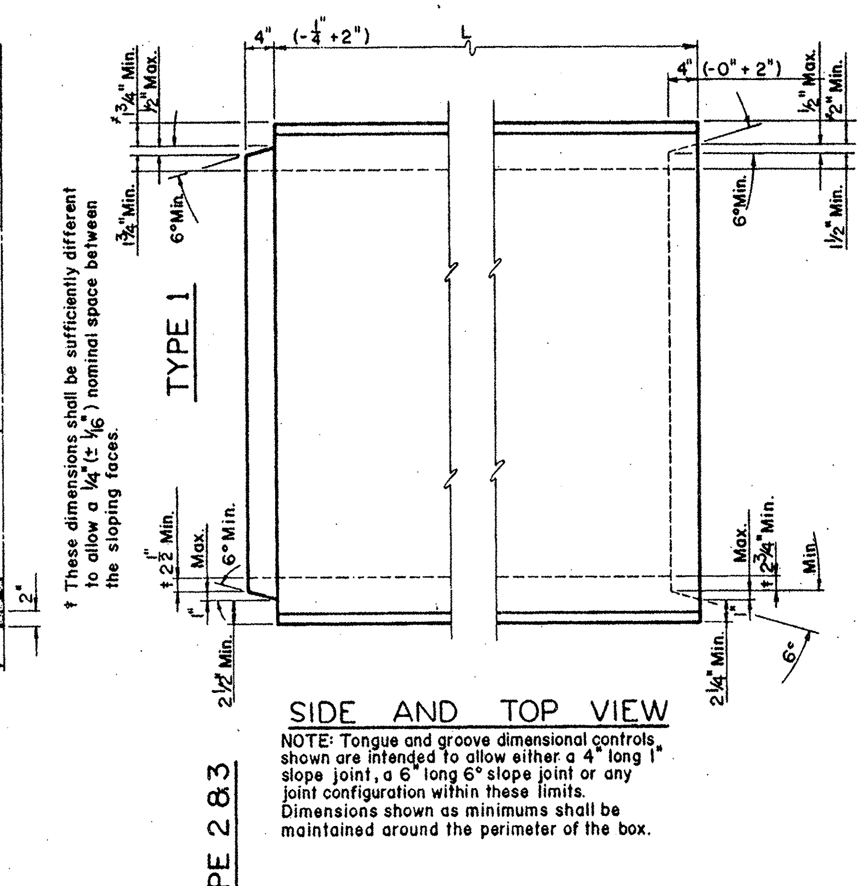
TYPE 1



HALF SECTION

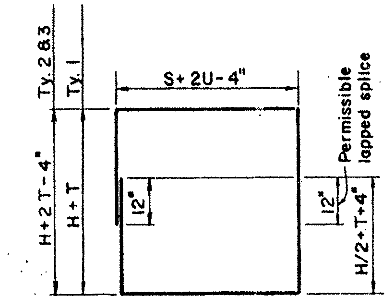
TYPES 2 & 3

*Permissible tack welding on mats shown.
⊙Permissible tack welding both mats.



SIDE AND TOP VIEW

NOTE: Tongue and groove dimensional controls shown are intended to allow either a 4" long 1" slope joint, a 6" long 6° slope joint or any joint configuration within these limits. Dimensions shown as minimums shall be maintained around the perimeter of the box.



BARS C

GENERAL NOTES:

Cement Stabilized Backfill shall be considered subsidiary to the unit price bid for Concrete Box.

All welding to be done by qualified welder.

Additional splices in reinforcing steel not shown hereon, must be submitted to the Bridge Division for approval prior to fabrication.

Grade 60 Bars or Wire Fabric may be used in place of Grade 40 Steel by supplying 82 % of the area of steel per linear foot shown in the Tables for Bars A.

Longitudinal steel shall have at least as much area as Bars F and shall be spaced at 18" c.c. maximum.

These designs are adequate for HS 20 live loading and any fill from 2'-0" to the maximum shown in the tables.

In lieu of furnishing the designs shown on this detail the contractor may use designs from ASTM C-789, Table I. In either case, the substituted design must equal or exceed the maximum fill height for the same sized box in the table on this detail. For boxes reinforced with wire fabric the minimum cover shall be three times the wire diameter but not less than one inch. Placing of reinforcement shall otherwise conform to specification "Reinforcing Steel".

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

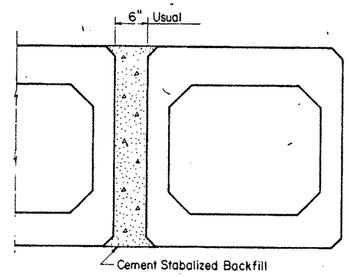
PRECAST CONCRETE BOX CULVERTS

PC-5

ORIGINAL DRAWING DATE: MARCH 1983		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.:-ADC	REVISIONS Rev. 1-86 (Gen. Notes)	15	6		312
CK.:-CCT		COUNTY	CONTROL	SECTION / JOB	HIGHWAY
DW.:-EDS					
CK.:-CCT		BEXAR	2452	2-23	

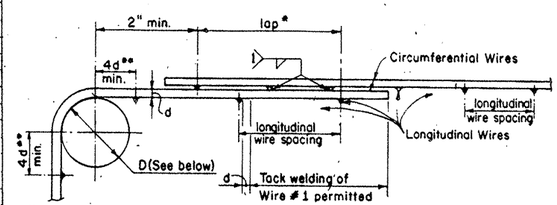
* Consult manufactures regarding availability of specific sizes.

CULV. SIZE* ft		DIMENSIONS (in)			CIRCUMFERENTIAL REINFORCEMENT AREAS (in²/ft)						LONGITUDINAL REINFORCEMENT AREAS (in²/ft)				LIFT WT. L=8'
S	H	T_t	T_b	U	A_{S1}	A_{S2}	A_{S3}	A_{S4}	A_{S7}	A_{S8}	A_{S5}	A_{S6}	A_{S9}		TONS
3	2	7	6	4	0.17	0.34	0.20	0.13	0.17	0.14	0.17	0.17	0.12		3.4
	3	7	6	4	0.13	0.36	0.22	0.13	0.17	0.14	0.18	0.17			3.8
4	2	7½	6	5	0.21	0.38	0.20	0.13	0.18	0.14	0.18	0.18			4.6
	3	7½	6	5	0.18	0.41	0.23	0.13	0.18	0.14	0.20	0.18			5.1
	4	7½	6	5	0.16	0.43	0.24	0.13	0.18	0.14	0.21	0.18			5.6
5	2	7	6	5	0.25	0.41	0.19	0.12	0.17	0.14	0.17	0.17			5.0
	3	8	7	6	0.22	0.41	0.22	0.14	0.19	0.17	0.19	0.19			6.8
	4	8	7	6	0.19	0.44	0.24	0.14	0.19	0.17	0.21	0.19			7.4
	5	8	7	6	0.16	0.46	0.26	0.14	0.19	0.17	0.22	0.19			8.0
6	3	8	7	7	0.30	0.42	0.21	0.17	0.19	0.17	0.19	0.19			8.1
	4	8	7	7	0.26	0.46	0.24	0.17	0.19	0.17	0.20	0.19			8.8
	5	8	7	7	0.23	0.48	0.26	0.17	0.19	0.17	0.21	0.19			9.5
	6	8	7	7	0.20	0.51	0.29	0.17	0.19	0.17	0.22	0.19			10.2
7	3	8	7	7	0.29	0.42	0.19	0.17	0.19	0.17	0.19	0.19			8.6
	4	8	8	8	0.32	0.45	0.24	0.19	0.19	0.19	0.19	0.19			10.7
	5	8	8	8	0.29	0.48	0.27	0.19	0.20	0.19	0.19	0.19			11.5
	6	8	8	8	0.27	0.51	0.29	0.19	0.20	0.19	0.20	0.19			12.3
	7	8	8	8	0.25	0.53	0.32	0.19	0.23	0.19	0.21	0.19			13.1
8	4	8	8	8	0.37	0.51	0.27	0.19	0.19	0.19	0.19	0.19			11.5
	5	8	8	8	0.34	0.53	0.30	0.19	0.19	0.19	0.20	0.19			12.3
	6	8	8	8	0.32	0.56	0.33	0.19	0.25	0.19	0.21	0.19			13.1
	7	8	8	8	0.30	0.58	0.35	0.19	0.27	0.22	0.22	0.19			13.9
	8	8	8	8	0.28	0.60	0.38	0.23	0.29	0.26	0.22	0.19			14.8
9	5	9	9	9	0.34	0.50	0.29	0.22	0.22	0.22	0.22	0.22			15.0
	6	9	9	9	0.32	0.53	0.32	0.22	0.22	0.22	0.22	0.22			15.9
	7	9	9	9	0.30	0.55	0.35	0.22	0.25	0.22	0.22	0.22			16.8
	8	9	9	9	0.28	0.57	0.38	0.22	0.27	0.24	0.22	0.22			17.8
	9	9	9	9	0.27	0.58	0.41	0.25	0.30	0.28	0.22	0.22			18.7
10	5	10	10	10	0.34	0.48	0.29	0.24	0.24	0.24	0.24	0.24			17.9
	6	10	10	10	0.32	0.50	0.32	0.24	0.24	0.24	0.24	0.24			19.0
	7	10	10	10	0.31	0.52	0.35	0.24	0.24	0.24	0.24	0.24			20.0
	8	10	10	10	0.29	0.54	0.38	0.24	0.26	0.24	0.24	0.24			21.0
	9	10	10	10	0.27	0.55	0.40	0.24	0.28	0.26	0.24	0.24			22.0
	10	10	10	10	0.27	0.57	0.43	0.27	0.32	0.31	0.24	0.24			23.1
11	4	11	11	11	0.38	0.44	0.26	0.26	0.26	0.26	0.26	0.26			20.0
	6	11	11	11	0.33	0.48	0.32	0.26	0.26	0.26	0.26	0.26			22.3
	8	11	11	11	0.29	0.51	0.38	0.26	0.26	0.26	0.26	0.26			24.5
	10	11	11	11	0.28	0.54	0.43	0.26	0.29	0.29	0.26	0.26			26.8
	11	11	11	11	0.28	0.56	0.46	0.30	0.34	0.34	0.26	0.26			27.9
12	4	12	12	12	0.40	0.42	0.29	0.29	0.29	0.29	0.29	0.29			23.4
	6	12	12	12	0.35	0.46	0.32	0.29	0.29	0.29	0.29	0.29			25.8
	8	12	12	12	0.31	0.49	0.38	0.29	0.29	0.29	0.29	0.29			28.3
	10	12	12	12	0.29	0.53	0.43	0.29	0.29	0.29	0.29	0.29			30.8
	12	12	12	12	0.29	0.57	0.50	0.33	0.36	0.37	0.29	0.29	0.12		33.2



MULTIPLE UNIT PLACEMENT

**4d minimum applies only where D is less than 8d.

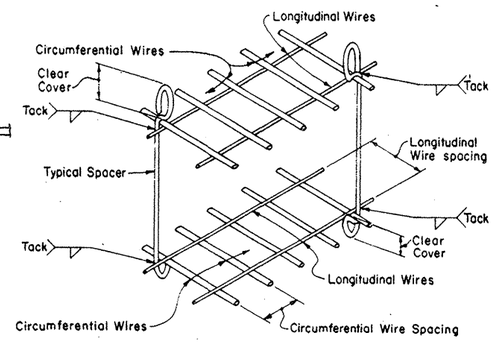


1. Tack as needed to hold mats.

TABLE OF MINIMUM BEND DIAMETERS

Wire Size	D min.
d ≤ W6	2d
d > W6	4d

LAP WELD AND BEND DETAILS



SPACER WELD DETAIL

GENERAL NOTES:

The Contractor may furnish designs shown on this sheet or on PC-7 in lieu of other precast direct traffic culverts of the same nominal size.

The Contractor may furnish Precast Concrete Box Culverts conforming to ASTM C850 (HS20 Loading) and to exceptions and requirements of this sheet and the specifications. Maximum fill = 4'-0"

At the Contractors option, dimensions T_t, T_b, and U may be increased by as much as 1" as necessary for forming purposes. All reinforcement areas and cover shall remain as shown.

Clear Cover. Clear cover for reinforcing steel shall be as shown except for wire sizes larger than W10 the 1" clear cover shall be increased to three times the wire diameter.

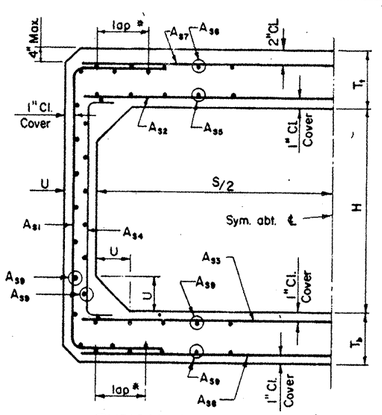
Tack Welding. No tack welding of circumferential wires will be permitted except within one and one-half longitudinal wire spacings of the end, but no closer than one circumferential wire diameter from the second longitudinal wire (See Lap Weld and Bend Detail).

Longitudinal wires may be welded at any point more than one-half longitudinal wire diameter from a circumferential wire. (See Spacer Weld Detail)

Multiple Unit Placement. Cement Stabilized Backfill shall be considered subsidiary to the unit price bid for Concrete Box.

Lap Splice. Requirement 3 for lap splice is based on Articles 1.5.22 (G)(1) and 1.5.20(B) of AASHTO "Standard Specifications for Highway Bridges", 12th. Edition plus 1981 Interim Specifications, with f'_c = 5000 p.s.i. and F_y = 65,000 p.s.i.

Marking. In addition to the marking requirements of Specification Item 462, "Concrete Box Culverts", each precast piece shall bear the following marking. TXPC6

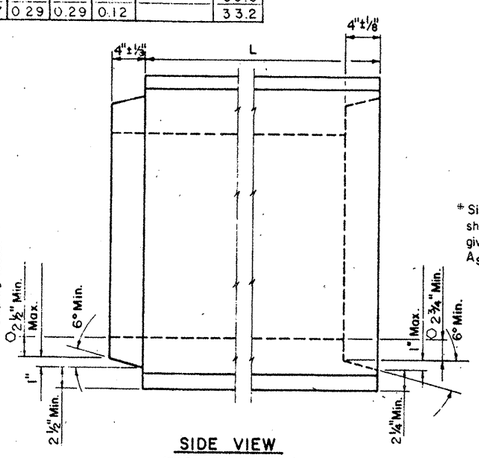


○ These dimensions shall be sufficiently different to allow a ¼" (± ⅛") nominal space between the sloping faces.

TYPICAL BOX HALF SECTION

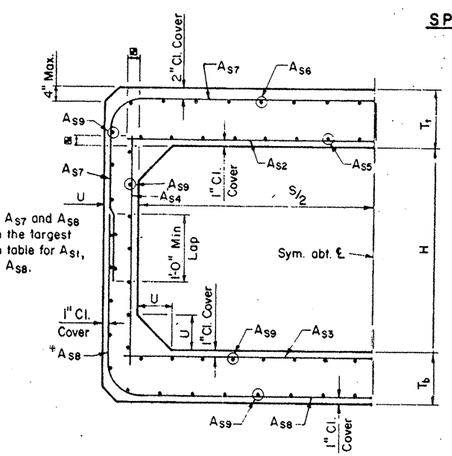
*NOTE: The lap measured between the outermost longitudinal wires of each fabric sheet shall not be less than the following.

(1) The spacing of the longitudinal wires plus 2 in. (larger spacing governs)
(2) 6 inches
(3) 31.0 A_s inches, where A_s equals the larger circumferential reinforcement area (in²/ft.) of the wires being lapped



SIDE VIEW
(TOP VIEW SIMILAR)

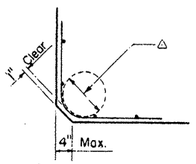
NOTE: Tongue and groove dimensional controls shown are intended to allow either a 4" long 1" slope joint, a 4" long 6° slope joint or any joint configuration within these limits. Dimensions shown as minimums shall be maintained around the perimeter of the box except the minimums shall be decreased ½" for 5" walls and 1" for 4" walls.



* Size of A_{S7} and A_{S8} shall be the largest given in table for A_{S1}, A_{S7} or A_{S8}.

OPTIONAL OUTSIDE WALL AND SLAB REINFORCING

■ Minimum lengths of inside mats shall be S or H plus one longitudinal wire spacing.



△ Minimum Bend Diameter must be approximately 10½ inches if 4 inch chamfer is used or approximately 3¾ inches for 2 inch chamfer. Minimum bend diameters in table may apply if chamfer is less than approximately 1¾ inches.

Rev. 6-89 (Add to Gen. Notes)

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

PRECAST CONCRETE BOX CULVERTS

PC-6

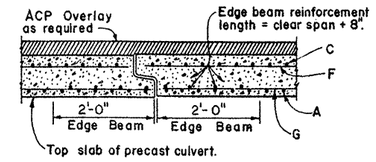
ORIGINAL DRAWING DATE MARCH 1983	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DR.:-LEH	REVISIONS	15	6	3/24
CK.:-MPM	4/83 Rev 2-84	COUNTY		
DW.:-EDS	⊙Rev. 10-83 Rev. 6-85	BEXAR	CONTROL / SECTION / JOB / HIGHWAY	2017 2 23 1/100
CK.:-LEH	⊙Rev. 8-86 Rev. 3-88			

CULVERT SIZE ft.		DIMENSIONS in.			TYPE SECT.	REINFORCING STEEL																EDGE BEAM REINF		LIFT⊗ WT. L = 12'	MAX FILL ft.
						BARS A		BARS B		BARS C		BARS D		BARS F		BARS G‡		BARS M		BARS N					
S	H	T_t	T_b	U		SIZE	SPA.	SIZE	SPA.	SIZE	SPA.	SIZE	SPA.	SIZE	SPA.	SIZE	SPA.	SIZE	SPA.	SIZE	SPA.	SIZE	NO.	TONS	
3	1	6	6	6	1	#5	6"	#5	12"	#4	18"	#4	15"	#4	18"	#4	6"	#4	18"			#5	3	2.7	15'
	1.5	"	"	"	1	"	"	"	"	"	"	"	"	"	"	"	"	"	15"			"	"	3.2	"
	2	"	"	"	2	"	"	"	"	"	15"	"	"	"	"	"	"	"	18"	#4	18"	"	"	2.7	"
	3	"	"	"	2	"	"	"	"	"	"	"	"	"	"	"	"	"	15"	"	15"	"	"	3.2	"
4	1	6	6	6	1	#5	5"	#5	10"	#4	18"	#4	15"	#4	18"	#4	6"	#4	18"			#5	4	3.2	12'
	2	"	"	"	1	"	"	"	"	"	"	"	12"	"	"	"	"	"	15"			"	"	4.1	"
	3	"	"	"	1	"	"	"	"	"	"	#5	9"	"	"	"	"	"	"			"	"	5.0	"
	4	"	"	"	1	"	"	"	"	"	"	"	7"	"	"	"	"	"	12"			"	"	5.9	"
5	1	6½	6	6	1	#5	4"	#5	8"	#4	18"	#4	15"	#4	18"	#4	6"	#4	18"			#5	5	3.5	10'
	2	"	"	"	1	"	"	"	"	"	"	"	12"	"	"	"	"	"	15"			"	"	4.4	"
	3	"	"	"	1	"	"	"	"	"	"	#5	9"	"	"	"	"	"	"			"	"	5.3	"
	4	"	"	"	1	"	"	"	"	"	"	"	7"	"	"	"	"	"	12"			"	"	6.2	"
	5	"	"	"	2	"	"	"	"	"	9"	#4	9"	"	"	"	"	"	15"	#4	15"	"	"	5.1	"
6	1	7	6½	6	1	#5	4"	#5	8"	#4	18"	#4	15"	#4	18"	#4	6"	#4	18"			#5	5	4.2	8'
	2	"	"	"	1	"	"	"	"	"	"	"	12"	"	"	"	"	"	15"			"	"	5.1	"
	3	"	"	"	1	"	"	"	"	"	"	#5	9	"	"	"	"	"	"			"	"	6.0	"
	4	"	"	"	1	"	"	"	"	"	"	"	7"	"	"	"	"	"	12"			"	"	6.9	"
	5	"	"	"	2	"	"	"	"	"	9"	#4	9"	"	"	"	"	"	15"	#4	15"	"	"	5.9	"
	6	"	"	"	2	"	"	"	"	#5	10"	#5	9"	"	"	"	"	"	"	"	"	"	"	6.3	"
7	1	7½	7	6	1	#5	4"	#5	6"	#4	18"	#4	15"	#4	18"	#4	6"	#4	18"			#5	5	5.0	8'
	2	"	"	"	1	"	"	"	"	"	"	"	12"	"	"	"	"	"	15"			"	"	5.9	"
	3	"	"	"	1	"	"	"	"	"	"	#5	9"	"	"	"	"	"	"			"	"	6.8	"
	4	"	"	"	1	"	"	"	"	"	"	"	7"	"	"	"	"	"	12"			"	"	7.7	"
	5	"	"	"	2	"	"	"	"	"	9"	#4	9"	"	"	"	"	"	15"	#4	15"	"	"	6.7	"
	6	"	"	"	2	"	"	"	"	#5	10"	#5	9"	"	"	"	"	"	"	"	"	"	"	7.1	"
	7	"	"	"	2	"	"	"	"	"	8"	"	6"	"	"	"	"	"	12"	"	12"	"	"	7.6	"
8	1	8	7½	6	1	#6	5"	#6	8"	#4	18"	#4	15"	#4	18"	#4	6"	#4	18"			#6	4	5.9	8'
	2	"	"	"	1	"	"	"	"	"	"	"	12"	"	"	"	"	"	15"			"	"	6.8	"
	3	"	"	"	1	"	"	"	"	"	"	#5	9"	"	"	"	"	"	"			"	"	7.7	"
	4	"	"	"	1	"	"	"	"	"	"	"	7"	"	"	"	"	"	12"			"	"	8.6	"
	5	"	"	"	2	"	"	"	"	"	9"	#4	9"	"	"	"	"	"	15"	#4	15"	"	"	7.6	"
	6	"	"	"	2	"	"	"	"	#5	10"	#5	9"	"	"	"	"	"	"	"	"	"	"	8.0	"
	7	"	"	"	2	"	"	"	"	"	8"	"	6"	"	"	"	"	"	12"	"	12"	"	"	8.5	"
	8	"	"	"	2	"	"	"	"	"	7"	"	5"	"	"	"	"	"	"	"	"	"	"	8.9	"
9	1	8	7½	6	1	#6	4"	#6	6"	#4	18"	#4	15"	#4	18"	#5	6"	#4	18"			#6	4	6.4	8'
	2	"	"	"	1	"	"	"	"	"	"	"	12"	"	"	"	"	"	15"			"	"	7.3	"
	3	"	"	"	1	"	"	"	"	"	"	#5	9"	"	"	"	"	"	"			"	"	8.2	"
	4	"	"	"	1	"	"	"	"	"	"	"	7"	"	"	"	"	"	12"			"	"	9.1	"
	5	"	"	"	2	"	"	"	"	"	9"	#4	9"	"	"	"	"	"	15"	#4	15"	"	"	8.2	"
	6	"	"	"	2	"	"	"	"	#5	10'	#5	9"	"	"	"	"	"	"	"	"	"	"	8.6	"
	7	"	"	"	2	"	"	"	"	"	8"	"	6"	"	"	"	"	"	12"	"	12"	"	"	9.0	"
	8	"	"	"	2	"	"	"	"	"	7"	"	5"	"	"	"	"	"	"	"	"	"	"	9.5	"
10	1	8½	8	6	1	#6	4"	#6	5"	#4	18"	#4	15"	#4	18"	#5	6"	#4	18"			#6	4	7.4	8'
	2	"	"	"	1	"	"	"	"	"	"	"	12"	"	"	"	"	"	15"			"	"	8.3	"
	3	"	"	"	1	"	"	"	"	"	"	#5	9"	"	"	"	"	"	"			"	"	9.2	"
	4	"	"	"	1	"	"	"	"	"	"	"	7"	"	"	"	"	"	12"			"	"	10.1	"
	5	"	"	"	2	"	"	"	"	"	9"	#4	9"	"	"	"	"	"	15"	#4	15"	"	"	9.2	"
	6	"	"	"	2	"	"	"	"	#5	10"	#5	9"	"	"	"	"	"	"	"	"	"	"	9.6	"
	7	"	"	"	2	"	"	"	"	"	8"	"	6"	"	"	"	"	"	12"	"	12"	"	"	10.0	"
	8	"	"	"	2	"	"	"	"	"	7"	"	5"	"	"	"	"	"	"	"	"	"	"	10.5	"

⊗ Lift weight is the maximum piece weight of the top and bottom sections.

‡ If the fill height is greater than 2'-0", the size and spacing of Bars G may be reduced to that of Bars F.

NOTE: Edge beam reinforcement may be combined with Bars A in a single layer, or placed in a separate layer as shown below. Bars shall be bundled as necessary to maintain required clear distances between bars.



EDGE BEAM

GENERAL NOTES:

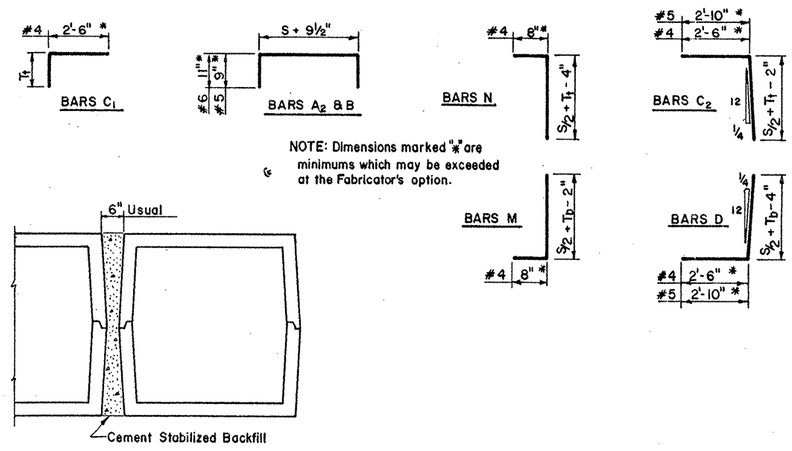
Design conforms to 1977 AASHTO Standard Specifications for Highway Bridges (Interim revisions included thru 1982) for HS 20 direct traffic loading and maximum fill height shown in the table. Precast culverts constructed according to this design shall conform to Item 462 "Concrete Box Culverts."

The Contractor may furnish designs shown on this sheet in lieu of other precast culvert designs of the same nominal size, provided the maximum fill does not exceed that shown in the table.

Reinforcing steel: Grade 60 deformed bars. Concrete, f'_c = 4000psi

Joint Protection: Where fill measured from the top of the precast box culvert to the roadway surface is less than 2'-0", joints shall be protected by strengthening the top slab with an Edge Beam at each free edge.

Edge Beams shall be subsidiary to the unit price bid for Concrete Box.



MULTIPLE UNIT PLACEMENT

Tack Welding: No tack welding of reinforcing bars will be permitted except within 6 inches of an end. Bars F are exempt from this restriction, and may be tack welded anywhere along their length.

Multiple Unit Placement: Cement Stabilized Backfill shall be considered subsidiary to the unit price bid for Concrete Box.

Form Removal and Handling Procedures: Precast pieces may be removed from the forms as soon as they have attained sufficient strength to allow handling without cracking. Damaged or cracked pieces shall be subject to rejection.

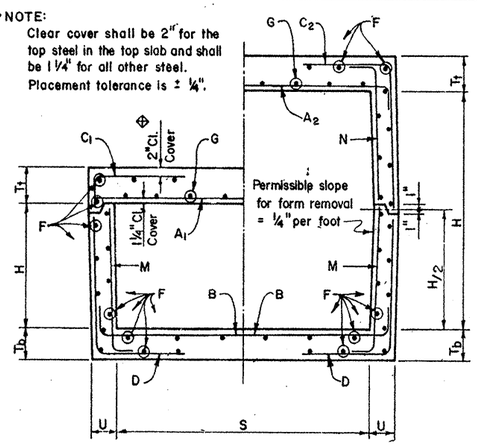
Marking: In addition to the marking requirements of Item 462, each piece shall bear the following markings:

Top and Bottom pieces without edge beams: TXPC7

Top pieces with edge beams: TXPC7 EB

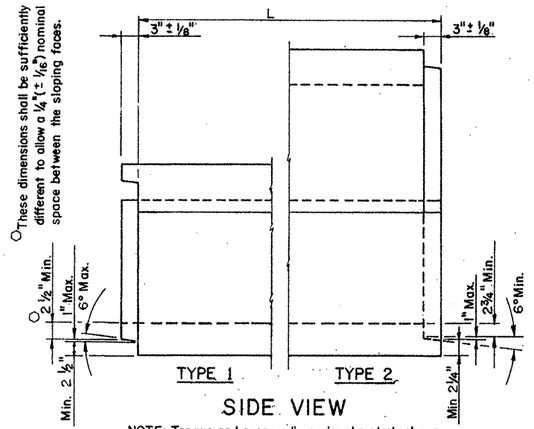
Joint Seals: Horizontal and transverse joints shall be sealed in accordance with the Specifications.

⊕ NOTE:
Clear cover shall be 2" for the top steel in the top slab and shall be 1¼" for all other steel.
Placement tolerance is ± ¼".



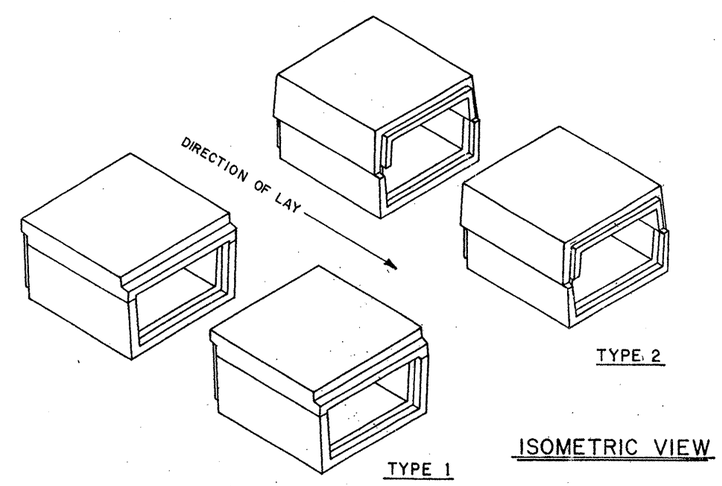
TYPE 1 TYPE 2

TYPICAL BOX HALF SECTIONS



SIDE VIEW

NOTE: Tongue and groove dimensional controls shown are intended to allow either a 3" long 1" slope joint, a 3" long 6° slope joint or any joint configuration within these limits. Dimensions shown as minimums shall be maintained around the box and along the horizontal joint.



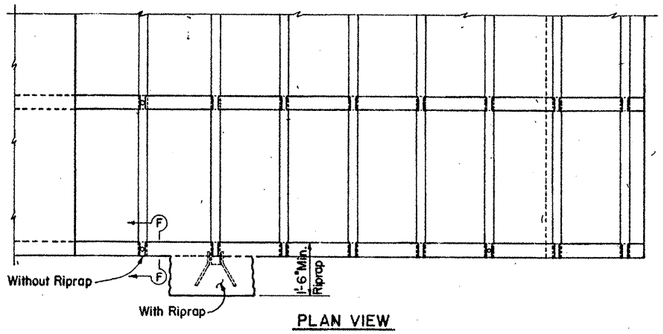
ISOMETRIC VIEW

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

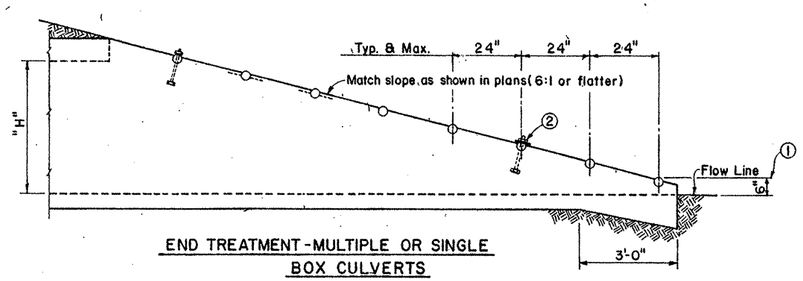
PRECAST CONCRETE BOX CULVERTS

PC-7

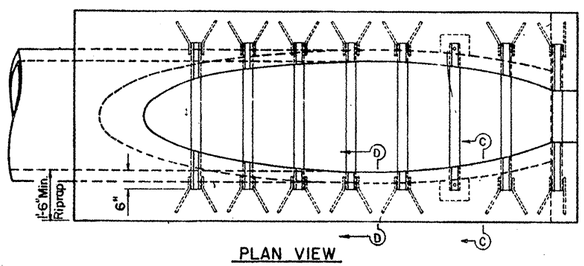
ORIGINAL DRAWING DATE: MARCH 1983	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
DN.:-LEH REVISIONS	15	6			3128
CK.:-MPM Rev. 2-84	COUNTY		CONTROL	SECTION	JOB HIGHWAY
DW.:-EDS					
CK.:-LEH	TEXAS	ALL			



PLAN VIEW

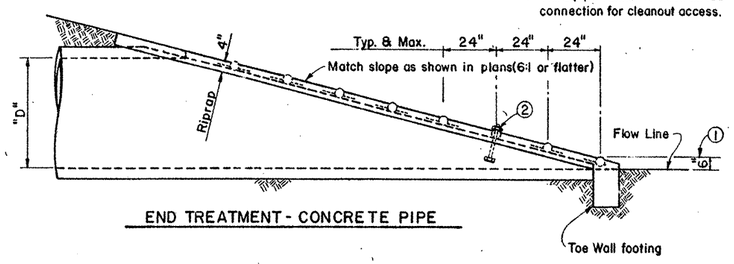


END TREATMENT - MULTIPLE OR SINGLE BOX CULVERTS

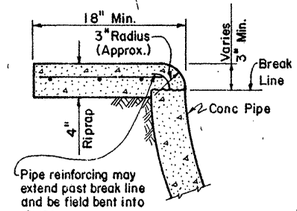


PLAN VIEW
CONCRETE PIPE

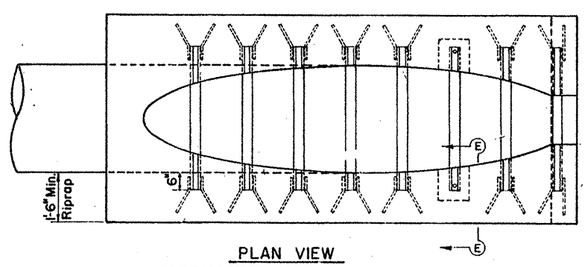
① Top of Safety Pipe Runner (Typ.)
② Third pipe runner to have bolted connection for cleanout access.



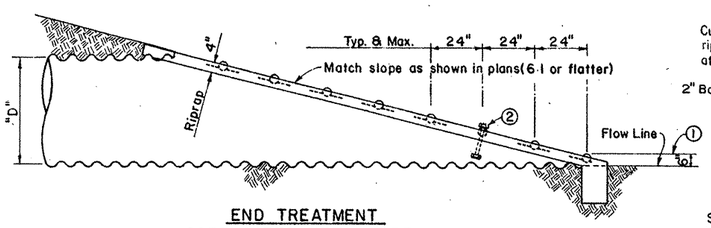
END TREATMENT - CONCRETE PIPE



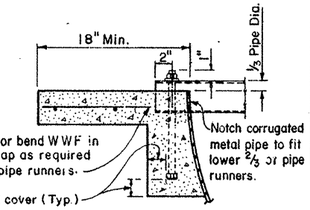
SEC. D-D



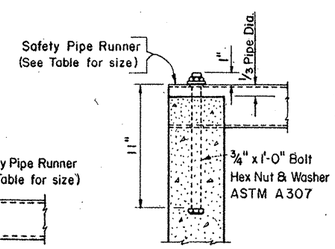
PLAN VIEW
CORRUGATED METAL PIPE



END TREATMENT
CORRUGATED METAL PIPE



SEC. E-E



SEC. F-F

REQUIRED PIPE SIZES FOR GIVEN PIPE YIELD										
Culvert Size	Pipe Runner Length	35 ksi: ASTM A53, Ty. E & S Gr. B			42 ksi: ASTM A500, Gr. B			52 ksi: API 5LX52		
		Nom.	OD	ID	Nom.	OD	ID	Nom.	OD	ID
30"	42"	3" XS 3½" STD	3.500 4.000	2.900 3.548	2½" XXS 3" STD	2.875 3.500	1.771 3.068	2½" XXS 3" STD	2.875 3.500	1.771 3.068
36"	48"	3" XXS 3½" XS	3.500 4.000	2.300 3.364	3" XS 3½" Std.	3.500 4.000	2.900 3.548	3" Std.	3.500	3.068
42"	54"	3" XXS 3½" XS 4" Std.	3.500 4.000 4.500	2.300 3.364 4.026	3" XXS 3½" XS 4" Std.	3.500 4.000 4.500	2.300 3.364 4.026	3" XS 3½" Std.	3.500 4.000	2.900 3.548
48"	60"	3" XXS 4" XS	3.500 4.500	2.300 3.826	3" XXS 3½" XS 4" Std.	3.500 4.000 4.500	2.300 3.364 4.026	3" XXS 3½" Std.	3.500 4.000	2.300 3.548
54"	66"	4" XS 5" Std.	4.500 5.563	3.826 5.047	3" XXS 4" Std.	3.500 4.500	2.300 4.026	3" XXS 3½" XS 4" Std.	3.500 4.000 4.500	2.300 3.364 4.026
60"	72"	4" XS 5" Std.	4.500 5.563	3.826 5.047	4" XS 5" Std.	4.500 5.563	3.826 5.047	3" XXS 3½" XS 4" Std.	3.500 4.000 4.500	2.300 3.364 4.026

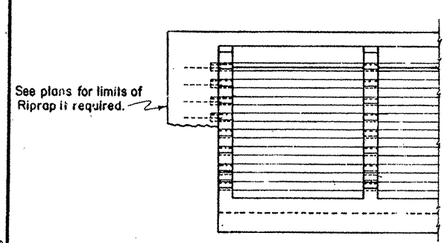
GENERAL NOTES:

These details are to be used as a guide for installation of safety pipe runners for parallel-drainage structures where out of control vehicles may impact the openings approximately perpendicular to the safety pipe runners. Some installations may require the preparation of special details. In general, safety pipe runners are installed on parallel-drainage structures at maximum spacings of approximately 24 inches.

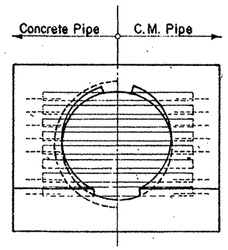
Installation of safety pipe runners for single or multiple culverts will be in accordance with the details shown if the use of safey pipe runners are specified elsewhere in the plans.

Payment for riprap (if required) toe wall footing is included in the price bid for each Safety Pipe End Treatment.

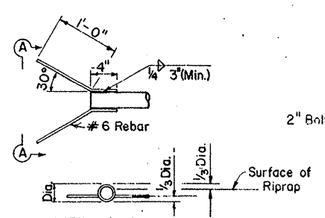
Design: Safety Pipe Runners are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, Safety Treatment of Roadside Parallel Drainage Structures, Texas Transportation Institute, June 1981.



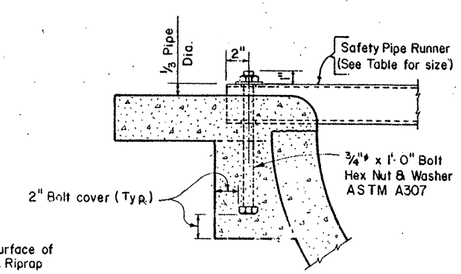
END VIEW
MULTIPLE OR SINGLE BOX CULVERTS



END VIEW
CONCRETE OR CORRUGATED METAL PIPE



VIEW A-A



SEC. C-C

Deepen and widen riprap around ends of 3rd. pipe runner and provide a bolted connection to allow cleanout access.

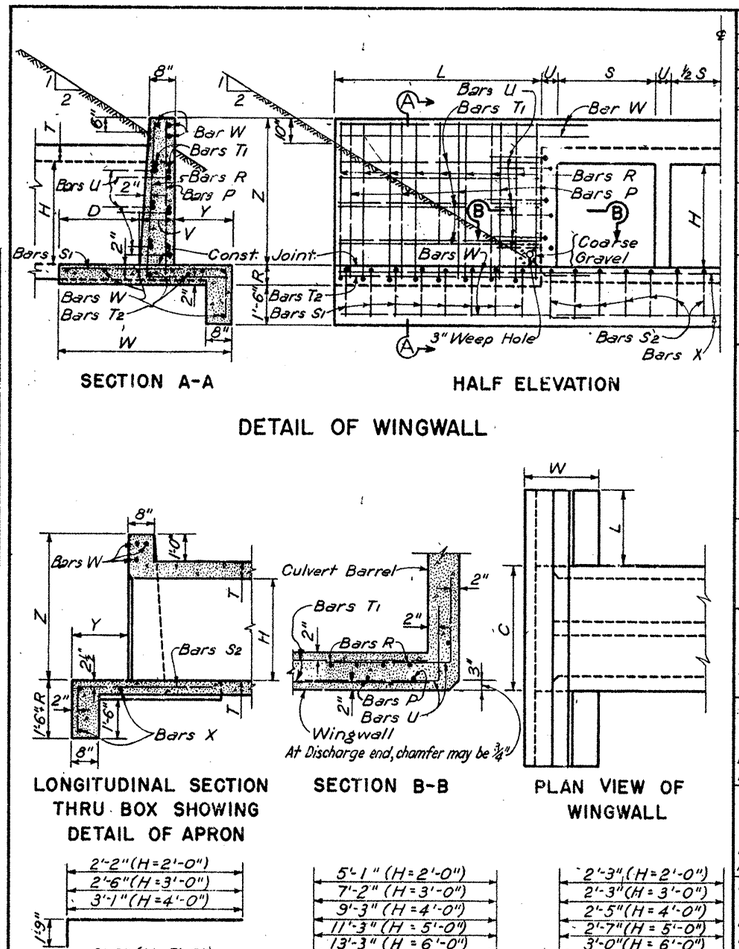
STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

PARALLEL DRAINAGE SAFETY PIPE RUNNERS

PD-SPR

ORIGINAL DRAWING DATE: JUNE 1985		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
DN.:-MPM	REVISIONS	15	6			3/3
CK.:-JJP	Rev. 10-86 (Gen Notes)	COUNTY				
DW.:-EDS	Rev. 11-87 (Added 30" Pipe to table)	BEXAR		CONTROL	SECTION	JOB	HIGHWAY
CK.:-MPM				2402	22	23	410

BRUNING 24 1425 7049

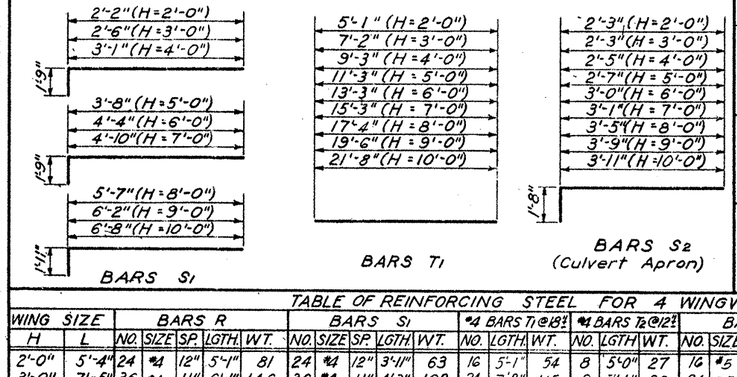


DETAIL OF WINGWALL

LONGITUDINAL SECTION THRU BOX SHOWING DETAIL OF APRON

SECTION B-B

PLAN VIEW OF WINGWALL



REINFORCING FOR 2 CULVERT APRONS

#BARS X - #4 @12" ± NUMBER OF SPANS 2 WT.	3 WT.	4 WT.	5 WT.	6 WT.	LENGTH	BARS S2 ~ #4 @ 12" ± NUMBER OF SPANS 2 NO.	2 WT.	3 NO.	3 WT.	4 NO.	4 WT.	5 NO.	5 WT.	6 NO.	6 WT.	CULVERT SIZE	S	H
31	45	60	75	90	3'-11"	24	63	36	94	46	120	58	152	68	178	MC5-1&2	5	2
31	45	60	75	90	3'-11"	24	63	36	94	46	120	58	152	68	178		5	3
31	45	60	75	90	4'-1"	24	65	36	98	46	125	58	158	68	185		5	4
47	69	92	114	137	4'-3"	24	68	36	102	46	131	58	165	68	193		5	5
36	53	71	88	105	3'-11"	28	73	42	110	54	141	68	178	80	209	MC6-1&2	6	3
36	53	71	88	105	4'-1"	28	76	42	114	54	147	68	185	80	218		6	4
55	81	108	134	161	4'-3"	28	79	42	119	54	153	68	193	80	227		6	5
55	81	108	134	161	4'-8"	28	87	42	131	54	168	68	212	80	250		6	6
41	61	81	102	122	3'-11"	32	84	48	126	62	162	78	204	92	241	MC7,2&3	7	3
41	61	81	102	122	4'-1"	32	87	48	131	62	169	78	213	92	251		7	4
63	94	124	154	185	4'-3"	32	91	48	136	62	176	78	221	92	261		7	5
63	94	124	154	185	4'-8"	32	100	48	150	62	193	78	243	92	287		7	6
63	94	124	154	185	4'-9"	32	102	48	152	62	197	78	247	92	292		7	7
47	69	92	115	138	4'-1"	36	98	54	147	70	191	88	240	104	283	MC8-1	8	4
71	106	140	174	209	4'-3"	36	102	54	153	70	199	88	250	104	295		8	5
71	106	140	174	209	4'-8"	36	112	54	168	70	218	88	275	104	324		8	6
71	106	140	174	209	4'-9"	36	114	54	171	70	222	88	279	104	330		8	7
96	143	189	235	281	5'-1"	36	122	54	183	70	238	88	299	104	353		8	8
47	69	92	115	138	4'-1"	36	98	54	147	70	191	88	240	104	283	MC8-2	8	4
71	106	140	174	209	4'-3"	36	102	54	153	70	199	88	250	104	295		8	5
71	106	140	174	209	4'-8"	36	112	54	168	70	218	88	275	104	324		8	6
71	106	140	174	209	4'-9"	36	114	54	171	70	222	88	279	104	330		8	7
96	143	189	235	281	5'-1"	36	122	54	183	70	238	88	299	104	353		8	8
47	69	92	115	138	4'-1"	36	98	54	147	70	191	88	240	104	283	MC8-3	8	4
71	106	140	174	209	4'-3"	36	102	54	153	70	199	88	250	104	295		8	5
71	106	140	174	209	4'-8"	36	112	54	168	70	218	88	275	104	324		8	6
71	106	140	174	209	4'-9"	36	114	54	171	70	222	88	279	104	330		8	7
96	143	189	235	281	5'-1"	36	122	54	183	70	238	88	299	104	353		8	8
79	118	156	194	233	4'-3"	40	114	60	170	78	221	98	278	118	335	MC9-1	9	5
79	118	156	194	233	4'-8"	40	125	60	187	78	243	98	306	118	368		9	6
79	118	156	194	233	4'-9"	40	127	60	190	78	247	98	311	118	374		9	7
107	159	210	262	314	5'-1"	40	136	60	204	78	265	98	333	118	400		9	8
107	159	210	262	314	5'-5"	40	145	60	217	78	282	98	355	118	427		9	9
79	118	156	194	233	4'-3"	40	114	60	170	78	221	98	278	118	335	MC9-2	9	5
79	118	156	194	233	4'-8"	40	125	60	187	78	243	98	306	118	368		9	6
79	118	156	194	233	4'-9"	40	127	60	190	78	247	98	311	118	374		9	7
107	159	210	262	314	5'-1"	40	136	60	204	78	265	98	333	118	400		9	8
107	159	210	262	314	5'-5"	40	145	60	217	78	282	98	355	118	427		9	9
79	118	156	194	233	4'-3"	40	114	60	170	78	221	98	278	118	335	MC9-3	9	5
79	118	156	194	233	4'-8"	40	125	60	187	78	243	98	306	118	368		9	6
79	118	156	194	233	4'-9"	40	127	60	190	78	247	98	311	118	374		9	7
107	159	210	262	314	5'-1"	40	136	60	204	78	265	98	333	118	400		9	8
107	159	210	262	314	5'-5"	40	145	60	217	78	282	98	355	118	427		9	9
87	130	172	214	260	4'-8"	44	137	66	206	86	268	108	337	130	406	MC10-1	10	6
87	130	172	214	260	4'-9"	44	140	66	209	86	273	108	343	130	412		10	7
118	175	232	289	350	5'-1"	44	149	66	224	86	292	108	366	130	441		10	8
118	175	232	289	350	5'-5"	44	159	66	239	86	311	108	391	130	471		10	9
118	175	232	289	350	5'-7"	44	164	66	246	86	321	108	403	130	485		10	10
87	130	172	214	260	4'-8"	44	137	66	206	86	268	108	337	130	406	MC10-2	10	6
87	130	172	214	260	4'-9"	44	140	66	209	86	273	108	343	130	412		10	7
118	175	232	289	350	5'-1"	44	149	66	224	86	292	108	366	130	441		10	8
118	175	232	289	350	5'-5"	44	159	66	239	86	311	108	391	130	471		10	9
118	175	232	289	350	5'-7"	44	164	66	246	86	321	108	403	130	485		10	10
87	130	172	214	260	4'-8"	44	137	66	206	86	268	108	337	130	406	MC10-3	10	6
87	130	172	214	260	4'-9"	44	140	66	209	86	273	108	343	130	412		10	7
118	175	232	289	350	5'-1"	44	149	66	224	86	292	108	366	130	441		10	8
118	175	232	289	350	5'-5"	44	159	66	239	86	311	108	391	130	471		10	9
118	175	232	289	350	5'-7"	44	164	66	246	86	321	108	403	130	485		10	10

TABLE OF DIMENSIONS

SLAB T	WING Z	L	R	W	V	D	Y	APRON C NUMBER OF SPANS 2	3	4	5	6
6"	3'-6"	5'-4"	7"	2'-6"	8"	10"	1'-0"	11'-6"	17'-0"	22'-6"	28'-0"	33'-6"
6"	4'-6"	7'-4"	7"	2'-10"	8"	1'-2"	1'-0"	11'-6"	17'-0"	22'-6"	28'-0"	33'-6"
6"	5'-6"	9'-4"	7"	3'-5"	8"	1'-7"	1'-2"	11'-6"	17'-0"	22'-6"	28'-0"	33'-6"
6"	6'-6"	11'-4"	7"	4'-0"	8"	2'-0"	1'-4"	11'-9"	17'-4"	22'-11"	28'-6"	34'-1"
6"	4'-6"	7'-4"	7"	2'-10"	8"	1'-2"	1'-0"	13'-6"	20'-0"	26'-6"	33'-0"	39'-6"
6"	5'-6"	9'-4"	7"	3'-5"	8"	1'-7"	1'-2"	13'-6"	20'-0"	26'-6"	33'-0"	39'-6"
6"	6'-6"	11'-4"	7"	4'-0"	8"	2'-0"	1'-4"	13'-9"	20'-4"	26'-11"	33'-6"	40'-1"
6"	7'-6"	13'-4"	7"	4'-8"	8"	2'-9"	1'-9"	13'-9"	20'-4"	26'-11"	33'-6"	40'-1"
6½"	4'-6½"	7'-5"	7"	2'-10"	8"	1'-2"	1'-0"	15'-6"	23'-0"	30'-6"	38'-0"	45'-6"
6½"	5'-6½"	9'-5"	7"	3'-5"	8"	1'-7"	1'-2"	15'-6"	23'-0"	30'-6"	38'-0"	45'-6"
6½"	6'-6½"	11'-5"	7"	4'-0"	8"	2'-0"	1'-4"	15'-9"	23'-4"	30'-11"	38'-6"	46'-1"
6½"	7'-6½"	13'-5"	7"	4'-8"	8"	2'-9"	1'-9"	15'-9"	23'-4"	30'-11"	38'-6"	46'-1"
6½"	8'-6½"	15'-5"	8"	5'-2"	9½"	2'-6½"	1'-10"	15'-9"	23'-4"	30'-11"	38'-6"	46'-1"
6½"	5'-6½"	9'-5"	7"	3'-5"	8"	1'-7"	1'-2"	17'-6"	26'-0"	34'-6"	43'-0"	51'-6"
6½"	6'-6½"	11'-5"	7"	4'-0"	8"	2'-0"	1'-4"	17'-9"	26'-4"	34'-11"	43'-6"	52'-1"
6½"	7'-6½"	13'-5"	7"	4'-8"	8"	2'-9"	1'-9"	17'-9"	26'-4"	34'-11"	43'-6"	52'-1"
6½"	8'-6½"	15'-5"	8"	5'-2"	9½"	2'-6½"	1'-10"	17'-9"	26'-4"	34'-11"	43'-6"	52'-1"
6½"	9'-6½"	17'-5"	9"	5'-9"	10½"	2'-9½"	2'-2"	18'-0"	26'-8"	35'-4"	44'-0"	52'-8"
7"	5'-7"	9'-6"	7"	3'-5"	8"	1'-7"	1'-2"	17'-6"	26'-0"	34'-6"	43'-0"	51'-6"
7"	6'-7"	11'-6"	7"	4'-0"	8"	2'-0"	1'-4"	17'-9"	26'-4"	34'-11"	43'-6"	52'-1"
7"	7'-7"	13'-6"	7"	4'-8"	8"	2'-9"	1'-9"	17'-9"	26'-4"	34'-11"	43'-6"	52'-1"
7"	8'-7"	15'-6"	8"	5'-2"	9½"	2'-6½"	1'-10"	17'-9"	26'-4"	34'-11"	43'-6"	52'-1"
7"	9'-7"	17'-6"	9"	5'-9"	10½"	2'-9½"	2'-2"	18'-0"	26'-8"	35'-4"	44'-0"	52'-8"
7½"	5'-7½"	9'-7"	7"	3'-5"	8"	1'-7"	1'-2"	17'-6"	26'-0"	34'-6"	43'-0"	51'-6"
7½"	6'-7½"	11'-7"	7"	4'-0"	8"	2'-0"	1'-4"	17'-9"	26'-4"	34'-11"	43'-6"	52'-1"
7½"	7'-7½"	13'-7"	7"	4'-8"	8"	2'-9"	1'-9"	17'-9"	26'-4"	34'-11"	43'-6"	52'-1"
7½"	8'-7½"	15'-7"	8"	5'-2"	9½"	2'-6½"	1'-10"	17'-9"	26'-4"	34'-11"	43'-6"	52'-1"
7½"	9'-7½"	17'-7"	9"	5'-9"	10½"	2'-9½"	2'-2"	18'-0"	26'-8"	35'-4"	44'-0"	52'-8"
8"	6'-8"	11'-8"	7"	4'-0"	8"	2'-0"	1'-4"	19'-9"	29'-4"	38'-11"	48'-6"	58'-1"
8"	7'-8"	13'-8"	7½"	4'-9"	8½"	2'-3½"	1'-9"	19'-9"	29'-4"	38'-11"	48'-6"	58'-1"
8"	8'-8"	15'-8"	8½"	5'-4"	9½"	2'-7½"	1'-11"	19'-9"	29'-4"	38'-11"	48'-6"	58'-1"
8"	9'-8"	17'-8"	9½"	6'-0"	11"	2'-11"	2'-2"	20'-0"	29'-8"	39'-4"	49'-0"	58'-8"
8"	10'-8"	19'-8"	10"	6'-6"	12½"	2'-11½"	2'-6"	20'-0"	29'-8"	39'-4"	49'-0"	58'-8"
8½"	6'-8½"	11'-9"	7"	4'-0"	8"	2'-0"	1'-4"	19'-9"	29'-4"	38'-11"	48'-6"	58'-1"
8½"	7'-8½"	13'-9"	7½"	4'-9"	8½"	2'-3½"	1'-9"	19'-9"	29'-4"	38'-11"	48'-6"	58'-1"
8½"	8'-8½"	15'-9"	8½"	5'-4"	9½"	2'-7½"	1'-11"	19'-9"	29'-4"	38'-11"	48'-6"	58'-1"
8½"	9'-8½"	17'-9"	9½"	6'-0"	11"	2'-11"	2'-2"	20'-0"	29'-8"	39'-4"	49'-0"	58'-8"
8½"	10'-8½"	19'-9"	10"	6'-6"	12½"	2'-11½"	2'-6"	20'-0"	29'-8"	39'-4"	49'-0"	58'-8"
7½"	7'-7½"	13'-7"	7½"	4'-9"	8½"	2'-3½"	1'-9"	21'-9"	32'-4"	42'-11"	53'-6"	64'-1"
7½"	8'-7½"	15'-7"	8½"	5'-4"	9½"	2'-7½"	1'-11"	21'-9"	32'-4"	42'-11"	53'-6"	64'-1"
7½"	9'-7½"	17'-7"	9½"	6'-0"	11"	2'-11"	2'-2"	22'-0"	32'-8"	43'-4"	54'-0"	64'-8"
7½"	10'-7½"	19'-7"	10"	6'-6"	12½"	2'-11½"	2'-6"	22'-0"	32'-8"	43'-4"	54'-0"	64'-8"
7½"	11'-7½"	21'-7"	11"	7'-0"	13½"	3'-2½"	2'-8"	22'-0"	32'-8"	43'-4"	54'-0"	64'-8"
8½"	7'-8½"	13'-9"	7½"	4'-9"	8½"	2'-3½"	1'-9"	21'-9"	32'-4"	42'-11"	53'-6"	64'-1"
8½"	8'-8½"	15'-9"	8½"	5'-4"	9½"	2'-7½"	1'-11"	21'-9"	32'-4"	42'-11"	53'-6"	64'-1"
8½"	9'-8½"	17'-9"	9½"	6'-0"	11"	2'-11"	2'-2"	22'-0"	32'-8"	43'-4"	54'-0"	64'-8"
8½"	10'-8½"	19'-9"	10"	6'-6"	12½"	2'-11½"	2'-6"	22'-0"	32'-8"	43'-4"	54'-0"	64'-8"
8½"	11'-8½"	21'-9"	11"	7'-0"	13½"	3'-2½"	2'-8"	22'-0"	32'-8"	43'-4"	54'-0"	64'-8"
9½"	7'-9½"	13'-11"	7½"	4'-9"	8½"	2'-3½"	1'-9"	21'-9"	32'-4"	42'-11"	53'-6"	64'-1"
9½"	8'-9½"	15'-9"	8½"	5'-4"	9½"	2'-7½"	1'-11"	21'-9"	32'-4"	42'-11"	53'-6"	64'-1"
9½"	9'-9½"	17'-11"	9½"	6'-0"	11"	2'-11"	2'-2"	22'-0"	32'-8"	43'-4"	54'-0"	64'-8"
9½"	10'-9½"	19'-11"	10"	6'-6"	12½"	2'-11½"	2'-6"	22'-0"	32'-8"	43'-4"	54'-0"	64'-8"
9½"	11'-9½"	21'-11"	11"	7'-0"	13½"	3'-2½"	2'-8"	22'-0"	32'-8"	43'-4"	54'-0"	64'-8"

TOTAL QUANTITIES (FOR 4 WINGS AND 2 APRONS)

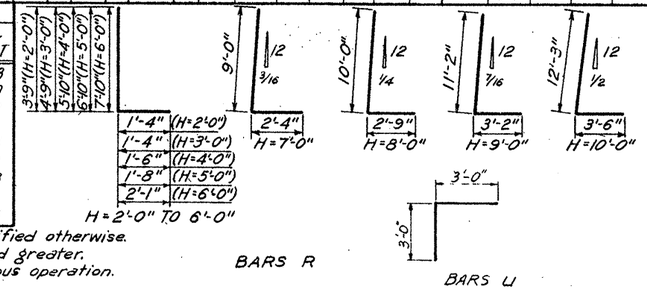
NUMBER OF SPANS 2 CONC. C.Y.	2 REINF. LBS.	3 CONC. C.Y.	3 REINF. LBS.	4 CONC. C.Y.	4 REINF. LBS.	5 CONC. C.Y.	5 REINF. LBS.	6 CONC. C.Y.	6 REINF. LBS.
5.11	592	5.75	637	6.38	678	7.01	725	7.65	766
7.47	883	8.10	928	8.73	969	9.37	1016	10.00	1057
10.61	1433	11.27	1480	11.94	1522	12.61	1570	13.28	1612
14.37	2101	15.08	2157	15.80	2209	16.51	2265	17.22	2316
7.70	898	8.45	952	9.19	1001	9.94	1055	10.69	1103
10.85	1449	11.64	1504	12.43	1555	13.22	1610	14.00	1660
14.63	2120	15.47	2186	16.31	2247	17.15	2313	17.99	2374
19.20	3016	20.14	3086	21.08	3150	22.02	3220	22.96	3285
8.04	914	8.92	976	9.79	1032	10.66	1095	11.53	1152
11.24	1465	12.16	1529	13.08	1587	14.00	1652	14.92	1710
15.06	2140	16.04	2216	17.02	2286	18.01	2361	18.99	2432
19.70	3037	20.81	3118	21.92	3191	23.03	3271	24.14	3346
26.80	4345	27.97	4426	29.13	4501	30.30	4581	31.47	4657
11.48	1482	12.53	1553	13.57	1620	14.62	1692	15.66	1758
15.32	2159	16.43	2245	17.54	2325	18.65	2410	19.77	2490
19.99	3057	21.25	3148	22.50	3232	23.76	3323	25.02	3407
27.11	4365	28.43	4457	29.75	4542	31.07	4633	32.39	4719
35.77	6166	37.25	6274	38.74	6375	40.22	6482	41.71	6582
11.63	1482	12.69	1553	13.75	1620	14.81	1692	15.86	1758
15.49	2159	16.62	2245	17.75	2325	18.88	2410	20.01	2490
20.21	3057	21.50	3148	22.78	3232	24.07	3323	25.35	3407
27.37	4365	28.72	4457	30.07	4542	31.43	4633	32.78	4719
36.09	6166	37.62	6274	39.14	6375	40.67	6482	42.19	6582
11.78	1482	12.85	1553	13.92	1620	14.99	1692	16.07	1758
15.67	2159	16.82	2245	17.97	2325	19.12	2410	20.27	2490
20.44	3057	21.75	3148	23.06	3232	24.38	3323	25.69	3407
27.64	4365	29.02	4457	30.40	4542	31.79	4633	33.17	4719
36.41	6166	37.98	6274	39.54	6375	41.11	6482	42.67	6582
15.76	2179	17.02	2274	18.28	2363	19.54	2458	20.80	2554
21.36	3078	22.82	3179	24.27	3273	25.72	3374	27.18	3475
28.56	4386	30.13	4488	31.69	4583	33.25	4685	34.81	4787
38.14	6191	39.86	6311	41.58	6423	43.30	6543	45.02	6662
48.54	8379	50.42	8503	52.30	8619	54.18	8744	56.06	8868
16.13	2179	17.43	2274	18.73	2363	20.03	2458	21.33	2554
21.84	3078	23.35	3179	24.87	3273	26.39	3374	27.91	3475
29.13	4386	30.77	4488	32.41	4583	34.04	4685	35.68	4787
38.83	6191	40.64	6311	42.45	6423	44.26	6543	46.07	6662
49.36	8379	51.35	8503	53.34	8619	55.32	8744	57.31	8868
16.31	2179	17.63	2274	18.95	2363	20.27	2458	21.60	2554
22.08	3078	23.63	3179	25.18	3273	26.73	3374	28.28	3476
29.41	4386	31.09	4488	32.76	4583	34.43	4685	36.11	4787
39.17	6191	41.03	6311	42.88	6423	44.73	6543	46.59	6662
49.77	8379	51.81	8503	53.85	8619	55.90	8744	57.94	8868
21.91	3098	23.55	3210	25.19	3314	26.83	3425	28.47	3540
29.18	4407	30.95	4519	32.71	4625	34.48	4737	36.25	4852
38.85	6215	40.79	6347	42.74	6472	44.69	6603	46.64	6739
49.35	8404	51.49	8541	53.62	8670	55.75	8807	57.89	8948
61.68	10,820	63.94	10,959	66.20	11,091	68.46	11,230	70.72	11,373
22.40	3098	24.11	3210	25.82	3314	27.54	3425	29.25	3540
29.76	4407	31.61	4519	33.46	4625	35.31	4737	37.16	4852
39.55	6215	41.60	6347	43.65	6472	45.69	6603	47.74	6739
50.19	8404	52.44	8541	54.70	8670	56.96	8807	59.21	8948
62.63	10,820	65.02	10,959	67.41	11,091	69.81	11,230	72.20	11,373
22.89	3098	24.67	3210	26.46	3314	28.24	3425	30.02	3540
30.35	4407	32.28	4519	34.21	4625	36.14	4737	38.07	4852
40.26	6215	42.41	6347	44.56	6472	46.70	6603	48.85	6739
51.03	8404	53.41	8541	55.79	8670	58.16	8807	60.54	8948
63.59	10,820	66.11	10,959	68.63	11,091	71.16	11,230	73.68	11,373

TABLE OF REINFORCING STEEL FOR 4 WINGWALLS

WING SIZE H	L	BARS R NO.	SIZE	SP.	LGTH.	WT.	BARS S1 NO.	SIZE	SP.	LGTH.	WT.	#4 BARS T1 @18¾" NO.	LGTH.	WT.	#4 BARS T2 @12¾" NO.	LGTH.	WT.	BARS U NO.	SIZE	SP.	LGTH.	WT.	#4 Bars P @18" cc. NO.	LGTH.	WT.	#4 BARS W @12¾" NO.	LGTH.	WT.	TOTAL WEIGHT
2'-0"	5'-4"	24	#4	12"	5'-1"	81	24	#4	12"	3'-1"	63	16	5'-1"	54	8	5'-0"	27	16	#5	18"	6'-0"	100	20	3'-9"	50	28	6'-7"	123	498
3'-0"	7'-5"	36	#4	11"	6'-1"	146	36	#4	11"	4'-3"	102	24	7'-2"	115	8	7'-1"	38	24	#5	18"	6'-0"	150	24	4'-9"	76	28	8'-8"	162	789
4'-0"	9'-6"	68	#4	7"	7'-4"	333	68	#4	7"	4'-10"	219	32	9'-3"	198	8	9'-2"	49	32	#5	18"	6'-0"	200	28	5'-9"	108	32	10'-9"	230	1337
5'-0"	11'-6"	68	#5	8"	8'-6"	603	68	#5	8"	5'-5"	384	32	11'-3"	240	12	11'-2"	90	32	#5	18"	6'-0"	200	36	6'-9"	162	36	12'-9"	307	1936
6'-0"	13'-6"	96	#5	7"	9'-1"	993	96	#5	7"	6'-1"	609	40	13'-3"	354	12	13'-2"	106	40	#5	18"	6'-0"	250	40	7'-9"	207	36	14'-9"	355	2874
7'-0"	15'-6"	136	#5	5½"	11'-4"	1607	136	#5	5½"	6'-7"	933	48	15'-3"	489	12	15'-2"	122	48	#5	18"	6'-0"	300	48	8'-9"	281	40	16'-9"	448	4180
8'-0"	17'-7"	132	#6	6½"	12'-9"	2528	132	#6	6½"	7'-6"	1487	48	17'-4"	556	16	17'-3"	184	48	#5	18"	6'-0"	300	52	9'-9"	339	44	18'-10"	554	5948
9'-0"	19'-9"	172	#6	5½"	14'-4"	3702	172	#6	5½"	8'-1"	2087	56	19'-6"	729	16	19'-5"	208	56	#5	18"	6'-0"	350	60	10'-10"	434	44	21'-0"	617	8127
10'-0"	21'-11"	212	#6	5"	15'-9"	5015	212	#6	5"	8'-7"	2732	64	21'-8"	926	16	21'-7"	231	64	#5	18"	6'-0"	401	68	11'-10"	490	48	23'-2"	743	10,538

*NO. BARS X (Lgth. = Dim. "C")
2 Bars when H = 2', 3' & 4'
3 Bars when H = 5', 6' & 7'
4 Bars when H = 8', 9' & 10'

GENERAL NOTES:
Chamfer all exposed corners ¾" unless specified otherwise.
All dimensions relating to reinforcing steel are to centers of bars. Provide Weep holes for H = 5'-0" and greater.
The bottom slab of the barrel, wing footings and toewalls shall be placed in one continuous operation.


3'-9"(H=2'-0")
4'-9"(H=3'-0")
5'-10"(H=4'-0")
6'-10"(H=5'-0")
7'-10"(H=6'-0")
1'-4" (H=2'-0")
1'-4" (H=3'-0")
1'-6" (H

TOTAL QUANTITIES ~ 4 WINGS & 2 APRONS

Culvert	Culvert Size S H	2 Spans Conc. C.Y.	2 Spans Reinf. Lbs.	3 Spans Conc. C.Y.	3 Spans Reinf. Lbs.	4 Spans Conc. C.Y.	4 Spans Reinf. Lbs.	5 Spans Conc. C.Y.	5 Spans Reinf. Lbs.	6 Spans Conc. C.Y.	6 Spans Reinf. Lbs.
MC5-1&2	5x2'	5.29	624	5.95	677	6.61	717	7.26	764	7.92	809
	5x3	7.73	893	8.39	946	9.04	986	9.70	1033	10.35	1078
	5x4	10.98	1480	11.67	1535	12.36	1576	13.05	1625	13.75	1671
	5x5	14.88	2239	15.61	2303	16.36	2355	17.09	2411	17.83	2469
MC6-1&2	6x3	7.97	915	8.75	969	9.51	1018	10.29	1073	11.07	1128
	6x4	11.23	1502	12.05	1559	12.87	1610	13.69	1666	14.49	1722
	6x5	15.15	2261	16.02	2332	16.89	2394	17.75	2462	18.62	2527
	6x6	19.88	3118	20.85	3187	21.82	3252	22.80	3324	23.77	3394
MC7-1,2&3	7x3	8.32	933	9.23	998	10.14	1062	11.04	1128	11.94	1191
	7x4	11.64	1522	12.59	1589	13.54	1655	14.49	1722	15.45	1788
	7x5	15.59	2295	16.61	2375	17.62	2457	18.65	2539	19.66	2620
	7x6	20.39	3140	21.54	3221	22.69	3304	23.84	3387	24.99	3469
	7x7	27.75	4518	28.96	4632	30.16	4718	31.37	4805	32.58	4891
MC8-1	8x4	11.88	1535	12.97	1608	14.05	1681	15.14	1752	16.21	1825
	8x5	15.86	2305	17.01	2392	18.16	2477	19.31	2564	20.47	2652
	8x6	20.70	3158	22.00	3250	23.29	3340	24.60	3433	25.90	3525
	8x7	28.07	4561	29.43	4654	30.80	4745	32.17	4838	33.53	4931
	8x8	37.03	6430	38.56	6539	40.11	6648	41.64	6758	43.18	6866
MC8-2	8x4	12.04	1535	13.14	1608	14.23	1681	15.33	1752	16.42	1825
	8x5	16.04	2305	17.21	2392	18.38	2477	19.55	2564	20.72	2652
	8x6	20.92	3158	22.26	3250	23.58	3340	24.92	3433	26.24	3525
	8x7	28.34	4561	29.73	4654	31.13	4745	32.54	4838	33.94	4931
	8x8	37.36	6430	38.95	6539	40.52	6648	42.10	6758	43.68	6866
MC8-3	8x4	12.20	1535	13.30	1608	14.41	1681	15.52	1752	16.64	1825
	8x5	16.22	2305	17.41	2392	18.60	2477	19.79	2564	20.98	2652
	8x6	21.16	3158	22.52	3250	23.87	3340	25.24	3433	26.60	3525
	8x7	28.61	4561	30.04	4654	31.47	4745	32.91	4838	34.34	4931
	8x8	37.69	6430	39.32	6539	40.93	6648	42.56	6758	44.17	6866
MC9-1	9x5	16.32	2325	17.62	2421	18.92	2518	20.23	2615	21.53	2712
	9x6	22.11	3179	23.62	3281	25.13	3384	26.63	3486	28.14	3588
	9x7	29.57	4582	31.19	4685	32.81	4789	34.42	4892	36.04	4995
	9x8	39.49	6453	41.27	6575	43.05	6698	44.83	6819	46.61	6939
	9x9	50.25	8845	52.20	8971	54.14	9098	56.09	9224	58.04	9349
MC9-2	9x5	16.70	2325	18.04	2421	19.39	2518	20.74	2615	22.08	2712
	9x6	22.61	3179	24.17	3281	25.75	3384	27.32	3486	28.89	3588
	9x7	30.16	4582	31.86	4685	33.55	4789	35.24	4892	36.94	4995
	9x8	40.20	6453	42.07	6575	43.95	6698	45.82	6819	47.69	6939
	9x9	51.10	8845	53.16	8971	55.22	9098	57.27	9224	59.33	9349
MC9-3	9x5	16.89	2325	18.25	2421	19.62	2518	20.98	2615	22.36	2712
	9x6	22.86	3179	24.46	3281	26.07	3384	27.67	3486	29.28	3588
	9x7	30.45	4582	32.19	4685	33.92	4789	35.64	4892	37.38	4995
	9x8	40.55	6453	42.48	6575	44.39	6698	46.31	6819	48.23	6939
	9x9	51.53	8845	53.64	8971	55.75	9098	57.87	9224	59.98	9349
MC10-1	10x6	22.68	3206	24.38	3318	26.08	3431	27.77	3543	29.47	3656
	10x7	30.21	4608	32.04	4722	33.86	4836	35.70	4950	37.53	5064
	10x8	40.22	6486	42.23	6619	44.25	6754	46.27	6886	48.29	7021
	10x9	51.09	8879	53.31	9016	55.51	9156	57.72	9294	59.93	9433
	10x10	63.86	11,210	66.20	11,350	68.53	11,492	70.87	11,632	73.21	11,774
MC10-2	10x6	23.19	3206	24.96	3318	26.73	3431	28.51	3543	30.28	3656
	10x7	30.81	4608	32.72	4722	34.64	4836	36.56	4950	38.47	5064
	10x8	40.94	6486	43.07	6619	45.19	6754	47.30	6886	49.42	7021
	10x9	51.96	8879	54.29	9016	56.63	9156	58.97	9294	61.30	9433
	10x10	64.84	11,210	67.31	11,350	69.79	11,492	72.27	11,632	74.75	11,774
MC10-3	10x6	23.70	3206	25.54	3318	27.39	3431	29.24	3543	31.08	3656
	10x7	31.42	4608	33.42	4722	35.42	4836	37.41	4950	39.41	5064
	10x8	41.68	6486	43.91	6619	46.13	6754	48.35	6886	50.57	7021
	10x9	52.83	8879	55.29	9016	57.76	9156	60.21	9294	62.68	9433
	10x10	65.83	11,210	68.44	11,350	71.05	11,492	73.67	11,632	76.28	11,774

REINFORCING STEEL ~ 2 CULVERT APRONS

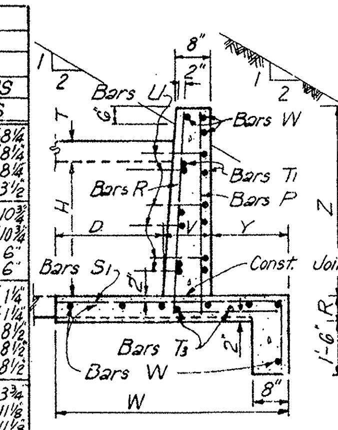
*Bars X ~ #4 @ 12" (Number of spans, Wt.); Bars S2 ~ #4 @ 12" (Number of spans, No. / Wt.)

Culvert Size S H	X 2 Wt	X 3 Wt	X 4 Wt	X 5 Wt	X 6 Wt	Length	S2 2 No.	S2 2 Wt	S2 3 No.	S2 3 Wt	S2 4 No.	S2 4 Wt	S2 5 No.	S2 5 Wt	S2 6 No.	S2 6 Wt
5x2'	32	48	62	78	92	3'-11"	24	63	38	100	48	126	60	157	72	188
5x3	32	48	62	78	92	3'-11"	24	63	38	100	48	126	60	157	72	188
5x4	32	48	62	78	92	4'-1"	24	65	38	104	48	131	60	164	72	196
5x5	48	72	96	118	142	4'-3"	24	68	38	108	48	136	60	170	72	204
6x3	38	56	74	92	110	3'-11"	30	79	44	115	56	146	70	183	84	220
6x4	38	56	74	92	110	4'-1"	30	81	44	120	56	153	70	191	84	229
6x5	58	84	112	140	166	4'-3"	30	86	44	125	56	159	70	199	84	238
6x6	58	84	112	140	166	4'-8"	30	94	44	137	56	174	70	218	84	262
7x3	42	64	84	106	126	3'-11"	34	93	50	136	66	180	82	224	98	267
7x4	42	64	84	106	126	4'-1"	34	97	50	142	66	188	82	233	98	279
7x5	66	96	128	160	192	4'-3"	34	106	50	156	66	206	82	256	98	305
7x6	66	96	128	160	192	4'-8"	34	108	50	159	66	210	82	261	98	311
7x7	66	96	128	160	192	4'-9"	34	116	50	170	66	224	82	279	98	333
8x4	48	72	96	118	142	4'-1"	38	104	56	153	74	202	92	251	110	300
8x5	74	110	144	180	216	4'-3"	38	108	56	159	74	210	92	261	110	313
8x6	74	110	144	180	216	4'-8"	38	118	56	174	74	230	92	287	110	343
8x7	74	110	144	180	216	4'-9"	38	121	56	178	74	235	92	292	110	349
8x8	100	148	196	244	292	5'-1"	38	129	56	190	74	251	92	313	110	373
8x4	48	72	96	118	142	4'-1"	38	104	56	153	74	202	92	251	110	300
8x5	74	110	144	180	216	4'-3"	38	108	56	159	74	210	92	261	110	313
8x6	74	110	144	180	216	4'-8"	38	118	56	174	74	230	92	287	110	343
8x7	74	110	144	180	216	4'-9"	38	121	56	178	74	235	92	292	110	349
8x8	100	148	196	244	292	5'-1"	38	129	56	190	74	251	92	313	110	373
8x4	48	72	96	118	142	4'-1"	38	104	56	153	74	202	92	251	110	300
8x5	74	110	144	180	216	4'-3"	38	108	56	159	74	210	92	261	110	313
8x6	74	110	144	180	216	4'-8"	38	118	56	174	74	230	92	287	110	343
8x7	74	110	144	180	216	4'-9"	38	121	56	178	74	235	92	292	110	349
8x8	100	148	196	244	292	5'-1"	38	129	56	190	74	251	92	313	110	373
9x5	82	122	162	202	242	4'-3"	42	120	62	176	82	233	102	290	122	347
9x6	82	122	162	202	242	4'-8"	42	131	62	193	82	256	102	318	122	380
9x7	82	122	162	202	242	4'-9"	42	134	62	197	82	261	102	324	122	387
9x8	110	164	218	272	324	5'-1"	42	142	62	210	82	279	102	346	122	414
9x9	110	164	218	272	324	5'-5"	42	152	62	224	82	297	102	369	122	442
9x5	82	122	162	202	242	4'-3"	42	120	62	176	82	233	102	290	122	347
9x6	82	122	162	202	242	4'-8"	42	131	62	193	82	256	102	318	122	380
9x7	82	122	162	202	242	4'-9"	42	134	62	197	82	261	102	324	122	387
9x8	110	164	218	272	324	5'-1"	42	142	62	210	82	279	102	346	122	414
9x9	110	164	218	272	324	5'-5"	42	152	62	224	82	297	102	369	122	442
9x5	82	122	162	202	242	4'-3"	42	120	62	176	82	233	102	290	122	347
9x6	82	122	162	202	242	4'-8"	42	131	62	193	82	256	102	318	122	380
9x7	82	122	162	202	242	4'-9"	42	134	62	197	82	261	102	324	122	387
9x8	110	164	218	272	324	5'-1"	42	142	62	210	82	279	102	346	122	414
9x9	110	164	218	272	324	5'-5"	42	152	62	224	82	297	102	369	122	442
10x6	90	134	178	222	266	4'-8"	48	150	70	218	92	287	114	355	136	424
10x7	90	134	178	222	266	4'-9"	48	152	70	222	92	292	114	362	136	432
10x8	122	180	240	298	358	5'-1"	48	163	70	238	92	313	114	387	136	462
10x9	122	180	240	298	358	5'-5"	48	174	70	253	92	333	114	413	136	492
10x10	122	180	240	298	358	5'-7"	48	179	70	261	92	343	114	425	136	507
10x6	90	134	178	222	266	4'-8"	48	150	70	218	92	287	114	355	136	424
10x7	90	134	178	222	266	4'-9"	48	152	70	222	92	292	114	362	136	432
10x8	122	180	240	298	358	5'-1"	48	163	70	238	92	313	114	387	136	462
10x9	122	180	240	298	358	5'-5"	48	174	70	253	92	333	114	413	136	492
10x10	122	180	240	298	358	5'-7"	48	179	70	261	92	343	114	425	136	507
10x6	90	134	178	222	266	4'-8"	48	150	70	218	92	287	114	355	136	424
10x7	90	134	178	222	266	4'-9"	48	152	70	222	92	292	114	362	136	432
10x8	122	180	240	298	358	5'-1"	48	163	70	238	92	313	114	387	136	462
10x9	122	180	240	298	358	5'-5"	48	174	70	253	92	333	114	413	136	492
10x10	122	180	240	298	358	5'-7"	48	179	70	261	92	343	114	425	136	507

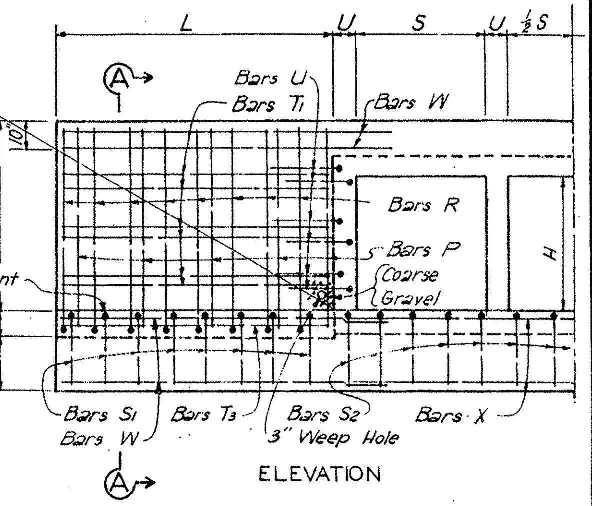
TABLE OF DIMENSIONS

Culvert Size S H	Slab T	Wingwall Z	L	R	W	V	D	Y	Apron C 2 Spans	3	4	5	6
5x2'	6"	3'-6"	5'-6¼"	7"	2'-6"	8"	10"	1'-0"	11'-10⅞"	17'-7¼"	23'-3½"	28'-11⅞"	34'-8¼"
5x3	6"	4'-6"	7'-7⅛"	7"	2'-10"	8"	1'-2"	1'-0"	11'-10⅞"	17'-7¼"	23'-3½"	28'-11⅞"	34'-8¼"
5x4	6"	5'-6"	9'-8"	7"	3'-5"	8"	1'-7"	1'-2"	11'-10⅞"	17'-7¼"	23'-3½"	28'-11⅞"	34'-8¼"
5x5	6"	6'-6"	11'-8¾"	7"	4'-0"	8"	2'-0"	1'-4"	12'-2"	17'-11⅜"	23'-8¾"	29'-6"	35'-3½"
6x3	6"	4'-6"	7'-7⅛"	7"	2'-10"	8"	1'-2"	1'-0"	13'-11¾"	20'-8½"	27'-5¼"	34'-2"	40'-10¾"
6x4	6"	5'-6"	9'-8"	7"	3'-5"	8"	1'-7"	1'-2"	13'-11¾"	20'-8½"	27'-5¼"	34'-2"	40'-10¾"
6x5	6"	6'-6"	11'-8¾"	7"	4'-0"	8"	2'-0"	1'-4"	14'-2⅞"	21'-0⅝"	27'-10⅜"	34'-8¼"	41'-6"
6x6	6"	7'-6"	13'-9⅜"	7"	4'-8"	8"	2'-3"	1'-9"	14'-2⅞"	21'-0⅝"	27'-10⅜"	34'-8¼"	41'-6"
7x3	6½"	4'-6½"	7'-8⅛"	7"	2'-10"	8"	1'-2"	1'-0"	16'-0½"	23'-9¾"	31'-6⅞"	39'-4⅛"	47'-1¼"
7x4	6½"	5'-6½"	9'-9"	7"	3'-5"	8"	1'-7"	1'-2"	16'-0½"	23'-9¾"	31'-6⅞"	39'-4⅛"	47'-1¼"
7x5	6½"	6'-6½"	11'-9⅞"	7"	4'-0"	8"	2'-0"	1'-4"	16'-3⅝"	24'-1⅞"	32'-0⅛"	39'-10¼"	47'-8½"
7x6	6½"	7'-6½"	13'-10⅝"	7"	4'-8"	8"	2'-3"	1'-9"	16'-3⅝"	24'-1⅞"	32'-0⅛"	39'-10¼"	47'-8½"
7x7	6½"	8'-6½"	15'-11½"	8"	5'-2"	9½"	2'-6½"	1'-10"	16'-3⅝"	24'-1⅞"	32'-0⅛"	39'-10¼"	47'-8½"
8x4	6½"	5'-6½"	9'-9"	7"	3'-5"	8"	1'-7"	1'-2"	18'-1⅜"	26'-11"	35'-8⅝"	44'-6¼"	53'-3¾"
8x5	6½"	6'-6½"	11'-9⅞"	7"	4'-0"	8"	2'-0"	1'-4"	18'-4½"	27'-3⅛"	36'-1¾"	45'-0⅜"	53'-11⅛"
8x6	6½"	7'-6½"	13'-10⅝"	7"	4'-8"	8"	2'-3"	1'-9"	18'-4½"	27'-3⅛"	36'-1¾"	45'-0⅜"	53'-11⅛"
8x7	6½"	8'-6½"	15'-11½"	8"	5'-2"	9½"	2'-6½"	1'-10"	18'-4½"	27'-3⅛"	36'-1¾"	45'-0⅜"	53'-11⅛"
8x8	6½"	9'-6½"	18'-0⅜"	9"	5'-9"	10½"	2'-8½"	2'-2"	18'-7⅝"	27'-7¼"	36'-7"	45'-6⅝"	54'-6¼"
8x4	7"	5'-7"	9'-10"	7"	3'-5"	8"	1'-7"	1'-2"	18'-1⅜"	26'-11"	35'-8⅝"	44'-6¼"	53'-3¾"
8x5	7"	6'-7"	11'-10⅞"	7"	4'-0"	8"	2'-0"	1'-4"	18'-4½"	27'-3⅛"	36'-1¾"	45'-0⅜"	53'-11⅛"
8x6	7"	7'-7"	13'-11¾"	7"	4'-8"	8"	2'-3"	1'-9"	18'-4½"	27'-3⅛"	36'-1¾"	45'-0⅜"	53'-11⅛"
8x7	7"	8'-7"	16'-0½"	8"	5'-2"	9½"	2'-6½"	1'-10"	18'-4½"	27'-3⅛"	36'-1¾"	45'-0⅜"	53'-11⅛"
8x8	7"	9'-7"	18'-1⅜"	9"	5'-9"	10½"	2'-8½"	2'-2"	18'-7⅝"	27'-7¼"	36'-7"	45'-6⅝"	54'-6¼"
8x4	7½"	5'-7½"	9'-11⅛"	7"	3'-5"	8"	1'-7"	1'-2"	18'-1⅜"	26'-11"	35'-8⅝"	44'-6¼"	53'-3¾"
8x5	7½"	6'-7½"	11'-11⅞"	7"	4'-0"	8"	2'-0"	1'-4"	18'-4½"	27'-3⅛"	36'-1¾"	45'-0⅜"	53'-11⅛"
8x6	7½"	7'-7½"	14'-0¾"	7"	4'-8"	8"	2'-3"	1'-9"	18'-4½"	27'-3⅛"	36'-1¾"	45'-0⅜"	53'-11⅛"
8x7	7½"	8'-7½"	16'-1⅝"	8"	5'-2"	9½"	2'-6½"	1'-10"	18'-4½"	27'-3⅛"	36'-1¾"	45'-0⅜"	53'-11⅛"
8x8	7½"	9'-7½"	18'-2½"	9"	5'-9"	10½"	2'-8½"	2'-2"	18'-7⅝"	27'-7¼"	36'-7"	45'-6⅝"	54'-6⅛"
9x5	7"	6'-7"	11'-10⅞"	7"	4'-0"	8"	2'-0"	1'-4"	20'-5⅜"	30'-4⅜"	40'-3½"	50'-2½"	60'-1⅝"
9x6	7"	7'-7"	13'-11¾"	7½"	4'-9"	8½"	2'-3½"	1'-9"	20'-5⅜"	30'-4⅜"	40'-3½"	50'-2½"	60'-1⅝"
9x7	7"	8'-7"	16'-0½"	8½"	5'-4"	9½"	2'-7½"	1'-11"	20'-5⅜"	30'-4⅜"	40'-3½"	50'-2½"	60'-1⅝"
9x8	7"	9'-7"	18'-1⅜"	9½"	6'-0"	11"	2'-11"	2'-2"	20'-8½"	30'-8½"	40'-8⅝"	50'-8¾"	60'-8⅞"
9x9	7"	10'-7"	20'-2¼"	10"	6'-6"	12½"	2'-11½"	2'-6"	20'-8½"	30'-8½"	40'-8⅝"	50'-8¾"	60'-8⅞"
9x5	8"	6'-8"	12'-1"	7"	4'-0"	8"	2'-0"	1'-4"	20'-5⅜"	30'-4⅜"	40'-3½"	50'-2½"	60'-1⅝"
9x6	8"	7'-8"	14'-1¾"	7½"	4'-9"	8½"	2'-3½"	1'-9"	20'-5⅜"	30'-4⅜"	40'-3½"	50'-2½"	60'-1⅝"
9x7	8"	8'-8"	16'-2⅜"	8½"	5'-4"	9½"	2'-7½"	1'-11"	20'-5⅜"	30'-4⅜"	40'-3½"	50'-2½"	60'-1⅝"
9x8	8"	9'-8"	18'-3½"	9½"	6'-0"	11"	2'-11"	2'-2"	20'-8½"	30'-8½"	40'-8⅝"	50'-8¾"	60'-8⅞"
9x9	8"	10'-8"	20'-4⅜"	10"	6'-6"	12½"	2'-11½"	2'-6"	20'-8½"	30'-8½"	40'-8⅝"	50'-8¾"	60'-8⅞"
9x5	8½"	6'-8½"	12'-2"	7"	4'-0"	8"	2'-0"	1'-4"	20'-5⅜"	30'-4⅜"	40'-3½"	50'-2½"	60'-1⅝"
9x6	8½"	7'-8½"	14'-2⅞"	7½"	4'-9"	8½"	2'-3½"	1'-9"	20'-5⅜"	30'-4⅜"	40'-3½"	50'-2½"	60'-1⅝"
9x7	8½"	8'-8½"	16'-3⅜"	8½"	5'-4"	9½"	2'-7½"	1'-11"	20'-5⅜"	30'-4⅜"	40'-3½"	50'-2½"	60'-1⅝"
9x8	8½"	9'-8½"	18'-4½"	9½"	6'-0"	11"	2'-11"	2'-2"	20'-8½"	30'-8½"	40'-8⅝"	50'-8¾"	60'-8⅞"
9x9	8½"	10'-8½"	20'-5⅜"	10"	6'-6"	12½"	2'-11½"	2'-6"	20'-8½"	30'-8½"	40'-8⅝"	50'-8¾"	60'-8⅞"
10x6	7½"	7'-7½"	14'-0¾"	7½"	4'-9"	8½"	2'-3½"	1'-9"	22'-6¼"	33'-5⅝"	44'-5⅛"	55'-4⅝"	66'-4⅛"
10x7	7½"	8'-7½"	16'-1⅝"	8½"	5'-4"	9½"	2'-7½"	1'-11"	22'-6¼"	33'-5⅝"	44'-5⅛"	55'-4⅝"	66'-4⅛"
10x8	7½"	9'-7½"	18'-2½"	9½"	6'-0"	11"	2'-11"	2'-2"	22'-9⅜"	33'-9⅞"	44'-10⅜"	55'-10⅞"	66'-11⅜"
10x9	7½"	10'-7½"	20'-3¼"	10"	6'-6"	12½"	2'-11½"	2'-6"	22'-9⅜"	33'-9⅞"	44'-10⅜"	55'-10⅞"	66'-11⅜"
10x10	7½"	11'-7½"	22'-4⅛"	11"	7'-0"	13½"	3'-2½"	2'-8"	22'-9⅜"	33'-9⅞"	44'-10⅜"	55'-10⅞"	66'-11⅜"
10x6	8½"	7'-8½"	14'-2⅞"	7½"	4'-9"	8½"	2'-3½"	1'-9"	22'-6¼"	33'-5⅝"	44'-5⅛"	55'-4⅝"	66'-4⅛"
10x7	8½"	8'-8½"	16'-3⅜"	8½"	5'-4"	9½"	2'-7½"	1'-11"	22'-6¼"	33'-5⅝"	44'-5⅛"	55'-4⅝"	66'-4⅛"
10x8	8½"	9'-8½"	18'-4½"	9½"	6'-0"	11"	2'-11"	2'-2"	22'-9⅜"	33'-9⅞"	44'-10⅜"	55'-10⅞"	66'-11⅜"
10x9	8½"	10'-8½"	20'-5⅜"	10"	6'-6"	12½"	2'-11½"	2'-6"	22'-9⅜"	33'-9⅞"	44'-10⅜"	55'-10⅞"	66'-11⅜"
10x10	8½"	11'-8½"	22'-6¼"	11"	7'-0"	13½"	3'-2½"	2'-8"	22'-9⅜"	33'-9⅞"	44'-10⅜"	55'-10⅞"	66'-11⅜"
10x6	9½"	7'-9½"	14'-4⅞"	7½"	4'-9"	8½"	2'-3½"	1'-9"	22'-6¼"	33'-5⅝"	44'-5⅛"	55'-4⅝"	66'-4⅛"
10x7	9½"	8'-9½"	16'-5¾"	8½"	5'-4"	9½"	2'-7½"	1'-11"	22'-6¼"	33'-5⅝"	44'-5⅛"	55'-4⅝"	66'-4⅛"
10x8	9½"	9'-9½"	18'-6⅝"	9½"	6'-0"	11"	2'-11"	2'-2"	22'-9⅜"	33'-9⅞"	44'-10⅜"	55'-10⅞"	66'-11⅜"
10x9	9½"	10'-9½"	20'-7⅜"	10"	6'-6"	12½"	2'-11½"	2'-6"	22'-9⅜"	33'-9⅞"	44'-10⅜"	55'-10⅞"	66'-11⅜"
10x10	9½"	11'-9½"	22'-8¼"	11"	7'-0"	13½"	3'-2½"	2'-8"	22'-9⅜"	33'-9⅞"	44'-10⅜"	55'-10⅞"	66'-11⅜"

DETAIL OF WINGWALL

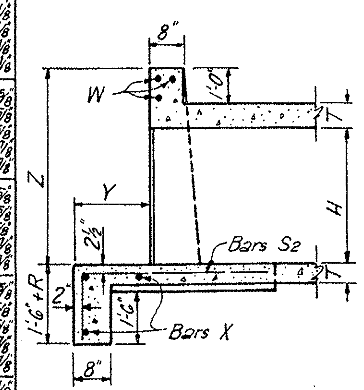


SEC. A-A

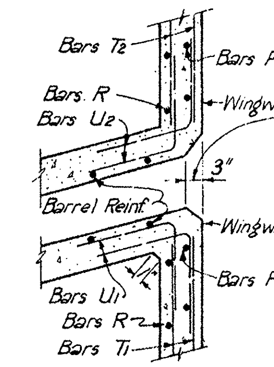


ELEVATION

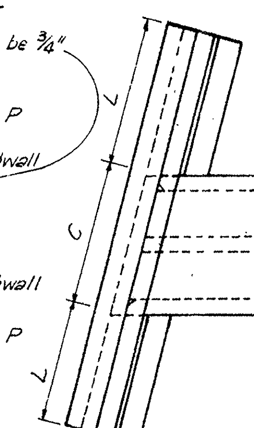
At discharge end, chamfer may be ¾"



LONGITUDINAL SECTION THRU BOX SHOWING DETAIL OF APRON



CORNER DETAIL



PLAN VIEW OF WINGWALL

TABLE OF REINFORCING STEEL FOR 4 WINGWALLS

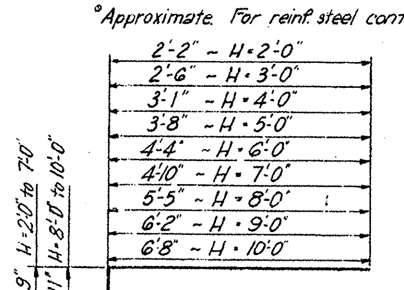
Wing Size H	°L	Bars R No.	Size	Spa.	Lgth.	Wt.	Bars S1 No.	Size	Spa.	Lgth.	Wt.	#4 Bars T1 @ 18" c.c. No.	Lgth.	Wt.	#4 Bars T2 @ 18" c.c. No.	Lgth.	Wt.	#4 Bars T3 @ 18" c.c. No.	Lgth.	Wt.	Bars U1 No.	Size	Spa.	Lgth.	Wt.	Bars U2 No.	Size	Spa.	Lgth.	Wt.	#4 Bars P @ 18" c.c. No.	Lgth.	Wt.	#4 Bars W @ 12" c.c. No.	Lgth.	Wt.	Total Weight
2'-0"	5'-6¼"	28	#4	12"	5'-1"	95	28	#4	12"	3'-11"	73	8	5'-1"	27	8	5'-3"	28	8	5'-1"	28	8	#5	18"	6'-0"	50	8	#5	18"	6'-0"	50	20	3'-9"	50	28	6'-10"	128	529
3'-0"	7'-8⅛"	36	#4	11"	6'-1"	146	36	#4	11"	4'-3"	102	12	7'-3"	58	12	7'-5"	59	8	7'-3"	39	12	#5	18"	6'-0"	75	12	#5	18"	6'-0"	75	24	4'-9"	76	28	9'-0"	168	798
4'-0"	9'-10"	72	#4	7"	7'-4"	353	72	#4	7"	4'-0"	232	16	9'-5"	101	16	9'-7"	102	8	9'-5"	50	16	#5	18"	6'-0"	100	16	#5	18"	6'-0"	100	28	5'-9"	108	32	11'-1"	237	1,383
5'-0"	11'-10⅞"	76	#5	8"	8'-6"	674	76	#5	8"	5'-5"	430	16	11'-6"	123	16	11'-8"	125	12	11'-6"	92	16	#5	18"	6'-0"	100	16	#5	18"	6'-0"	100	36	6'-9"	162	36	13'-2"	317	2,123
6'-0"	13'-11¾"	100	#5	7"	9'-11"	1,034	100	#5	7"	6'-1"	634	20	13'-7"	181	20	13'-9"	184	12	13'-7"	109	20	#5	18"	6'-0"	125	20	#5	18"	6'-0"	125	40	7'-9"	207	36	15'-3"	367	2,966
7'-0"	16'-0½"	144	#5	5½"	11'-4"	1,702	144	#5	5½"	6'-7"	989	24	15'-8"	251	24	15'-10"	254	12	15'-8"	126	24	#5	18"	6'-0"	150	24	#5	18"	6'-0"	150	48	8'-9"	281	40	17'-4"	463	4,366
8'-0"	18'-2½"	140	#6	6½"	12'-9"	2,681	140	#6	6½"	7'-4"	1,542	24	17'-10"	286	24	18'-0"	289	16	17'-10"	191	24	#5	18"	6'-0"	150	24	#5	18"	6'-0"	150	52	9'-9"	339	44	19'-6"	573	6,201
9'-0"	20'-5⅜"	184	#6	5½"	14'-4"	3,961	184	#6	5½"	8'-1"	2,234	28	20'-0"	374	28	20'-2"	377	16	20'-0"	214	28	#5	18"	6'-0"	175	28	#5	18"	6'-0"	175	60	10'-10"	434	44	21'-9"	639	8,583
10'-0"	22'-8¼"	220	#6	5"	15'-9"	5,204	220	#6	5"	8'-7"	2,836	32	22'-3"	476	32	22'-5"	479	16	22'-3"	238	32	#5	18"	6'-0"	200	32	#5	18"	6'-0"	200	64	11'-10"	506	48	24'-0"	770	10,909

°Approximate. For reinf. steel control.

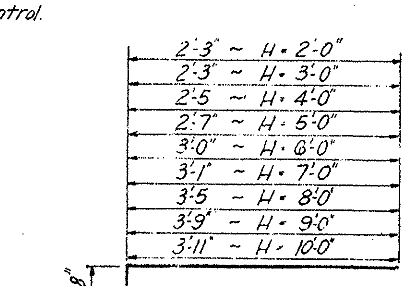
*NUMBER OF BARS X

2 Bars when H = 2', 3', & 4'
3 Bars when H = 5', 6', & 7'
4 Bars when H = 8', 9', & 10'

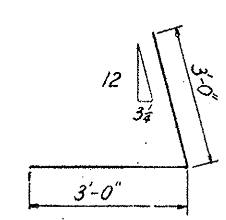
Length = Dimension C



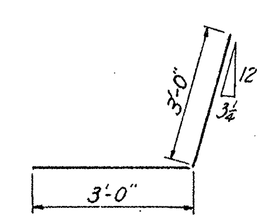
BARS S1



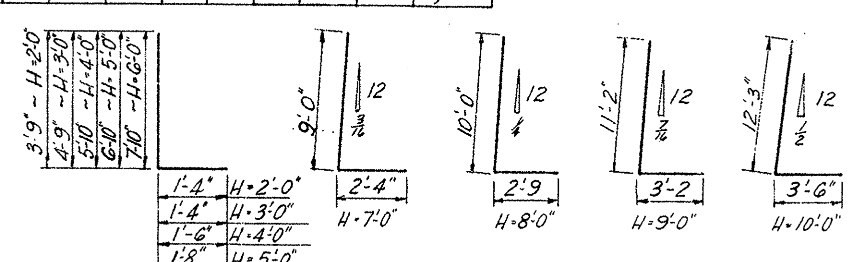
BARS S2



BARS U1



BARS U2



BARS R

GENERAL NOTES:

Chamfer all exposed corners ¾" unless otherwise specified.

All dimensions relating to reinforcing steel are to centers of bars. Provide Weep Holes for H = 5'-0" and greater.

The bottom slab of the barrel, wing footing and toewalls shall be placed in one continuous operation.

TEXAS HIGHWAY DEPARTMENT

BRIDGE DIVISION

PARALLEL WINGS - 15° SKEW

FOR MULTIPLE BOX CULVERTS 5' x 2' TO 10' x 10'

MCW-P-15°

REVISIONS
Rev. Nov. '64
Rev. Nov. 1967
Rev. June 1974
Rev. 12-84

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			SHEET NO.
6	TEXAS				315
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR	2452	2	23	LP 1604

TOTAL QUANTITIES ~ 4 WINGS & 2 APRONS

Culvert	Size S×H	2 Spans Conc. C.Y.	2 Spans Reinf. Lbs.	3 Spans Conc. C.Y.	3 Spans Reinf. Lbs.	4 Spans Conc. C.Y.	4 Spans Reinf. Lbs.	5 Spans Conc. C.Y.	5 Spans Reinf. Lbs.	6 Spans Conc. C.Y.	6 Spans Reinf. Lbs.
MC5142	5×2	5.90	662	6.64	716	7.37	765	8.09	808	8.83	866
MC5142	5×3	8.63	986	9.35	1040	10.08	1089	10.82	1132	11.55	1190
MC5142	5×4	12.25	1633	13.01	1688	13.79	1738	14.56	1782	15.33	1843
MC5142	5×5	16.59	2450	17.41	2517	18.24	2577	19.06	2631	19.85	2697
MC6142	6×3	8.89	1008	9.76	1066	10.61	1128	11.48	1189	12.34	1246
MC6142	6×4	12.53	1657	13.44	1715	14.35	1778	15.27	1842	16.17	1901
MC6142	6×5	16.89	2478	17.86	2547	18.83	2624	19.80	2699	20.77	2769
MC6142	6×6	22.17	3434	23.26	3508	24.34	3589	25.43	3668	26.51	3742
MC7-1,2,&3	7×3	9.28	1026	10.30	1095	11.30	1160	12.31	1231	13.31	1301
MC7-1,2,&3	7×4	12.98	1674	14.04	1746	15.10	1812	16.17	1884	17.23	1957
MC7-1,2,&3	7×5	17.39	2498	18.52	2584	19.65	2664	20.80	2751	21.93	2837
MC7-1,2,&3	7×6	22.75	3455	24.03	3546	25.31	3631	26.59	3723	27.87	3814
MC7-1,2,&3	7×7	30.95	4985	32.30	5077	33.64	5162	34.99	5255	36.34	5347
MC8-1	8×4	13.26	1690	14.47	1771	15.67	1852	16.88	1933	18.06	2014
MC8-1	8×5	17.69	2519	18.97	2615	20.25	2712	21.53	2808	22.83	2904
MC8-1	8×6	23.08	3477	24.54	3579	25.98	3682	27.44	3783	28.89	3885
MC8-1	8×7	31.30	5007	32.83	5110	34.35	5214	35.88	5316	37.40	5419
MC8-1	8×8	41.30	7020	43.01	7141	44.73	7263	46.44	7384	48.16	7505
MC8-2	8×4	13.43	1690	14.65	1771	15.88	1852	17.10	1933	18.31	2014
MC8-2	8×5	17.89	2519	19.19	2615	20.50	2712	21.80	2808	23.11	2904
MC8-2	8×6	23.34	3477	24.83	3579	26.30	3682	27.79	3783	29.27	3885
MC8-2	8×7	31.60	5007	33.16	5110	34.72	5214	36.29	5316	37.85	5419
MC8-2	8×8	41.67	7020	43.44	7141	45.19	7263	46.96	7384	48.72	7505
MC8-3	8×4	13.60	1690	14.84	1771	16.07	1852	17.31	1933	18.56	2014
MC8-3	8×5	18.09	2519	19.42	2615	20.75	2712	22.08	2808	23.41	2904
MC8-3	8×6	23.60	3477	25.11	3579	26.63	3682	28.15	3783	29.66	3885
MC8-3	8×7	31.92	5007	33.51	5110	35.10	5214	36.71	5316	38.30	5419
MC8-3	8×8	42.04	7020	43.86	7141	45.66	7263	47.47	7384	49.27	7505
MC9-1	9×5	18.20	2544	19.63	2652	21.11	2758	22.56	2865	24.02	2972
MC9-1	9×6	24.66	3505	26.35	3618	28.02	3731	29.70	3843	31.38	3957
MC9-1	9×7	32.98	5034	34.79	5149	36.59	5262	38.39	5377	40.19	5492
MC9-1	9×8	44.04	7052	46.03	7187	48.01	7321	50.00	7456	51.98	7590
MC9-1	9×9	56.05	9771	58.22	9910	60.39	10,049	62.56	10,190	64.73	10,328
MC9-2	9×5	18.63	2544	20.13	2652	21.63	2758	23.13	2865	24.63	2972
MC9-2	9×6	25.22	3505	26.96	3618	28.72	3731	30.47	3843	32.23	3957
MC9-2	9×7	33.64	5034	35.53	5149	37.42	5262	39.31	5377	41.20	5492
MC9-2	9×8	44.84	7052	46.93	7187	49.02	7321	51.11	7456	53.20	7590
MC9-2	9×9	57.00	9771	59.29	9910	61.59	10,049	63.88	10,190	66.18	10,328
MC9-3	9×5	18.83	2544	20.36	2652	21.88	2758	23.41	2865	24.94	2972
MC9-3	9×6	25.50	3505	27.29	3618	29.08	3731	30.86	3843	32.65	3957
MC9-3	9×7	33.96	5034	35.90	5149	37.83	5262	39.76	5377	41.70	5492
MC9-3	9×8	45.23	7052	47.38	7187	49.51	7321	51.65	7456	53.80	7590
MC9-3	9×9	57.47	9771	59.82	9910	62.18	10,049	64.55	10,190	66.90	10,328
MC10-1	10×6	25.30	3527	27.19	3657	29.09	3780	30.98	3905	32.87	4035
MC10-1	10×7	33.69	5057	35.74	5189	37.77	5313	39.81	5439	41.88	5570
MC10-1	10×8	44.86	7078	47.10	7233	49.35	7379	51.60	7527	53.85	7681
MC10-1	10×9	56.98	9798	59.45	9959	61.91	10,110	64.37	10,263	66.85	10,423
MC10-1	10×10	71.22	12,526	73.83	12,689	76.44	12,843	79.05	12,999	81.66	13,162
MC10-2	10×6	25.87	3527	27.84	3657	29.81	3780	31.80	3905	33.77	4035
MC10-2	10×7	34.36	5057	36.50	5189	38.64	5313	40.77	5439	42.91	5570
MC10-2	10×8	45.67	7078	48.04	7233	50.40	7379	52.76	7527	55.12	7681
MC10-2	10×9	57.95	9798	60.35	9959	63.16	10,110	65.77	10,263	68.37	10,423
MC10-2	10×10	72.32	12,526	75.08	12,689	77.84	12,843	80.61	12,999	83.37	13,162
MC10-3	10×6	26.43	3527	28.49	3657	30.55	3780	32.61	3905	34.66	4035
MC10-3	10×7	35.04	5057	37.27	5189	39.50	5313	41.73	5439	43.96	5570
MC10-3	10×8	46.49	7078	48.97	7233	51.45	7379	53.92	7527	56.41	7681
MC10-3	10×9	58.92	9798	61.67	9959	64.42	10,110	67.16	10,263	69.90	10,423
MC10-3	10×10	73.4[illegible]	12,526	76.34	12,689	79.25	12,843	82.17	12,999	85.08	13,162

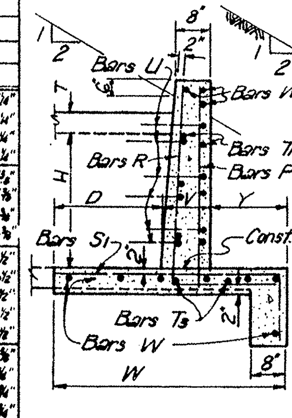
REINFORCING STEEL ~ 2 CULVERT APRONS

*BARS X ~ #4 @ 12" (Number of spans: wt.); Bars S2 ~ #4 @ 12" (Number of spans: no., wt.)

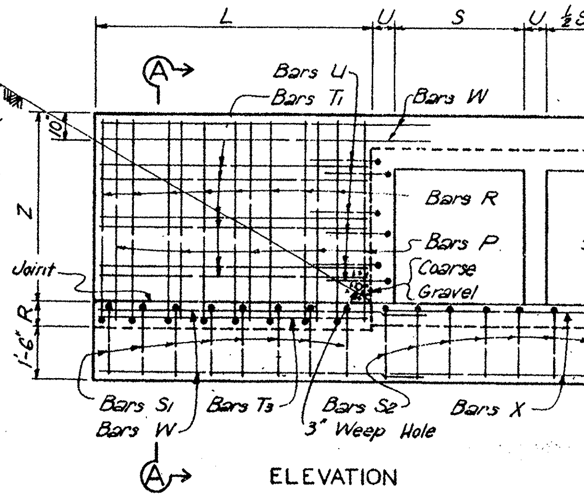
Culvert	Size S×H	X 2 wt.	X 3 wt.	X 4 wt.	X 5 wt.	X 6 wt.	Length	S2 2 no.	S2 2 wt.	S2 3 no.	S2 3 wt.	S2 4 no.	S2 4 wt.	S2 5 no.	S2 5 wt.	S2 6 no.	S2 6 wt.
MC5142	5×2	35	52	69	86	103	3'-11"	28	73	42	110	54	142	64	168	80	209
MC5142	5×3	35	52	69	86	103	3'-11"	28	73	42	110	54	142	64	168	80	209
MC5142	5×4	35	52	69	86	103	4'-1"	28	76	42	114	54	147	64	174	80	218
MC5142	5×5	54	80	106	132	153	4'-3"	28	79	42	120	54	154	64	182	80	227
MC6142	6×3	42	62	82	102	122	3'-11"	34	88	48	126	64	168	80	209	94	246
MC6142	6×4	42	62	82	102	122	4'-1"	34	93	48	131	64	174	80	218	94	257
MC6142	6×5	64	94	125	155	185	4'-3"	34	97	48	136	64	182	80	227	94	267
MC6142	6×6	64	94	125	155	185	4'-8"	34	106	48	150	64	200	80	249	94	293
MC7-1,2,&3	7×3	48	71	94	117	140	3'-11"	38	100	56	146	72	188	90	236	108	283
MC7-1,2,&3	7×4	48	71	94	117	140	4'-1"	38	104	56	153	72	196	90	245	108	295
MC7-1,2,&3	7×5	73	108	143	178	213	4'-3"	38	108	56	159	72	204	90	256	108	307
MC7-1,2,&3	7×6	73	108	143	178	213	4'-8"	38	118	56	174	72	224	90	281	108	337
MC7-1,2,&3	7×7	73	108	143	178	213	4'-9"	38	121	56	178	72	228	90	286	108	343
MC8-1	8×4	54	80	106	133	159	4'-1"	42	114	62	169	82	224	102	278	122	333
MC8-1	8×5	82	122	162	201	241	4'-3"	42	120	62	176	82	233	102	290	122	346
MC8-1	8×6	82	122	162	201	241	4'-8"	42	131	62	193	82	256	102	318	122	380
MC8-1	8×7	82	122	162	201	241	4'-9"	42	134	62	197	82	261	102	324	122	387
MC8-1	8×8	112	165	218	272	325	5'-1"	42	142	62	210	82	279	102	346	122	414
MC8-2	8×4	54	80	106	133	159	4'-1"	42	114	62	169	82	224	102	278	122	333
MC8-2	8×5	82	122	162	201	241	4'-3"	42	120	62	176	82	233	102	290	122	346
MC8-2	8×6	82	122	162	201	241	4'-8"	42	131	62	193	82	256	102	318	122	380
MC8-2	8×7	82	122	162	201	241	4'-9"	42	134	62	197	82	261	102	324	122	387
MC8-2	8×8	112	165	218	272	325	5'-1"	42	142	62	210	82	279	102	346	122	414
MC8-3	8×4	54	80	106	133	159	4'-1"	42	114	62	169	82	224	102	278	122	333
MC8-3	8×5	82	122	162	201	241	4'-3"	42	120	62	176	82	233	102	290	122	346
MC8-3	8×6	82	122	162	201	241	4'-8"	42	131	62	193	82	256	102	318	122	380
MC8-3	8×7	82	122	162	201	241	4'-9"	42	134	62	197	82	261	102	324	122	387
MC8-3	8×8	112	165	218	272	325	5'-1"	42	142	62	210	82	279	102	346	122	414
MC9-1	9×5	91	136	180	224	269	4'-3"	48	136	70	199	92	261	114	324	136	386
MC9-1	9×6	91	136	180	224	269	4'-8"	48	150	70	218	92	287	114	355	136	424
MC9-1	9×7	91	136	180	224	269	4'-9"	48	152	70	222	92	291	114	362	136	432
MC9-1	9×8	123	183	242	303	362	5'-1"	48	163	70	238	92	313	114	387	136	462
MC9-1	9×9	123	183	242	303	362	5'-5"	48	174	70	253	92	333	114	413	136	492
MC9-2	9×5	91	136	180	224	269	4'-3"	48	136	70	199	92	261	114	324	136	386
MC9-2	9×6	91	136	180	224	269	4'-8"	48	150	70	218	92	287	114	355	136	424
MC9-2	9×7	91	136	180	224	269	4'-9"	48	152	70	222	92	291	114	362	136	432
MC9-2	9×8	123	183	242	303	362	5'-1"	48	163	70	238	92	313	114	387	136	462
MC9-2	9×9	123	183	242	303	362	5'-5"	48	174	70	253	92	333	114	413	136	492
MC9-3	9×5	91	136	180	224	269	4'-3"	48	136	70	199	92	261	114	324	136	386
MC9-3	9×6	91	136	180	224	269	4'-8"	48	150	70	218	92	287	114	355	136	424
MC9-3	9×7	91	136	180	224	269	4'-9"	48	152	70	222	92	291	114	362	136	432
MC9-3	9×8	123	183	242	303	362	5'-1"	48	163	70	238	92	313	114	387	136	462
MC9-3	9×9	123	183	242	303	362	5'-5"	48	174	70	253	92	333	114	413	136	492
MC10-1	10×6	101	150	198	248	297	4'-8"	52	162	78	243	102	318	126	393	152	474
MC10-1	10×7	101	150	198	248	297	4'-9"	52	165	78	248	102	324	126	400	152	482
MC10-1	10×8	136	202	267	333	399	5'-1"	52	176	78	265	102	346	126	428	152	516
MC10-1	10×9	136	202	267	333	399	5'-5"	52	188	78	283	102	369	126	456	152	550
MC10-1	10×10	136	202	267	333	399	5'-7"	52	194	78	291	102	380	126	470	152	567
MC10-2	10×6	101	150	198	248	297	4'-8"	52	162	78	243	102	318	126	393	152	474
MC10-2	10×7	101	150	198	248	297	4'-9"	52	165	78	248	102	324	126	400	152	482
MC10-2	10×8	136	202	267	333	399	5'-1"	52	176	78	265	102	346	126	428	152	516
MC10-2	10×9	136	202	267	333	399	5'-5"	52	188	78	283	102	369	126	456	152	550
MC10-2	10×10	136	202	267	333	399	5'-7"	52	194	78	291	102	380	126	470	152	567
MC10-3	10×6	101	150	198	248	297	4'-8"	52	162	78	243	102	318	126	393	152	474
MC10-3	10×7	101	150	198	248	297	4'-9"	52	165	78	248	102	324	126	400	152	482
MC10-3	10×8	136	202	267	333	399	5'-1"	52	176	78	265	102	346	126	428	152	516
MC10-3	10×9	136	202	267	333	399	5'-5"	52	188	78	283	102	369	126	456	152	550
MC10-3	10×10	136	202	267	333	399	5'-7"	52	194	78	291	102	380	126	470	152	567

TABLE OF DIMENSIONS

Culvert	Culvert Size S×H	Slab T	Wingwall Z	L	R	W	V	D	Y	Apron C, 2 Spans	3 Spans	4 Spans	5 Spans	6 Spans
MC5142	5×2	6"	3'-6"	6'-1⅞"	7"	2'-6"	8"	10"	1'-0"	13'-3⅜"	19'-7⅝"	25'-11¾"	32'-4"	38'-8¼"
MC5142	5×3	6"	4'-6"	8'-5⅜"	7"	2'-10"	8"	1'-2"	1'-0"	13'-3⅜"	19'-7⅝"	25'-11¾"	32'-4"	38'-8¼"
MC5142	5×4	6"	5'-6"	10'-9⅜"	7"	3'-5"	8"	1'-7"	1'-2"	13'-3⅜"	19'-7⅝"	25'-11¾"	32'-4"	38'-8¼"
MC5142	5×5	6"	6'-6"	13'-1"	7"	4'-0"	8"	2'-0"	1'-4"	13'-6⅝"	20'-0⅝"	26'-5½"	32'-10⅜"	39'-4¼"
MC6142	6×3	6"	4'-6"	8'-5⅜"	7"	2'-10"	8"	1'-2"	1'-0"	15'-7⅛"	23'-1⅛"	30'-7¼"	38'-1¼"	45'-7⅜"
MC6142	6×4	6"	5'-6"	10'-9⅜"	7"	3'-5"	8"	1'-7"	1'-2"	15'-7⅛"	23'-1⅛"	30'-7¼"	38'-1¼"	45'-7⅜"
MC6142	6×5	6"	6'-6"	13'-1"	7"	4'-0"	8"	2'-0"	1'-4"	15'-10½"	23'-5¾"	31'-1"	38'-8¼"	46'-3⅜"
MC6142	6×6	6"	7'-6"	15'-4¾"	7"	4'-8"	8"	2'-3"	1'-9"	15'-10½"	23'-5¾"	31'-1"	38'-8¼"	46'-3⅜"
MC7-1,2,&3	7×3	6½"	4'-6½"	8'-6¼"	7"	2'-10"	8"	1'-2"	1'-0"	17'-10¾"	26'-6¾"	35'-2⅝"	43'-10½"	52'-6½"
MC7-1,2,&3	7×4	6½"	5'-6½"	10'-10⅝"	7"	3'-5"	8"	1'-7"	1'-2"	17'-10¾"	26'-6¾"	35'-2⅝"	43'-10½"	52'-6½"
MC7-1,2,&3	7×5	6½"	6'-6½"	13'-2¼"	7"	4'-0"	8"	2'-0"	1'-4"	18'-2¼"	26'-11⅜"	35'-8⅜"	44'-5½"	53'-2½"
MC7-1,2,&3	7×6	6½"	7'-6½"	15'-5⅝"	7"	4'-8"	8"	2'-3"	1'-9"	18'-2¼"	26'-11⅜"	35'-8⅜"	44'-5½"	53'-2½"
MC7-1,2,&3	7×7	6½"	8'-6½"	17'-9⅝"	8"	5'-2"	9½"	2'-6½"	1'-10"	18'-2¼"	26'-11⅜"	35'-8⅜"	44'-5½"	53'-2½"
MC8-1	8×4	6½"	5'-6½"	10'-10½"	7"	3'-5"	8"	1'-7"	1'-2"	20'-2½"	30'-0⅜"	39'-10⅜"	49'-7⅜"	59'-5⅜"
MC8-1	8×5	6½"	6'-6½"	13'-2¼"	7"	4'-0"	8"	2'-0"	1'-4"	20'-6"	30'-4⅜"	40'-3⅜"	50'-2⅜"	60'-1¾"
MC8-1	8×6	6½"	7'-6½"	15'-5⅝"	7"	4'-8"	8"	2'-3"	1'-9"	20'-6"	30'-4⅜"	40'-3⅜"	50'-2⅜"	60'-1¾"
MC8-1	8×7	6½"	8'-6½"	17'-9⅝"	8"	5'-2"	9½"	2'-6½"	1'-10"	20'-6"	30'-4⅜"	40'-3⅜"	50'-2⅜"	60'-1¾"
MC8-1	8×8	6½"	9'-6½"	20'-1⅛"	9"	5'-9"	10½"	2'-8½"	2'-2"	20'-10½"	30'-9½"	40'-9⅜"	50'-9⅜"	60'-9¾"
MC8-2	8×4	7"	5'-7"	10'-11⅜"	7"	3'-5"	8"	1'-7"	1'-2"	20'-2½"	30'-0⅜"	39'-10⅜"	49'-7⅜"	59'-5⅜"
MC8-2	8×5	7"	6'-7"	13'-3⅜"	7"	4'-0"	8"	2'-0"	1'-4"	20'-6"	30'-4⅜"	40'-3⅜"	50'-2⅜"	60'-1¾"
MC8-2	8×6	7"	7'-7"	15'-7⅜"	7"	4'-8"	8"	2'-3"	1'-9"	20'-6"	30'-4⅜"	40'-3⅜"	50'-2⅜"	60'-1¾"
MC8-2	8×7	7"	8'-7"	17'-10⅜"	8"	5'-2"	9½"	2'-6½"	1'-10"	20'-6"	30'-4⅜"	40'-3⅜"	50'-2⅜"	60'-1¾"
MC8-2	8×8	7"	9'-7"	20'-2⅛"	9"	5'-9"	10½"	2'-8½"	2'-2"	20'-10½"	30'-9½"	40'-9⅜"	50'-9⅜"	60'-9¾"
MC8-3	8×4	7½"	5'-7½"	11'-0⅜"	7"	3'-5"	8"	1'-7"	1'-2"	20'-2½"	30'-0⅜"	39'-10⅜"	49'-7⅜"	59'-5⅜"
MC8-3	8×5	7½"	6'-7½"	13'-4½"	7"	4'-0"	8"	2'-0"	1'-4"	20'-6"	30'-4⅜"	40'-3⅜"	50'-2⅜"	60'-1¾"
MC8-3	8×6	7½"	7'-7½"	15'-8¼"	7"	4'-8"	8"	2'-3"	1'-9"	20'-6"	30'-4⅜"	40'-3⅜"	50'-2⅜"	60'-1¾"
MC8-3	8×7	7½"	8'-7½"	18'-0"	8"	5'-2"	9½"	2'-6½"	1'-10"	20'-6"	30'-4⅜"	40'-3⅜"	50'-2⅜"	60'-1¾"
MC8-3	8×8	7½"	9'-7½"	20'-3⅜"	9"	5'-9"	10½"	2'-8½"	2'-2"	20'-10½"	30'-9½"	40'-9⅜"	50'-9⅜"	60'-9¾"
MC9-1	9×5	7"	6'-7"	13'-3⅜"	7"	4'-0"	8"	2'-0"	1'-4"	22'-9⅝"	33'-10½"	44'-11⅜"	56'-0"	67'-0⅜"
MC9-1	9×6	7"	7'-7"	15'-7⅜"	7½"	4'-9"	8½"	2'-3½"	1'-9"	22'-9⅝"	33'-10½"	44'-11⅜"	56'-0"	67'-0⅜"
MC9-1	9×7	7"	8'-7"	17'-10⅜"	8½"	5'-4"	9½"	2'-7½"	1'-11"	22'-9⅝"	33'-10½"	44'-11⅜"	56'-0"	67'-0⅜"
MC9-1	9×8	7"	9'-7"	20'-2⅜"	9½"	6'-0"	11"	2'-11"	2'-2"	23'-1⅛"	34'-3⅜"	45'-5"	56'-7"	67'-8⅜"
MC9-1	9×9	7"	10'-7"	22'-6¾"	10"	6'-6"	12½"	2'-11½"	2'-6"	23'-1⅛"	34'-3⅜"	45'-5"	56'-7"	67'-8⅜"
MC9-2	9×5	8"	6'-8"	13'-5⅝"	7"	4'-0"	8"	2'-0"	1'-4"	22'-9⅝"	33'-10½"	44'-11⅜"	56'-0"	67'-0⅜"
MC9-2	9×6	8"	7'-8"	15'-9⅜"	7½"	4'-9"	8½"	2'-3½"	1'-9"	22'-9⅝"	33'-10½"	44'-11⅜"	56'-0"	67'-0⅜"
MC9-2	9×7	8"	8'-8"	18'-1⅛"	8½"	5'-4"	9½"	2'-7½"	1'-11"	22'-9⅝"	33'-10½"	44'-11⅜"	56'-0"	67'-0⅜"
MC9-2	9×8	8"	9'-8"	20'-4⅜"	9½"	6'-0"	11"	2'-11"	2'-2"	23'-1⅛"	34'-3⅜"	45'-5"	56'-7"	67'-8⅜"
MC9-2	9×9	8"	10'-8"	22'-8½"	10"	6'-6"	12½"	2'-11½"	2'-6"	23'-1⅛"	34'-3⅜"	45'-5"	56'-7"	67'-8⅜"
MC9-3	9×5	8½"	6'-8½"	13'-6⅜"	7"	4'-0"	8"	2'-0"	1'-4"	22'-9⅝"	33'-10½"	44'-11⅜"	56'-0"	67'-0⅜"
MC9-3	9×6	8½"	7'-8½"	15'-10⅝"	7½"	4'-9"	8½"	2'-3½"	1'-9"	22'-9⅝"	33'-10½"	44'-11⅜"	56'-0"	67'-0⅜"
MC9-3	9×7	8½"	8'-8½"	18'-2¼"	8½"	5'-4"	9½"	2'-7½"	1'-11"	22'-9⅝"	33'-10½"	44'-11⅜"	56'-0"	67'-0⅜"
MC9-3	9×8	8½"	9'-8½"	20'-6"	9½"	6'-0"	11"	2'-11"	2'-2"	23'-1⅛"	34'-3⅜"	45'-5"	56'-7"	67'-8⅜"
MC9-3	9×9	8½"	10'-8½"	22'-9⅜"	10"	6'-6"	12½"	2'-11½"	2'-6"	23'-1⅛"	34'-3⅜"	45'-5"	56'-7"	67'-8⅜"
MC10-1	10×6	7½"	7'-7½"	15'-8¼"	7½"	4'-9"	8½"	2'-3½"	1'-9"	25'-1⅛"	37'-4"	49'-6⅜"	61'-9⅜"	74'-0"
MC10-1	10×7	7½"	8'-7½"	18'-0"	8½"	5'-4"	9½"	2'-7½"	1'-11"	25'-1⅛"	37'-4"	49'-6⅜"	61'-9⅜"	74'-0"
MC10-1	10×8	7½"	9'-7½"	20'-3⅜"	9½"	6'-0"	11"	2'-11"	2'-2"	25'-4⅛"	37'-8⅜"	50'-0½"	62'-4¼"	74'-8"
MC10-1	10×9	7½"	10'-7½"	22'-7⅜"	10"	6'-6"	12½"	2'-11½"	2'-6"	25'-4⅛"	37'-8⅜"	50'-0½"	62'-4¼"	74'-8"
MC10-1	10×10	7½"	11'-7½"	24'-11⅜"	11"	7'-0"	13½"	3'-2½"	2'-8"	25'-4⅛"	37'-8⅜"	50'-0½"	62'-4¼"	74'-8"
MC10-2	10×6	8½"	7'-8½"	15'-10⅝"	7½"	4'-9"	8½"	2'-3½"	1'-9"	25'-1⅛"	37'-4"	49'-6⅜"	61'-9⅜"	74'-0"
MC10-2	10×7	8½"	8'-8½"	18'-2¼"	8½"	5'-4"	9½"	2'-7½"	1'-11"	25'-1⅛"	37'-4"	49'-6⅜"	61'-9⅜"	74'-0"
MC10-2	10×8	8½"	9'-8½"	20'-6"	9½"	6'-0"	11"	2'-11"	2'-2"	25'-4⅛"	37'-8⅜"	50'-0½"	62'-4¼"	74'-8"
MC10-2	10×9	8½"	10'-8½"	22'-9⅝"	10"	6'-6"	12½"	2'-11½"	2'-6	25'-4⅛"	37'-8⅜"	50'-0½"	62'-4¼"	74'-8"
MC10-2	10×10	8½"	11'-8½"	25'-1⅛"	11"	7'-0"	13½"	3'-2½"	2'-8"	25'-4⅛"	37'-8⅜"	50'-0½"	62'-4¼"	74'-8"
MC10-3	10×6	9½"	7'-9½"	16'-0⅜"	7½"	4'-9"	8½"	2'-3½"	1'-9"	25'-1⅛"	37'-4"	49'-6⅜"	61'-9⅜"	74'-0"
MC10-3	10×7	9½"	8'-9½"	18'-4½"	8½"	5'-4"	9½"	2'-7½"	1'-11"	25'-1⅛"	37'-4"	49'-6⅜"	61'-9⅜"	74'-0"
MC10-3	10×8	9½"	9'-9½"	20'-8⅜"	9½"	6'-0"	11"	2'-11"	2'-2"	25'-4⅛"	37'-8⅜"	50'-0½"	62'-4¼"	74'-8"
MC10-3	10×9	9½"	10'-9½"	23'-0"	10"	6'-6"	12½"	2'-11½"	2'-6"	25'-4⅛"	37'-8⅜"	50'-0½"	62'-4¼"	74'-8"
MC10-3	10×10	[illegible]	11'-9½"	25'-3¼"	11"	7'-0"	13½"	3'-2½"	2'-8"	25'-4⅛"	37'-8⅜"	50'-0½"	62'-4¼"	74'-8"

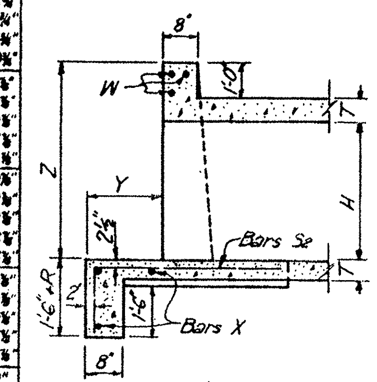


SEC. A-A

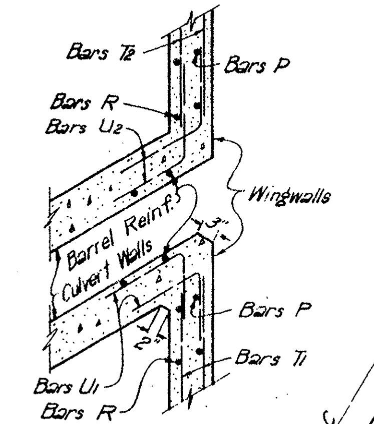


ELEVATION

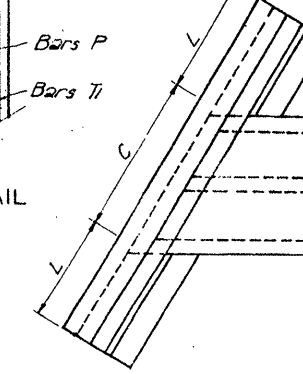
DETAIL OF WINGWALL



LONGITUDINAL SECTION THRU BOX SHOWING DETAIL OF APRON



CORNER DETAIL



PLAN VIEW OF WINGWALL

TABLE OF REINFORCING STEEL FOR 4 WINGWALLS

Wing Size H	Wing Size L	Bars R No.	Bars R Size	Bars R Spa.	Bars R Lgth.	Bars R Wt.	Bars S1 No.	Bars S1 Size	Bars S1 Spa.	Bars S1 Lgth.	Bars S1 Wt.	#4 Bars T1 @ 18" c.c. No.	T1 Lgth.	T1 Wt.	#4 Bars T2 @ 18" c.c. No.	T2 Lgth.	T2 Wt.	#4 Bars T3 @ 18" c.c. No.	T3 Lgth.	T3 Wt.	Bars U1 No.	U1 Size	U1 Spa.	U1 Lgth.	U1 Wt.	Bars U2 No.	U2 Size	U2 Spa.	U2 Lgth.	U2 Wt.	#4 Bars P @ 18" c.c. No.	P Lgth.	P Wt.	#4 Bars W @ 12" c.c. No.	W Lgth.	W Wt.	Total Weight
2'-0"	6'-1⅞"	28	#4	12"	5'-1"	95	28	#4	12"	3'-11"	73	8	5'-7"	30	8	6'-1"	33	8	5'-9"	31	8	#5	18"	6'-0"	50	8	#5	18"	6'-0"	50	20	3'-9"	50	28	7'-7"	142	554
3'-0"	8'-6¾"	40	#4	11"	6'-1"	162	40	#4	11"	4'-3"	114	12	8'-0"	64	12	8'-6"	68	8	8'-2"	44	12	#5	18"	6'-0"	75	12	#5	18"	6'-0"	75	28	4'-9"	89	28	10'-0"	187	878
4'-0"	10'-11⅝"	80	#4	7"	7'-4"	392	80	#4	7"	4'-10"	259	16	10'-4"	110	16	10'-10"	116	8	10'-7"	57	16	#5	18"	6'-0"	100	16	#5	18"	6'-0"	100	32	5'-9"	123	32	12'-5"	265	1522
5'-0"	13'-3⅜"	84	#5	8"	8'-6"	745	84	#5	8"	5'-5"	475	16	12'-8"	135	16	13'-2"	141	12	12'-11"	104	16	#5	18"	6'-0"	100	16	#5	18"	6'-0"	100	36	6'-9"	162	36	14'-9"	355	2317
6'-0"	15'-7⅛"	112	#5	7"	9'-11"	1159	112	#5	7"	6'-1"	710	20	15'-0"	200	20	15'-6"	207	12	15'-2"	122	20	#5	18"	6'-0"	125	20	#5	18"	6'-0"	125	40	7'-9"	207	36	17'-0"	409	3264
7'-0"	17'-10½"	160	#5	5½"	11'-4"	1891	160	#5	5½"	6'-7"	1098	24	17'-4"	278	24	17'-10"	286	12	17'-6"	140	24	#5	18"	6'-0"	150	24	#5	18"	6'-0"	150	48	8'-9"	281	40	19'-4"	517	4791
8'-0"	20'-3⅜"	152	#6	6½"	12'-9"	2911	152	#6	6½"	7'-4"	1674	24	19'-8"	315	24	20'-2"	323	16	19'-11"	213	24	#5	18"	6'-0"	150	24	#5	18"	6'-0"	150	60	9'-9"	391	44	21'-9"	639	6766
9'-0"	22'-9⅝"	204	#6	5½"	14'-4"	4392	204	#6	5½"	8'-1"	2477	28	22'-2"	415	28	22'-8"	424	16	22'-5"	240	28	#5	18"	6'-0"	175	28	#5	18"	6'-0"	175	64	10'-10"	463	44	24'-3"	713	9474
10'-0"	25'-3¾"	248	#6	5"	15'-9"	5867	248	#6	5"	8'-7"	3198	32	24'-9"	529	32	25'-3"	540	16	24'-11"	266	32	#5	18"	6'-0"	200	32	#5	18"	6'-0"	200	68	11'-10"	538	48	26'-9"	858	12,192

*NUMBER OF BARS X

2 Bars when H = 2', 3', & 4'
3 Bars when H = 5', 6', & 7'
4 Bars when H = 8', 9', & 10'

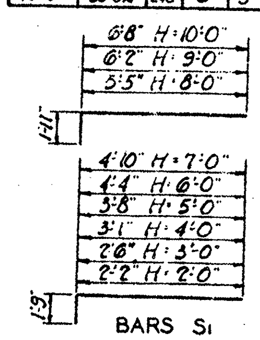
Length = Dimension C

GENERAL NOTES:

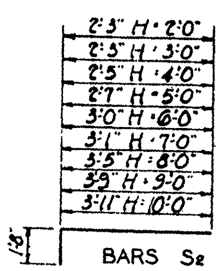
Chamfer all exposed corners ¾" unless otherwise specified.

All dimensions relating to reinforcing steel are to centers of bars. Provide Weep Holes for H = 5'-0" and greater.

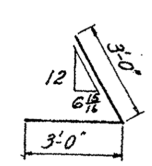
The bottom slab of the barrel, wing footing and toewalls shall be placed in one continuous operation.



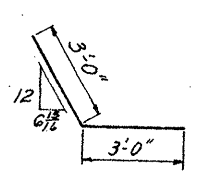
BARS S1



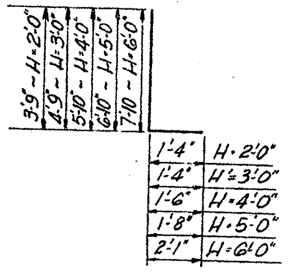
BARS S2



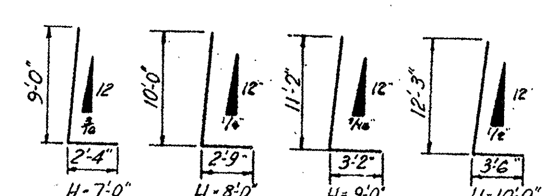
BARS U1



BARS U2



BARS R



TEXAS HIGHWAY DEPARTMENT

BRIDGE DIVISION

PARALLEL WINGS-30° SKEW

FOR MULTIPLE BOX CULVERTS 5' x 2' TO 10' x 10'

MCW-P-30°

REVISIONS
Rev. Nov. '64
Rev. Nov. 1967

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			SHEET NO.
6	TEXAS				316
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR	2452	2	23	[illegible]

TOTAL QUANTITIES ~ 4 WINGS & 2 APRONS

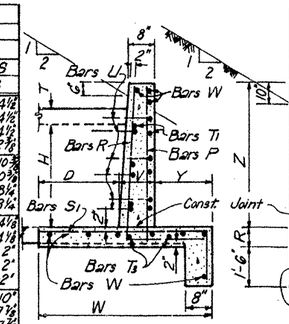
NUMBER OF SPANS 2 Conc. C.Y.	2 Reinf. Lbs.	3 Conc. C.Y.	3 Reinf. Lbs.	4 Conc. C.Y.	4 Reinf. Lbs.	5 Conc. C.Y.	5 Reinf. Lbs.	6 Conc. C.Y.	6 Reinf. Lbs.
7.23	799	8.13	861	9.02	925	9.91	987	10.82	1043
10.56	1161	11.46	1223	12.35	1287	13.25	1349	14.14	1405
15.00	1942	15.94	2005	16.89	2071	17.83	2135	18.78	2193
20.32	2930	21.33	3007	22.34	3084	23.35	3162	24.35	3234
10.89	1185	11.95	1261	13.00	1332	14.06	1403	15.12	1476
15.34	1966	16.46	2045	17.58	2118	18.70	2191	19.80	2266
20.69	2959	21.88	3053	23.07	3140	24.25	3230	25.44	3319
27.15	4164	28.48	4264	29.81	4356	31.14	4450	32.47	4544
11.37	1206	12.61	1292	13.85	1379	15.08	1460	16.31	1545
15.90	1988	17.20	2076	18.50	2166	19.80	2249	21.10	2337
21.30	2988	22.68	3092	24.07	3199	25.47	3297	26.86	3404
27.86	4199	29.43	4305	31.00	4418	32.57	4522	34.14	4634
37.90	6068	39.56	6180	41.20	6294	42.85	6399	44.50	6513
16.24	2013	17.72	2105	19.19	2208	20.68	2311	22.15	2408
21.67	3015	23.24	3125	24.81	3249	26.37	3371	27.96	3489
28.27	4223	30.05	4340	31.82	4471	33.60	4600	35.38	4725
38.34	6097	40.21	6215	42.07	6347	43.94	6478	45.81	6604
50.59	8580	52.68	8720	54.79	8875	56.88	9027	58.99	9174
16.45	2013	17.95	2105	19.45	2208	20.94	2311	22.43	2408
21.91	3015	23.50	3125	25.10	3249	26.70	3371	28.30	3489
28.58	4223	30.41	4340	32.22	4471	34.04	4600	35.85	4725
38.71	6097	40.62	6215	42.53	6347	44.45	6478	46.36	6604
51.04	8580	53.20	8720	55.35	8875	57.52	9027	59.67	9174
16.66	2013	18.17	2105	19.69	2208	21.20	2311	22.73	2408
22.16	3015	23.79	3125	25.41	3249	27.04	3371	28.67	3489
28.91	4223	30.76	4340	32.61	4471	34.48	4600	36.33	4725
39.09	6097	41.04	6215	42.99	6347	44.96	6478	46.91	6604
51.49	8580	53.71	8720	55.92	8875	58.14	9027	60.34	9174
22.29	3044	24.09	3177	25.85	3305	27.63	3438	29.42	3568
30.21	4254	32.27	4395	34.32	4530	36.37	4671	38.41	4808
40.39	6128	42.61	6271	44.82	6407	47.02	6550	49.23	6689
53.94	8616	56.37	8783	58.80	8945	61.23	9112	63.67	9275
68.65	11,840	71.30	12,013	73.96	12,181	76.62	12,355	79.28	12,523
22.81	3044	24.65	3177	26.49	3305	28.33	3438	30.16	3568
30.89	4254	33.02	4395	35.17	4530	37.32	4671	39.47	4808
41.20	6128	43.51	6271	45.83	6407	48.14	6550	50.46	6689
54.91	8616	57.47	8783	60.03	8945	62.59	9112	65.15	9275
69.80	11,840	72.62	12,013	75.43	12,181	78.23	12,355	81.05	12,523
23.07	3044	24.93	3177	26.80	3305	28.67	3438	30.55	3568
31.23	4254	33.42	4395	35.61	4530	37.80	4671	39.99	4808
41.59	6128	43.97	6271	46.33	6407	48.69	6550	51.07	6689
55.39	8616	58.02	8783	60.64	8945	63.26	9112	65.89	9275
70.38	11,840	73.27	12,013	76.15	12,181	79.05	12,355	81.94	12,523
30.99	4285	33.30	4438	35.62	4592	37.94	4745	40.26	4899
41.27	6159	43.77	6314	46.26	6469	48.76	6625	51.26	6780
54.98	8698	57.69	8832	60.44	9016	63.20	9198	65.96	9380
69.79	11,876	72.82	12,064	75.83	12,255	78.84	12,443	81.87	12,632
87.23	15,153	90.42	15,345	93.62	15,538	96.82	15,730	100.01	15,922
31.68	4285	34.10	4438	36.51	4592	38.95	4745	41.37	4899
42.09	6159	44.70	6314	47.32	6469	49.94	6625	52.55	6780
55.93	8698	58.83	8832	61.73	9016	64.61	9198	67.51	9380
70.98	11,876	74.16	12,064	77.36	12,255	80.55	12,443	83.73	12,632
88.57	15,153	91.95	15,345	95.33	15,538	98.73	15,730	102.11	15,922
32.37	4285	34.89	4438	37.42	4592	39.94	4745	42.46	4899
42.92	6159	45.65	6314	48.38	6469	51.11	6625	53.84	6780
56.94	8698	59.98	8832	63.02	9016	66.04	9198	69.08	9380
72.17	11,876	75.53	12,064	78.90	12,255	82.25	12,443	85.62	12,632
89.93	15,153	93.49	15,345	97.06	15,538	100.63	15,730	104.20	15,922

REINFORCING STEEL ~ 2 CULVERT APRONS

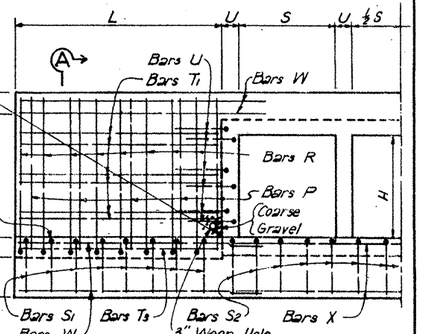
Length	*Bars X ~ #4 @ 12" NUMBER OF SPANS 2 No.	2 Wt.	3 No.	3 Wt.	4 No.	4 Wt.	5 No.	5 Wt.	6 No.	6 Wt.	Bars S2 ~ #4 @ 12" NUMBER OF SPANS 2 No.	2 Wt.	3 No.	3 Wt.	4 No.	4 Wt.	5 No.	5 Wt.	6 No.	6 Wt.
3'-1"	34	84	89	50	131	66	173	82	215	96	251
3'-1"	34	89	50	131	66	173	82	215	96	251
4'-1"	34	93	50	136	66	180	82	224	96	262
4'-3"	34	97	50	142	66	187	82	233	96	273
3'-11"	40	105	60	157	78	204	96	251	114	298
4'-1"	40	109	60	164	78	213	96	262	114	311
4'-3"	40	114	60	170	78	221	96	273	114	324
4'-8"	40	125	60	187	78	243	96	299	114	355
3'-11"	46	120	68	178	90	235	110	288	132	345
4'-1"	46	125	68	185	90	245	110	300	132	360
4'-3"	46	131	68	193	90	256	110	312	132	375
4'-8"	46	148	68	212	90	281	110	343	132	411
4'-9"	46	146	68	216	90	286	110	349	132	419
4'-1"	52	142	74	202	100	274	126	344	150	409
4'-3"	52	148	74	210	100	284	126	358	150	426
4'-8"	52	162	74	231	100	312	126	393	150	468
4'-9"	52	165	74	235	100	317	126	400	150	476
5'-1"	52	177	74	251	100	340	126	428	150	509
4'-1"	52	142	74	202	100	273	126	344	150	409
4'-3"	52	148	74	210	100	284	126	358	150	426
4'-8"	52	162	74	231	100	312	126	393	150	468
4'-9"	52	165	74	235	100	317	126	400	150	476
5'-1"	52	177	74	251	100	340	126	428	150	509
4'-3"	58	165	86	244	112	318	140	397	166	471
4'-8"	58	181	86	268	112	349	140	436	166	517
4'-9"	58	184	86	273	112	355	140	444	166	527
5'-1"	58	197	86	292	112	380	140	475	166	564
5'-5"	58	210	86	311	112	405	140	507	166	601
4'-3"	58	165	86	244	112	318	140	397	166	471
4'-8"	58	181	86	268	112	349	140	436	166	517
4'-9"	58	184	86	273	112	355	140	444	166	527
5'-1"	58	197	86	292	112	380	140	475	166	564
5'-5"	58	210	86	311	112	405	140	507	166	601
4'-8"	64	200	94	293	124	387	154	480	184	574
4'-9"	64	203	94	298	124	393	154	489	184	584
5'-1"	64	217	94	319	124	421	154	523	184	625
5'-5"	64	232	94	340	124	449	154	557	184	666
5'-7"	64	239	94	351	124	462	154	574	184	686
4'-8"	64	200	94	293	124	387	154	480	184	574
4'-9"	64	203	94	298	124	393	154	489	184	584
5'-1"	64	217	94	319	124	421	154	523	184	625
5'-5"	64	232	94	340	124	449	154	557	184	666
5'-7"	64	239	94	351	124	462	154	574	184	686

TABLE OF DIMENSIONS

Culvert Size S	H	Slab T	WINGWALL Z	L	R	W	V	D	Y	APRON C NUMBER OF SPANS 2	3	4	5	6
5x2		6"	3'-6"	7'-6 1/4"	7"	2'-6"	8"	1'-0"	1'-0"	16'-3 1/8"	24'-0 1/2"	31'-9 7/8"	39'-7 1/8"	47'-4 1/2"
5x3		6"	4'-6"	10'-4 1/2"	7"	2'-10"	8"	1'-2"	1'-0"	16'-3 1/8"	24'-0 1/2"	31'-9 7/8"	39'-7 1/8"	47'-4 1/2"
5x4		6"	5'-6"	13'-2 1/8"	7"	3'-5"	8"	1'-7"	1'-2"	16'-3 1/8"	24'-0 1/2"	31'-9 7/8"	39'-7 1/8"	47'-4 1/2"
5x5		6"	6'-6"	16'-0 3/8"	7"	4'-0"	8"	2'-0"	1'-4"	16'-7 3/4"	24'-6 1/8"	32'-4 7/8"	40'-3 5/8"	48'-2 7/8"
6x3		6"	4'-6"	10'-4 1/2"	7"	2'-10"	8"	1'-2"	1'-0"	19'-1 7/8"	28'-3 3/8"	37'-5 3/4"	46'-8"	55'-10 3/8"
6x4		6"	5'-6"	13'-2 3/8"	7"	3'-5"	8"	1'-7"	1'-2"	19'-1 7/8"	28'-3 3/8"	37'-5 3/4"	46'-8"	55'-10 3/8"
6x5		6"	6'-6"	16'-0 3/8"	7"	4'-0"	8"	2'-0"	1'-4"	19'-5 3/8"	28'-9 1/8"	38'-0 3/4"	47'-4 1/2"	56'-8 1/4"
6x6		6"	7'-6"	18'-10 1/4"	7"	4'-8"	8"	2'-3"	1'-9"	19'-5 3/8"	28'-9 1/8"	38'-0 3/4"	47'-4 1/2"	56'-8 1/4"
7x3		6 1/2"	4'-6 1/2"	10'-5 7/8"	7"	2'-10"	8"	1'-2"	1'-0"	21'-1"	32'-6 3/8"	43'-1 7/8"	53'-8 7/8"	64'-4 1/8"
7x4		6 1/2"	5'-6 1/2"	13'-3 3/4"	7"	3'-5"	8"	1'-7"	1'-2"	21'-1"	32'-6 3/8"	43'-1 7/8"	53'-8 7/8"	64'-4 1/8"
7x5		6 1/2"	6'-6 1/2"	16'-1 3/8"	7"	4'-0"	8"	2'-0"	1'-4"	22'-3 1/4"	33'-0"	43'-8 3/8"	54'-5 3/8"	65'-2"
7x6		6 1/2"	7'-6 1/2"	18'-11 3/4"	7"	4'-8"	8"	2'-3"	1'-9"	22'-3 1/4"	33'-0"	43'-8 3/8"	54'-5 3/8"	65'-2"
7x7		6 1/2"	8'-6 1/2"	21'-9 5/8"	8"	5'-2"	9 1/2"	2'-6 1/2"	1'-10"	22'-3 1/4"	33'-0"	43'-8 3/8"	54'-5 3/8"	65'-2"
8x4		7"	5'-7"	13'-5 1/4"	7"	3'-5"	8"	1'-7"	1'-2"	24'-9"	36'-9 1/4"	48'-9 1/8"	60'-9 3/8"	72'-10"
8x5		7"	6'-7"	16'-3 1/8"	7"	4'-0"	8"	2'-0"	1'-4"	25'-1 1/4"	37'-2 7/8"	49'-4 1/2"	61'-6 1/4"	73'-7 1/8"
8x6		7"	7'-7"	19'-1 1/8"	7"	4'-8"	8"	2'-3"	1'-9"	25'-1 1/4"	37'-2 7/8"	49'-4 1/2"	61'-6 1/4"	73'-7 1/8"
8x7		7"	8'-7"	21'-11 1/8"	8"	5'-2"	9 1/2"	2'-6 1/2"	1'-10"	25'-1 1/4"	37'-2 7/8"	49'-4 1/2"	61'-6 1/4"	73'-7 1/8"
8x8		7"	9'-7"	24'-9"	9"	5'-9"	10 1/2"	2'-8 1/2"	2'-2"	25'-6 1/2"	37'-8 1/2"	49'-11 3/8"	62'-2 3/8"	74'-5 3/4"
8x4		7 1/2"	5'-7 1/2"	13'-6 5/8"	7"	3'-5"	8"	1'-7"	1'-2"	24'-9"	36'-9 1/4"	48'-9 1/8"	60'-9 3/8"	72'-10"
8x5		7 1/2"	6'-7 1/2"	16'-4 3/8"	7"	4'-0"	8"	2'-0"	1'-4"	25'-1 1/4"	37'-2 7/8"	49'-4 1/2"	61'-6 1/4"	73'-7 1/8"
8x6		7 1/2"	7'-7 1/2"	19'-2 1/2"	7"	4'-8"	8"	2'-3"	1'-9"	25'-1 1/4"	37'-2 7/8"	49'-4 1/2"	61'-6 1/4"	73'-7 1/8"
8x7		7 1/2"	8'-7 1/2"	22'-0 1/2"	8"	5'-2"	9 1/2"	2'-6 1/2"	1'-10"	25'-1 1/4"	37'-2 7/8"	49'-4 1/2"	61'-6 1/4"	73'-7 1/8"
8x8		7 1/2"	9'-7 1/2"	24'-10 3/8"	9"	5'-9"	10 1/2"	2'-8 1/2"	2'-2"	25'-5 1/2"	37'-8 1/2"	49'-11 3/8"	62'-2 3/8"	74'-5 3/4"
9x5		7"	6'-7"	16'-3 1/8"	7"	4'-0"	8"	2'-0"	1'-4"	27'-1 1/8"	41'-5 3/4"	55'-0 1/2"	68'-7 1/8"	82'-1 3/4"
9x6		7"	7'-7"	19'-1 1/8"	7 1/2"	4'-9"	8 1/2"	2'-3 1/2"	1'-9"	27'-1 1/8"	41'-5 3/4"	55'-0 1/2"	68'-7 1/8"	82'-1 3/4"
9x7		7"	8'-7"	21'-11 1/8"	8 1/2"	5'-4"	9 1/2"	2'-7 1/2"	1'-11"	27'-1 1/8"	41'-5 3/4"	55'-0 1/2"	68'-7 1/8"	82'-1 3/4"
9x8		7"	9'-7"	24'-9"	9 1/2"	6'-0"	11"	2'-11"	2'-2"	28'-3 3/4"	41'-11 1/2"	55'-7 1/2"	69'-3 3/8"	82'-11 1/8"
9x9		7"	10'-7"	27'-7"	10"	6'-6"	12 1/8"	2'-11 1/2"	2'-6"	28'-3 3/4"	41'-11 1/2"	55'-7 1/2"	69'-3 3/8"	82'-11 1/8"
9x5		8"	6'-8"	16'-6"	7"	4'-0"	8"	2'-0"	1'-4"	27'-11 1/8"	41'-5 3/4"	55'-0 1/2"	68'-7 1/8"	82'-1 3/4"
9x6		8"	7'-8"	19'-4"	7 1/2"	4'-9"	8 1/2"	2'-3 1/2"	1'-9"	27'-11 1/8"	41'-5 3/4"	55'-0 1/2"	68'-7 1/8"	82'-1 3/4"
9x7		8"	8'-8"	22'-1 1/2"	8 1/2"	5'-4"	9 1/2"	2'-7 1/2"	1'-11"	27'-11 1/8"	41'-5 3/4"	55'-0 1/2"	68'-7 1/8"	82'-1 3/4"
9x8		8"	9'-8"	24'-11 1/2"	9 1/2"	6'-0"	11"	2'-11"	2'-2"	28'-3 3/4"	41'-11 1/2"	55'-7 1/2"	69'-3 3/8"	82'-11 1/8"
9x9		8"	10'-8"	27'-9 3/4"	10"	6'-6"	12 1/8"	2'-11 1/2"	2'-6"	28'-3 3/4"	41'-11 1/2"	55'-7 1/2"	69'-3 3/8"	82'-11 1/8"
10x6		7 1/2"	7'-7 1/2"	19'-2 1/2"	7 1/2"	4'-9"	8 1/2"	2'-3 1/2"	1'-9"	30'-9 1/8"	45'-8 3/8"	60'-8 3/8"	75'-7 7/8"	90'-7 1/4"
10x7		7 1/2"	8'-7 1/2"	22'-0 1/2"	8 1/2"	5'-4"	9 1/2"	2'-7 1/2"	1'-11"	30'-9 1/8"	45'-8 3/8"	60'-8 3/8"	75'-7 7/8"	90'-7 1/4"
10x8		7 1/2"	9'-7 1/2"	24'-10 3/8"	9 1/2"	6'-0"	11"	2'-11"	2'-2"	31'-1 3/8"	46'-2 3/8"	61'-3 3/8"	76'-4 3/8"	91'-5 3/8"
10x9		7 1/2"	10'-7 1/2"	27'-9 3/4"	10"	6'-6"	12 1/8"	2'-11 1/2"	2'-6"	31'-1 3/8"	46'-2 3/8"	61'-3 3/8"	76'-4 3/8"	91'-5 3/8"
10x10		7 1/2"	11'-7 1/2"	30'-6 1/4"	11"	7'-0"	13 1/2"	3'-2 1/2"	2'-8"	31'-1 3/8"	46'-2 3/8"	61'-3 3/8"	76'-4 3/8"	91'-5 3/8"
10x6		8 1/2"	7'-8 1/2"	19'-5 3/8"	7 1/2"	4'-9"	8 1/2"	2'-3 1/2"	1'-9"	30'-9 1/8"	45'-8 3/8"	60'-8 3/8"	75'-7 7/8"	90'-7 1/4"
10x7		8 1/2"	8'-8 1/2"	22'-3 1/4"	8 1/2"	5'-4"	9 1/2"	2'-7 1/2"	1'-11"	30'-9 1/8"	45'-8 3/8"	60'-8 3/8"	75'-7 7/8"	90'-7 1/4"
10x8		8 1/2"	9'-8 1/2"	25'-1 1/4"	9 1/2"	6'-0"	11"	2'-11"	2'-2"	31'-1 3/8"	46'-2 3/8"	61'-3 3/8"	76'-4 3/8"	91'-5 3/8"
10x9		8 1/2"	10'-8 1/2"	27'-11 1/8"	10"	6'-6"	12 1/8"	2'-11 1/2"	2'-6"	31'-1 3/8"	46'-2 3/8"	61'-3 3/8"	76'-4 3/8"	91'-5 3/8"
10x10		8 1/2"	11'-8 1/2"	30'-9 1/2"	11"	7'-0"	13 1/2"	3'-2 1/2"	2'-8"	31'-1 3/8"	46'-2 3/8"	61'-3 3/8"	76'-4 3/8"	91'-5 3/8"

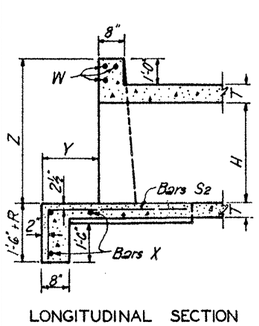


SEC. A-A

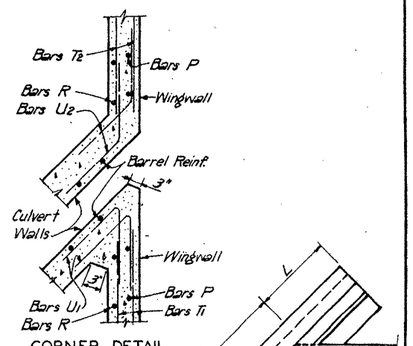


ELEVATION

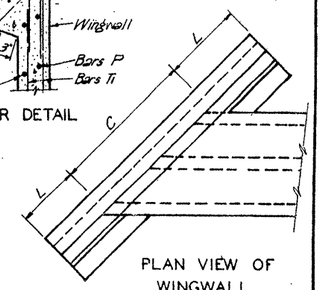
DETAIL OF WINGWALL



LONGITUDINAL SECTION THRU BOX SHOWING DETAIL OF APRON



CORNER DETAIL



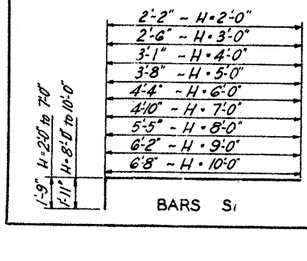
PLAN VIEW OF WINGWALL

TABLE OF REINFORCING STEEL FOR 4 WINGWALLS

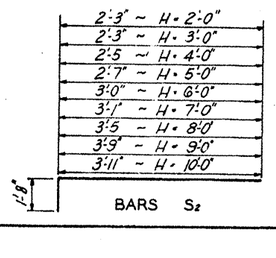
WING SIZE H	L	Bars R No.	Size	Spa.	Lgth.	Wt.	Bars S1 No.	Size	Spa.	Lgth.	Wt.	#4 Bars T1 @ 18" cc No.	Lgth.	Wt.	#4 Bars T2 @ 18" cc No.	Lgth.	Wt.	#4 Bars T3 @ 18" cc No.	Lgth.	Wt.	Bars U1 No.	Size	Spa.	Lgth.	Wt.	Bars U2 No.	Size	Spa.	Lgth.	Wt.	#4 Bars P @ 18" cc No.	Lgth.	Wt.	#4 Bars W @ 12" cc No.	Lgth.	Wt.	TOTAL WEIGHT
2'-0"	7'-6 1/2"	36	#4	12"	5'-1"	122	36	#4	12"	3'-11"	94	8	6'-9"	36	8	7'-9"	41	8	7'-1"	38	8	#5	18"	6'-0"	50	8	#5	18"	6'-0"	50	24	3'-9"	60	28	9'-4"	175	666
3'-0"	10'-5 3/4"	48	#4	11"	6'-1"	195	48	#4	11"	4'-3"	136	12	10'-8"	82	8	10'-0"	53	12	#5	18"	12	#5	18"	6'-0"	75	12	#5	18"	6'-0"	75	32	4'-9"	102	28	12'-3"	229	1028
4'-0"	13'-5 1/4"	96	#4	7"	7'-4"	470	96	#4	7"	4'-10"	309	12	12'-7"	134	12	13'-7"	145	8	12'-11"	69	12	#5	18"	6'-0"	100	12	#5	18"	6'-0"	100	40	5'-9"	154	32	15'-2"	324	1805
5'-0"	16'-3 1/8"	100	#5	8"	8'-6"	887	100	#5	8"	5'-5"	565	12	15'-5"	165	12	15'-5"	175	12	15'-9"	126	12	#5	18"	6'-0"	100	12	#5	18"	6'-0"	100	48	6'-9"	216	36	18'-0"	433	2767
6'-0"	19'-1 1/8"	136	#5	7"	9'-11"	1407	136	#5	7"	6'-1"	863	20	18'-3"	244	20	19'-3"	257	12	18'-7"	149	20	#5	18"	6'-0"	125	20	#5	18"	6'-0"	125	56	7'-9"	290	36	20'-10"	501	3961
7'-0"	21'-11"	196	#5	5 1/2"	11'-4"	2317	196	#5	5 1/2"	6'-7"	1345	24	21'-1"	338	24	22'-1"	354	12	21'-5"	172	24	#5	18"	6'-0"	150	24	#5	18"	6'-0"	150	64	8'-9"	374	40	23'-8"	632	5832
8'-0"	24'-10 3/8"	188	#6	6 1/2"	12'-9"	3600	188	#6	6 1/2"	7'-4"	2070	24	24'-0"	385	24	25'-0"	401	12	24'-5"	261	24	#5	18"	6'-0"	150	24	#5	18"	6'-0"	150	72	9'-9"	429	44	26'-7"	781	8267
9'-0"	27'-11 1/8"	248	#6	5 1/2"	14'-4"	5340	248	#6	5 1/2"	8'-1"	3012	28	27'-1"	507	28	28'-1"	525	12	27'-5"	293	28	#5	18"	6'-0"	175	28	#5	18"	6'-0"	175	80	10'-10"	579	44	29'-8"	872	11,478
10'-0"	31'-0"	300	#6	5"	15'-9"	7097	300	#6	5"	8'-7"	3868	32	30'-2"	645	32	31'-2"	666	12	30'-6"	322	32	#5	18"	6'-0"	200	32	#5	18"	6'-0"	200	88	11'-10"	696	48	32'-9"	1050	14,748

*NUMBER OF BARS X
2 Bars when H = 2', 3' & 4'
3 Bars when H = 5', 6' & 7'
4 Bars when H = 8', 9' & 10'

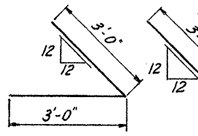
Length = Dimension C



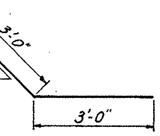
BARS S1



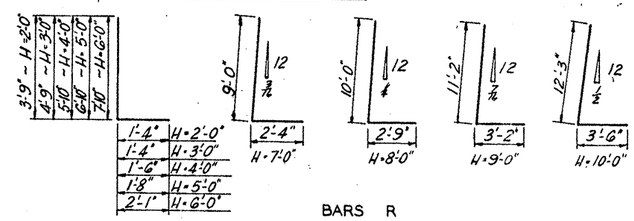
BARS S2



BARS U1



BARS U2



BARS R

GENERAL NOTES:

Chamfer all exposed corners 3/4" unless otherwise specified.

All dimensions relating to reinforcing steel are to centers of bars. Provide Weep Holes for H=5'-0" and greater.

The bottom slab of the barrel, wing footing and headwalls shall be placed in one continuous operation.

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

PARALLEL WINGS-45° SKEW
FOR MULTIPLE BOX CULVERTS
5'x 2' TO 10'x 10'

MCW-P-45°

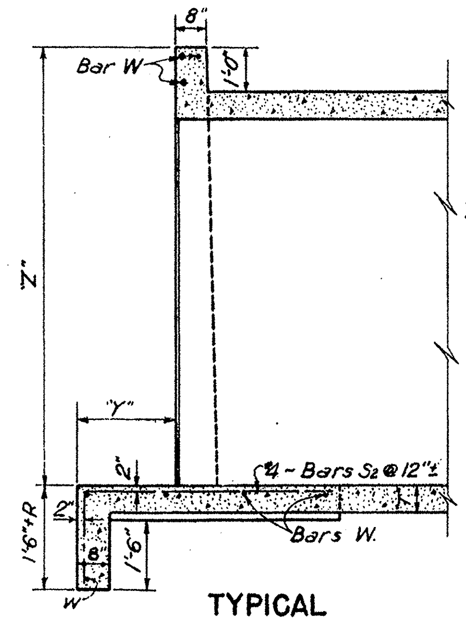
REVISIONS
Rev. Nov. 64
Rev. Nov. 1967

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.	SHEET NO.
6	TEXAS		3/6/1
STATE DIST. NO.	COUNTY	CONT. SECT. JOB	HIGHWAY NO.
15	BEXAR	2452-2-23	

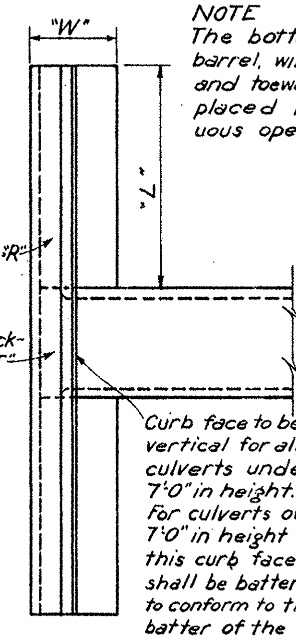
CULVERT SIZE S × H	SLAB DEPTH "T"	MAX FILL FT	WING HEIGHT "Z"	WING LENGTH "L"	TOTAL QUANT. 4 WINGWALLS CONC. C.Y.	REINF. LB.	TABLE OF DIMENSIONS "R"	"W"	"V"	"D"	"Y"
3 × 2	6"	14'	3'-6"	5'-3"	4.10	558	6½"	2'-6"	8"	10"	1'-0"
3 × 3	6"	14'	4'-6"	6'-9"	6.11	818	7"	2'-10"	8"	1'-2"	1'-0"
4 × 2	6"	12'	3'-6"	5'-3"	4.21	564	6½"	2'-6"	8"	10"	1'-0"
4 × 3	6"	12'	4'-6"	6'-9"	6.23	824	7"	2'-10"	8"	1'-2"	1'-0"
4 × 4	6"	12'	5'-6"	8'-3"	8.75	1322	7"	3'-5"	8"	1'-7"	1'-2"
5 × 2	6"	8'	3'-6"	5'-3"	4.33	569	7"	2'-6"	8"	10"	1'-0"
5 × 3	6"	8'	4'-6"	6'-9"	6.34	829	7"	2'-10"	8"	1'-2"	1'-0"
5 × 4	6"	8'	5'-6"	8'-3"	8.87	1328	7"	3'-5"	8"	1'-7"	1'-2"
5 × 5	6"	8'	6'-6"	9'-9"	11.86	1876	7"	4'-0"	8"	2'-0"	1'-4"
6 × 3	6"	8'	4'-6"	6'-9"	6.46	835	7"	2'-10"	8"	1'-2"	1'-0"
6 × 4	6"	8'	5'-6"	8'-3"	8.90	1334	7"	3'-5"	8"	1'-7"	1'-2"
6 × 5	6"	8'	6'-6"	9'-9"	11.99	1883	7"	4'-0"	8"	2'-0"	1'-4"
6 × 6	6"	8'	7'-6"	11'-3"	15.56	2616	7"	4'-8"	8"	2'-3"	1'-9"
7 × 3	6½"	8'	4'-6½"	6'-10"	6.68	841	7"	2'-10"	8"	1'-2"	1'-0"
7 × 4	6½"	8'	5'-6½"	8'-4"	9.24	1341	7"	3'-5"	8"	1'-7"	1'-2"
7 × 5	6½"	8'	6'-6½"	9'-10"	12.27	1890	7"	4'-0"	8"	2'-0"	1'-4"
7 × 6	6½"	8'	7'-6½"	11'-4"	15.89	2624	7"	4'-8"	8"	2'-3"	1'-9"
7 × 7	6½"	8'	8'-6½"	12'-10"	21.55	3650	8"	5'-2"	9½"	2'-6½"	1'-10"
8 × 4	6½"	4'	5'-6½"	8'-4"	9.36	1347	7"	3'-5"	8"	1'-7"	1'-2"
8 × 5	6½"	4'	6'-6½"	9'-10"	12.40	1897	7"	4'-0"	8"	2'-0"	1'-4"
8 × 6	6½"	4'	7'-6½"	11'-4"	16.03	2632	7"	4'-8"	8"	2'-3"	1'-9"
8 × 7	6½"	4'	8'-6½"	12'-10"	21.70	3659	8"	5'-2"	9½"	2'-6½"	1'-10"
8 × 8	6½"	4'	9'-6½"	14'-4"	28.49	5222	9"	5'-9"	10½"	2'-8½"	2'-2"
8 × 4	7"	6'	5'-7"	8'-4"	9.41	1347	7"	3'-5"	8"	1'-7"	1'-2"
8 × 5	7"	6'	6'-7"	9'-10"	12.46	1897	7"	4'-0"	8"	2'-0"	1'-4"
8 × 6	7"	6'	7'-7"	11'-4"	16.11	2632	7"	4'-8"	8"	2'-3"	1'-9"
8 × 7	7"	6'	8'-7"	12'-10"	21.79	3659	8"	5'-2"	9½"	2'-6½"	1'-10"
8 × 8	7"	6'	9'-7"	14'-4"	28.60	5222	9"	5'-9"	10½"	2'-8½"	2'-2"
8 × 4	7½"	8'	5'-7½"	8'-5"	9.54	1347	7"	3'-5"	8"	1'-7"	1'-2"
8 × 5	7½"	8'	6'-7½"	9'-11"	12.61	1897	7"	4'-0"	8"	2'-0"	1'-4"
8 × 6	7½"	8'	7'-7½"	11'-5"	16.30	2632	7"	4'-8"	8"	2'-3"	1'-9"
8 × 7	7½"	8'	8'-7½"	12'-11"	22.02	3659	8"	5'-2"	9½"	2'-6½"	1'-10"
8 × 8	7½"	8'	9'-7½"	14'-5"	28.88	5222	9"	5'-9"	10½"	2'-8½"	2'-2"
9 × 5	7"	6'	6'-7"	9'-10"	12.59	1904	7"	4'-0"	8"	2'-0"	1'-4"
9 × 6	7"	6'	7'-7"	11'-4"	16.26	2640	7"	4'-8"	8"	2'-3"	1'-9"
9 × 7	7"	6'	8'-7"	12'-10"	21.95	3668	8"	5'-2"	9½"	2'-6½"	1'-10"
9 × 8	7"	6'	9'-7"	14'-4"	28.78	5232	9"	5'-9"	10½"	2'-8½"	2'-2"
9 × 9	7"	6'	10'-7"	15'-10"	37.26	6874	9½"	6'-4"	12½"	2'-10½"	2'-5"
9 × 5	8"	8'	6'-8"	10'-0"	12.90	1904	7"	4'-0"	8"	2'-0"	1'-4"
9 × 6	8"	8'	7'-8"	11'-6"	17.35	2640	7½"	4'-9"	8½"	2'-3½"	1'-9"
9 × 7	8"	8'	8'-8"	13'-0"	23.11	3668	8½"	5'-4"	9½"	2'-7½"	1'-11"
9 × 8	8"	8'	9'-8"	14'-6"	30.73	5232	9½"	6'-0"	11"	2'-11"	2'-2"
9 × 9	8"	8'	10'-8"	16'-0"	38.93	6874	10"	6'-6"	12½"	2'-11½"	2'-6"
10 × 5	7"	4'	6'-7"	9'-10"	12.72	1911	7"	4'-0"	8"	2'-0"	1'-4"
10 × 6	7"	4'	7'-7"	11'-4"	16.41	2648	7"	4'-8"	8"	2'-3"	1'-9"
10 × 7	7"	4'	8'-7"	12'-10"	22.11	3677	8"	5'-2"	9½"	2'-6½"	1'-10"
10 × 8	7"	4'	9'-7"	14'-4"	28.96	5241	9"	5'-9"	10½"	2'-8½"	2'-2"
10 × 9	7"	4'	10'-7"	15'-10"	37.45	6885	9½"	6'-4"	12½"	2'-10½"	2'-5"
10 × 10	7"	4'	11'-7"	17'-4"	48.02	8740	11"	7'-0"	13½"	3'-2½"	2'-8"
10 × 5	8"	6'	6'-8"	10'-0"	13.04	1911	7"	4'-0"	8"	2'-0"	1'-4"
10 × 6	8"	6'	7'-8"	11'-6"	17.51	2648	7½"	4'-9"	8½"	2'-3½"	1'-9"
10 × 7	8"	6'	8'-8"	13'-0"	23.28	3677	8½"	5'-4"	9½"	2'-7½"	1'-11"
10 × 8	8"	6'	9'-8"	14'-6"	30.91	5241	9½"	6'-0"	11"	2'-11"	2'-2"
10 × 9	8"	6'	10'-8"	16'-0"	39.14	6885	10"	6'-6"	12½"	2'-11½"	2'-6"
10 × 10	8"	6'	11'-8"	17'-6"	48.80	8740	11"	7'-0"	13½"	3'-2½"	2'-8"
10 × 5	8½"	8'	6'-8½"	10'-1"	13.20	1911	7"	4'-0"	8"	2'-0"	1'-4"
10 × 6	8½"	8'	7'-8½"	11'-7"	17.71	2648	7½"	4'-9"	8½"	2'-3½"	1'-9"
10 × 7	8½"	8'	8'-8½"	13'-1"	23.52	3677	8½"	5'-4"	9½"	2'-7½"	1'-11"
10 × 8	8½"	8'	9'-8½"	14'-7"	31.20	5241	9½"	6'-0"	11"	2'-11"	2'-2"
10 × 9	8½"	8'	10'-8½"	16'-1"	39.50	6885	10"	6'-6"	12½"	2'-11½"	2'-6"
10 × 10	8½"	8'	11'-8½"	17'-7"	49.18	8740	11"	7'-0"	13½"	3'-2½"	2'-8"

TABLE OF REINFORCING STEEL FOR 4 WING WALLS

WING SIZE "Z"	"L"	BARS R NO	SIZE	SPAC	LENGTH	WEIGHT	BARS S1 NO	SIZE	SPAC	LENGTH	WEIGHT	#4 BARS T1 @18"± NO	LENGTH	WEIGHT	#4 BARS T2 @ 12"± NO	LENGTH	WEIGHT	BARS U NO	SIZE	SPAC	LENGTH	WEIGHT	#4 Bars P @18"c.c. SPAC	LENGTH	WEIGHT	#4 BARS W @12"± NO	LENGTH	WEIGHT	TOTAL WEIGHT
3'-6"	5'-3"	24	#4	12"	5'-1"	81	24	#4	12"	3'-11"	63	16	5'-0"	53	8	5'-0"	27	16	#5	18"	6'-0"	100	20	3'-9"	50	28	8'-9"	164	538
4'-6"	6'-9"	32	#4	11"	6'-1"	130	32	#4	11"	4'-3"	91	24	6'-6"	104	8	6'-6"	35	24	#5	18"	6'-0"	150	24	4'-9"	76	28	11'-3"	210	796
5'-6"	8'-3"	60	#4	7"	7'-3"	291	60	#4	7"	4'-10"	194	32	8'-0"	171	8	8'-0	43	32	#5	18"	6'-0"	200	28	5'-9"	108	32	13'-3"	283	1290
6'-6"	9'-9"	56	#5	8½"	8'-5"	492	60	#5	8"	5'-5"	339	32	9'-6"	203	12	9'-6"	76	32	#5	18"	6'-0"	200	32	6'-9"	144	36	15'-9"	379	1833
7'-6"	11'-3"	80	#5	7"	9'-10"	820	80	#5	7"	6'-1"	507	40	11'-0"	294	12	11'-0"	88	40	#5	18"	6'-0"	250	36	7'-9"	186	36	17'-3"	415	2560
8'-6½"	12'-10"	112	#5	5½"	11'-4"	1,324	104	#5	6"	6'-7"	714	48	12'-7"	403	12	12'-7"	101	48	#5	18"	6'-0"	300	40	8'-9"	234	40	18'-11"	505	3581
9'-6½"	14'-4"	108	#6	6½"	12'-9"	2,068	116	#6	6"	7'-4"	1277	48	14'-1"	452	16	14'-1"	150	48	#5	18"	6'-0"	300	44	9'-9"	287	44	20'-6"	603	5137
10'-7"	15'-10"	140	#6	5½"	14'-4"	3,013	140	#6	5½"	7'-11"	1665	56	15'-7"	583	16	15'-7"	167	56	#5	18"	6'-0"	350	48	10'-10"	347	44	22'-0"	647	6772
11'-7"	17'-4"	168	#6	5"	15'-9"	3974	168	#6	5"	8'-7"	2165	64	17'-1"	730	16	17'-1"	183	64	#5	18"	6'-0"	401	52	11'-10"	411	48	23'-6"	754	8618

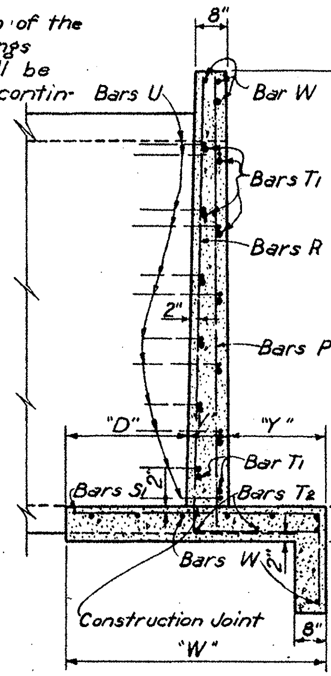


TYPICAL LONGITUDINAL SECTION THRU BOX SHOWING DETAIL OF APRON

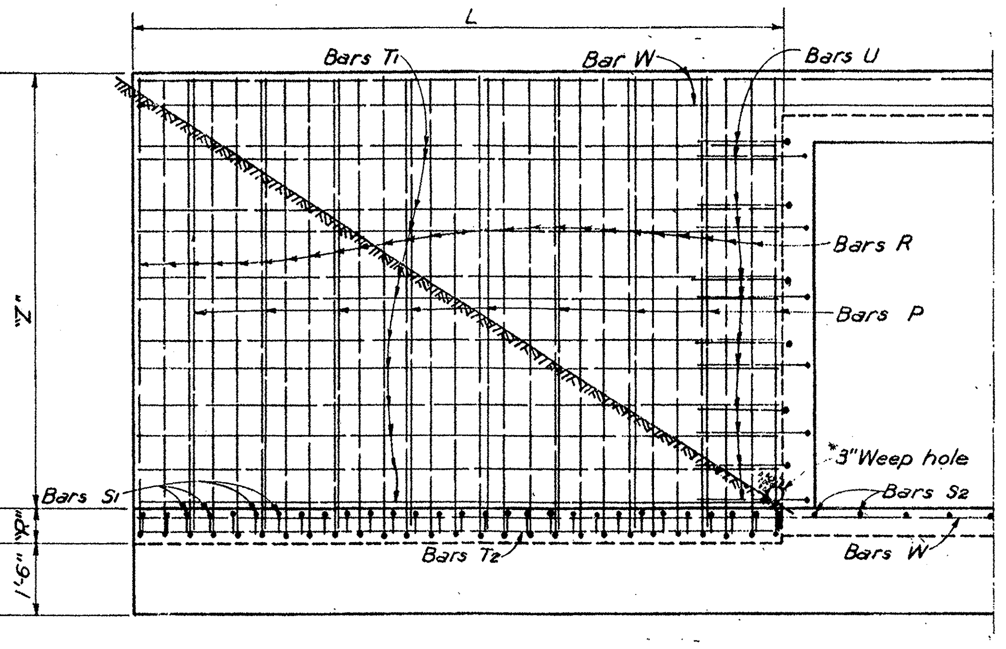


PLAN VIEW OF WING WALL

NOTE
The bottom slab of the barrel, wing footings and toewalls shall be placed in one continuous operation.



SECTION

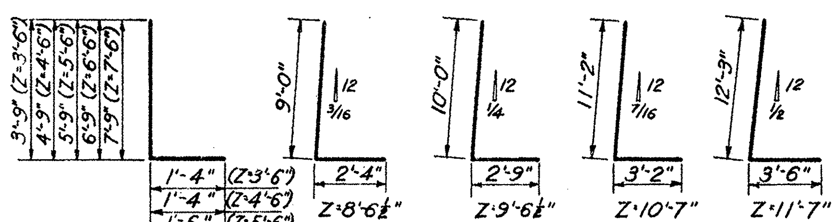


HALF ELEVATION

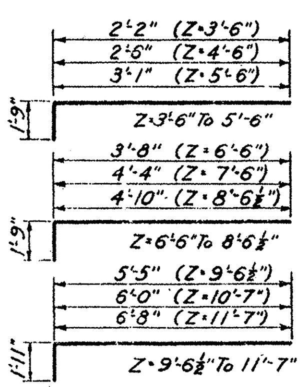
DETAIL OF WING WALL

*Place one weep hole per wing at approximate earth line as shown. Fill around inlet of drains with broken stone or coarse gravel to permit free passage of water. Weep holes required for Z=6'-6" and greater.

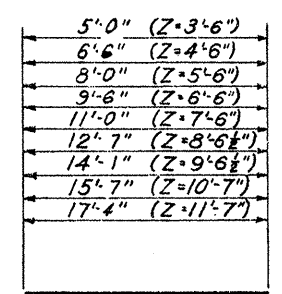
GENERAL NOTES:
Chamfer all exposed corners ¾" unless specified otherwise.
All dimensions relating to reinforcing steel are to centers of bars.



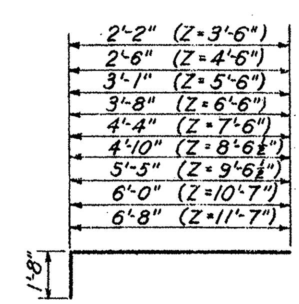
BARS R



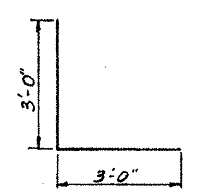
BARS S1



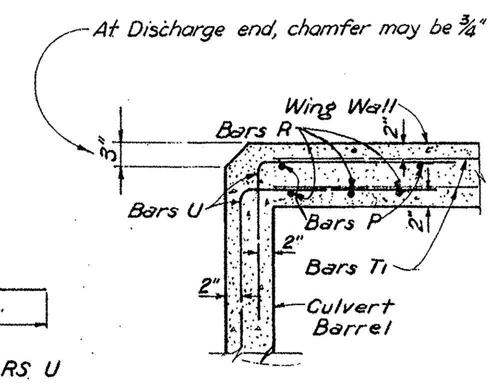
BARS T1



BARS S2
(Culvert Apron)



BARS U



ARRANGEMENT OF WING WALL REINF. AT CULVERT WALL

BILL OF #4 BARS S2 @12"± FOR 2 CULVERT APRONS "Z"	SPAN	NO	LGTH	WEIGHT	"Z"	SPAN	NO	LGTH	WEIGHT
3'-6"	3'-0"	8	3'-10"	20	6'-6"	9'-0"	20	5'-4"	71
	4'-0"	10	3'-10"	26		10'-0"	22	5'-4"	78
	5'-0"	12	3'-10"	31	7'-6"	6'-0"	14	6'-0"	56
4'-6"	3'-0"	8	4'-2"	22		7'-0"	16	6'-0"	64
	4'-0"	10	4'-2	28		8'-0"	18	6'-0"	72
	5'-0"	12	4'-2"	33		9'-0"	20	6'-0"	80
	6'-0"	14	4'-2"	39		10'-0"	22	6'-0"	88
	7'-0"	16	4'-2"	45	8'-6½"	7'-0"	16	6'-6"	69
5'-6"	4'-0"	10	4'-9"	32		8'-0"	18	6'-6"	78
	5'-0"	12	4'-9"	38		9'-0"	20	6'-6"	87
	6'-0"	14	4'-9"	44		10'-0"	22	6'-6"	96
	7'-0"	16	4'-9"	51	9'-6½"	8'-0"	18	7'-1"	85
	8'-0	18	4'-9"	57		9'-0"	20	7'-1"	95
6'-6"	5'-0"	12	5'-4"	43		10'-0"	22	7'-1"	104
	6'-0"	14	5'-4"	50	10'-7"	9'-0"	20	7'-8"	102
	7'-0"	16	5'-4"	57		10'-0"	22	7'-8"	113
	8'-0"	18	5'-4"	64	11'-7"	10'-0"	22	8'-4"	122

PLAN
NOTE BOOK
NO.

PROFILE
NOTE BOOK
NO.
SURVEYED
PLOTTED
GRADES CHECKED
B. M.S NOTED
STRUCTURE NOTATIONS CH'KD

TEXAS HIGHWAY DEPARTMENT

PARALLEL WINGS-NORMAL

FOR SINGLE BOX CULVERTS
3 X 2 TO 10 X 10

PW-N

	DRAWING	DATE	FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
DN. CFS&WH	Original	June 1948	6	TEXAS		316B
CK. DN. W.H.	Rev. Oct. 1958		STATE DIST. NO.	COUNTY	CONTROL NO. / SECTION NO. / JOB NO.	HIGHWAY NO.
DW. ABL	Rev. Jan. 1959		15	BEXAR	2452 / 2 / 23	L1604
CK. DW. W.H.	Rev. Nov. 1964					
TR. AOB	Rev. Nov. 1967	Rev. 6-74				
CK. TR. W.H.						

TABLE OF DIMENSIONS AND QUANTITIES FOR TWO TYPE A HEADWALLS

NO. OF PIPES	DIAM. OF PIPES	G	K	T	E	H	W	BARS A1 4~#3 Lgth.	BARS A1 Wt.	BARS A2 #3 @18"± No.	BARS A2 Lgth.	BARS A2 Wt.	BARS E 4~#5 Lgth.	BARS E Wt.	BARS F1 @12"± No.	BARS F1 Size	BARS F1 Lgth.	BARS F1 Wt.	BARS F2 @12"± No.	BARS F2 Size	BARS F2 Lgth.	BARS F2 Wt.	TOTAL QUANTITIES STEEL LBS.	TOTAL QUANTITIES CONC. C.Y.
1	12"	~	12"	9"	1'-9"	2'-6"	7'-0"	6'-8"	10	8	2'-6"	8	6'-8"	28	12	#4	2'-11"	23	12	#4	3'-8"	29	98	1.48
2	"	10"	"	"	"	"	8'-10"	8'-6"	13	"	"	"	8'-6"	35	14	"	"	27	14	"	"	34	117	1.81
3	"	"	"	"	"	"	10'-8"	10'-4"	16	"	"	"	10'-4"	43	16	"	"	31	16	"	"	39	137	2.15
4	"	"	"	"	"	"	12'-6"	12'-2"	18	"	"	"	12'-2"	51	18	"	"	35	18	"	"	44	156	2.48
1	15"	~	12"	9"	1'-9"	2'-9"	8'-3"	7'-11"	12	8	3'-0"	9	7'-11"	33	12	#4	3'-2"	25	12	#4	3'-11"	31	110	1.82
2	"	1'-0"	"	"	"	"	10'-6"	10'-2"	15	"	"	"	10'-2"	42	14	"	"	30	14	"	"	37	133	2.24
3	"	"	"	"	"	"	12'-9"	12'-5"	19	"	"	"	12'-5"	52	16	"	"	34	16	"	"	42	156	2.66
4	"	"	"	"	"	"	15'-0"	14'-8"	22	"	"	"	14'-8"	61	18	"	"	38	18	"	"	47	177	3.09
1	18"	~	12"	9"	1'-9"	3'-0"	9'-6"	9'-2"	14	8	3'-6"	11	9'-2"	38	20	#4	3'-5"	46	20	#4	4'-2"	56	165	2.19
2	"	1'-2"	"	"	"	"	12'-2"	11'-10"	18	"	"	"	11'-10"	49	22	"	"	50	22	"	"	61	189	2.70
3	"	"	"	"	"	"	14'-10"	14'-6"	22	"	"	"	14'-6"	60	24	"	"	55	24	"	"	67	215	3.21
4	"	"	"	"	"	"	17'-6"	17'-2"	26	"	"	"	17'-2"	72	26	"	"	59	26	"	"	72	240	3.73
1	24"	~	12"	9"	2'-0"	3'-6"	12'-0"	11'-8"	18	8	4'-6"	14	11'-8"	49	24	#4	3'-11"	63	24	#4	4'-11"	79	223	3.17
2	"	1'-5"	"	"	"	"	15'-5"	15'-1"	23	"	"	"	15'-1"	63	26	"	"	68	26	"	"	85	253	3.89
3	"	"	"	"	"	"	18'-10"	18'-6"	28	"	"	"	18'-6"	77	28	"	"	73	28	"	"	92	284	4.62
4	"	"	"	"	"	"	22'-3"	21'-11"	33	"	"	"	21'-11"	91	30	"	"	79	30	"	"	99	316	5.35
1	30"	~	12"	9"	2'-3"	4'-0"	14'-6"	14'-2"	21	16	5'-6"	33	14'-2"	59	28	#4	4'-5"	83	28	#4	5'-8"	106	302	4.31
2	"	1'-8"	"	"	"	"	18'-8"	18'-4"	28	"	"	"	18'-4"	76	32	"	"	94	32	"	"	121	352	5.28
3	"	"	"	"	"	"	22'-10"	22'-6"	34	"	"	"	22'-6"	94	36	"	"	106	36	"	"	136	403	6.26
4	"	"	"	"	"	"	27'-0"	26'-8"	40	"	"	"	26'-8"	111	40	"	"	118	40	"	"	152	454	7.24
1	36"	~	12"	12"	2'-6"	4'-6"	17'-0"	16'-8"	25	16	6'-6"	39	16'-8"	70	32	#4	5'-2"	111	32	#4	6'-8"	143	388	6.40
2	"	1'-11"	"	"	"	"	21'-11"	21'-7"	32	"	"	"	21'-7"	90	36	"	"	124	36	"	"	160	445	7.89
3	"	"	"	"	"	"	26'-10"	26'-6"	40	"	"	"	26'-6"	111	40	"	"	138	40	"	"	178	506	9.37
4	"	"	"	"	"	"	31'-9"	31'-5"	47	"	"	"	31'-5"	131	44	"	"	152	44	"	"	196	565	10.85
1	42"	~	12"	12"	2'-9"	5'-0"	19'-6"	19'-2"	29	16	7'-6"	45	19'-2"	80	36	#4	5'-8"	136	36	#4	7'-5"	178	468	8.10
2	"	2'-2"	"	"	"	"	25'-2"	24'-10"	37	"	"	"	24'-10"	104	40	"	"	152	40	"	"	198	536	9.96
3	"	"	"	"	"	"	30'-10"	30'-6"	46	"	"	"	30'-6"	127	44	"	"	167	44	"	"	218	603	11.80
4	"	"	"	"	"	"	36'-6"	36'-2"	54	"	"	"	36'-2"	151	48	"	"	182	48	"	"	238	670	13.68
1	48"	~	15"	12"	3'-0"	5'-9"	23'-0"	22'-8"	34	24	8'-9"	79	22'-8"	95	40	#5	6'-5"	288	40	#5	8'-5"	351	827	10.74
2	"	2'-5"	"	"	"	"	29'-5"	29'-1"	44	"	"	"	29'-1"	121	44	"	"	295	44	"	"	386	925	13.08
3	"	"	"	"	"	"	35'-10"	35'-6"	53	"	"	"	35'-6"	148	48	"	"	321	48	"	"	422	1023	15.43
4	"	"	"	"	"	"	42'-3"	41'-11"	63	"	"	"	41'-11"	175	52	"	"	348	52	"	"	457	1122	17.77
1	54"	~	15"	12"	3'-3"	6'-3"	25'-6"	25'-2"	38	24	9'-9"	88	25'-2"	105	44	#5	6'-11"	318	44	#5	9'-2"	421	970	12.87
2	"	2'-10"	"	"	"	"	32'-10"	32'-6"	49	"	"	"	32'-6"	136	50	"	"	361	50	"	"	478	1112	15.77
3	"	"	"	"	"	"	40'-2"	39'-10"	60	"	"	"	39'-10"	166	56	"	"	404	56	"	"	536	1254	18.66
4	"	"	"	"	"	"	47'-6"	47'-2"	71	"	"	"	47'-2"	197	62	"	"	447	62	"	"	593	1396	21.55
1	60"	~	15"	12"	3'-6"	6'-9"	28'-0"	27'-8"	42	24	10'-9"	97	27'-8"	115	48	#5	7'-5"	371	48	#5	9'-11"	497	1122	15.20
2	"	3'-0"	"	"	"	"	36'-0"	35'-8"	54	"	"	"	35'-8"	149	54	"	"	418	54	"	"	559	1277	18.55
3	"	"	"	"	"	"	44'-0"	43'-8"	66	"	"	"	43'-8"	182	60	"	"	464	60	"	"	621	1430	21.89
4	"	"	"	"	"	"	52'-0"	51'-8"	78	"	"	"	51'-8"	216	66	"	"	511	66	"	"	683	1585	25.24
1	66"	~	15"	12"	3'-9"	7'-3"	30'-6"	30'-2"	45	32	11'-9"	141	30'-2"	126	52	#5	7'-11"	430	52	#5	10'-8"	579	1321	17.72
2	"	3'-1"	"	"	"	"	39'-1"	38'-9"	58	"	"	"	38'-9"	162	58	"	"	479	58	"	"	645	1485	21.49
3	"	"	"	"	"	"	47'-8"	47'-4"	78	"	"	"	47'-4"	198	64	"	"	529	64	"	"	712	1651	25.27
4	"	"	"	"	"	"	56'-3"	55'-11"	84	"	"	"	55'-11"	233	70	"	"	578	70	"	"	779	1815	29.05
1	72"	~	15"	12"	4'-0"	7'-9"	33'-0"	32'-8"	49	32	12'-9"	153	32'-8"	136	56	#5	8'-5"	492	56	#5	11'-5"	667	1497	20.42
2	"	3'-2"	"	"	"	"	42'-2"	41'-10"	63	"	"	"	41'-10"	175	62	"	"	544	62	"	"	738	1673	24.66
3	"	"	"	"	"	"	51'-4"	51'-0"	77	"	"	"	51'-0"	213	68	"	"	597	68	"	"	810	1850	28.89
4	"	"	"	"	"	"	60'-6"	60'-2"	90	"	"	"	60'-2"	251	74	"	"	650	74	"	"	881	2025	33.12

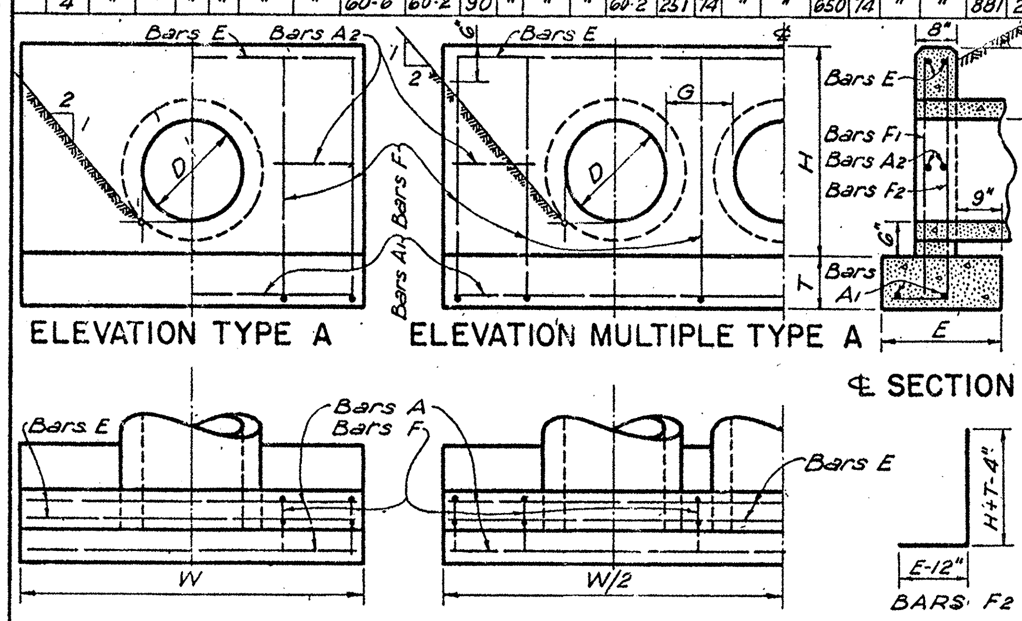
TABLE OF DIMENSIONS AND QUANTITIES FOR TWO TYPE B HEADWALLS

Table of dimensions; reinforcing steel and quantities for two headwalls (Bars A1-Ax through Bars D1-Dx):

NO. OF PIPES	DIAM. OF PIPES	G	K	X	H	Y	W	BARS A1-Ax #4 @ 12"± No.	A1-Ax Av. Lgth.	A1-Ax Wt.	BARS B #3 @ 18"± No.	B Lgth.	B Wt.	BARS B1-Bx #3 @ 18"± No.	B1-Bx Av. Lgth.	B1-Bx Wt.	C=2'-0" #4 @12"± No.	C Wt.	BARS D1-Dx #3 @ 12"± No.	D1-Dx Av. Lgth.	D1-Dx Wt.
1	12"	~	12"	2'-4"	2'-0"	1'-0"	2'-4"	2	2'-8"	4	6	2'-6"	6	~	~	~	4	5	~	~	~
2	"	10"	"	4'-2"	"	"	4'-2"	"	4'-6"	6	8	"	8	~	~	~	"	"	~	~	~
3	"	"	"	6'-0"	"	"	6'-0"	"	6'-4"	8	10	"	9	~	~	~	"	"	~	~	~
4	"	"	"	7'-10"	"	"	7'-10"	"	8'-2"	11	12	"	11	~	~	~	"	"	~	~	~
1	15"	~	12"	2'-7½"	2'-3"	1'-6"	3'-2½"	4	3'-0"	8	6	3'-0"	7	4	1'-10"	3	8	11	~	~	
2	"	1'-0"	"	4'-10½"	"	"	5'-5½"	"	5'-3"	14	8	"	9	"	"	"	"	"	~	~	
3	"	"	"	7'-1½"	"	"	7'-8½"	"	7'-6"	20	10	"	11	"	"	"	"	"	~	~	
4	"	"	"	9'-4½"	"	"	9'-11½"	"	9'-9"	26	14	"	16	"	"	"	"	"	~	~	
1	18"	~	12"	2'-11"	2'-6"	2'-0"	4'-0⅞"	4	3'-10"	10	6	3'-6"	8	4	1'-10"	3	8	11	4	1'-0"	2
2	"	1'-2"	"	5'-7"	"	"	6'-8⅞"	"	6'-6"	17	8	"	11	"	"	"	"	"	"	"	"
3	"	"	"	8'-3"	"	"	9'-4⅞"	"	9'-2"	25	12	"	16	"	"	"	"	"	"	"	"
4	"	"	"	10'-11"	"	"	12'-0⅞"	"	11'-10"	32	16	"	21	"	"	"	"	"	"	"	"
1	24"	~	12"	3'-6"	3'-0"	3'-0"	5'-9¾"	6	5'-0"	20	6	4'-6"	10	4	1'-10"	3	8	11	4	1'-0"	2
2	"	1'-5"	"	6'-11"	"	"	9'-2¾"	"	8'-5"	34	10	"	17	"	"	"	"	"	"	"	"
3	"	"	"	10'-4"	"	"	12'-7¾"	"	11'-10"	47	16	"	27	"	"	"	"	"	"	"	"
4	"	"	"	13'-9"	"	"	16'-0¾"	"	15'-3"	61	20	"	34	"	"	"	"	"	"	"	"
1	30"	~	12"	4'-1"	3'-6"	4'-0"	7'-6⅝"	8	6'-2"	33	6	5'-6"	12	8	3'-1"	9	12	16	8	2'-2"	7
2	"	1'-8"	"	8'-3"	"	"	11'-8⅝"	"	10'-4"	55	12	"	25	"	"	"	"	"	"	"	"
3	"	"	"	12'-5"	"	"	15'-10⅝"	"	14'-6"	77	18	"	37	"	"	"	"	"	"	"	"
4	"	"	"	16'-7"	"	"	20'-0⅝"	"	18'-8"	100	24	"	50	"	"	"	"	"	"	"	"
1	36"	~	12"	4'-8"	4'-0"	5'-0"	9'-3½"	10	7'-4"	49	8	6'-6"	20	8	3'-1"	9	12	16	8	2'-2"	7
2	"	1'-11"	"	9'-7"	"	"	14'-2½"	"	12'-3"	82	14	"	34	"	"	"	"	"	"	"	"
3	"	"	"	14'-6"	"	"	19'-1½"	"	17'-2"	115	20	"	49	"	"	"	"	"	"	"	"
4	"	"	"	19'-5"	"	"	24'-0½"	"	22'-1"	147	28	"	68	"	"	"	"	"	"	"	"
1	42"	~	12"	5'-3"	4'-6"	6'-0"	11'-0¼"	12	8'-6"	68	8	7'-6"	23	12	4'-5"	20	16	21	12	3'-3"	15
2	"	2'-2"	"	10'-11"	"	"	16'-8¼"	"	14'-2"	114	16	"	45	"	"	"	"	"	"	"	"
3	"	"	"	16'-7"	"	"	22'-4¼"	"	19'-10"	159	24	"	68	"	"	"	"	"	"	"	"
4	"	"	"	22'-3"	"	"	28'-0¼"	"	25'-6"	204	32	"	90	"	"	"	"	"	"	"	"
1	48"	~	15"	5'-10"	5'-3"	7'-0"	12'-9⅛"	14	9'-8"	90	10	8'-6"	32	12	4'-5"	20	16	21	12	3'-4"	15
2	"	2'-5"	"	12'-3"	"	"	19'-2⅛"	"	16'-1"	150	18	"	58	"	"	"	"	"	"	"	"
3	"	"	"	18'-8"	"	"	25'-7⅛"	"	22'-6"	210	26	"	83	"	"	"	"	"	"	"	"
4	"	"	"	25'-1"	"	"	32'-0⅛"	"	28'-11"	270	36	"	115	"	"	"	"	"	"	"	"
1	54"	~	15"	6'-5"	5'-9"	8'-0"	14'-6"	16	10'-10"	116	10	9'-6"	36	12	4'-5"	20	20	27	16	4'-5"	27
2	"	2'-10"	"	13'-9"	"	"	21'-10"	"	18'-2"	194	20	"	71	"	"	"	"	"	"	"	"
3	"	"	"	21'-1"	"	"	29'-2"	"	25'-6"	273	30	"	107	"	"	"	"	"	"	"	"
4	"	"	"	28'-5"	"	"	36'-6"	"	32'-10"	351	40	"	143	"	"	"	"	"	"	"	"
1	60"	~	15"	7'-0"	6'-3"	9'-0"	16'-2⅞"	18	12'-0"	144	10	10'-6"	39	16	5'-9"	35	20	27	16	4'-5"	27
2	"	3'-0"	"	15'-0"	"	"	24'-2⅞"	"	20'-0"	240	22	"	87	"	"	"	"	"	"	"	"
3	"	"	"	23'-0"	"	"	32'-2⅞"	"	28'-0"	337	32	"	126	"	"	"	"	"	"	"	"
4	"	"	"	31'-0"	"	"	40'-2⅞"	"	36'-5"	438	44	"	174	"	"	"	"	"	"	"	"
1	66"	~	15"	7'-7"	6'-9"	10'-0"	17'-11¾"	20	13'-2"	176	12	11'-6"	52	16	5'-9"	35	24	32	20	5'-7"	42
2	"	3'-1"	"	16'-2"	"	"	26'-6¾"	"	21'-9"	231	24	"	104	"	"	"	"	"	"	"	"
3	"	"	"	24'-9"	"	"	35'-1¾"	"	30'-4"	405	34	"	147	"	"	"	"	"	"	"	"
4	"	"	"	33'-4"	"	"	43'-8¾"	"	39'-8"	530	46	"	199	"	"	"	"	"	"	"	"
1	72"	~	15"	8'-2"	7'-3"	11'-0"	19'-8⅝"	22	14'-4"	211	12	12'-6"	56	16	5'-9"	35	24	32	20	5'-7"	42
2	"	3'-2"	"	17'-4"	"	"	28'-10⅝"	"	23'-6"	345	24	"	113	"	"	"	"	"	"	"	"
3	"	"	"	26'-6"	"	"	38'-0⅝"	"	32'-10"	482	38	"	179	"	"	"	"	"	"	"	"
4	"	"	"	35'-8"	"	"	47'-2⅝"	"	41'-10"	615	50	"	235	"	"	"	"	"	"	"	"

Reinforcing steel and quantities for two headwalls (continued: Bars E through Bars W, and totals):

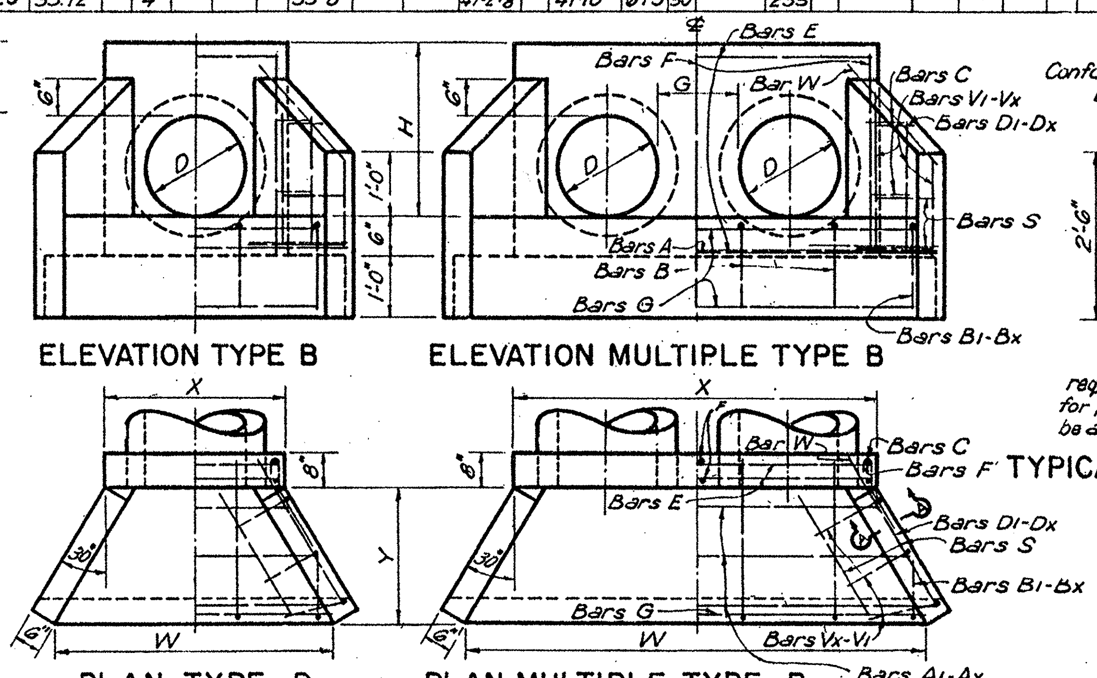
NO. OF PIPES	DIAM. OF PIPES	BARS E 8~#5 Lgth.	E Wt.	BARS F No.	F Size	F Lgth.	F Wt.	BARS G 4~#3 Lgth.	G Wt.	BARS S 12~#4 Lgth.	S Wt.	BARS V1-Vx #4 @ 12"± No.	V1-Vx Av. Lgth.	V1-Vx Wt.	BARS W 4~#5 Lgth.	W Wt.	*TOTAL QUANTITIES STEEL LBS	*TOTAL QUANTITIES CONC. C.Y.
1	12"	2'-0"	17	8	#4	2'-2"	12	2'-8"	4	8"	5	4	2'-11"	8	1'-8"	7	68	.52
2	"	3'-10"	32	12	"	"	17	4'-6"	7	"	"	"	"	"	"	"	95	.82
3	"	5'-8"	47	16	"	"	23	6'-4"	10	"	"	"	"	"	"	"	122	1.11
4	"	7'-6"	63	20	"	"	29	8'-2"	12	"	"	"	"	"	"	"	151	1.40
1	15"	2'-3"	19	8	#4	2'-5"	13	3'-7"	5	1'-3"	10	8	3'-0"	16	2'-3"	9	101	.75
2	"	4'-6"	38	12	"	"	19	5'-10"	9	"	"	"	"	"	"	"	138	1.16
3	"	6'-9"	56	16	"	"	26	8'-1"	12	"	"	"	"	"	"	"	174	1.57
4	"	9'-0"	75	20	"	"	32	10'-4"	16	"	"	"	"	"	"	"	214	1.98
1	18"	2'-7"	22	8	#4	2'-8"	14	4'-5"	7	1'-10"	15	12	3'-2"	25	2'-11"	12	129	1.00
2	"	5'-3"	44	12	"	"	21	7'-1"	11	"	"	"	"	"	"	"	172	1.55
3	"	7'-11"	66	16	"	"	29	9'-9"	15	"	"	"	"	"	"	"	219	2.11
4	"	10'-7"	88	20	"	"	36	12'-5"	19	"	"	"	"	"	"	"	264	2.65
1	24"	3'-2"	26	8	#4	3'-2"	17	6'-2"	9	3'-0"	24	16	3'-5"	37	4'-2"	17	176	1.62
2	"	6'-7"	55	12	"	"	25	9'-7"	14	"	"	"	"	"	"	"	239	2.46
3	"	9'-10"	82	16	"	"	34	13'-0"	20	"	"	"	"	"	"	"	304	3.32
4	"	13'-5"	112	20	"	"	42	16'-5"	25	"	"	"	"	"	"	"	368	4.18
1	30"	3'-9"	31	8	#4	3'-8"	20	7'-11"	12	4'-2"	33	20	3'-8"	49	5'-5"	23	245	2.34
2	"	7'-11"	66	16	"	"	39	12'-1"	18	"	"	"	"	"	"	"	340	3.58
3	"	12'-1"	101	24	"	"	59	16'-3"	24	"	"	"	"	"	"	"	435	4.80
4	"	16'-3"	136	32	"	"	78	20'-5"	31	"	"	"	"	"	"	"	532	6.04
1	36"	4'-4"	36	8	#4	4'-2"	22	9'-8"	15	5'-4"	43	24	3'-11"	63	6'-8"	28	308	3.23
2	"	9'-3"	77	16	"	"	45	14'-7"	22	"	"	"	"	"	"	"	426	4.89
3	"	14'-2"	118	24	"	"	67	19'-6"	29	"	"	"	"	"	"	"	544	6.55
4	"	19'-1"	159	32	"	"	89	24'-5"	37	"	"	"	"	"	"	"	666	8.22
1	42"	4'-11"	41	8	#4	4'-8"	25	11'-5"	17	6'-5"	51	28	4'-2"	78	7'-11"	33	392	4.23
2	"	10'-7"	88	16	"	"	50	17'-1"	26	"	"	"	"	"	"	"	541	6.40
3	"	16'-3"	136	24	"	"	75	22'-9"	34	"	"	"	"	"	"	"	690	8.56
4	"	21'-11"	183	32	"	"	100	28'-5"	43	"	"	"	"	"	"	"	838	10.74
1	48"	5'-6"	46	8	#5	5'-5"	45	13'-2"	20	7'-7"	61	32	4'-5"	94	9'-3"	39	483	5.43
2	"	11'-11"	99	16	"	"	90	19'-7"	29	"	"	"	"	"	"	"	676	8.25
3	"	18'-4"	153	24	"	"	136	26'-0"	39	"	"	"	"	"	"	"	871	11.07
4	"	24'-9"	207	32	"	"	181	32'-5"	49	"	"	"	"	"	"	"	1072	13.89
1	54"	6'-1"	51	8	#5	5'-11"	49	14'-10"	22	8'-9"	70	40	4'-8"	125	10'-5"	43	586	6.71
2	"	13'-5"	112	20	"	"	123	22'-2"	33	"	"	"	"	"	"	"	845	10.28
3	"	20'-9"	173	32	"	"	198	29'-6"	44	"	"	"	"	"	"	"	1107	13.84
4	"	28'-1"	234	44	"	"	272	36'-10"	55	"	"	"	"	"	"	"	1367	17.42
1	60"	6'-8"	56	8	#5	6'-5"	54	16'-7"	25	9'-11"	80	44	4'-11"	145	11'-8"	49	681	8.11
2	"	14'-8"	122	20	"	"	134	25'-7"	38	"	"	"	"	"	"	"	984	12.34
3	"	22'-8"	189	32	"	"	214	32'-7"	49	"	"	"	"	"	"	"	1278	16.57
4	"	30'-8"	256	44	"	"	295	40'-8"	61	"	"	"	"	"	"	"	1587	20.82
1	66"	7'-3"	60	8	#5	6'-11"	58	18'-4"	28	11'-1"	89	48	5'-2"	166	13'-0"	54	792	9.65
2	"	15'-10"	132	20	"	"	144	26'-11"	40	"	"	"	"	"	"	"	1129	14.54
3	"	24'-5"	204	32	"	"	231	35'-6"	53	"	"	"	"	"	"	"	1458	19.42
4	"	33'-0"	275	44	"	"	318	44'-2"	67	"	"	"	"	"	"	"	1807	24.31
1	72"	7'-10"	65	8	#5	7'-5"	62	20'-1"	30	12'-3"	98	52	5'-5"	188	14'-3"	59	878	11.32
2	"	17'-0"	142	20	"	"	155	29'-3"	44	"	"	"	"	"	"	"	1253	16.91
3	"	26'-2"	218	32	"	"	248	38'-5"	58	"	"	"	"	"	"	"	1639	22.52
4	"	35'-4"	295	44	"	"	341	47'-8"	72	"	"	"	"	"	"	"	2017	28.11



ELEVATION TYPE A   ELEVATION MULTIPLE TYPE A   ℄ SECTION

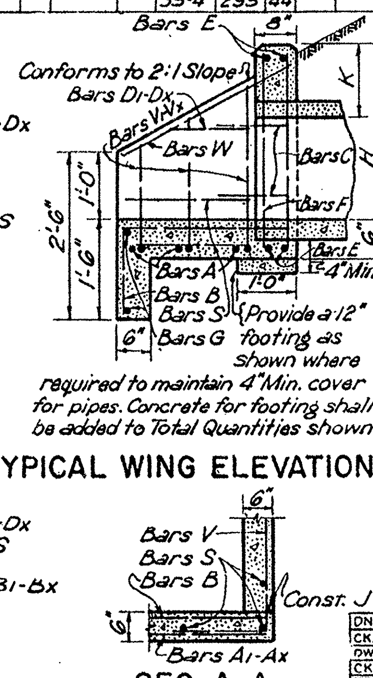
PLAN TYPE A   PLAN MULTIPLE TYPE A   BARS F2

*Concrete Quantities increase slightly for metal pipe installations.



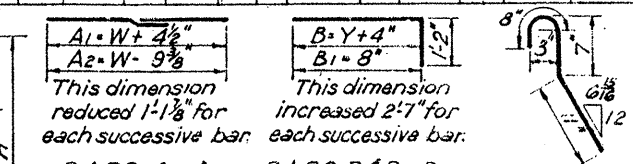
ELEVATION TYPE B   ELEVATION MULTIPLE TYPE B

PLAN TYPE B   PLAN MULTIPLE TYPE B



TYPICAL WING ELEVATION

SEC. A-A



BARS A1-Ax   BARS B & B1-Bx   BARS C

GENERAL NOTES:-

All exposed corners shall be chamfered ¾".

Reinforcing steel shall be placed with the center of the outside layer of bars 2" from the surface of the concrete. Total Quantities include one 20 diameter lap for all bars over 60'-0" in length.

TEXAS HIGHWAY DEPARTMENT

CONCRETE HEADWALLS FOR PIPE CULVERTS

12 TO 72 INCHES IN DIAMETER

CH-11

DN. T.H.D.	DRAWING	DATE	FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
CK. DN. T.H.D.	Original	Feb. 1950				
DW. M.D.A.	Rev. Nov. 24 Quant. note		6	TEXAS		317
CK. DW. K.M.	Rev. 11-67 Concrete		STATE DIST. NO.	COUNTY	CONTROL NO. / SECTION NO. / JOB NO.	HIGHWAY NO.
TR. O.C.K.						
CK. TR. M.D.A.			15	BEXAR	2452 2 23	410

Rev. Jan. '59.

PLAN: NOTE BOOK ___ NO. ___ SURVEYED ___ PLOTTED ___ ALIGNMENT CHECKED ___ RT. OF WAY CHECKED ___ BY ___ DATE ___

PROFILE: NOTE BOOK ___ NO. ___ SURVEYED ___ PLOTTED ___ GRADES CHECKED ___ B. M.S NOTED ___ STRUCTURE NOTAT'NS CH'KD ___ BY ___ DATE ___

TABLE OF DIMENSIONS & REINFORCING STEEL MODIFICATIONS

ENTER WITH NORMAL CULVERT SPAN & WIDTH

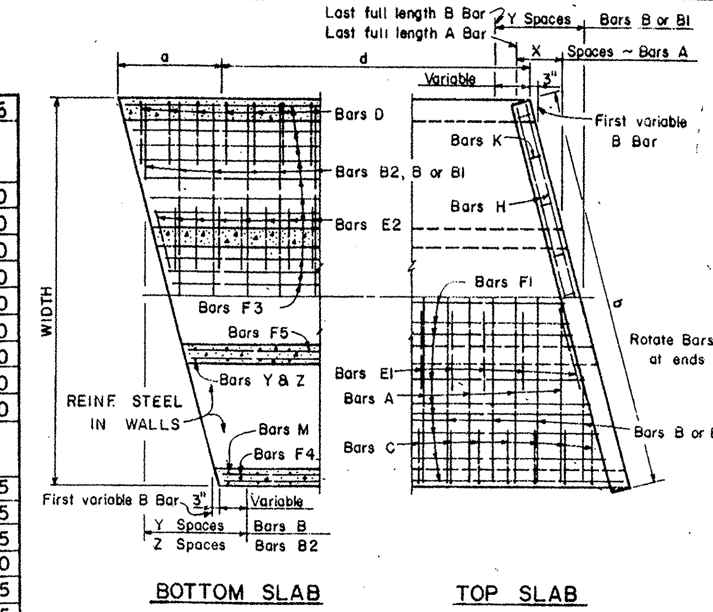
S	SPANS	DIMENSIONS WIDTH	b	a	d	NO. K	LENGTH H	NO. BARS A	B/B1	B2	MC--1 LENGTH OF VARIABLE BARS (FIRST & LAST) A	A	*B, B1, or B2	B/B1	B2	SPACES X	Y	Z	MC--2 Y	LENGTH LAST B	NO B	MC--3 Y	LENGTH LAST B	NO B
5	2	11'- 6"	11.91	3.08	43.85	24	11'- 7"	44	86	-	7'-11"	4'- 2"	9'- 9"	2'- 3"	-	2	3	-	3	2'- 3"	86	-	-	-
5	3	17'- 0"	17.60	4.56	42.38	36	17'- 3"	43	84	-	13'- 5"	2'- 2"	15'- 3"	4'- 1"	-	4	4	-	4	4'- 1"	84	-	-	-
5	4	22'- 6"	23.29	6.03	40.90	46	22'-11"	41	80	-	18'-11"	3'-11"	20'- 9"	2'- 1"	-	5	6	-	6	2'- 1"	80	-	-	-
5	5	28'- 0"	28.99	7.50	39.43	58	28'- 8"	40	78	-	24'- 5"	2'- 0"	26'- 3"	3'-10"	-	7	7	-	7	3'-10"	78	-	-	-
5	6	33'- 6"	34.68	8.98	37.96	70	34'- 4"	38	74	-	29'-11"	3'- 9"	31'- 9"	1'-10"	-	8	9	-	9	1'-10"	74	-	-	-
5	2	11'- 9"	12.16	3.15	43.78	24	11'-10"	44	86	-	8'- 2"	4'- 5"	10'- 0"	2'- 6"	-	2	3	-	3	2'- 6"	86	-	-	-
5	3	17'- 4"	17.95	4.64	42.29	36	17'- 7"	43	84	-	13'- 9"	2'- 7"	15'- 7"	4'- 5"	-	4	4	-	4	4'- 5"	84	-	-	-
5	4	22'-11"	23.73	6.14	40.79	48	23'- 5"	41	80	-	19'- 4"	4'- 5"	21'- 2"	2'- 6"	-	5	6	-	6	2'- 6"	80	-	-	-
5	5	28'- 6"	29.51	7.64	39.30	60	29'- 2"	40	78	-	24'-11"	2'- 6"	26'- 9"	4'- 4"	-	7	7	-	7	4'- 4"	78	-	-	-
5	6	34'- 1"	35.29	9.13	37.80	70	34'-11"	38	74	-	30'- 6"	4'- 4"	32'- 4"	2'- 6"	-	8	9	-	9	2'- 6"	74	-	-	-
6	2	13'- 6"	13.98	3.62	43.32	28	13'- 8"	53	104	-	10'- 2"	3'-11"	11'- 9"	2'- 5"	-	3	4	-	5	1'-10"	130	-	-	-
6	3	20'- 0"	20.71	5.36	41.57	42	20'- 4"	50	98	-	16'- 8"	4'- 3"	18'- 3"	2'- 8"	-	5	6	-	7	3'- 4"	124	-	-	-
6	4	26'- 6"	27.44	7.10	39.83	56	27'- 1"	48	94	-	23'- 2"	4'- 6"	24'- 9"	3'- 0"	-	7	8	-	10	2'- 4"	118	-	-	-
6	5	33'- 0"	34.16	8.84	38.09	68	33'-10"	46	90	-	29'- 8"	1'- 8"	31'- 3"	3'- 3"	-	10	10	-	12	3'-11"	114	-	-	-
6	6	39'- 6"	40.89	10.58	36.35	82	40'- 6"	44	86	-	36'- 2"	1'-11"	37'- 9"	3'- 6"	-	12	12	-	15	2'-11"	108	-	-	-
6	2	13'- 9"	14.24	3.68	43.25	28	13'-10"	53	104	-	10'- 5"	4'- 2"	12'- 0"	2'- 8"	-	3	4	-	5	2'- 1"	130	-	-	-
6	3	20'- 4"	21.05	5.45	41.49	42	20'- 9"	50	98	-	17'- 0"	4'- 7"	18'- 7"	3'- 0"	-	5	6	-	7	3'- 8"	124	-	-	-
6	4	26'-11"	27.87	7.21	39.72	56	27'- 6"	48	94	-	23'- 7"	1'-10"	25'- 2"	3'- 5"	-	8	8	-	10	2'- 9"	118	-	-	-
6	5	33'- 6"	34.68	8.98	37.96	70	34'- 4"	46	90	-	30'- 2"	2'- 2"	31'- 9"	3'- 9"	-	10	10	-	13	1'-11"	114	-	-	-
6	6	40'- 1"	41.50	10.74	36.19	84	41'- 2"	44	86	-	36'- 9"	2'- 6"	38'- 4"	4'- 1"	-	12	12	-	15	3'- 6"	108	-	-	-
7	2	15'- 6"	16.05	4.15	42.78	32	15'- 9"	52	102	-	12'- 2"	2'-10"	13'- 9"	4'- 5"	-	4	4	-	6	2'- 1"	136	4	4'- 5"	102
7	3	23'- 0"	23.81	6.16	40.77	48	23'- 5"	50	98	-	19'- 8"	4'- 1"	21'- 3"	2'- 7"	-	6	7	-	9	2'- 7"	130	7	2'- 7"	98
7	4	30'- 6"	31.58	8.17	38.76	64	31'- 3"	47	92	-	27'- 2"	2'- 3"	28'- 9"	2'-10"	-	9	9	-	12	3'- 1"	124	9	3'-10"	92
7	5	38'- 0"	39.34	10.18	36.75	80	39'- 0"	45	88	-	34'- 8"	3'- 7"	36'- 3"	2'- 1"	-	11	12	-	15	3'- 7"	118	12	2'- 1"	88
7	6	45'- 6"	47.11	12.19	34.74	94	46'- 9"	42	82	-	42'- 2"	1'- 9"	43'- 9"	3'- 4"	-	14	14	-	19	1'- 9"	110	14	3'- 4"	82
7	2	15'- 9"	16.31	4.22	42.71	32	16'- 0"	52	102	-	12'- 5"	3'- 1"	14'- 0"	1'- 7"	-	4	5	-	6	2'- 4"	136	5	1'- 7"	102
7	3	23'- 4"	24.16	6.25	40.68	48	23'-10"	49	96	-	20'- 0"	4'- 5"	21'- 7"	2'-11"	-	6	7	-	9	2'-11"	130	7	2'-11"	96
7	4	30'-11"	32.01	8.28	38.65	64	31'- 8"	47	92	-	27'- 7"	2'- 8"	29'- 2"	4'- 4"	-	9	9	-	12	3'- 6"	124	9	4'- 4"	92
7	5	38'- 6"	39.86	10.32	36.62	80	39'- 6"	45	88	-	35'- 2"	4'- 1"	36'- 9"	2'- 6"	-	11	12	-	16	1'- 9"	116	12	2'- 6"	88
7	6	46'- 1"	47.71	12.35	34.59	96	47'- 4"	42	82	-	42'- 9"	2'- 4"	44'- 4"	3'-11"	-	14	14	-	19	2'- 4"	110	14	3'-11"	82
8	2	17'- 6"	18.12	4.69	42.24	36	17'- 9"	60	118	-	14'- 5"	3'-10"	15'- 9"	2'- 6"	-	5	6	-	7	2'- 8"	144	8	2'- 8"	168
8	3	26'- 0"	26.92	6.97	39.97	54	26'- 7"	57	112	-	22'-11"	1'- 9"	24'- 3"	3'- 1"	-	9	9	-	11	2'- 6"	136	13	1'-10"	160
8	4	34'- 6"	35.72	9.24	37.69	72	35'- 4"	54	106	-	31'- 5"	2'- 4"	32'- 9"	3'- 8"	-	12	12	-	15	2'- 3"	128	17	2'-11"	150
8	5	43'- 0"	44.52	11.52	35.41	90	44'- 2"	51	100	-	39'-11"	2'-11"	41'- 3"	1'- 7"	-	15	16	-	19	2'- 0"	122	22	2'- 1"	142
8	6	51'- 6"	53.32	13.80	33.13	108	53'- 0"	47	92	-	48'- 5"	3'- 6"	49'- 9"	2'- 2"	-	18	19	-	23	1'-10"	114	26	3'- 1"	132
8	2	17'- 9"	18.38	4.76	42.18	38	18'- 0"	60	118	-	14'- 8"	4'- 1"	16'- 0"	2'- 9"	-	5	6	-	7	2'-11"	144	8	2'-11"	168
8	3	26'- 4"	27.26	7.06	39.88	54	26'-11"	57	112	-	23'- 3"	2'- 1"	24'- 7"	3'- 5"	-	9	9	-	11	2'-10"	136	13	2'- 2"	160
8	4	34'-11"	36.15	9.36	37.58	72	35'-10"	54	106	-	31'-10"	2'- 9"	33'- 2"	4'- 1"	-	12	12	-	15	2'- 8"	128	17	3'- 4"	150
8	5	43'- 6"	45.04	11.66	35.28	90	44'- 9"	51	100	-	40'- 5"	3'- 5"	41'- 9"	2'- 1"	-	15	16	-	19	2'- 7"	120	22	2'- 7"	142
8	6	52'- 1"	53.92	13.96	32.98	108	53'- 7"	47	92	-	49'- 0"	4'- 1"	50'- 4"	2'- 9"	-	18	19	-	23	2'- 5"	112	27	1'-10"	132
8	2	18'- 0"	18.64	4.82	42.11	38	18'- 3"	60	118	-	14'-11"	1'- 8"	16'- 3"	3'- 0"	-	6	6	-	7	3'- 2"	144	8	3'- 2"	168
8	3	26'- 8"	27.61	7.15	39.79	56	27'- 3"	57	112	-	23'- 7"	2'- 5"	24'-11"	3'- 9"	-	9	9	-	11	3'- 2"	136	13	2'- 6"	160
8	4	35'- 4"	36.58	9.47	37.47	74	36'- 3"	54	106	-	32'- 3"	3'- 2"	33'- 7"	1'-10"	-	12	13	-	15	3'- 1"	128	18	1'-10"	150
8	5	44'- 0"	45.55	11.79	35.14	92	45'- 2"	50	98	-	40'-11"	3'-11"	42'- 3"	2'- 7"	-	15	16	-	19	3'- 1"	120	22	3'- 1"	140
8	6	52'- 8"	54.53	14.11	32.82	110	54'- 2"	47	92	-	49'- 7"	2'- 0"	50'-11"	3'- 4"	-	19	19	-	23	3'- 0"	112	27	2'- 5"	132
9	2	19'- 9"	20.45	5.29	41.64	42	20'- 1"	56	55	66	16'- 7"	2'- 7"	18'- 0"	4'- 0"	1'- 8"	6	6	8	9	3'- 1"	166	7	3'- 1"	124
9	3	29'- 4"	30.37	7.86	39.07	62	30'- 0"	53	52	62	26'- 2"	3'- 9"	27'- 7"	2'- 5"	1'-11"	9	10	12	14	3'- 4"	156	11	2'- 8"	116
9	4	38'-11"	40.29	10.43	36.51	80	40'- 0"	49	48	58	35'- 9"	2'- 2"	37'- 2"	3'- 7"	2'- 2"	13	13	16	20	1'- 9"	146	15	2'- 4"	110
9	5	48'- 6"	50.21	13.00	33.94	100	49'-10"	46	45	54	45'- 4"	3'- 4"	46'- 9"	2'- 0"	2'- 5"	16	17	20	25	2'- 0"	136	19	2'- 0"	102
9	6	58'- 1"	60.13	15.56	31.37	120	59'- 9"	42	41	50	54'-11"	1'- 9"	56'- 4"	3'- 2"	2'- 8"	20	20	24	30	2'- 3"	126	23	1'- 7"	94
9	2	20'- 0"	20.71	5.36	41.57	42	20'- 4"	56	55	71	16'-10"	2'-10"	18'- 3"	4'- 3"	3'- 0"	6	6	8	9	3'- 4"	166	7	3'- 4"	124
9	3	29'- 8"	30.71	7.95	38.98	62	30'- 4"	53	52	67	26'- 6"	4'- 1"	27'-11"	2'- 9"	1'-10"	9	10	13	15	1'-10"	156	11	3'- 0"	116
9	4	39'- 4"	40.72	10.54	36.39	82	40'- 4"	49	48	62	36'- 2"	2'- 7"	37'- 7"	4'- 0"	2'- 9"	13	13	17	20	2'- 2"	146	15	2'- 9"	108
9	5	49'- 0"	50.73	13.13	33.80	102	50'- 4"	46	45	58	45'-10"	3'-10"	47'- 3"	2'- 6"	1'- 6"	16	17	22	25	2'- 6"	136	19	2'- 6"	100
9	6	58'- 8"	60.74	15.72	31.21	122	60'- 4"	42	41	53	55'- 6"	2'- 4"	56'-11"	3'- 9"	2'- 6"	20	20	26	30	2'-10"	124	23	2'- 2"	94
10	2	21'- 9"	22.52	5.83	41.11	46	22'- 2"	36	35	47	17'-10"	4'- 9"	20'- 0"	2'- 7"	3'- 8"	4	5	6	8	2'- 7"	122	8	3'- 8"	132
10	3	32'- 4"	33.47	8.66	38.27	68	33'- 1"	33	32	43	28'- 5"	2'- 3"	30'- 7"	4'- 5"	4'- 5"	7	7	9	12	3'- 3"	114	13	2'- 7"	122
10	4	42'-11"	44.43	11.50	35.43	90	44'- 1"	31	30	40	39'- 0"	4'- 2"	41'- 2"	2'- 0"	2'- 0"	9	10	13	16	3'-10"	106	18	1'- 6"	112
10	5	53'- 6"	55.39	14.34	32.60	112	55'- 0"	28	27	37	49'- 7"	1'- 8"	51'- 9"	3'-10"	2'- 9"	12	12	16	21	2'- 0"	98	22	2'- 9"	104
10	6	64'- 1"	66.35	17.17	29.76	134	66'- 0"	26	25	34	60'- 2"	3'- 7"	62'- 4"	5'- 9"	3'- 7"	14	14	19	25	2'- 7"	88	27	1'- 8"	94
10	2	22'- 0"	22.78	5.89	41.04	46	22'- 5"	36	35	46	18'- 1"	5'- 1"	20'- 3"	2'-10"	3'-11"	4	5	6	8	2'-10"	122	9	1'- 7"	130
10	3	32'- 8"	33.82	8.75	38.18	68	33'- 6"	33	32	43	28'- 9"	2'- 7"	30'-11"	4'- 9"	1'- 6"	7	7	10	12	3'- 7"	114	13	2'-11"	122
10	4	43'- 4"	44.86	11.61	35.32	90	44'- 6"	31	30	40	39'- 5"	4'- 7"	41'- 7"	2'- 5"	2'- 5"	9	10	13	17	1'- 9"	106	18	1'-11"	112
10	5	54'- 0"	55.91	14.47	32.46	112	55'- 7"	28	27	37	50'- 1"	2'- 3"	52'- 3"	4'- 4"	3'- 3"	12	12	16	21	2'- 6"	96	22	3'- 3"	104
10	6	64'- 8"	66.95	17.33	29.61	134	66'- 7"	26	25	33	60'- 9"	4'- 2"	62'-11"	1'-11"	4'- 2"	14	15	19	25	3'- 2"	88	27	2'- 3"	94

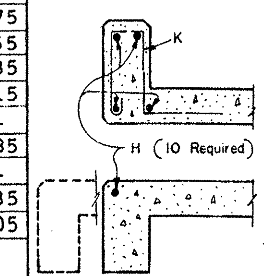
#

NO. BARS REQUIRED

NO. SPANS=		2	3	4	5	6
H	BARS F_4	BARS F_5				
2	4	4	8	12	16	20
3	4	4	8	12	16	20
4	6	6	12	18	24	30
5	16	8	16	24	32	40
6	16	8	16	24	32	40
7	20	10	20	30	40	50
8	20	10	20	30	40	50
9	24	12	24	36	48	60
10	28	14	28	42	56	70
** SPAC	BARS C & D	BARS E_1 OR E_2				
4½"	-	125	250	375	500	625
5 "	226	113	226	339	452	565
5½"	206	103	206	309	412	515
6 "	188	94	188	282	376	470
6½"	174	87	174	261	348	435
7 "	162	81	162	243	324	405
7½"	150	75	150	225	300	375
8 "	142	17	142	213	284	355
8½"	-	67	134	201	268	335
9 "	126	63	126	189	252	315
9½"	120	-	-	-	-	-
10 "	114	57	114	171	228	285
10½"	108	-	-	-	-	-
12 "	-	47	94	141	188	235
14 "	-	41	82	123	164	205
	BARS M	BARS Y & Z				
	64	47	94	141	188	235

**Determine spacing of Bars C, D, E_1 & E_2 from the normal culvert standard.





CURB & TOEWALL SEC.

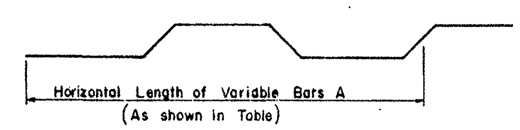
LENGTH F BARS
F1, F3 & F4 = 46'-7"
F5 = 46'-5"

F4 replace F2 in ext. wall
F5 replace F2 in int. wall

SUPPLEMENT TO TABLE OF DIMENSIONS & REINFORCING STEEL MODIFICATIONS

SPANS	9'x5' MC--2 Y	LENGTH LAST B	NO. B	MC--3 Y	LENGTH LAST B	NO. B	10'x9' MC--1 Z	LENGTH LAST B_2	NO. B_2	10'x10' MC--1 Z	LENGTH LAST B_2	NO. B_2
2	9	1'-10"	154	7	2'- 2"	116	7	1'- 7"	49	7	2'- 6"	51
3	13	3'- 4"	144	10	3'-10"	110	10	2'-11"	45	10	4'- 4"	48
4	18	2'-10"	134	14	2'-10"	102	13	4'- 3"	42	14	3'- 2"	44
5	23	2'- 3"	126	18	1'-10"	96	17	2'- 6"	39	18	2'- 0"	41
6	28	1'- 9"	116	21	3'- 6"	88	20	3'-10"	35	21	3'-10"	37

*Length of first variable B bar is the same for MC--2 & MC--3.



BARS A

For ease of fabrication, it is pointed out that variable length A Bars may be fabricated full length and cut off. The cut off portions can then be used for the other end of the skewed portion with a very slight amount of waste.

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

MULTIPLE BOX CULVERT

15° SKEW

MC- 15°

Sheet 1 of 2

ORIGINAL DRAWING DATE: May 1964	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN: THD REVISIONS	15	6		319
CK:	COUNTY		CONTROL SECTION JOB	HIGHWAY
DW: CK:	BEXAR		2452 2 23	

BARREL QUANTITIES FOR 44'-0" CLEAR WIDTH

	S	H	2 Span		3 Span		4 Span		5 Span		6 Span	
	ft	ft	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.
MC5-1	5	2	25.79	3777	37.37	5570	48.95	7357	60.53	9150	72.11	10937
	5	3	28.40	3924	40.85	5782	53.30	7631	65.75	9488	78.20	11339
	5	4	31.01	4197	44.33	6181	57.64	8156	70.96	10140	84.28	12117
	5	5	36.23	5040	51.29	7241	66.36	9435	81.42	11637	96.48	13841
MC5-2	5	2	25.79	3417	37.37	5160	48.95	6899	60.53	8644	72.11	10381
	5	3	28.40	3557	40.85	5364	53.30	7165	65.75	8974	78.20	10774
	5	4	31.01	3821	44.33	5755	57.64	7682	70.96	9617	84.28	11545
	5	5	36.23	4649	51.29	6797	66.36	8941	81.42	11070	96.48	13242
MC6-1	6	3	31.98	4734	46.22	7013	60.46	9284	74.69	11561	88.93	13834
	6	4	34.59	5016	49.69	7421	64.80	9817	79.91	12221	95.02	14621
	6	5	39.81	5874	56.66	8497	73.51	11114	90.36	13740	107.21	16364
	6	6	42.85	6074	60.72	8760	78.58	11442	96.45	13697	114.31	16818
MC6-2	6	3	31.98	5007	46.22	7613	60.46	10210	74.69	12811	88.93	15410
	6	4	34.59	5303	49.69	8035	64.80	10758	79.91	13485	95.02	16212
	6	5	39.81	6170	56.66	9118	73.51	12061	90.36	15009	107.21	17958
	6	6	42.85	6384	60.72	9394	78.58	12403	96.45	15413	114.31	18425
MC7-1	7	3	37.80	5061	54.92	7478	72.04	9883	89.15	12299	106.27	14705
	7	4	40.41	5342	58.40	7885	76.38	10417	94.37	12958	112.35	15491
	7	5	45.68	6198	65.41	8961	85.15	11715	104.89	14477	124.63	17233
	7	6	48.72	6398	69.47	9225	90.22	11942	110.97	14868	131.73	17686
	7	7	51.76	6786	73.53	9740	95.29	12682	117.06	15634	138.82	18577
MC7-2	7	3	37.80	5206	54.92	7920	72.04	10628	89.15	13342	106.27	16050
	7	4	40.41	5487	58.40	8327	76.38	11160	94.37	14002	112.35	16837
	7	5	45.68	6341	65.41	9399	85.15	12454	104.89	15514	124.63	18570
	7	6	48.72	6575	69.47	9732	90.22	12885	110.97	16044	131.73	19198
	7	7	51.76	6963	73.53	10247	95.29	13524	117.06	16810	138.82	20089
MC7-3	7	3	37.80	5900	54.92	9101	72.04	12298	89.15	15502	106.27	18697
	7	4	40.41	6188	58.40	9516	76.38	12837	94.37	16169	112.35	19491
	7	5	45.68	7053	65.41	10601	85.15	14146	104.89	17697	124.63	21241
	7	6	48.72	7303	69.47	10960	90.22	14611	110.97	18270	131.73	21922
	7	7	51.76	7909	73.53	11693	95.29	15470	117.06	19255	138.82	23032
MC8-1	8	4	44.28	6385	64.20	9417	84.12	12437	104.04	15472	123.96	18496
	8	5	49.54	7264	71.22	10513	92.89	13761	114.56	17016	136.24	20267
	8	6	52.59	7515	75.27	10868	97.96	14218	120.65	17576	143.33	20929
	8	7	55.63	7917	79.33	11396	103.03	14871	126.73	18357	150.43	21834
	8	8	62.63	8435	88.67	11960	114.70	15551	140.74	19110	166.78	22660
MC8-2	8	4	46.82	6362	67.97	9640	89.12	12908	110.27	16184	131.42	19457
	8	5	52.12	7235	75.03	10727	97.95	14221	120.87	17716	143.79	21216
	8	6	55.16	7448	79.09	11005	103.02	14562	126.95	18121	150.88	21684
	8	7	58.20	7852	83.15	11534	108.09	15217	133.04	18901	157.98	22591
	8	8	65.24	8363	92.53	12123	119.83	15887	147.12	19644	174.41	23401

BARREL QUANTITIES FOR 44'-0" CLEAR WIDTH

	S	H	2 Span		3 Span		4 Span		5 Span		6 Span	
	ft	ft	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.
MC8-3	8	4	49.35	7273	71.73	11107	94.11	14931	116.49	18764	138.87	22593
	8	5	54.68	8168	78.84	12218	103.00	16268	127.16	20323	151.32	24377
	8	6	57.73	8400	82.90	12513	108.07	16627	133.24	20745	158.42	24864
	8	7	60.77	8977	86.95	13216	113.14	17455	139.33	21690	165.51	25944
	8	8	67.84	9251	96.39	13568	124.94	17892	153.48	22210	182.03	26522
MC9-1	9	5	56.27	7893	81.26	11565	106.26	15242	131.25	18919	156.24	22596
	9	6	59.31	8141	85.32	11913	111.33	15687	137.33	19464	163.34	23238
	9	7	62.35	8544	89.37	12441	116.40	16341	143.42	20243	170.44	24144
	9	8	69.39	9179	98.72	13221	128.13	17275	157.50	21327	186.87	25371
	9	9	72.87	9599	103.40	13766	133.92	17945	164.45	22122	194.98	26293
MC9-2	9	5	61.99	7722	89.76	11480	117.53	15236	145.29	18996	173.06	22757
	9	6	65.03	8234	93.81	12148	122.60	16059	151.38	19977	180.16	23893
	9	7	68.07	8644	97.87	12684	127.67	16720	157.46	20765	187.26	24807
	9	8	75.19	9171	107.32	13393	139.52	17627	171.69	21860	203.86	26083
	9	9	78.66	9590	111.99	13939	145.32	18298	178.64	22658	211.97	27011
MC9-3	9	5	64.85	8642	94.01	12979	123.17	17315	152.33	21656	181.48	25994
	9	6	67.89	9222	98.07	13767	128.24	18311	158.41	22861	188.58	27408
	9	7	70.94	9643	102.12	14314	133.31	18984	164.49	23658	195.68	28330
	9	8	78.08	10433	111.62	15307	145.22	20190	177.79	25074	212.36	29951
	9	9	81.56	10877	116.29	15876	151.02	20886	185.75	25895	220.47	30899
MC10-1	10	6	66.62	8959	96.24	13089	125.86	17213	155.48	21336	185.10	25602
	10	7	69.66	9500	100.30	13790	130.93	18075	161.57	22359	192.20	26786
	10	8	76.74	9874	109.73	14229	142.73	18595	175.72	22959	208.72	27460
	10	9	80.22	10510	114.37	15061	148.52	19622	182.67	24182	216.83	28881
	10	10	83.69	11355	119.01	16101	154.32	20857	189.63	25613	224.94	30513
MC10-2	10	6	72.92	9595	105.61	14262	138.29	18918	170.98	23576	203.66	28385
	10	7	75.96	10109	109.66	14901	143.36	19683	177.06	24465	210.76	29400
	10	8	83.11	10593	119.19	15350	155.28	20217	191.36	25077	227.44	30086
	10	9	86.59	11280	123.83	16324	161.07	21480	198.31	26427	235.55	31624
	10	10	90.07	12131	128.47	17355	166.87	22589	205.27	27815	243.67	33192
MC10-3	10	6	79.23	10251	114.98	15269	150.74	20280	186.49	25286	222.24	30456
	10	7	82.27	10946	119.04	16089	155.80	21225	192.57	26357	229.34	31653
	10	8	89.49	11250	128.67	16460	167.84	21679	207.02	26893	246.19	32263
	10	9	92.97	12034	133.30	17368	173.64	22713	213.97	28053	254.30	33549
	10	10	96.44	13101	137.94	18652	179.43	24211	220.92	29764	262.42	35466

GENERAL NOTES:

The necessary details for adapting normal MULTIPLE BOX CULVERT Standards, MC-5-1 through MC-10-3, to 15° Skew Culverts are shown on these sheets. Refer to the appropriate normal Standard for details, dimensions, sections, notes and bar diagrams not shown hereon.

Quantities shown hereon are for 44'-0" Clear Width between headwalls measured perpendicular to the center line. Quantities of reinforcing steel are approximate. Quantities P.L.F. Barrel shown on normal MC Standards may be converted to P.L.F. Clear Width by Multiplying by 1.0353.

The number of variable length bars required: Bars A = 2X, Bars B = 4Y, Bars B_1 = 2Y, and Bars B_2 = 2Z.

Size of Bars H: #4 for Spans = 5'-7', #5 for Spans = 8'-10'.

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

MULTIPLE BOX CULVERT

15° SKEW

MC-15°

Sheet 2 of 2

ORIGINAL	DRAWING DATE: MAY, 1964	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN: THD	REVISIONS	45	6		320
CK:		COUNTY		CONTROL SECTION JOB	HIGHWAY
DW:		BEXAR		2452 2 23	
CK:					

TABLE OF DIMENSIONS & REINFORCING STEEL MODIFICATIONS

ENTER WITH NORMAL CULVERT SPAN & WIDTH

SPANS S	SPANS S	MC--1 DIMENSIONS WIDTH	b	a	d	NO. K	LENGTH H	NO. BARS A	B/B1	B2	LENGTH OF VARIABLE BARS (FIRST & LAST) A	A	*B, B1 or B2	B/B1	B2	SPACES X	Y	Z	MC--2 Y	LENGTH LAST B	NO B	MC--3 Y	LENGTH LAST B	NO B
5	2	11'- 6"	13.28	6.64	45.71	26	12'-11"	46	90	-	9 - 9"	2'-10"	10'- 7"	1'-11"	-	5	6	-	6	1'-11"	90	-	-	-
5	3	17'- 0"	19.63	9.81	42.53	40	19'- 3"	43	84	-	15'- 3"	3'- 2"	16'- 1"	2'- 3"	-	8	9	-	9	2'- 3"	84	-	-	-
5	4	22'- 6"	25.98	12.99	39.36	52	25'- 8"	40	78	-	20'- 9"	1'- 8"	21'- 7"	2'- 6"	-	12	12	-	12	2'- 6"	78	-	-	-
5	5	28'- 0"	32.33	16.17	36.18	66	32'- 0"	37	72	-	26'- 3"	2'- 0"	27'- 1"	2'-10"	-	15	15	-	15	2'-10"	72	-	-	-
5	6	33'- 6"	38.68	19.34	33.01	78	38'- 4"	34	66	-	31'- 9"	2'- 4"	32'- 7"	3'- 2"	-	18	18	-	18	3'- 2"	66	-	-	-
5	2	11'- 9"	13.57	6.78	45.56	28	13'- 2"	46	90	-	10'- 0"	3'- 1"	10'-10"	2'- 2"	-	5	6	-	6	2'- 2"	90	-	-	-
5	3	17'- 4"	20.01	10.01	42.34	40	19'- 8"	43	84	-	15'- 7"	1'- 9"	16'- 5"	2'- 7"	-	9	9	-	9	2'- 7"	84	-	-	-
5	4	22'-11"	26.46	13.23	39.12	54	26'- 1"	40	78	-	21'- 2"	2'- 1"	22'- 0"	2'-11"	-	12	12	-	12	2'-11"	78	-	-	-
5	5	28'- 6"	32.91	16.45	35.89	66	32'- 7"	36	70	-	26'- 9"	2'- 6"	27'- 7"	1'- 7"	-	15	16	-	16	1'- 7"	70	-	-	-
5	6	34'- 1"	39.36	19.68	32.67	80	39'- 0"	33	64	-	32'- 4"	2'-11"	33'- 2"	2'- 0"	-	18	19	-	19	2'- 0"	64	-	-	-
6	2	13'- 6"	15.59	7.79	44.55	32	15'- 3"	54	106	-	11'-10"	1'- 9"	12'- 7"	2'- 6"	-	8	8	-	10	2'- 1"	134	-	-	-
6	3	20'- 0"	23.09	11.55	40.80	46	22'- 9"	50	98	-	18'- 4"	2'- 6"	19'- 1"	1'- 9"	-	12	13	-	16	1'- 9"	122	-	-	-
6	4	26'- 6"	30.60	15.30	37.05	62	30'- 3"	45	88	-	24'-10"	1'- 9"	25'- 7"	2'- 6"	-	17	17	-	21	2'- 6"	110	-	-	-
6	5	33'- 0"	38.11	19.05	33.29	76	37'- 9"	41	80	-	31'- 4"	2'- 6"	32'- 1"	1'- 9"	-	21	22	-	27	2'- 1"	100	-	-	-
6	6	39'- 6"	45.61	22.81	29.54	92	45'- 3"	36	70	-	37'-10"	1'- 9"	38'- 7"	2'- 6"	-	26	26	-	33	1'- 7"	88	-	-	-
6	2	13'- 9"	15.88	7.94	44.41	32	15'- 6"	54	106	-	12'- 1"	2'- 0"	12'-10"	2'- 9"	-	8	8	-	10	2'- 5"	132	-	-	-
6	3	20'- 4"	23.48	11.74	40.61	48	23'- 2"	49	96	-	18'- 8"	2'- 9"	19'- 5"	2'- 1"	-	12	13	-	16	2'- 1"	122	-	-	-
6	4	26'-11"	31.08	15.54	36.81	62	30'- 9"	45	88	-	25'- 3"	2'- 2"	26'- 0"	2'-11"	-	17	17	-	22	1'- 9"	110	-	-	-
6	5	33'- 6"	38.68	19.34	33.01	78	38'- 4"	40	78	-	31'-10"	1'- 6"	32'- 7"	2'- 3"	-	22	22	-	27	2'- 7"	98	-	-	-
6	6	40'- 1"	46.28	23.14	29.20	92	45'-11"	36	70	-	38'- 5"	2'- 4"	39'- 2"	1'- 8"	-	26	27	-	33	2'- 2"	88	-	-	-
7	2	15'- 6"	17.90	8.95	43.40	36	17'- 6"	53	104	-	13'-10"	2'- 3"	14'- 7"	1'- 7"	-	9	10	-	13	1'- 7"	138	10	1'- 7"	104
7	3	23'- 0"	26.56	13.28	39.07	54	26'- 2"	47	92	-	21'- 4"	2'- 7"	22'- 1"	1'-10"	-	14	15	-	20	1'- 6"	124	15	1'-10"	92
7	4	30'- 6"	35.22	17.61	34.34	70	34'-10"	42	82	-	28'-10"	2'-10"	29'- 7"	2'- 2"	-	19	20	-	26	2'- 6"	110	20	2'- 2"	82
7	5	38'- 0"	43.88	21.94	30.41	88	43'- 6"	37	72	-	36'- 4"	1'- 8"	37'- 1"	2'- 5"	-	25	25	-	33	2'- 5"	96	25	2'- 5"	72
7	6	45'- 6"	52.54	26.27	26.08	106	52'- 2"	32	62	-	43'-10"	1'-11"	44'- 7"	2'- 9"	-	30	30	-	40	2'- 4"	84	30	2'- 9"	62
7	2	15'- 9"	18.19	9.09	43.25	36	17'-10"	53	104	-	14'- 1"	2'- 6"	14'-10"	1'-10"	-	9	10	-	13	1'-10"	138	10	1'-10"	104
7	3	23'- 4"	26.95	13.47	38.87	54	26'- 7"	47	92	-	21'- 8"	2'-11"	22'- 5"	2'- 2"	-	14	15	-	20	1'-10"	124	15	2'- 2"	92
7	4	30'-11"	35.70	17.85	34.50	72	35'- 4"	42	82	-	29'- 3"	1'-10"	30'- 0"	2'- 7"	-	20	20	-	27	1'-10"	110	20	2'- 7"	82
7	5	38'- 6"	44.46	22.23	30.12	90	44'- 1"	37	72	-	36'-10"	2'- 2"	37'- 7"	1'- 6"	-	25	26	-	34	1'-10"	96	26	1'- 6"	72
7	6	46'- 1"	53.21	26.61	25.74	106	52'-10"	31	60	-	44'- 5"	2'- 7"	45'- 2"	1'-10"	-	30	31	-	41	1'-10"	82	31	1'-10"	60
8	2	17'- 6"	20.21	10.10	42.24	40	19'-10"	60	118	-	16'- 0"	2'- 6"	16'- 7"	1'-10"	-	12	13	-	15	2'- 5"	144	18	1'-10"	168
8	3	26'- 0"	30.02	15.01	37.34	60	29'- 8"	53	104	-	24'- 6"	2'- 5"	25'- 1"	1'- 9"	-	19	20	-	24	1'-10"	128	28	1'- 8"	150
8	4	34'- 6"	39.84	19.92	32.43	80	39'- 6"	46	90	-	33'- 0"	2'- 4"	33'- 7"	1'- 8"	-	26	27	-	32	2'- 3"	110	38	1'- 6"	130
8	5	43'- 0"	49.65	24.83	27.52	100	49'- 3"	40	78	-	41'- 6"	2'- 3"	42'- 1"	1'- 7"	-	33	34	-	41	1'- 8"	94	47	2'- 3"	110
8	6	51'- 6"	59.47	29.73	22.61	120	59'- 1"	33	64	-	50'- 0"	2'- 2"	50'- 7"	1'- 6"	-	40	41	-	49	2'- 1"	78	57	2'- 1"	90
8	2	17'- 9"	20.50	10.25	42.10	42	20'- 2"	60	118	-	16'- 3"	1'- 6"	16'-10"	2'- 1"	-	13	13	-	16	1'- 8"	144	18	2'- 1"	168
8	3	26'- 4"	30.41	15.20	37.14	62	30'- 1"	53	104	-	24'-10"	1'- 6"	25'- 5"	2'- 1"	-	20	20	-	24	2'- 2"	128	28	2'- 0"	148
8	4	34'-11"	40.32	20.16	32.19	80	40'- 1"	46	90	-	33'- 5"	1'- 6"	34'- 0"	2'- 1"	-	27	27	-	33	1'- 8"	110	38	2'- 0"	128
8	5	43'- 6"	50.23	25.11	27.23	100	49'-10"	39	76	-	42'- 0"	1'- 6"	42'- 7"	2'- 1"	-	34	34	-	41	2'- 2"	94	48	1'-11"	108
8	6	52'- 1"	60.14	30.07	22.28	120	59'- 9"	32	62	-	50'- 7"	1'- 6"	51'- 2"	2'- 1"	-	41	41	-	50	1'- 8"	76	58	1'-10"	90
8	2	18'- 0"	20.78	10.39	41.95	42	20'- 5"	60	118	-	16'- 6"	1'- 9"	17'- 1"	2'- 4"	-	13	13	-	16	1'-11"	144	18	2'- 4"	168
8	3	26'- 8"	30.79	15.40	36.95	62	30'- 5"	53	104	-	25'- 2"	1'-10"	25'- 9"	2'- 5"	-	20	20	-	25	1'- 6"	126	29	1'- 6"	148
8	4	35'- 4"	40.80	20.40	31.95	82	40'- 5"	46	90	-	33'-10"	1'-11"	34'- 5"	2'- 6"	-	27	27	-	33	2'- 1"	110	39	1'- 6"	128
8	5	44'- 0"	50.81	25.40	26.94	102	50'- 5"	39	76	-	42'- 6"	2'- 0"	43'- 1"	2'- 7"	-	34	34	-	42	1'- 8"	92	49	1'- 6"	108
8	6	52'- 8"	60.81	30.41	21.94	122	60'- 5"	32	62	-	51'- 2"	2'- 1"	51'- 9"	2'- 8"	-	41	41	-	50	2'- 3"	74	59	1'- 6"	88
9	2	19'- 9"	22.81	11.40	40.94	46	22'- 5"	55	54	65	18'- 2"	2'- 7"	18'-10"	1'-11"	1'- 6"	13	14	17	21	1'- 6"	164	16	1'- 6"	122
9	3	29'- 4"	33.87	16.94	35.41	68	33'- 6"	48	47	56	27'- 9"	1'- 9"	28'- 5"	2'- 5"	2'- 5"	21	21	25	32	1'- 7"	142	24	1'-10"	106
9	4	38'-11"	44.94	22.47	29.88	90	44'- 7"	41	40	48	37'- 4"	2'- 3"	38'- 0"	1'- 7"	2'- 3"	28	29	34	43	1'- 8"	120	32	2'- 2"	90
9	5	48'- 6"	56.00	28.00	24.34	112	55'- 8"	33	32	39	46'-11"	2'- 9"	47'- 7"	2'- 1"	2'- 0"	35	36	43	54	1'- 8"	98	40	2'- 6"	72
9	6	58'- 1"	67.07	33.53	18.81	134	66'- 9"	26	25	30	56'- 6"	1'-11"	57'- 2"	2'- 7"	1'-11"	43	43	52	65	1'- 9"	76	49	1'- 9"	56
9	2	20'- 0"	23.09	11.55	40.80	46	22'- 9"	55	54	70	18'- 5"	1'- 6"	19'- 1"	2'- 2"	1'-11"	14	14	18	21	1'- 9"	164	16	1'- 9"	122
9	3	29'- 8"	34.26	17.13	35.22	68	33'-11"	48	47	60	28'- 1"	2'- 1"	28'- 9"	2'- 9"	2'- 6"	21	21	27	32	1'-11"	140	24	2'- 2"	106
9	4	39'- 4"	45.42	22.71	29.64	92	45'- 1"	40	39	51	37'- 9"	2'- 8"	38'- 5"	2'- 0"	2'- 1"	28	29	37	43	2'- 1"	118	32	2'- 7"	88
9	5	49'- 0"	56.58	28.29	24.06	114	56'- 3"	33	32	41	47'- 5"	1'-11"	48'- 1"	2'- 7"	1'- 7"	36	36	47	54	2'- 2"	96	41	1'-11"	72
9	6	58'- 8"	67.74	33.87	18.48	136	67'- 5"	25	24	32	57'- 1"	2'- 6"	57'- 9"	1'-11"	2'- 2"	43	44	56	65	2'- 4"	74	49	2'- 4"	54
10	2	21'- 9"	25.11	12.56	39.79	50	24'- 9"	35	34	45	19'-10"	1'- 8"	20'-10"	2'- 8"	2'- 8"	10	10	13	17	2'- 4"	118	18	2'- 5"	126
10	3	32'- 4"	37.34	18.67	33.68	76	37'- 0"	29	28	38	30'- 5"	2'- 2"	31'- 5"	3'- 1"	2'- 7"	15	15	20	26	2'- 6"	100	28	2'- 2"	108
10	4	42'-11"	49.56	24.78	27.57	100	49'- 2"	24	23	31	41'- 0"	2'- 7"	42'- 0"	1'- 7"	2'- 7"	20	21	27	36	1'- 7"	82	38	1'-11"	88
10	5	53'- 6"	61.78	30.89	21.46	124	61'- 5"	19	18	24	51'- 7"	3'- 1"	52'- 7"	2'- 1"	2'- 7"	25	26	34	45	1'- 9"	64	48	1'- 8"	68
10	6	64'- 1"	74.00	37.00	15.35	148	73'- 8"	14	13	17	62'- 2"	1'- 7"	63'- 2"	2'- 6"	2'- 6"	31	31	41	54	1'-11"	46	57	2'- 6"	48
10	2	22'- 0"	25.40	12.70	39.64	52	25'- 0"	34	33	45	20'- 1"	1'-10"	21'- 1"	2'-10"	2'-10"	10	10	13	17	2'- 7"	118	19	1'- 7"	126
10	3	32'- 8"	37.72	18.86	33.49	76	37'- 4"	29	28	38	30'- 9"	2'- 5"	31'- 9"	3'- 5"	2'-11"	15	16	20	27	1'- 9"	100	28	2'- 6"	106
10	4	43'- 4"	50.04	25.02	27.33	100	49'- 8"	24	23	31	41'- 5"	3'- 0"	42'- 5"	2'- 0"	3'- 0"	20	21	27	36	2'- 0"	82	38	2'- 4"	88
10	5	54'- 0"	62.35	31.18	21.17	126	62'- 0"	19	18	24	52'- 1"	1'- 7"	53'- 1"	2'- 7"	1'- 6"	26	26	35	45	2'- 3"	64	48	2'- 2"	68
10	6	64'- 8"	74.67	37.34	15.01	150	74'- 4"	13	12	17	62'- 9"	2'- 2"	63'- 9"	3'- 1"	1'- 7"	31	31	42	54	2'- 6"	44	58	2'- 1"	48

#

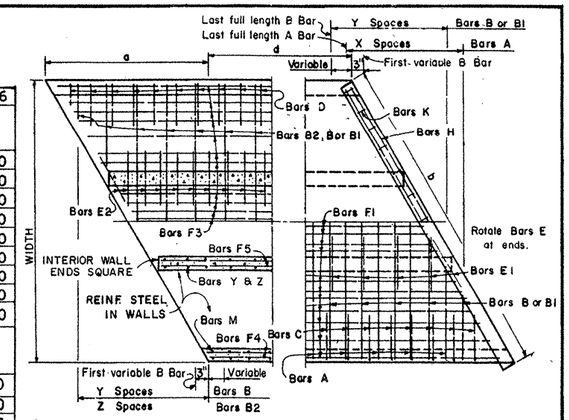
NO. BARS REQUIRED

NO. SPANS = H	BARS F_4	BARS F_5 2	3	4	5	6
2	4	4	8	12	16	20
3	4	4	8	12	16	20
4	6	6	12	18	24	30
5	16	8	16	24	32	40
6	16	8	16	24	32	40
7	20	10	20	30	40	50
8	20	10	20	30	40	50
9	24	12	24	36	48	60
10	28	14	28	42	56	70

** SPAC	BARS C & D	BARS E_1 OR E_2				
4½"	-	140	280	420	560	700
5 "	252	126	252	378	504	630
5½"	230	115	230	345	460	575
6 "	210	105	210	315	420	525
6½"	194	97	194	291	388	485
7 "	180	90	180	270	360	450
7½"	168	84	168	252	336	420
8 "	158	79	158	237	316	395
8½"	-	74	148	222	296	370
9 "	140	70	140	210	280	350
9½"	134	-	-	-	-	-
10 "	126	63	126	189	252	315
10½"	120	-	-	-	-	-
12 "	-	53	106	159	212	265
14 "	-	45	90	135	180	225

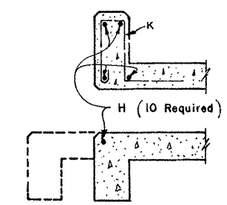
BARS M	BARS Y & Z				
68	53	106	159	212	265

**Determine spacing of Bars C, D, E_1 & E_2 from the normal culvert standard.



BOTTOM SLAB

TOP SLAB



CURB & TOEWALL SEC.

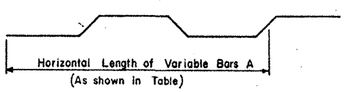
LENGTH F BARS
F1, F3 & F4 = 52'-0"
F5 = 51'-9"

F4 replace F2 in ext. wall
F5 replace F2 in int. wall

SUPPLEMENT TO TABLE OF DIMENSIONS & REINFORCING STEEL MODIFICATIONS

SPANS S	9'x5' MC--2 Y	LENGTH LAST B	NO. B	MC--3 Y	LENGTH LAST B	NO. B	10'x9' MC--1 Z	LENGTH LAST B_2	NO. B_2	10'x10' MC--1 Z	LENGTH LAST B_2	NO. B_2
2	19	1'-11"	150	15	1'- 8"	116	14	2'- 4"	47	15	1'-11"	50
3	29	2'- 2"	130	22	2'- 8"	100	21	2'-10"	40	23	1'- 7"	42
4	39	2'- 4"	110	30	2'- 5"	84	29	2'- 0"	32	30	2'- 8"	34
5	50	1'- 7"	90	38	2'- 2"	68	36	2'- 7"	25	38	2'- 4"	26
6	60	1'-10"	70	46	2'- 0"	52	44	1'- 8"	18	46	2'- 1"	19

*Length of first variable B bar is the same for MC--2 & MC--3.



BARS A

For ease of fabrication, it is pointed out that variable length A Bars may be fabricated full length and cut off. The cut off portions can then be used for the other end of the skewed portion with a very slight amount of waste.

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

MULTIPLE BOX CULVERT

30° SKEW

MC-30°

Sheet 1 of 2

ORIGINAL DRAWING DATE: MAY, 1964	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN: T.H.D. REVISIONS	15	6		321
CK:	COUNTY		CONTROL SECTION JOB HIGHWAY	
DR:	BEXAR		2452 2-23	
CK:				

BARREL QUANTITIES FOR 44'-0" CLEAR WIDTH

	S ft	H ft	2 Span Conc	2 Span Reinf.	3 Span Conc	3 Span Reinf.	4 Span Conc	4 Span Reinf.	5 Span Conc	5 Span Reinf.	6 Span Conc	6 Span Reinf.
MC5-1	5	2	28.76	4212	41.66	6213	54.57	8205	67.47	10205	80.38	12199
	5	3	31.66	4376	45.53	6448	59.40	8511	73.27	10583	87.14	12647
	5	4	34.56	4681	49.40	6894	64.23	9096	79.06	11309	93.89	13515
	5	5	40.37	5622	57.14	8077	73.90	10524	90.66	12980	107.42	15437
MC5-2	5	2	28.76	3811	41.66	5756	54.57	7694	67.47	9640	80.38	11578
	5	3	31.66	3966	45.53	5983	59.40	7991	73.27	10009	87.14	12017
	5	4	34.56	4261	49.40	6418	64.23	8567	79.06	10726	93.89	12876
	5	5	40.37	5185	57.14	7581	73.90	9973	90.66	12348	107.42	14770
MC6-1	6	3	35.65	5281	51.52	7823	67.38	10354	83.25	12895	99.11	15430
	6	4	38.56	5595	55.39	8278	72.22	10949	89.04	13631	105.87	16307
	6	5	44.37	6551	63.13	9477	81.88	12396	100.63	15326	119.40	18252
	6	6	47.76	6774	67.63	9771	87.52	12762	107.40	15277	127.27	18759
MC6-2	6	3	35.65	5585	51.52	8491	67.38	11387	83.25	14289	99.11	17188
	6	4	38.56	5915	55.39	8962	72.22	11998	89.04	15041	105.87	18082
	6	5	44.37	6882	63.13	10170	81.88	13453	100.63	16740	119.40	20030
	6	6	47.76	7120	67.63	10479	87.52	13834	107.40	17192	127.27	20551
MC7-1	7	3	42.15	5711	61.22	8439	80.29	11155	99.37	13881	118.44	16597
	7	4	45.05	6024	65.09	8894	85.13	11750	105.16	14617	125.20	17475
	7	5	50.90	6979	72.89	10094	94.86	13200	116.84	16313	138.82	19419
	7	6	54.30	7201	77.39	10388	100.50	13564	123.60	16749	146.70	19925
	7	7	57.68	7634	81.91	10962	106.13	14278	130.36	17604	154.59	20919
MC7-2	7	3	42.15	5872	61.22	8932	80.29	11985	99.37	15045	118.44	18098
	7	4	45.05	6185	65.09	9387	85.13	12579	105.16	15781	125.20	18976
	7	5	50.90	7138	72.89	10582	94.86	14024	116.84	17470	138.82	20911
	7	6	54.30	7399	77.39	10954	100.50	14504	123.60	18061	146.70	21610
	7	7	57.68	7832	81.91	11528	106.13	15218	130.36	18915	154.59	22605
MC7-3	7	3	42.15	6646	61.22	10250	80.29	13848	99.37	17454	118.44	21050
	7	4	45.05	6967	65.09	10713	85.13	14449	105.16	18198	125.20	21935
	7	5	50.90	7932	72.89	11923	94.86	15911	116.84	19904	138.82	23890
	7	6	54.30	8211	77.39	12324	100.50	16430	123.60	20543	146.70	24650
	7	7	57.68	8887	81.91	13141	106.13	17388	130.36	21642	154.59	25887
MC8-1	8	4	49.37	7121	71.56	10503	93.76	13872	115.95	17257	138.14	20629
	8	5	55.22	8102	79.36	11726	103.49	15348	127.63	18979	151.77	22606
	8	6	58.61	8383	83.86	12122	109.13	15857	134.39	19604	159.64	23343
	8	7	61.99	8831	88.38	12711	114.76	16586	141.15	20474	167.53	24353
	8	8	69.78	9408	98.74	13341	127.70	17345	156.67	21314	185.63	25273
MC8-2	8	4	52.20	7096	75.77	10753	99.34	14397	122.90	18050	146.47	21701
	8	5	58.09	8070	83.62	11965	109.14	15861	134.66	19760	160.19	23663
	8	6	61.48	8308	88.12	12275	114.77	16241	141.43	20211	168.07	24185
	8	7	64.86	8758	92.64	12865	120.41	16971	148.18	21082	175.95	25197
	8	8	72.69	9329	103.06	13522	133.42	17719	163.79	21910	194.15	26100

BARREL QUANTITIES FOR 44'-0" CLEAR WIDTH

	S ft	H ft	2 Span Conc	2 Span Reinf.	3 Span Conc	3 Span Reinf.	4 Span Conc	4 Span Reinf.	5 Span Conc	5 Span Reinf.	6 Span Conc	6 Span Reinf.
MC8-3	8	4	55.02	8112	79.96	12389	104.90	16653	129.84	20928	154.78	25198
	8	5	60.95	9112	87.87	13628	114.77	18144	141.68	22667	168.59	27190
	8	6	64.34	9370	92.37	13957	120.41	18544	148.44	23138	176.47	27732
	8	7	67.73	10013	96.88	14741	126.04	19468	155.20	24203	184.35	28937
	8	8	75.59	10319	107.36	15134	139.12	19955	170.88	24771	202.64	29581
MC9-1	9	5	62.72	8803	90.56	12900	118.40	16999	146.24	21101	174.08	25262
	9	6	66.12	9080	95.07	13288	124.04	17496	153.00	21709	181.96	25918
	9	7	69.49	9529	99.58	13877	129.67	18226	159.76	22578	189.84	26929
	9	8	77.32	10239	110.00	14748	142.68	19268	175.36	23788	208.04	28298
	9	9	81.18	10707	115.15	15355	149.11	20015	183.08	24674	217.04	29326
MC9-2	9	5	69.10	8613	100.04	12805	130.97	16992	161.90	21187	192.84	25381
	9	6	72.49	9184	104.54	13550	136.61	17910	168.67	22281	200.72	26649
	9	7	75.87	9641	109.06	14148	142.24	18648	175.42	23160	208.61	27669
	9	8	83.78	10230	119.58	14939	155.38	19660	191.19	24382	226.99	29091
	9	9	87.64	10697	124.74	15548	161.82	20408	198.91	25271	235.99	30127
MC9-3	9	5	72.29	9639	104.78	14477	137.26	19312	169.74	24153	202.23	28992
	9	6	75.68	10286	109.29	15356	142.90	20423	176.51	25497	210.11	30568
	9	7	79.07	10756	113.80	15965	148.53	21173	183.26	26386	218.00	31598
	9	8	87.01	11637	124.38	17073	161.74	22519	199.11	27966	236.47	33407
	9	9	90.88	12133	129.53	17708	168.17	23295	206.83	28882	245.47	34463
MC10-1	10	6	74.27	10106	107.25	14769	140.25	19424	173.25	24079	206.23	28892
	10	7	77.65	10709	111.77	15551	145.88	20386	180.00	25220	214.12	30213
	10	8	85.51	11129	122.24	16041	158.96	20967	195.69	25890	232.41	30969
	10	9	89.38	11838	127.39	16969	165.39	22112	203.40	27255	241.41	32554
	10	10	93.26	12780	132.54	18128	171.83	23490	211.12	28851	250.41	34374
MC10-2	10	6	81.29	10815	117.70	16077	154.11	21324	190.53	26577	226.93	31996
	10	7	84.67	11388	122.21	16790	159.75	22177	197.28	27569	234.82	33129
	10	8	92.62	11818	132.79	17291	172.96	22776	213.13	28253	253.29	33899
	10	9	104.11	12697	137.94	18378	179.39	24073	220.85	29759	262.29	35613
	10	10	100.36	13646	143.09	19528	185.83	25422	228.56	31307	271.30	37363
MC10-3	10	6	88.32	11547	128.15	17201	167.99	22845	207.83	28485	247.66	34307
	10	7	91.71	12322	132.67	18116	173.62	23899	214.58	29680	255.54	35642
	10	8	99.73	12663	143.36	18529	186.97	24407	230.59	30278	274.21	36326
	10	9	104.64	13537	148.51	19542	193.40	25560	238.31	31573	283.20	37761
	10	10	107.48	14728	153.66	20973	199.85	27231	246.02	33481	292.21	39901

GENERAL NOTES:

The necessary details for adapting normal MULTIPLE BOX CULVERT Standards, MC-5-1 through MC-10-3, to 30° Skew Culverts are shown on these sheets. Refer to the appropriate normal Standard for details, dimensions, sections, notes and bar diagrams not shown hereon.

Quantities shown hereon are for 44'-0" Clear Width between headwalls measured perpendicular to the center line. Quantities of reinforcing steel are approximate. Quantities P.L.F. Barrel shown on normal MC Standards may be converted to P.L.F. Clear Width by Multiplying by 1.1547.

The number of variable length bars required: Bars A = 2X, Bars B = 4Y, Bars B_1 = 2Y, and Bars B_2 = 2Z.

Size of Bars H: #4 for Spans = 5'-6', #5 for Spans = 7'-9', #6 for Spans = 10'.

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

MULTIPLE BOX CULVERT

30° SKEW

MC-30°

Sheet 2 of 2

ORIGINAL DRAWING DATE: MAY, 1964	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
ON: THD. REVISIONS	15	6		322
CK:	COUNTY		CONTROL SECTION JOB	HIGHWAY
DW:	BEXAR		1412 2 23	46
CK:				

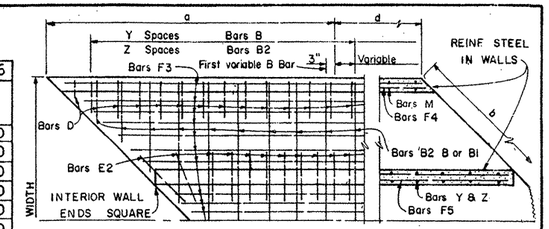
TABLE OF DIMENSIONS & REINFORCING STEEL MODIFICATIONS
ENTER WITH NORMAL CULVERT SPAN & WIDTH

SPANS		MC--1 DIMENSIONS WIDTH	b	a	d	NO. K	LENGTH H	NO. BARS A	B/B1	B2	LENGTH OF VARIABLE BARS (FIRST & LAST) A	A	B,B1, or B2	B/B1	B2	SPACES X	Y	Z	MC--2 Y	LENGTH LAST B	NO. B	MC--3 Y	LENGTH LAST B	NO. B
5	2	11'- 6"	16.26	11.50	52.61	32	15'-11"	53	104	-	10'- 4"	2'- 4"	10'-10"	1'-10"	-	9	10	-	10	1'-10"	104	-	-	-
5	3	17'- 0"	24.04	17.00	47.11	48	23'- 8"	48	94	-	15'-10"	1'-10"	16'- 4"	2'- 4"	-	15	15	-	15	2'- 4"	94	-	-	-
5	4	22'- 6"	31.82	22.50	41.61	64	31'- 6"	42	82	-	21'- 4"	2'- 4"	21'-10"	1'-10"	-	20	21	-	21	1'-10"	82	-	-	-
5	5	28'- 0"	39.60	28.00	36.11	80	39'- 3"	37	72	-	26'-10"	1'-10"	27'- 4"	2'- 4"	-	26	26	-	26	2'- 4"	72	-	-	-
5	6	33'- 6"	47.38	33.50	30.61	96	47'- 0"	31	60	-	32'- 4"	2'- 4"	32'-10"	1'-10"	-	31	32	-	32	1'-10"	60	-	-	-
5	2	11'- 9"	16.62	11.75	52.36	34	16'- 3"	53	104	-	10'- 7"	1'- 7"	11'- 1"	2'- 1"	-	10	10	-	10	2'- 1"	104	-	-	-
5	3	17'- 4"	24.51	17.33	46.78	50	24'- 2"	47	92	-	16'- 2"	2'- 2"	16'- 8"	1'- 8"	-	15	16	-	16	1'- 8"	92	-	-	-
5	4	22'-11"	32.41	22.92	41.19	66	32'- 1"	42	82	-	21'- 9"	1'- 9"	22'- 3"	2'- 3"	-	21	21	-	21	2'- 3"	82	-	-	-
5	5	28'- 6"	40.30	28.50	35.61	82	40'- 0"	36	70	-	27'- 4"	2'- 4"	27'-10"	1'-10"	-	26	27	-	27	1'-10"	70	-	-	-
5	6	34'- 1"	48.20	34.08	30.03	96	47'-10"	31	60	-	32'-11"	1'-11"	33'- 5"	2'- 5"	-	32	32	-	32	2'- 5"	60	-	-	-
6	2	13'- 6"	19.09	13.50	50.61	38	18'- 9"	61	120	-	12'- 5"	1'- 7"	12'-10"	2'- 0"	-	14	14	-	18	1'- 6"	152	-	-	-
6	3	20'- 0"	28.28	20.00	44.11	56	27'-11"	54	106	-	18'-11"	2'- 3"	19'- 4"	1'-10"	-	21	22	-	27	2'- 0"	132	-	-	-
6	4	26'- 6"	37.48	26.50	37.61	76	37'- 2"	46	90	-	25'- 5"	2'- 1"	25'-10"	1'- 8"	-	29	30	-	37	1'-10"	112	-	-	-
6	5	33'- 0"	46.67	33.00	31.11	94	46'- 4"	38	74	-	31'-11"	1'-11"	32'- 4"	1'- 6"	-	37	38	-	47	1'- 8"	92	-	-	-
6	6	39'- 6"	55.86	39.50	24.61	112	55'- 6"	30	58	-	38'- 5"	1'- 9"	38'-10"	2'- 2"	-	45	45	-	57	1'- 6"	74	-	-	-
6	2	13'- 9"	19.45	13.75	50.36	40	19'- 1"	61	120	-	12'- 8"	1'-10"	13'- 1"	2'- 3"	-	14	14	-	18	1'- 9"	150	-	-	-
6	3	20'- 4"	28.76	20.33	43.78	58	28'- 5"	53	104	-	19'- 3"	1'- 9"	19'- 8"	2'- 2"	-	22	22	-	28	1'- 8"	130	-	-	-
6	4	26'-11"	38.07	26.92	37.19	76	37'- 9"	45	88	-	25'-10"	1'- 8"	26'- 3"	2'- 1"	-	30	30	-	38	1'- 7"	112	-	-	-
6	5	33'- 6"	47.38	33.50	30.61	96	47'- 0"	37	72	-	32'- 5"	1'- 7"	32'-10"	2'- 0"	-	38	38	-	48	1'- 6"	92	-	-	-
6	6	40'- 1"	56.69	40.08	24.03	114	56'- 4"	29	56	-	39'- 0"	1'- 6"	39'- 5"	1'-11"	-	46	46	-	57	2'- 1"	72	-	-	-
7	2	15'- 6"	21.92	15.50	48.61	44	21'- 7"	59	116	-	14'- 5"	1'-11"	14'-10"	1'- 6"	-	16	17	-	22	1'- 8"	156	17	1'- 6"	116
7	3	23'- 0"	32.53	23.00	41.11	66	32'- 2"	50	98	-	21'-11"	1'-11"	22'- 4"	1'- 6"	-	25	26	-	34	1'- 8"	132	26	1'- 6"	98
7	4	30'- 6"	43.13	30.50	33.61	86	42'-10"	41	80	-	29'- 5"	1'-11"	29'-10"	1'- 6"	-	34	35	-	46	1'- 8"	108	35	1'- 6"	80
7	5	38'- 0"	53.74	38.00	26.11	108	53'- 5"	32	62	-	36'-11"	1'-11"	37'- 4"	1'- 6"	-	43	44	-	58	1'- 8"	84	44	1'- 6"	62
7	6	45'- 6"	64.35	45.50	18.61	130	64'- 0"	23	44	-	44'- 5"	1'-11"	44'-10"	1'- 6"	-	52	53	-	70	1'- 8"	60	53	1'- 6"	44
7	2	15'- 9"	22.27	15.75	48.36	44	21'-11"	59	116	-	14'- 8"	2'- 2"	15'- 1"	1'- 9"	-	16	17	-	22	1'-11"	154	17	1'- 9"	116
7	3	23'- 4"	33.00	23.33	40.78	66	32'- 8"	50	98	-	22'- 3"	2'- 3"	22'- 8"	1'-10"	-	25	26	-	34	2'- 0"	130	26	1'-10"	98
7	4	30'-11"	43.72	30.92	33.19	88	43'- 5"	40	78	-	29'-10"	1'- 6"	30'- 3"	1'-11"	-	35	35	-	47	1'- 6"	106	35	1'-11"	78
7	5	38'- 6"	54.45	38.50	25.61	110	54'- 1"	31	60	-	37'- 5"	1'- 7"	37'-10"	2'- 0"	-	44	44	-	59	1'- 7"	82	44	2'- 0"	60
7	6	46'- 1"	65.17	46.08	18.03	130	64'-10"	22	42	-	45'- 0"	1'- 8"	45'- 5"	2'- 1"	-	53	53	-	71	1'- 8"	58	53	2'- 1"	42
8	2	17'- 6"	24.75	17.50	46.61	50	24'- 5"	67	132	-	16'- 6"	1'- 7"	16'-10"	1'-11"	-	22	22	-	27	1'- 8"	160	31	1'-10"	186
8	3	26'- 0"	36.77	26.00	38.11	74	36'- 5"	55	108	-	25'- 0"	1'- 7"	25'- 4"	1'-11"	-	34	34	-	41	2'- 0"	130	48	1'-10"	152
8	4	34'- 6"	48.79	34.50	29.61	98	48'- 5"	43	84	-	33'- 6"	1'- 7"	33'-10"	1'-11"	-	46	46	-	56	1'- 9"	102	65	1'-10"	118
8	5	43'- 0"	60.81	43.00	21.11	122	60'- 6"	31	60	-	42'- 0"	1'- 7"	42'- 4"	1'-11"	-	58	58	-	71	1'- 6"	72	82	1'-10"	84
8	6	51'- 6"	72.83	51.50	12.61	146	72'- 6"	19	36	-	50'- 6"	1'- 7"	50'-10"	1'-11"	-	70	70	-	85	1'-10"	42	99	1'-10"	50
8	2	17'- 9"	25.10	17.75	46.36	50	24'- 9"	66	130	-	16'- 9"	1'-10"	17'- 1"	1'- 6"	-	22	23	-	27	1'-11"	158	32	1'- 7"	186
8	3	26'- 4"	37.24	26.33	37.78	74	36'-11"	54	106	-	25'- 4"	1'-11"	25'- 8"	1'- 7"	-	34	35	-	42	1'- 9"	130	49	1'- 8"	152
8	4	34'-11"	49.38	34.92	29.19	100	49'- 1"	42	82	-	33'-11"	2'- 0"	34'- 3"	1'- 8"	-	46	47	-	57	1'- 7"	100	66	1'- 9"	116
8	5	43'- 6"	61.52	43.50	20.61	124	61'- 2"	30	58	-	42'- 6"	2'- 1"	42'-10"	1'- 9"	-	58	59	-	71	2'- 0"	70	83	1'-10"	82
8	6	52'- 1"	73.66	52.08	12.03	148	73'- 4"	18	34	-	51'- 1"	1'- 6"	51'- 5"	1'-10"	-	71	71	-	86	1'-10"	40	100	1'-11"	48
8	2	18'- 0"	25.46	18.00	46.11	52	25'- 2"	66	130	-	17'- 0"	2'- 1"	17'- 4"	1'- 9"	-	22	23	-	28	1'- 7"	158	32	1'-10"	184
8	3	26'- 8"	37.71	26.67	37.44	76	37'- 5"	54	106	-	25'- 8"	1'- 7"	26'- 0"	1'-11"	-	35	35	-	43	1'- 6"	128	50	1'- 6"	150
8	4	35'- 4"	49.97	35.33	28.78	100	49'- 8"	41	80	-	34'- 4"	1'- 9"	34'- 8"	2'- 1"	-	47	47	-	57	2'- 0"	98	67	1'- 8"	116
8	5	44'- 0"	62.22	44.00	20.11	124	61'-11"	29	56	-	43'- 0"	1'-11"	43'- 4"	1'- 7"	-	59	60	-	72	1'-11"	68	84	1'-10"	80
8	5	52'- 8"	74.48	52.67	11.44	150	74'- 2"	17	32	-	51'- 8"	2'- 1"	52'- 0"	1'- 9"	-	71	72	-	87	1'-10"	38	102	1'- 6"	46
9	2	19'- 9"	27.93	19.75	44.36	56	27'- 7"	60	59	71	18'- 9"	1'- 6"	19'- 1"	1'-10"	1'- 7"	24	24	29	36	1'- 7"	178	27	1'- 9"	132
9	3	29'- 4"	41.48	29.33	34.78	84	41'- 2"	47	46	55	28'- 4"	2'- 1"	28'- 8"	1'- 8"	1'- 9"	36	37	44	55	1'- 8"	140	41	2'- 0"	104
9	4	38'-11"	55.04	38.92	25.19	110	54'- 8"	34	33	40	37'-11"	1'-11"	38'- 3"	1'- 6"	2'- 0"	49	50	59	74	1'- 9"	100	56	1'- 7"	76
9	5	48'- 6"	68.59	48.50	15.61	138	68'- 3"	21	20	25	47'- 6"	1'- 9"	47'-10"	2'- 1"	1'- 7"	62	62	75	93	1'-10"	62	70	1'-10"	46
9	6	58'- 1"	82.14	58.08	6.03	164	81'-10"	9	8	9	57'- 1"	1'- 7"	57'- 5"	1'-11"	1'- 9"	75	75	90	112	1'-11"	24	84	2'- 1"	18
9	2	20'- 0"	28.28	20.00	44.11	56	27'-11"	59	58	75	19'- 0"	1'- 9"	19'- 4"	2'- 1"	1'-10"	24	24	31	36	1'-10"	176	27	2'- 0"	132
9	3	29'- 8"	41.95	29.67	34.44	84	41'- 7"	47	46	59	28'- 8"	1'- 8"	29'- 0"	2'- 0"	1'- 7"	37	37	48	56	1'- 6"	138	42	1'- 8"	102
9	4	39'- 4"	55.63	39.33	24.78	112	55'- 4"	34	33	42	38'- 4"	1'- 7"	38'- 8"	1'-11"	1'-11"	50	50	64	75	1'- 8"	100	56	2'- 0"	74
9	5	49'- 0"	69.30	49.00	15.11	138	69'- 0"	21	20	26	48'- 0"	1'- 6"	48'- 4"	1'-10"	1'- 8"	63	63	81	94	1'-10"	60	71	1'- 8"	44
9	6	58'- 8"	82.97	58.67	5.44	166	82'- 8"	8	7	9	57'- 8"	2'- 2"	58'- 0"	1'- 9"	2'- 0"	75	76	97	114	1'- 6"	22	85	2'- 0"	16
10	2	21'- 9"	30.76	21.75	42.36	62	30'- 5"	37	36	48	20'- 6"	1'-10"	21'- 1"	2'- 5"	1'-10"	17	17	23	30	1'- 9"	126	32	1'- 8"	136
10	3	32'- 4"	45.73	32.33	31.78	92	45'- 5"	28	27	36	31'- 1"	1'-11"	31'- 8"	2'- 6"	1'-11"	26	26	35	46	1'- 8"	94	49	1'- 8"	102
10	4	42'-11"	60.69	42.92	21.19	122	60'- 4"	19	18	24	41'- 8"	2'- 0"	42'- 3"	2'- 7"	2'- 0"	35	35	47	62	1'- 7"	64	66	1'- 7"	68
10	5	53'- 6"	75.66	53.50	10.61	152	75'- 4"	10	9	12	52'- 3"	2'- 1"	52'-10"	1'- 6"	2'- 1"	44	45	59	78	1'- 6"	32	83	1'- 7"	34
10	6	64'- 1"	90.63	64.08	0.03	182	90'- 4"	-	-	-	62'-10"	2'- 2"	63'- 5"	1'- 7"	2'- 2"	53	54	71	93	2'- 1"	-	100	1'- 6"	-
10	2	22'- 0"	31.11	22.00	42.11	62	30'- 9"	37	36	48	20'- 9"	2'- 1"	21'- 4"	1'- 6"	2'- 1"	17	18	23	30	2'- 0"	126	32	1'-11"	134
10	3	32'- 8"	46.20	32.67	31.44	92	45'-10"	27	26	36	31'- 5"	2'- 3"	32'- 0"	1'- 8"	2'- 3"	26	28	35	46	2'- 0"	94	49	2'- 0"	100
10	4	43'- 4"	61.28	43.33	20.78	122	60'-11"	18	17	23	42'- 1"	2'- 5"	42'- 8"	1'-10"	1'- 6"	35	37	48	62	2'- 0"	62	66	2'- 0"	66
10	5	54'- 0"	76.37	54.00	10.11	154	76'- 0"	9	8	11	52'- 9"	2'- 7"	53'- 4"	2'- 0"	1'- 8"	44	45	60	78	2'- 0"	30	83	2'- 1"	32
10	6	†64'- 8"	91.45	64.67	-	184	91'- 1"	-	-	-	63'- 5"	1'- 7"	64'- 0"	2'- 2"	1'-10"	54	54	72	94	2'- 0"	-	101	1'- 6"	-

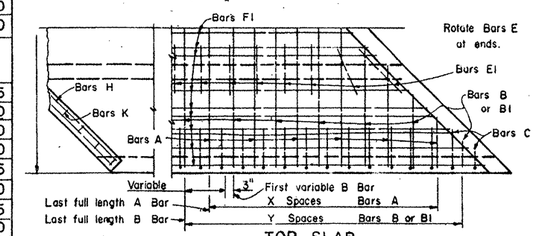
NO. BARS REQUIRED

NO. SPANS =		2	3	4	5	6
H	BARS F_4	BARS F_5				
2	4	4	8	12	16	20
3	4	4	8	12	16	20
4	6	6	12	18	24	30
5	16	8	16	24	32	40
6	16	8	16	24	32	40
7	20	10	20	30	40	50
8	20	10	20	30	40	50
9	24	12	24	36	48	60
10	28	14	28	42	56	70
** SPAC	BARS C & D	BARS E_1 OR E_2				
4½"	-	171	342	513	684	855
5 "	308	154	308	462	616	770
5½"	280	140	280	420	560	700
6 "	256	128	256	384	512	640
6½"	238	119	238	357	476	595
7 "	220	110	220	330	440	550
7½"	206	103	206	309	412	515
8 "	192	96	192	288	384	480
8½"	-	91	182	273	364	455
9 "	172	86	172	258	344	430
9½"	162	-	-	-	-	-
10 "	154	77	154	231	308	385
10½"	148	-	-	-	-	-
12 "	-	64	128	192	256	320
14 "	-	55	110	165	220	275
	BARS M	BARS Y & Z				
	86	64	128	192	256	320

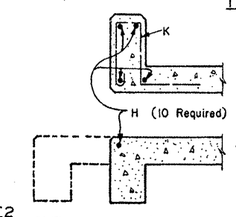
**Determine spacing of Bars C, D, E1, & E2 from the normal culvert standard.



BOTTOM SLAB



TOP SLAB



CURB & TOEWALL SEC.

LENGTH F BARS
F1, F3 & F4 = 63'-9"
F5 = 63'-3"

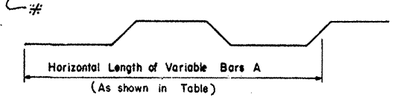
F4 replace F2 in ext. wall
F5 replace F2 in int. wall

SUPPLEMENT TO TABLE OF DIMENSIONS & REINFORCING STEEL MODIFICATIONS

SPANS	9'x5' MC--2 Y	LENGTH LAST B	NO. B	MC--3 Y	LENGTH LAST B	NO. B	10'x9' MC--1	LENGTH LAST B_2	NO. B_2	10'x10' Z	LENGTH LAST B_2	NO. B_2
2	33	1'- 9"	164	25	2'- 1"	124	24	2'- 2"	100	26	1'- 6"	106
3	51	1'- 7"	128	39	1'- 9"	98	37	2'- 0"	74	39	1'-11"	78
4	68	1'-11"	92	52	2'- 1"	70	50	1'-10"	50	53	1'- 6"	52
5	86	1'- 9"	58	66	1'- 9"	44	63	1'- 8"	24	66	1'-10"	24
6	104	1'- 7"	22	79	2'- 2"	16	76	1'- 6"	--	80	1'- 6"	--

*Length of first variable B bar is the same for MC--2 & MC--3.

†At this width dimension "d" is negative for a 44' clear roadway. The values in this table are based on d = 0.



BARS A

For ease of fabrication, it is pointed out that variable length A Bars may be fabricated full length and cut off. The cut off portions can then be used for the other end of the skewed portion with a very slight amount of waste.

TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

MULTIPLE BOX CULVERT

45° SKEW

MC-45°

Sheet 1 of 2

ORIGINAL	DRAWING DATE: MAY, 1964	STATE DISTRICT 15	FEDERAL REGION 6	FEDERAL AID PROJECT	SHEET 323
DN: THD	REVISIONS	COUNTY BEXAR	CONTROL 2452	SECTION 223	JOB
CK:					HIGHWAY
DW:					
CK:					

BARREL QUANTITIES FOR 44'-0" CLEAR WIDTH

	S	H	2 Span		3 Span		4 Span		5 Span		6 Span	
	ft	ft	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.
MC5-1	5	2	35.21	5159	51.01	7609	66.81	10049	82.62	12499	98.42	14941
	5	3	38.76	5360	55.74	7897	72.73	10423	89.70	12961	106.68	15489
	5	4	42.32	5734	60.48	8443	78.63	11140	96.78	13851	114.94	16553
	5	5	49.44	6885	69.94	9891	90.45	12889	110.96	15896	131.48	18907
MC5-2	5	2	35.21	4667	51.01	7049	66.81	9423	82.62	11807	98.42	14181
	5	3	38.76	4858	55.74	7327	72.73	9787	89.70	12258	106.68	14719
	5	4	42.32	5219	60.48	7860	78.63	10493	96.78	13137	114.94	15771
	5	5	49.44	6351	69.94	9285	90.45	12214	110.96	15123	131.48	18089
MC6-1	6	3	43.65	6538	63.07	9686	82.50	12820	101.92	15966	121.34	19106
	6	4	47.21	6922	67.81	10243	88.41	13548	109.01	16867	129.60	20180
	6	5	54.32	8096	77.27	11713	100.23	15324	123.18	18946	146.14	22563
	6	6	58.46	8369	82.79	12072	107.11	15772	131.45	18887	155.77	23184
MC6-2	6	3	43.65	6910	63.07	10505	82.50	14085	101.92	17673	121.34	21260
	6	4	47.21	7314	67.81	11082	88.41	14834	109.01	18593	129.60	22354
	6	5	54.32	8500	77.27	12561	100.23	16618	123.18	20679	146.14	24741
	6	6	58.46	8792	82.79	12939	107.11	17084	131.45	21232	155.77	25379
MC7-1	7	3	51.61	6994	74.96	10335	98.26	13662	121.67	17001	145.02	20327
	7	4	55.16	7378	79.70	10892	104.23	14390	128.75	17902	153.28	21402
	7	5	62.33	8547	89.22	12361	116.13	16166	143.03	19979	169.93	23783
	7	6	66.47	8820	94.74	12722	123.01	16613	151.29	20514	179.56	24403
	7	7	70.61	9350	100.26	13425	129.91	17487	159.55	21560	189.19	25620
MC7-2	7	3	51.61	7192	74.96	10939	98.26	14679	121.67	18426	145.02	22166
	7	4	55.16	7576	79.70	11496	104.23	15406	128.75	19327	153.28	23240
	7	5	62.33	8742	89.22	12960	116.13	17176	143.03	21396	169.93	25610
	7	6	66.47	9062	94.74	13415	123.01	17764	151.29	22120	179.56	26467
	7	7	70.61	9592	100.26	14118	129.91	18638	159.55	23167	189.19	27685
MC7-3	7	3	51.61	8140	74.96	12552	98.26	16960	121.67	21376	145.02	25780
	7	4	55.16	8533	79.70	13119	104.23	17697	128.75	22287	153.28	26865
	7	5	62.33	9715	89.22	14601	116.13	19487	143.03	24377	169.93	29259
	7	6	66.47	10056	94.74	15092	123.01	20123	151.29	25161	179.56	30190
	7	7	70.61	10885	100.26	16093	129.91	21296	159.55	26506	189.19	31706
MC8-1	8	4	60.46	8722	87.63	12864	114.80	16990	141.96	21135	169.13	25266
	8	5	67.62	9923	97.15	14361	126.70	18798	156.24	23244	185.79	27686
	8	6	71.75	10266	102.67	14847	133.58	19422	164.50	24009	195.41	28590
	8	7	75.90	10815	108.18	15568	140.48	20314	172.76	25075	205.05	29826
	8	8	85.42	11522	120.86	16338	156.29	21243	191.72	26104	227.15	30954
MC8-2	8	4	63.91	8691	92.78	13169	121.63	17633	150.48	22107	179.33	26579
	8	5	71.13	9883	102.37	14654	133.61	19426	164.85	24200	196.10	28981
	8	6	75.27	10175	107.89	15033	140.50	19891	173.12	24753	205.73	29621
	8	7	79.41	10726	113.40	15756	147.39	20787	181.38	25819	215.36	30859
	8	8	88.99	11425	126.14	16560	163.29	21701	200.43	26834	237.58	31966

BARREL QUANTITIES FOR 44'-0" CLEAR WIDTH

	S	H	2 Span		3 Span		4 Span		5 Span		6 Span	
	ft	ft	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.	Conc	Reinf.
MC8-3	8	4	67.37	9936	97.91	15173	128.44	20396	158.97	25631	189.51	30863
	8	5	74.64	11159	107.57	16691	140.51	22222	173.45	27761	206.39	33300
	8	6	78.77	11476	113.09	17094	147.39	22713	181.71	28338	216.02	33965
	8	7	82.92	12263	118.60	18054	154.29	23844	189.97	29642	225.65	35440
	8	8	92.55	12638	131.42	18535	170.27	24440	209.13	30338	247.99	36230
MC9-1	9	5	76.80	10908	110.87	15986	144.95	21070	179.04	26157	213.12	31240
	9	6	80.93	11248	116.39	16461	151.84	21678	187.30	26901	222.74	32117
	9	7	85.08	11798	121.90	17182	158.73	22572	195.56	27966	231.68	33355
	9	8	94.66	12668	134.65	18251	174.63	23850	214.61	29450	254.60	35037
	9	9	99.39	13241	140.94	18995	182.50	24765	224.05	30536	265.60	36296
MC9-2	9	5	84.62	10675	122.48	15870	160.35	21062	198.22	26262	236.09	31460
	9	6	88.75	11375	128.00	16782	167.23	22186	206.48	27603	245.72	33012
	9	7	92.90	11935	133.51	17515	174.13	23090	214.74	28679	255.35	34261
	9	8	102.57	12657	146.38	18486	190.19	24331	233.99	30178	277.80	36009
	9	9	107.30	13229	152.68	19231	198.06	25248	243.43	31269	288.81	37278
MC9-3	9	5	88.53	11932	128.29	17918	168.06	23903	207.83	29895	247.59	35882
	9	6	92.66	12724	133.81	18994	174.94	25263	216.09	31541	257.23	37812
	9	7	96.81	13300	139.32	19740	181.84	26183	224.35	32630	266.86	39074
	9	8	106.53	14381	152.26	21100	197.98	27833	243.70	34568	289.41	41294
	9	9	111.26	14987	158.55	21877	205.85	28783	253.14	35689	300.42	42588
MC10-1	10	6	90.92	12378	131.32	18088	171.70	23790	212.09	29491	252.47	35386
	10	7	95.07	13116	136.83	19046	178.59	24968	220.35	30888	262.11	37004
	10	8	104.70	13630	149.64	19645	194.58	25680	239.50	31710	284.43	37929
	10	9	109.43	14499	155.93	20782	202.44	27083	248.94	33381	295.44	39871
	10	10	114.17	15653	162.23	22202	210.31	28770	258.37	35336	306.45	42099
MC10-2	10	6	99.53	13247	144.11	19691	188.68	26117	233.25	32550	277.82	39187
	10	7	103.67	13948	149.62	20563	195.57	27162	241.51	33765	287.46	40575
	10	8	113.40	14474	162.56	21177	211.72	20896	260.87	34603	310.02	41517
	10	9	118.13	15551	168.85	22508	219.58	29485	270.30	36447	321.03	43617
	10	10	122.87	16713	175.15	23916	227.45	31136	279.73	38344	332.03	45759
MC10-3	10	6	108.14	14143	156.91	21067	205.67	27980	254.44	34886	303.20	42017
	10	7	112.29	15092	162.42	22187	212.57	29271	262.70	36350	312.84	43652
	10	8	122.11	15590	175.50	22693	228.88	29893	282.25	37084	335.64	44489
	10	9	126.84	16580	181.79	23933	236.74	31306	291.69	38669	346.64	46247
	10	10	131.58	18038	188.09	25687	244.61	33352	301.12	41007	357.64	48868

GENERAL NOTES:

The necessary details for adapting normal MULTIPLE BOX CULVERT Standards, MC-5-1 through MC-10-3, to 45° Skew Culverts are shown on these sheets. Refer to the appropriate normal Standard for details, dimensions, sections, notes and bar diagrams not shown hereon.

Quantities shown hereon are for 44'-0" Clear Width between headwalls measured perpendicular to the center line. Quantities of reinforcing steel are approximate. Quantities P.L.F. Barrel shown on normal MC Standards may be converted to P.L.F. Clear Width by Multiplying by 1.4142.

The number of variable length bars required: Bars A = 2X, Bars B = 4Y, Bars B_1 = 2Y, and Bars B_2 = 2Z.

Size of Bars H: #4 for Spans = 5', #5 for Spans = 6'-8', #6 for Spans = 9'-10'.

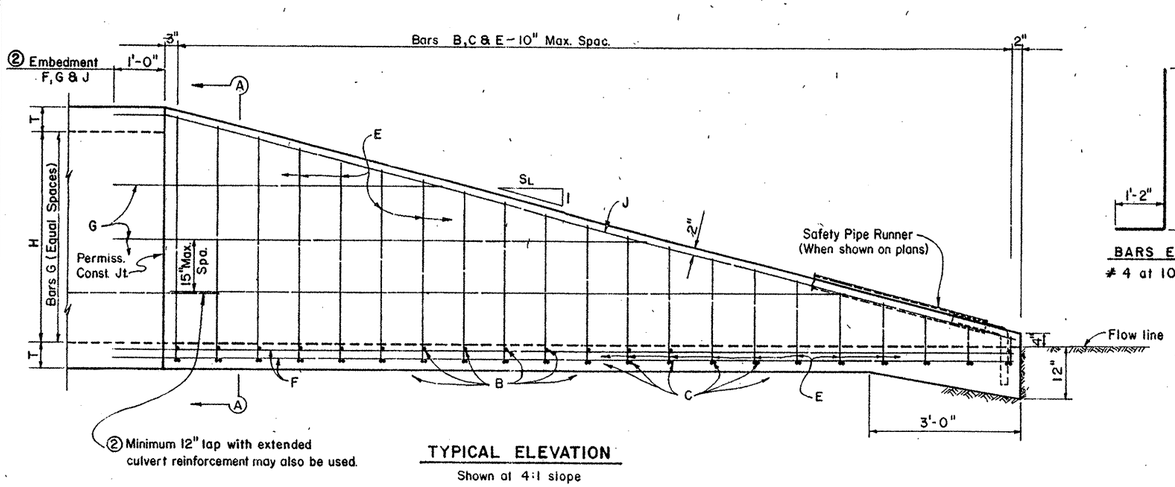
TEXAS HIGHWAY DEPARTMENT
BRIDGE DIVISION

MULTIPLE BOX CULVERT
45° SKEW

MC-45°

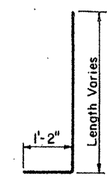
Sheet 2 of 2

ORIGINAL DRAWING DATE: MAY, 1964		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN: THD	REVISIONS	15	6		324
CK:		COUNTY		CONTROL / SECTION / JOB	HIGHWAY
DW:		BEXAR		7052 / 2 / 23	LP/LM
CK:					



TYPICAL ELEVATION

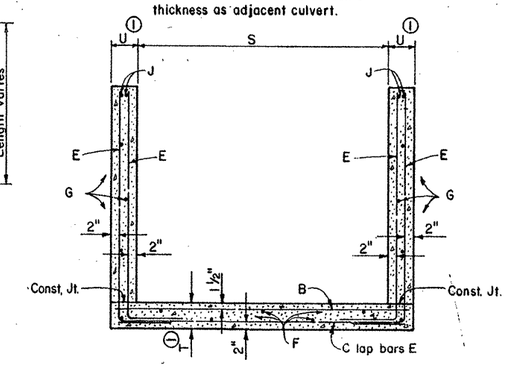
Shown at 4:1 slope



BARS E

4 at 10"

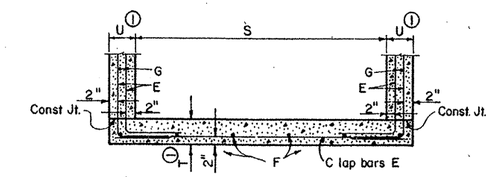
① Dimensions T and U to be a minimum of 6 inches thick, or may be same thickness as adjacent culvert.



SECTION A-A

SINGLE CULVERT

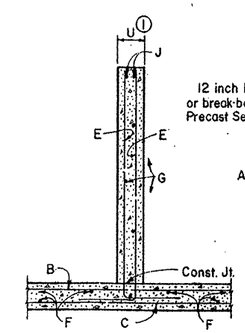
S > 4'



SECTION A-A

SINGLE CULVERT

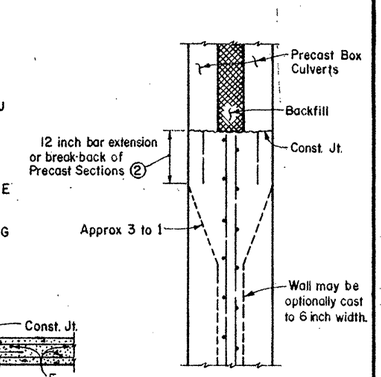
S ≤ 4'



SECTION A-A

INTERIOR WING

MULTIPLE CULVERTS



PLAN

INTERIOR WING EXTENSIONS

FOR MULTIPLE

BOX CULVERTS

QUANTITY CALCULATIONS ③

S = Clear Span of Each Barrel
H = Height of Barrels
N = Number of Barrels
SL = Side Slope Ratio
W = N(S) + .5(N+1)
L = (H+.167) SL

CONCRETE VOLUME $= \left[.5(W)(L) + .75(W) + .25(H+.833)(L)(N+1)\right] \frac{1}{27}$

STEEL QUANTITY CALCULATIONS

Bar	Unit Weight	Avg. Length (Ft.)	No. Bars
B ⊙	.668	(W-.25)	$\left(\frac{L}{.833}+.5\right)^{*}$
C	.668	(W-.25)	$\left(\frac{L}{.833}+.5\right)^{*}$
E	.668	$\left(\frac{H+3.5}{2}\right)$	$\left(\frac{L}{.833}+.5\right)^{*}(N+1)(2)$
F	.668	(L+.875)	((S+2)+(N-1)(S+1))
G	.668	$\left(\frac{SL}{2}(H+.667)+1.0\right)$	$\left(\frac{H}{2}+.5\right)^{*}(N+1)$
J	.668	$\left(L\left(\frac{\sqrt{SL^2+1}}{SL}\right)+.875\right)$	(N+1)(2)

③ Based on T & U = 6". Interior Wings with multiple precast box culverts are assumed at 6".

* Round up to next highest integer.

⊙ Omit B bars if S ≤ 4'.

EXAMPLE 1

SINGLE BARREL 4 x 3

6:1 SLOPE

Bar	No.	Size	Length	Weight	Weight Using Formula
Bars B will be omitted for S ≤ 4'					
C	24	#4	4'-9"	76	76
E	96	#4	3'-3" avg.	208	208
F	6	#4	19'-10"	79	80
G	4	#4	12'-0" avg.	32	32
J	4	#4	20'-2"	54	54
Reinforcing Steel Lbs.				449	450
Con. (Calculated)				C.Y.	3.25
Con. (Using Formula)				C.Y.	3.25

EXAMPLE 2

DOUBLE BARREL 5 x 4

4:1 SLOPE

Bar	No.	Size	Length	Weight	Weight Using Formula
B	21	#4	11'-3"	158	158
C	21	#4	11'-3"	158	158
E	126	#4	3'-9" avg.	316	316
F	13	#4	17'-6"	152	152
G	9	#4	10'-3" avg.	62	62
J	6	#4	18'-1"	72	72
Reinforcing Steel Lbs.				918	918
Conc. (Calculated)				C.Y.	6.11
Conc. (Using Formula)				C.Y.	6.11

GENERAL NOTES:

The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

Quantities are for one complete end, either single or multiple box, and are included in the price bid for each Safety End Treatment.

Additional Riprap as indicated elsewhere in the plans will also be included in the price bid for Safety End Treatment.

INCLUDE THIS SHEET IN PLANS ONLY WHEN SINGLE OR MULTIPLE BOX CULVERTS REQUIRE TREATMENT.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

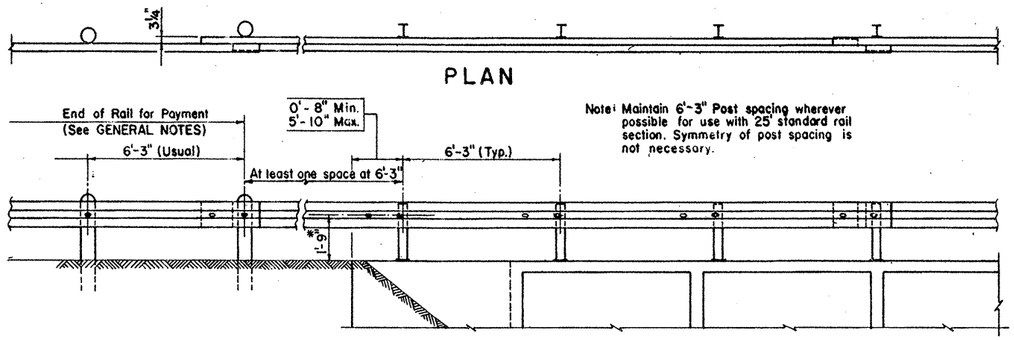
STRAIGHT WING WALLS

FOR SINGLE OR MULTIPLE

BOX CULVERT SAFETY END TREATMENT

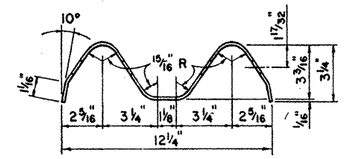
SWW

ORIGINAL DRAWING DATE: JUNE 1985		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT ⊕	SHEET
DN.: JJP	REVISIONS	12	6		325
CK.: MPM	Rev. 1-86 (Added plan Int. Wall Ext.)	COUNTY		CONTROL / SECTION / JOB	Revision Date
DW.: EDS		BEXAR		1051 2 23	1/1/64
CK.: MPM					



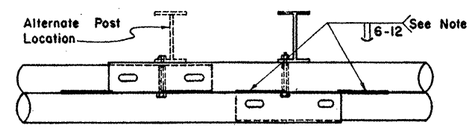
PLAN

INSIDE ELEVATION OF RAIL

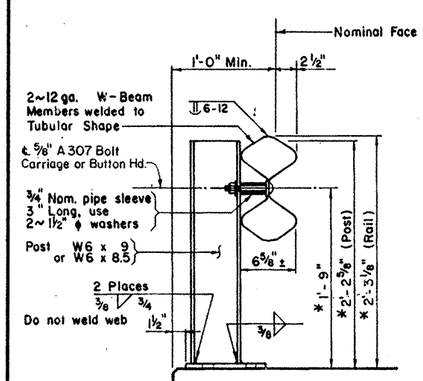


W-BEAM MEMBER

Member shall be 12 gauge steel ~ Nom. thickness = .1046" exclusive of protective coating.

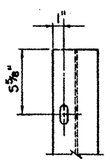


PLAN

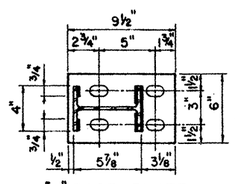


ELEV. OF POST

* Increase 2" for structures with overlay.

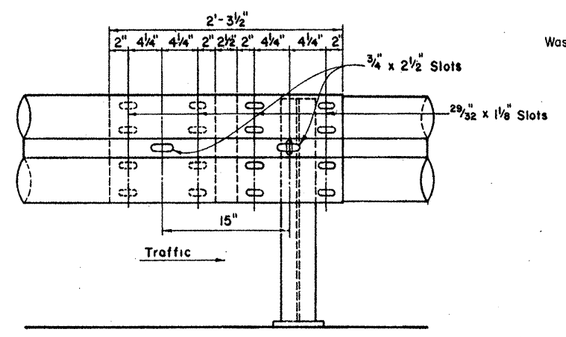


3/4" x 1 1/2" Slotted Hole in Post



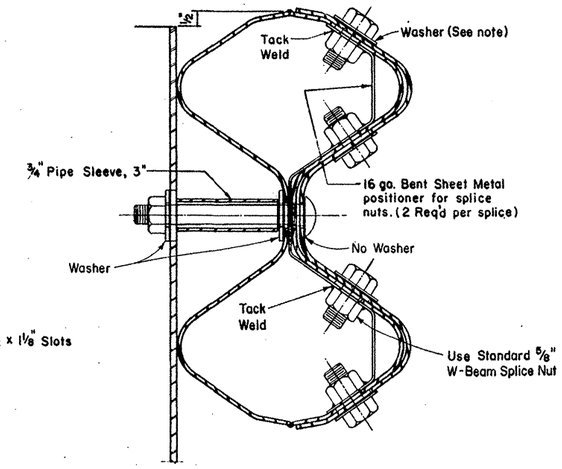
5/8" BASE PLATE

1" x 1 1/2" Slotted Holes



TUBULAR W-BEAM RAIL DETAILS

Note: Tubular W-Beam Rail Member is to be fabricated from standard 25' Nominal W-Beam sections. Additional post mounting slots are to be made in each member 15" from the standard slots at 6'-3" centers. Top and bottom seams shall be butt welded 6" at 12" spacing. Continuous seam welding is also acceptable. Welds shall be chipped and cleaned and the complete 25 ft. tubular member shall be galvanized after fabrication.



SPLICE DETAIL

NOTE: 8~5/8" Splice nuts shall be tacked to a bent sheet metal positioner as shown. Other suitable positioning methods or devices may be substituted. The completed splice shall have 16 bolts. Each bolt will include a 1 3/4" x 3" x 3/16" plate washer or a 1 3/4 inch diameter washer.

GENERAL NOTES:

This rail has been successfully evaluated by full scale impact tests conducted in accordance with NCHRP Report 153. Test documentation may be found in Research Report 230-1, "Tubular W-Beam Bridge Rail," of Research Study 2-5-78-230 "Bridge Rail to contain Heavy Trucks and Buses," Texas Transportation Institute, October 1978.

Tubular Rail Member shall be extended and connected to at least the first soil embedded post at each end of the structure. More such posts shall be used to utilize 25 ft. standard sections. Approach guard fence posts shall be spaced at 6'-3" adjacent to the Tubular Rail since its flexibility is similar to standard metal beam guard fence. Do not install additionall posts at 3'-1 1/2" centers. Payment for this rail shall be in increments of 25 feet.

Rail posts may be vertical or perpendicular to adjacent roadway grade and cross slope. Grout may be used under base plates if necessary.

All bolts, nuts, washers, and bottom plates are considered as parts of the rail for payment.

All steel components except reinforcing shall be galvanized unless otherwise shown in plans.

Rail shall be extended across all fixed armor joints, slab span joints, or pan form joints with no change in post spacing or continuity. At expansion armor joints of 1 1/4" or less, the splice bolts nearest the joint and post mounting bolts at intervening posts shall be snugly tightened to allow for rail expansion. At expansion armor joints over 1 1/4", suitably longer splice holes shall be provided.

Anchor bolts shall be 7/8" Dia. A307 (or A36 threaded rods with tack welded nuts) with hex nuts and washers as shown. Threaded rods may be 0.781 min. dia. with rolled threads. Nuts shall conform to A307 requirements and shall be tapped or chased after galvanizing. Bolts and nuts shall have Class 2A and 2B fit tolerances.

Shop drawings to be submitted to the Bridge Engineer for approval are required only for the proposed rail splices at armor expansion joints greater than 1 1/4" and for rails on horizontal curves in which case the tubular rail member shall be fabricated to the required radius if the radius is 600 feet or less. For rails not requiring shop drawings, erection drawings showing splice locations, post spacing, and anchor bolt locations shall be submitted to the Resident Engineer for approval. Shop or Erection Drawings may be 11" by 18" or larger.

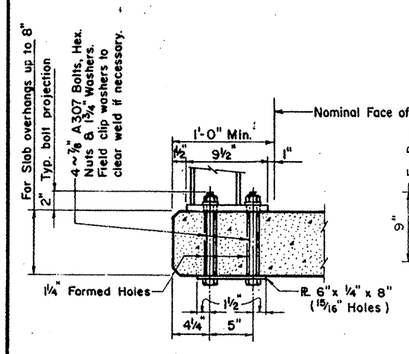
Weight of railing (6'-3" post spacing and no overlay) is 21.7 plf.

This rail is intended to be used only for curbless structures.

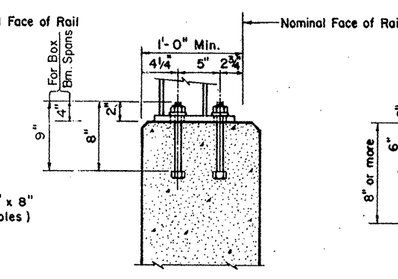
Fully anchored guard fence must be attached to both ends of the rail.

Tests have shown that although this rail deflects horizontaly two or three feet, adequate vehicle containment and re-direction is achieved. The resulting more gradual deceleration thus produces a safer condition than afforded by other bridge railings.

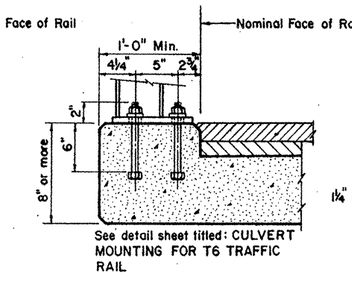
This railing is especially suitable for use on bridge width box culverts. The detail sheet titled: CULVERT MOUNTING FOR T6 TRAFFIC RAIL is then required to show headwall and wingwall modifications and additional reinforcing steel to be included as part of the railing for payment.



BASIC CONDITION

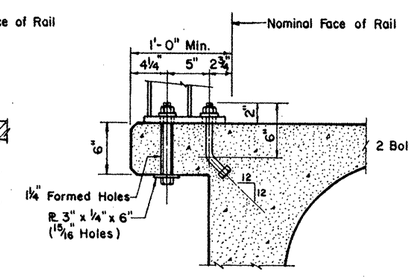


FOR ABUT. WINGWALLS

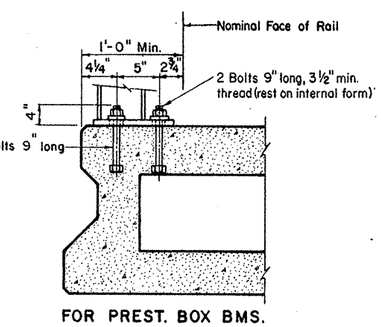


See detail sheet titled: CULVERT MOUNTING FOR T6 TRAFFIC RAIL

FOR CULVERTS OR SLABS 8" THICK OR MORE



FOR CG-O 42 & 48 PAN FORM UNITS



FOR PREST. BOX BMS.

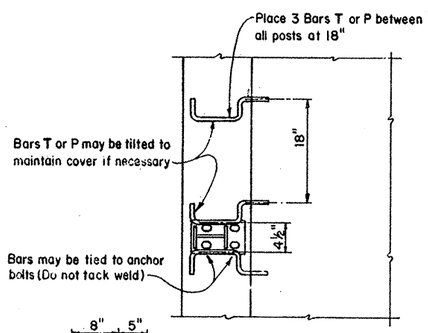
POST MOUNTING DETAILS

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

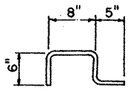
TRAFFIC RAIL TYPE T6

PREPARED BY AND FOR THE USE OF TEXAS SDHPT

ORIGINAL DRAWING DATE: DEC. 1980		STATE DISTRICT	FEDERAL REGION	FEDERAL/AID PROJECT #	SHEET
DN.:-JJP	REVISIONS	16	6		32A
CK.:-RLR	Rev. 12-81 Rev. 10-85 (Anchor Bolts on Box Bms.)	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DW.:-AS	Rev. 2-84 Rev. 5-87 (Carriage Bolts)	BEXAR	245	2	23	1
CK.:-JJP	Rev. 6-84					

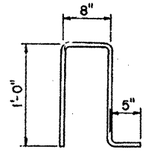


PLAN



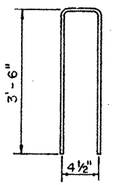
BARS T #5

"D" = 2" to 9"
2 at 4½" c.c. at each post
3 at 18" c.c. between all posts

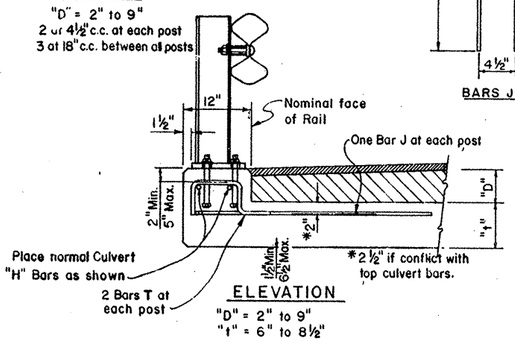


BARS P #5

"D" = 9½" to 1'-3"
2 at 4½" c.c. at each post
3 at 18"± between all posts



BARS J #5

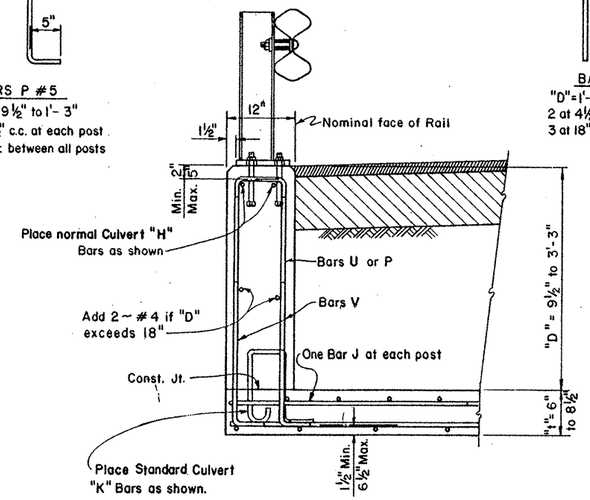


ELEVATION

"D" = 2" to 9"
"t" = 6" to 8½"

DIRECT TRAFFIC TO 9" FILL

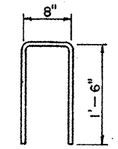
Standard Culvert "K" Bars may be tilted as necessary to maintain cover.



ELEVATION

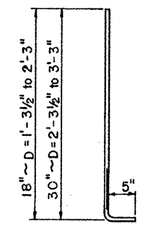
CULVERT FILL 9½" to 3'-3"

NOTE: Place bars T, P, or U as high as possible within the ranges shown.



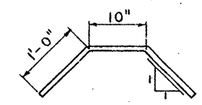
BARS U #5

"D" = 1'-3½" to 3'-3"
2 at 4½" c.c. at each post
3 at 18"± between all posts

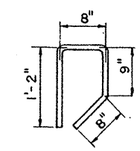


BARS V #5

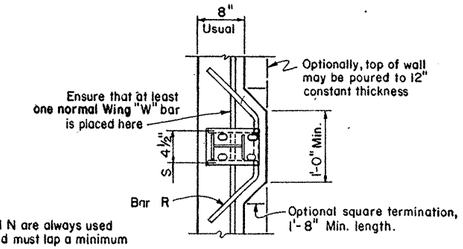
2 pairs at 4½" c.c. at each post
3 pairs at 18"± between all posts



BARS R #5

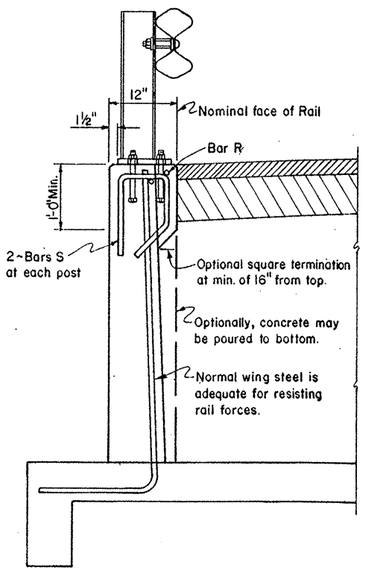


BARS S #5



NOTE: Bars U and N are always used together and must lap a minimum of 9".

PLAN



CULVERT WINGWALLS

See detail sheet titled: TRAFFIC RAIL TYPE T6 for railing, post, and anchor bolt details. These culvert mounting details are not suitable for mounting other rail types such as T101.

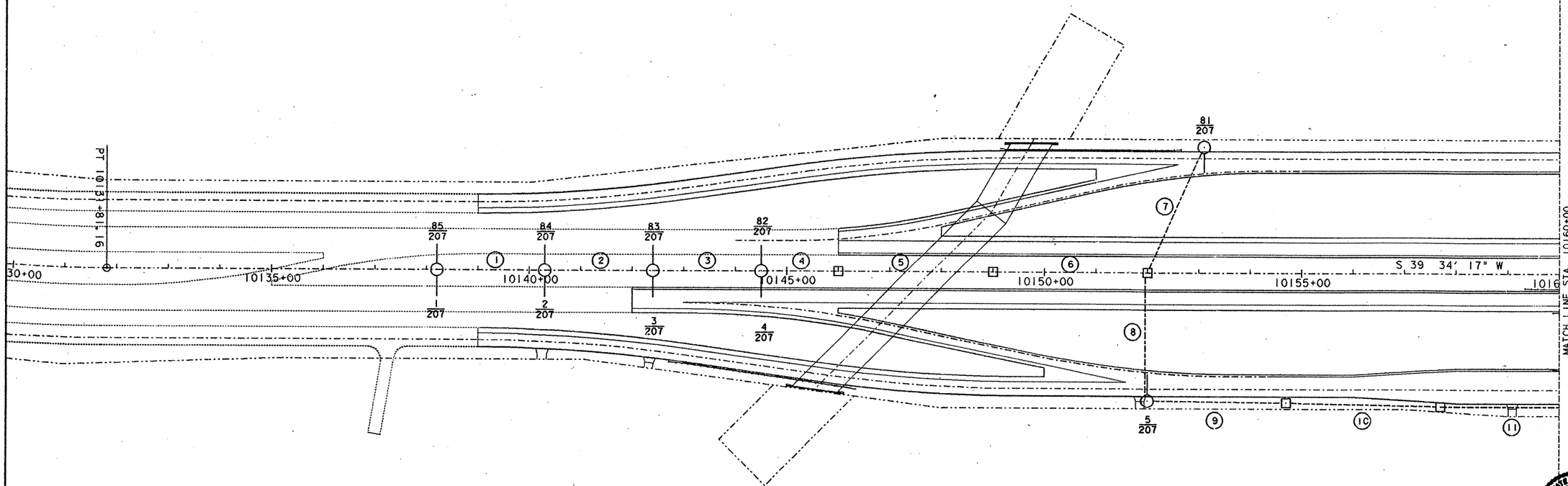
STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

CULVERT MOUNTING FOR T6 TRAFFIC RAIL

ORIGINAL DRAWING DATE: DEC. 1960		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.:-JJP	REVISIONS	15	6		25B
CK.:-	Rev. 5-84	COUNTY		CONTROL / SECTION / JOB	HIGHWAY
DW.:-EDS		BEXAR		7 / 52 / 23	4 of 4
CK.:-JJP					

ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
RDWY ILLUM ASSEM (TY SA40T-8-8) (.25KW) S	EA	4
RDWY ILLUM ASSEM (TY SA40T-8) (.25KW) S	EA	2
RDWY ILLUM ASSEM FND (TY A)	EA	6
CONDT (SCH 40 PVC) (1¼")	LF	1974
CONDT (SCH 80 PVC) (1¼")	LF	230
CONDT (SCH 80 PVC) (2")	LF	528
ELECT CONDR (NO. 8) (BARE)	LF	2765
ELECT CONDR (NO. 8) (TY XHHW)	LF	5530
GROUND BOX (TY A) (RPM) (122311) APRON	EA	5



LEGEND

- RDWY ILLUM ASSEM (TY SA 40T-8-8) (.25 KW) S
- RDWY ILLUM ASSEM (TY SA 40T-8) (.25 KW) S
- RDWY ILLUM ASSEM (TY SA 50T-8) (.4 KW) S
- RDWY ILLUM ASSEM U/P (SPL-CO) (.15 KW) S (TY 1)
- PVC & CONDR (TRENCHED)
- PVC & CONDR (BORED)
- (12) CONDUIT RUN NUMBER
- GROUND BOX
- SERVICE POLE (TY S)
- 2/207 LIGHT NUMBER / RELAY NUMBER

RUN	GROUND LENGTH (FT)		CONDUCTOR NO. & LENGTH (FT)		CONDUIT (FT)		
	#8 BARE		#8 XHHW		1¼" PVC SCH 40	1¼" PVC SCH 80	2" PVC SCH 80
1	1-216		2-216		216		
2	1-216		2-216		216		
3	1-216		2-216		216		
4	1-156		2-156		153		
5	1-306		2-306		300		
6	1-306		2-306		300		
7	1-283		2-283				280
8	1-251		2-251				248
9	1-276		2-276		273		
10	1-306		2-306		300		
11	1-233		2-233			230	

RDWY ILLUMINATION ASSEMBLY SUMMARY			
POLE	STA	TYPE	REMARKS
1/85	138+20	(TY SA40T-8-8) (.25 KW) S	
2/84	140+30	(TY SA40T-8-8) (.25 KW) S	
3/83	142+40	(TY SA40T-8-8) (.25 KW) S	
4/82	144+50	(TY SA40T-8-8) (.25 KW) S	
81	153+10	(TY SA40T-8) (.25 KW) S	245' LT
5	152+00	(TY SA40T-8) (.25 KW) S	245' RT

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

ILLUMINATION LAYOUT

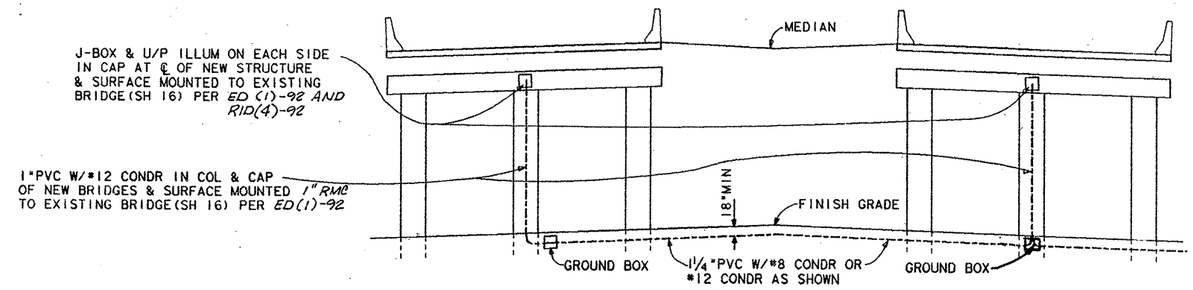
SHEET 1 OF 7

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			326
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023 ETC	LP16C

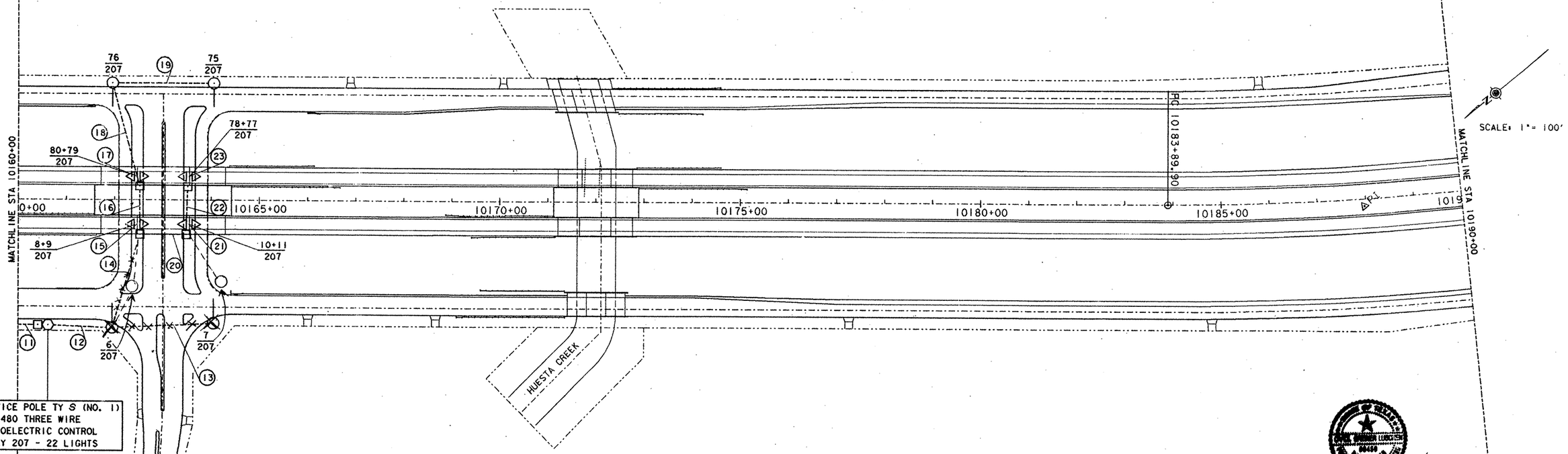
151p2b1604111.dgn

ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
RDWY ILLUM ASSEM (TY SA40T-8)(.25KW)S	EA	4
RDWY ILLUM ASSEM (U/P TY-1)(.15 KW)S(SPL CO)	EA	8
RDWY ILLUM ASSEM FND (TY A)	EA	4
CONDT (SCH 40 PVC)(1¼")	LF	566
CONDT (SCH 80 PVC)(1¼")	LF	846
CONDT (SCH 40 PVC)(1")	LF	80
ELECT CONDR (NO. 8)(BARE)	LF	1210
ELECT CONDR (NO. 12)(BARE)	LF	336
ELECT CONDR (NO. 8)(TY XHHW)	LF	2420
ELECT CONDR(NO. 12)(TY XHHW)	LF	672
GROUND BOX (TY A)(RPM) (122311) APRON	EA	5
SERV POLE (TY S)	EA	1



SERVICE LEAD DETAIL
ILLUM. ASSEM. (U/P TY 1)(.15 KW)S(SPL CO)
AT BRIDGE INTERSECTIONS



SERVICE POLE TY S (NO. 1)
240/480 THREE WIRE
PHOTOELECTRIC CONTROL
RELAY 207 - 22 LIGHTS

RELAY 207
14 @ .75 AMPS
8 @ .45 AMPS
14.10 AMPS
25.3695 IR DROP

LEGEND

- RDWY ILLUM ASSEM (TY SA 40T-8-8)(.25 KW)S
- RDWY ILLUM ASSEM (TY SA 40T-8)(.25 KW)S
- RDWY ILLUM ASSEM (TY SA 50T-8)(.4 KW)S
- RDWY ILLUM ASSEM U/P (SPL-CO)(.15 KW)S (TY 1)
- PVC & CONDR (TRENCHED)
- PVC & CONDR (BORED)
- (12) CONDUIT RUN NUMBER
- GROUND BOX
- SERVICE POLE (TY S)
- 2/207 LIGHT NUMBER / RELAY NUMBER

RUN	GROUND LENGTH (FT) #8 BARE	GROUND LENGTH (FT) #12 BARE	CONDUCTOR NO. & LENGTH (FT) #8 XHHW	CONDUCTOR NO. & LENGTH (FT) #12 XHHW	CONDUIT (FT) 1¼" PVC SCH 40	CONDUIT (FT) 1¼" PVC SCH 80	CONDUIT (FT) 1" PVC SCH 40
11	1-83		2-83			80	
12	1-133		2-133		130		
13	1-216		2-216			~~216~~	
14	1-233		2-233			230	
*15		1-26		2-26			20
16	1-116		2-116		110		
*17		1-26		2-26			20
18	1-213		2-213			210	
19	1-216		2-216		216		
20		1-116		2-116		110	
*21		1-26		2-26			20
22		1-116		2-116	110		
*23		1-26		2-26			20

* VERTICAL RUN IN COLUMN

RDWY ILLUMINATION ASSEMBLY SUMMARY			
POLE	STA	TYPE	REMARKS
6	161+95	(TY SA40T-8)(.25 KW)S	265'RT
7	164+05	(TY SA40T-8)(.25 KW)S	255'RT
8 & 9	162+46	(U/P TY-1)(.15 KW)S(SPL CO)	50'RT
10 & 11	163+54	(U/P TY-1)(.15 KW)S(SPL CO)	50'RT
75	164+05	(TY SA40T-8)(.25 KW)S	245'LT
76	161+95	(TY SA40T-8)(.25 KW)S	245'LT
77 & 78	163+54	(U/P TY-1)(.15 KW)S(SPL CO)	50'LT
79 & 80	162+46	(U/P TY-1)(.15 KW)S(SPL CO)	50'LT

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

ILLUMINATION LAYOUT

SHEET 2 OF 7

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		329

STATE	DIST.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023 ETC	LP1604

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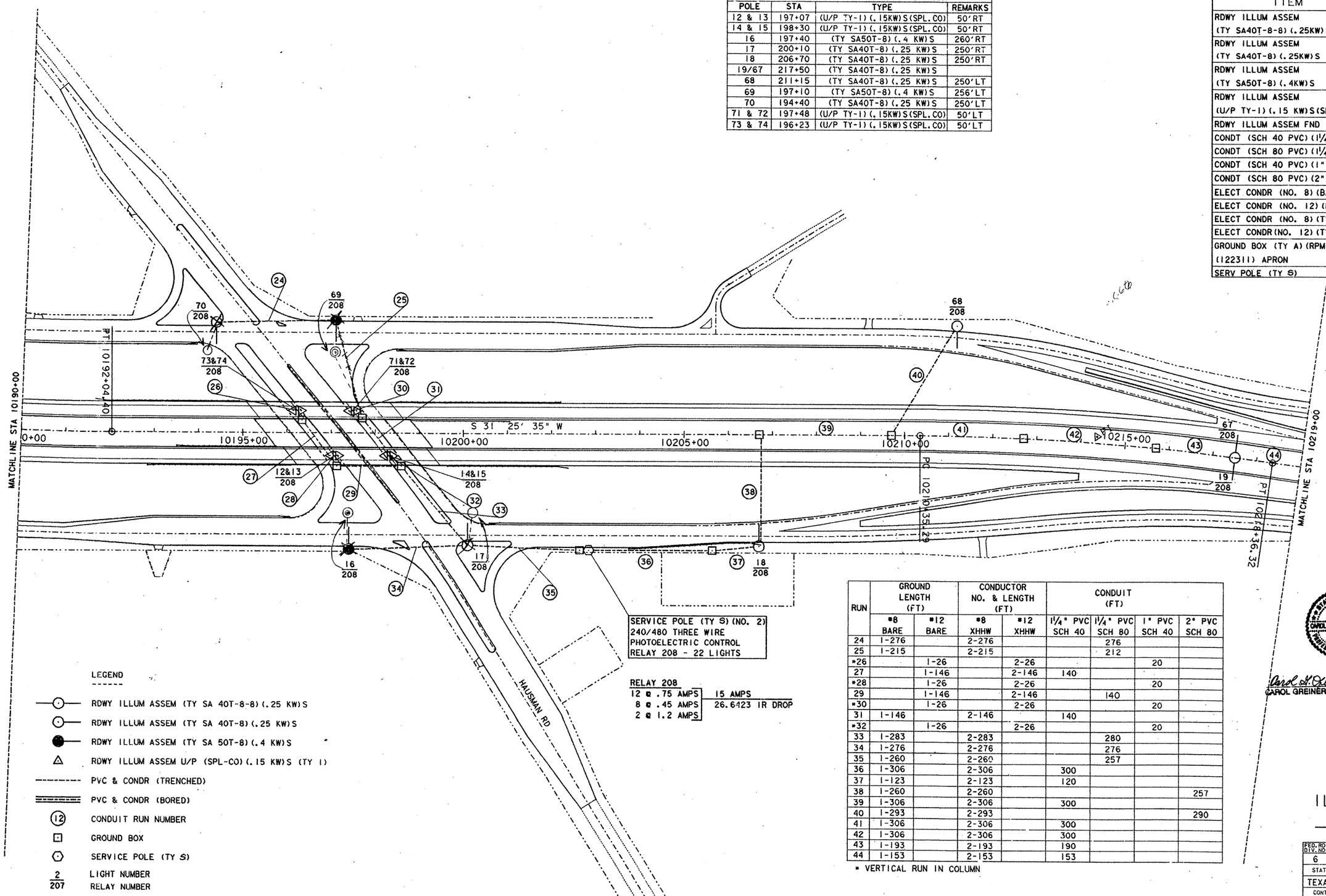
RDWY ILLUMINATION ASSEMBLY SUMMARY			
POLE	STA	TYPE	REMARKS
12 & 13	197+07	(U/P TY-1) (.15KW)S(SPL.CO)	50'RT
14 & 15	198+30	(U/P TY-1) (.15KW)S(SPL.CO)	50'RT
16	197+40	(TY SA50T-8) (.4 KW)S	260'RT
17	200+10	(TY SA40T-8) (.25 KW)S	250'RT
18	206+70	(TY SA40T-8) (.25 KW)S	250'RT
19/67	217+50	(TY SA40T-8) (.25 KW)S	
68	211+15	(TY SA40T-8) (.25 KW)S	250'LT
69	197+10	(TY SA50T-8) (.4 KW)S	256'LT
70	194+40	(TY SA40T-8) (.25 KW)S	250'LT
71 & 72	197+48	(U/P TY-1) (.15KW)S(SPL.CO)	50'LT
73 & 74	196+23	(U/P TY-1) (.15KW)S(SPL.CO)	50'LT

ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
RDWY ILLUM ASSEM (TY SA40T-8-8) (.25KW)S	EA	1
RDWY ILLUM ASSEM (TY SA40T-8) (.25KW)S	EA	4
RDWY ILLUM ASSEM (TY SA50T-8) (.4KW)S	EA	2
RDWY ILLUM ASSEM (U/P TY-1) (.15 KW)S(SPL. CO)	EA	8
RDWY ILLUM ASSEM FND (TY A)	EA	7
CONDT (SCH 40 PVC) (1¼")	LF	1943
CONDT (SCH 80 PVC) (1¼")	LF	1441
CONDT (SCH 40 PVC) (1")	LF	80
CONDT (SCH 80 PVC) (2")	LF	547
ELECT CONDR (NO. 8) (BARE)	LF	3702
ELECT CONDR (NO. 12) (BARE)	LF	396
ELECT CONDR (NO. 8) (TY XHHW)	LF	7404
ELECT CONDR (NO. 12) (TY XHHW)	LF	792
GROUND BOX (TY A) (RPM) (122311) APRON	EA	10
SERV POLE (TY S)	EA	1



RUN	GROUND LENGTH (FT) #8 BARE	GROUND LENGTH (FT) #12 BARE	CONDUCTOR NO. & LENGTH (FT) #8 XHHW	CONDUCTOR NO. & LENGTH (FT) #12 XHHW	CONDUIT (FT) 1¼" PVC SCH 40	CONDUIT (FT) 1¼" PVC SCH 80	CONDUIT (FT) 1" PVC SCH 40	CONDUIT (FT) 2" PVC SCH 80
24	1-276		2-276			276		
25	1-215		2-215			212		
*26		1-26		2-26			20	
27		1-146		2-146	140			
*28		1-26		2-26			20	
29		1-146		2-146		140		
*30		1-26		2-26			20	
31	1-146		2-146		140			
*32		1-26		2-26			20	
33	1-283		2-283			280		
34	1-276		2-276			276		
35	1-260		2-260			257		
36	1-306		2-306		300			
37	1-123		2-123		120			
38	1-260		2-260					257
39	1-306		2-306		300			
40	1-293		2-293					290
41	1-306		2-306		300			
42	1-306		2-306		300			
43	1-193		2-193		190			
44	1-153		2-153		153			

* VERTICAL RUN IN COLUMN

STATE OF TEXAS
CAROL GREINER LUSCHEN
69459
REGISTERED PROFESSIONAL ENGINEER

Carol G. Luschen 1-31-92
CAROL GREINER LUSCHEN DATE

ILLUMINATION LAYOUT

SHEET 3 OF 7

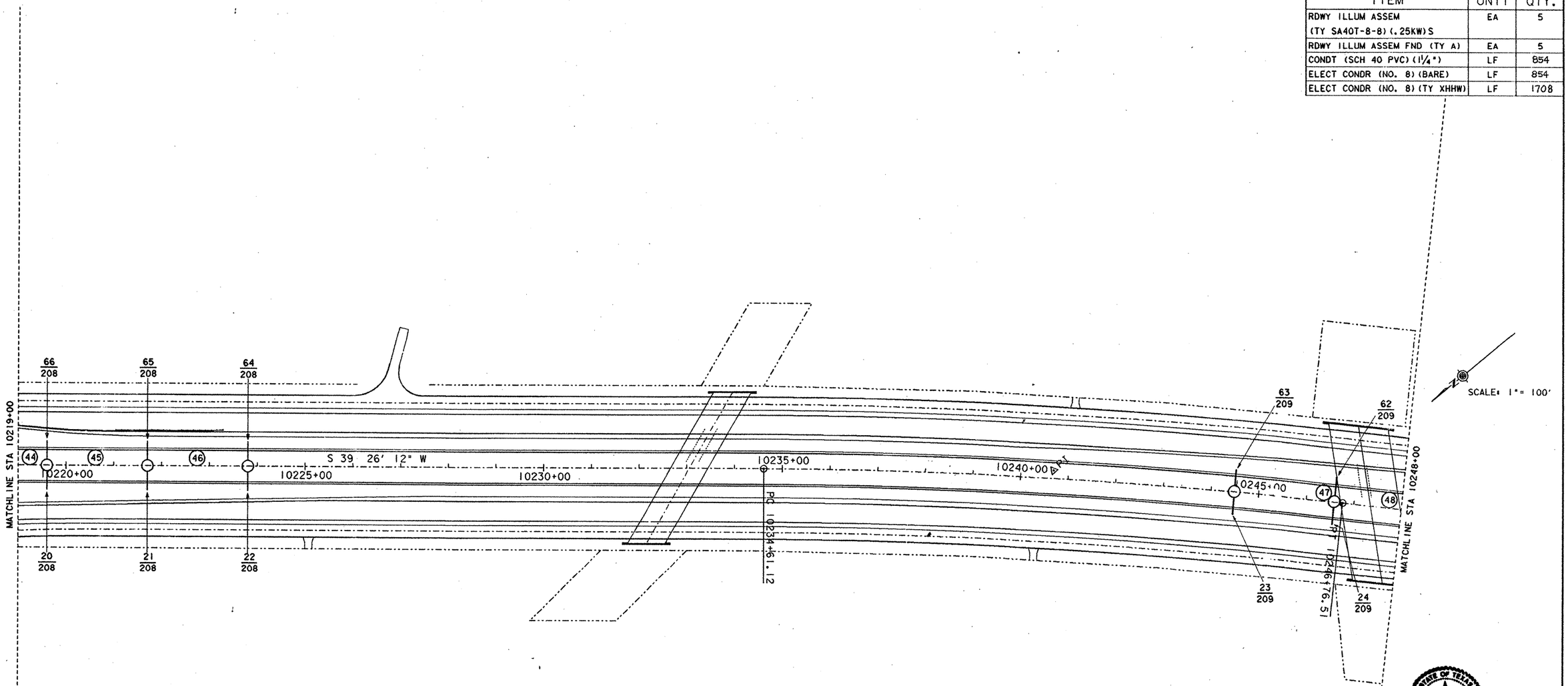
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		328

STATE	DIST.	COUNTY
TEXAS	15	BEXAR

CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, Etc	LP1604

151p2b# 1604113. dgn

ESTIMATED QUANTITIES		
ITEM	UNIT	QTY.
RDWY ILLUM ASSEM (TY SA40T-8-8)(.25KW)S	EA	5
RDWY ILLUM ASSEM FND (TY A)	EA	5
CONDT (SCH 40 PVC)(1¼")	LF	854
ELECT CONDR (NO. 8)(BARE)	LF	854
ELECT CONDR (NO. 8)(TY XHHW)	LF	1708



LEGEND

- RDWY ILLUM ASSEM (TY SA 40T-8-8)(.25 KW)S
- RDWY ILLUM ASSEM (TY SA 40T-8)(.25 KW)S
- RDWY ILLUM ASSEM (TY SA 50T-8)(.4 KW)S
- RDWY ILLUM ASSEM U/P (SPL-CO)(.15 KW)S (TY 1)
- PVC & CONDR (TRENCHED)
- PVC & CONDR (BORED)
- (12) CONDUIT RUN NUMBER
- GROUND BOX
- SERVICE POLE (TY S)
- 2/207 LIGHT NUMBER / RELAY NUMBER

RUN	GROUND LENGTH (FT)		CONDUCTOR NO. & LENGTH (FT)		CONDUIT (FT)		
	#8 BARE		#8 XHHW		1¼" PVC SCH 40		
44	1-63		2-63		63		
45	1-216		2-216		216		
46	1-216		2-216		216		
RELAY 208							
RELAY 209							
47	1-216		2-216		216		
48	1-143		2-143		143		

RDWY ILLUMINATION ASSEMBLY SUMMARY			
POLE	STA	TYPE	REMARKS
20/66	219+60	(TY SA40T-8-8)(.25 KW)S	
21/65	221+70	(TY SA40T-8-8)(.25 KW)S	
22 / 64	223+80	(TY SA40T-8-8)(.25 KW)S	
23/63	244+50	(TY SA40T-8-8)(.25 KW)S	
24/62	246+60	(TY SA40T-8-8)(.25 KW)S	

STATE OF TEXAS
CAROL GREINER LUSCHEN
66456
REGISTERED PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

ILLUMINATION LAYOUT

SHEET 4 OF 7

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			329
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023 ETC	LP1604

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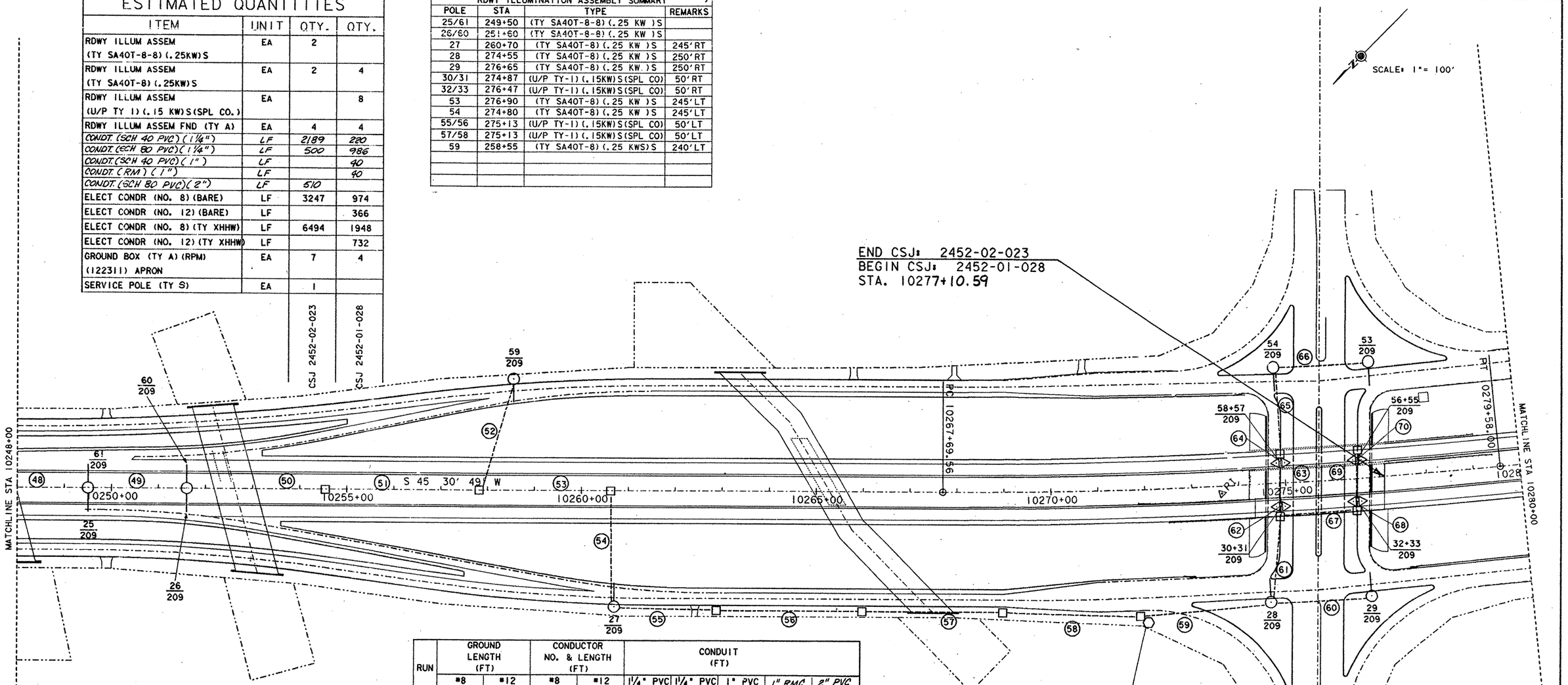
ESTIMATED QUANTITIES

ITEM	UNIT	QTY. CSJ 2452-02-023	QTY. CSJ 2452-01-028
RDWY ILLUM ASSEM (TY SA40T-8-8) (.25KW)S	EA	2	
RDWY ILLUM ASSEM (TY SA40T-8) (.25KW)S	EA	2	4
RDWY ILLUM ASSEM (U/P TY 1) (.15 KW)S(SPL CO.)	EA		8
RDWY ILLUM ASSEM FND (TY A)	EA	4	4
CONDT. (SCH 40 PVC) (1 1/4")	LF	2189	220
CONDT. (SCH 80 PVC) (1 1/4")	LF	500	986
CONDT. (SCH 40 PVC) (1")	LF		40
CONDT. (RM) (1")	LF		40
CONDT. (SCH 80 PVC) (2")	LF	510	
ELECT CONDR (NO. 8) (BARE)	LF	3247	974
ELECT CONDR (NO. 12) (BARE)	LF		366
ELECT CONDR (NO. 8) (TY XHHW)	LF	6494	1948
ELECT CONDR (NO. 12) (TY XHHW)	LF		732
GROUND BOX (TY A) (RPM) (122311) APRON	EA	7	4
SERVICE POLE (TY S)	EA	1	

RDWY ILLUMINATION ASSEMBLY SUMMARY

POLE	STA	TYPE	REMARKS
25/61	249+50	(TY SA40T-8-8) (.25 KW)S	
26/60	251+60	(TY SA40T-8-8) (.25 KW)S	
27	260+70	(TY SA40T-8) (.25 KW)S	245'RT
28	274+55	(TY SA40T-8) (.25 KW)S	250'RT
29	276+65	(TY SA40T-8) (.25 KW)S	250'RT
30/31	274+87	(U/P TY-1) (.15KW)S(SPL CO)	50'RT
32/33	276+47	(U/P TY-1) (.15KW)S(SPL CO)	50'RT
53	276+90	(TY SA40T-8) (.25 KW)S	245'LT
54	274+80	(TY SA40T-8) (.25 KW)S	245'LT
55/56	275+13	(U/P TY-1) (.15KW)S(SPL CO)	50'LT
57/58	275+13	(U/P TY-1) (.15KW)S(SPL CO)	50'LT
59	258+55	(TY SA40T-8) (.25 KWS)S	240'LT



RELAY 209
14 @ .75 AMPS — 14.10 AMPS
8 @ .45 AMPS — 30.7072 AMPS IR DROP

CSJ: 2452-02-023
CSJ: 2452-01-028

RUN	GROUND LENGTH (FT) #8 BARE	GROUND LENGTH (FT) #12 BARE	CONDUCTOR NO. & LENGTH (FT) #8 XHHW	CONDUCTOR NO. & LENGTH (FT) #12 XHHW	CONDUIT (FT) 1 1/4" PVC SCH 40	CONDUIT (FT) 1 1/4" PVC SCH 80	CONDUIT (FT) 1" PVC SCH 40	CONDUIT (FT) 1" RMC	CONDUIT (FT) 2" PVC SCH 80
48	1-153		2-153		153				
49	1-216		2-216		216				
50	1-323		2-323		320				
51	1-306		2-306		300				
52	1-263		2-263						260
53	1-306		2-306		300				
54	1-253		2-253						250
55	1-203		2-203			200			
56	1-306		2-306		300				
57	1-306		2-306		300				
58	1-306		2-306		300				
59	1-306		2-306			300			
60	1-216		2-216			216			
61	1-213		2-213			210			
*62		1-26		2-26			20		
63	1-116		2-116		110				
*64		1-26		2-26				20	
65	1-213		2-213			210			
66	1-216		2-216			210			
67		1-146		2-146		140			
*68		1-26		2-26			20		
69		1-116		2-116		110			
*70		1-26		2-26				20	

* VERTICAL RUN IN COLUMN

LEGEND

- RDWY ILLUM ASSEM (TY SA 40T-8-8) (.25 KW)S
- RDWY ILLUM ASSEM (TY SA 40T-8) (.25 KW)S
- RDWY ILLUM ASSEM (TY SA 50T-8) (.4 KW)S
- RDWY ILLUM ASSEM U/P (SPL-CO) (.15 KW)S (TY 1)
- PVC & CONDR (TRENCHED)
- PVC & CONDR (BORED)
- (12) CONDUIT RUN NUMBER
- GROUND BOX
- SERVICE POLE (TY S)
- 2/207 LIGHT NUMBER / RELAY NUMBER

STATE OF TEXAS — CAROL GREINER LUSCHEN — 66459 — REGISTERED PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN — DATE

ILLUMINATION LAYOUT

SHEET 5 OF 7

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			330
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023 ETC	LP1604

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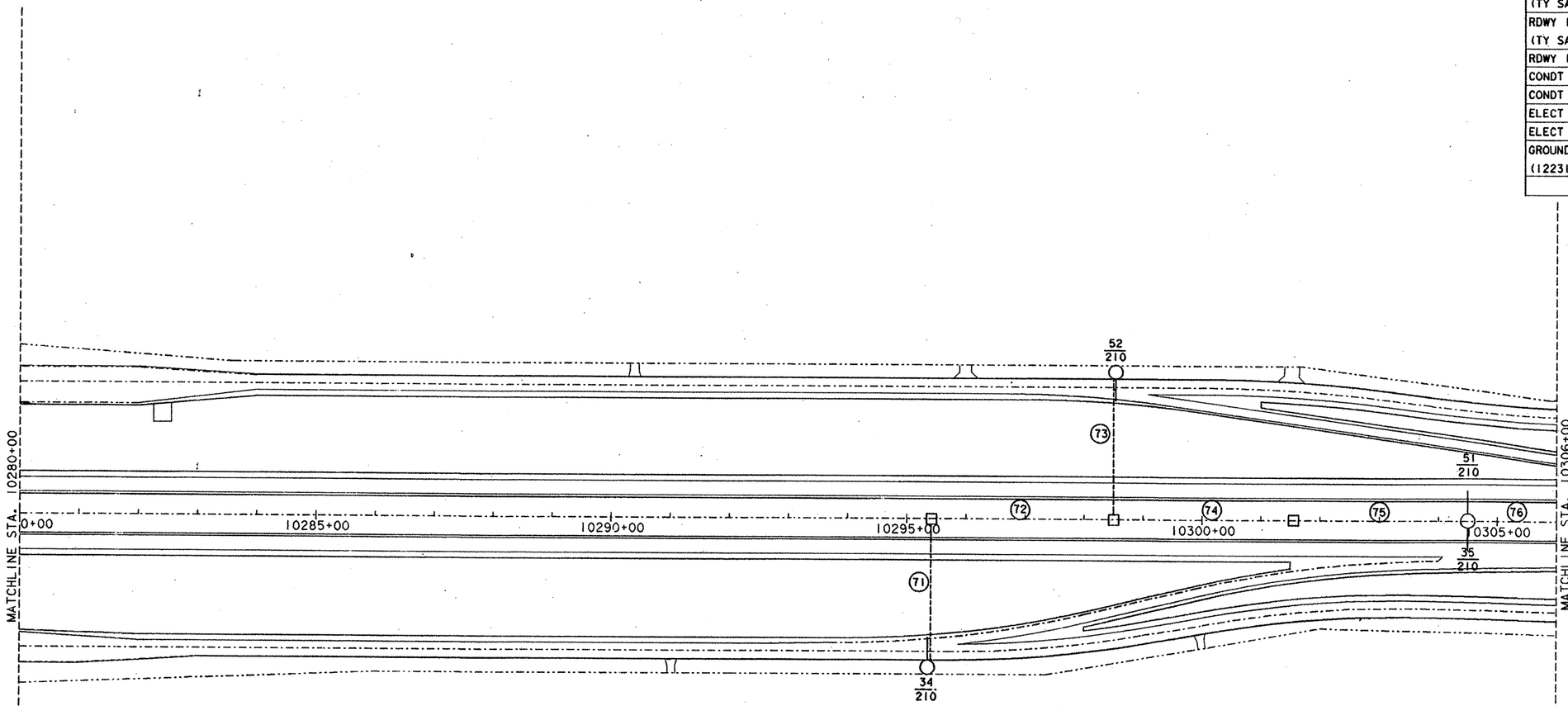
ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
RDWY ILLUM ASSEM (TY SA40T-8-8) (.25KW)S	EA	1
RDWY ILLUM ASSEM (TY SA40T-8) (.25KW)S	EA	2
RDWY ILLUM ASSEM FND (TY A)	EA	3
CONDT (SCH 40 PVC) (1¼")	LF	1073
CONDT (SCH 80 PVC) (2")	LF	500
ELECT CONDR (NO. 8) (BARE)	LF	1594
ELECT CONDR (NO. 8) (TY XHHW)	LF	3188
GROUND BOX (TY A) (RPM) (122311) APRON	EA	3



SCALE: 1" = 100'

LEGEND

- RDWY ILLUM ASSEM (TY SA 40T-8-8) (.25 KW)S
- RDWY ILLUM ASSEM (TY SA 40T-8) (.25 KW)S
- RDWY ILLUM ASSEM (TY SA 50T-8) (.4 KW)S
- RDWY ILLUM ASSEM U/P (SPL-CO) (.15 KW)S (TY 1)
- PVC & CONDR (TRENCHED)
- PVC & CONDR (BORED)
- (12) CONDUIT RUN NUMBER
- GROUND BOX
- SERVICE POLE (TY S)
- 2/207 LIGHT NUMBER / RELAY NUMBER

RUN	GROUND LENGTH (FT)		CONDUCTOR NO. & LENGTH (FT)		CONDUIT (FT)		
	#8 BARE		#8 XHHW		1¼" PVC SCH 40	2" PVC SCH 80	
71	1-253		2-253			250	
72	1-316		2-316		310		
73	1-253		2-253			250	
74	1-306		2-306		300		
75	1-313		2-313		310		
76	1-153		2-153		153		

RDWY ILLUMINATION ASSEMBLY SUMMARY			
POLE	STA	TYPE	REMARKS
34	295+40	(TY SA40T-8) (.25 KW)S	250' RT
35/51	304+50	(TY SA40T-8-8) (.25 KW.)S	
52	298+50	(TY SA40T-8) (.25 KW)S	250' LT

STATE OF TEXAS
CAROL SREINER LUSCHEN
06450
REGISTERED
PROFESSIONAL ENGINEER

Carol S. Luschen 1-31-94
CAROL SREINER LUSCHEN DATE

ILLUMINATION LAYOUT

SHEET 6 OF 7

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			331
STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC.	LP1604

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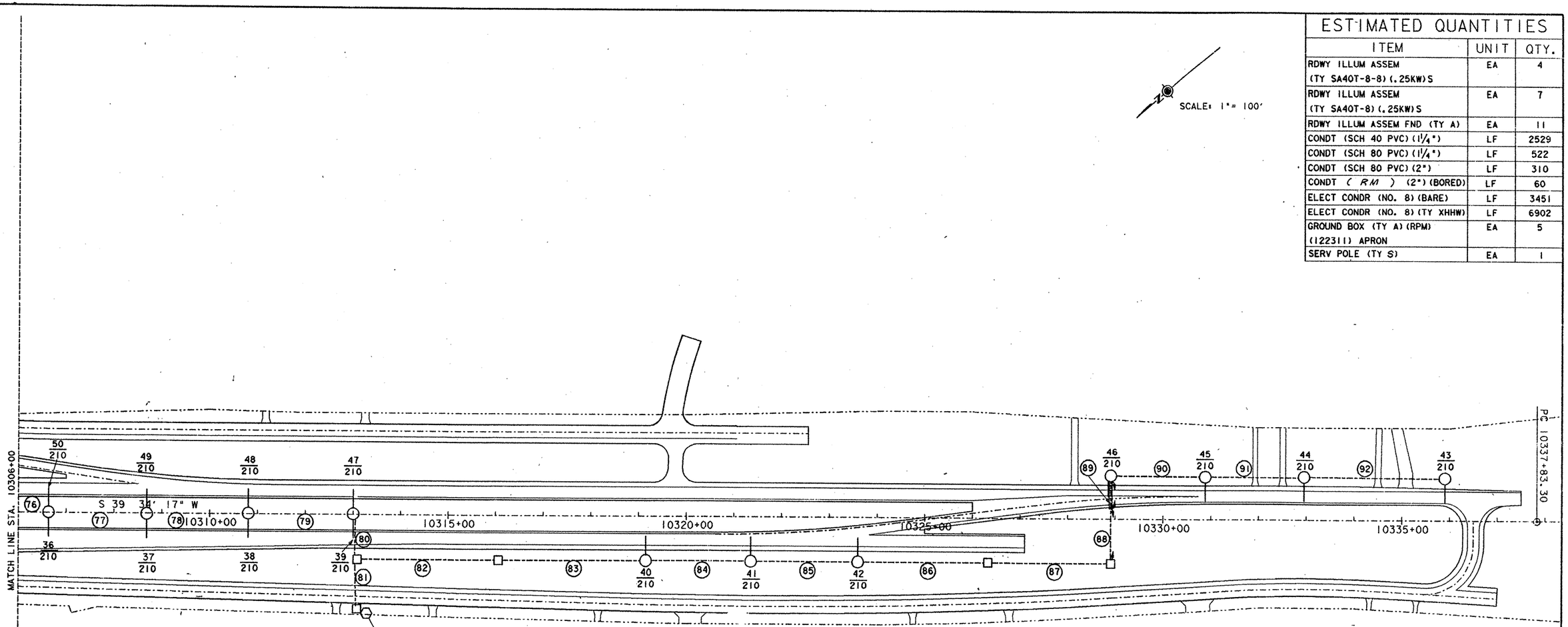
ESTIMATED QUANTITIES

ITEM	UNIT	QTY.
RDWY ILLUM ASSEM (TY SA40T-8-8) (.25KW) S	EA	4
RDWY ILLUM ASSEM (TY SA40T-8) (.25KW) S	EA	7
RDWY ILLUM ASSEM FND (TY A)	EA	11
CONDT (SCH 40 PVC) (1¼")	LF	2529
CONDT (SCH 80 PVC) (1¼")	LF	522
CONDT (SCH 80 PVC) (2")	LF	310
CONDT (RM) (2") (BORED)	LF	60
ELECT CONDR (NO. 8) (BARE)	LF	3451
ELECT CONDR (NO. 8) (TY XHHW)	LF	6902
GROUND BOX (TY A) (RPM) (122311) APRON	EA	5
SERV POLE (TY S)	EA	1



LEGEND

- RDWY ILLUM ASSEM (TY SA 40T-8-8) (.25 KW) S
- RDWY ILLUM ASSEM (TY SA 40T-8) (.25 KW) S
- RDWY ILLUM ASSEM (TY SA 50T-8) (.4 KW) S
- RDWY ILLUM ASSEM U/P (SPL-CO) (.15 KW) S (TY 1)
- PVC & CONDR (TRENCHED)
- PVC & CONDR (BORED)
- (12) CONDUIT RUN NUMBER
- GROUND BOX
- SERVICE POLE (TY S)
- 2 / 207 LIGHT NUMBER / RELAY NUMBER

RUN	GROUND LENGTH (FT)		CONDUCTOR NO. & LENGTH (FT)		CONDUIT (FT)			
	#8 BARE		#8 XHHW		1¼" PVC SCH 40	1¼" PVC SCH 80	2" PVC SCH 80	2" RM BORED
76	1-63		2-63		63			
77	1-216		2-216		216			
78	1-216		2-216		216			
79	1-216		2-216		216			
80	1-83		2-83				80	
81	1-136		2-136				130	
82	1-316		2-316		310			
83	1-313		2-313		310			
84	1-216		2-216		216			
85	1-216		2-216		216			
86	1-303		2-303		300			
87	1-256		2-256		250			
88	1-100		2-100				100	
89	1-63		2-63					60
90	1-216		2-216		216			
91	1-216		2-216			216		
92	1-306		2-306			306		

RDWY ILLUMINATION ASSEMBLY SUMMARY			
POLE	STA	TYPE	REMARKS
36/50	306+60	(TY SA40T-8-8) (.25 KW.) S	
37/49	308+70	(TY SA40T-8-8) (.25 KW) S	
38/48	310+80	(TY SA40T-8-8) (.25 KW) S	
39/47	312+90	(TY SA40T-8-8) (.25 KW.) S	
40	319+10	(TY SA40T-8) (.25 KW.) S	80' RT
41	321+20	(TY SA40T-8) (.25 KW.) S	80' RT
42	323+30	(TY SA40T-8) (.25 KW) S	80' RT
43	335+80	(TY SA40T-8) (.25 KW) S	80' LT
44	332+80	(TY SA40T-8) (.25 KW) S	80' LT
45	330+70	(TY SA40T-8) (.25 KW) S	80' LT
46	328+60	(TY SA40T-8) (.25 KW) S	80' LT

STATE OF TEXAS
CAROL GREINER LUSCHEN
60450
REGISTERED
PROFESSIONAL ENGINEER

Carol G. Luschen P.E. 1-31-92
CAROL GREINER LUSCHEN DATE

ILLUMINATION LAYOUT

SHEET 7 OF 7

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		332

STATE	DIST.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023, ETC	LP1604

15ip2b1604ill.dgn

GENERAL :

I. SCOPE

Details herein apply to roadway lighting installations bid under the following Specification Items: Roadway Illumination Assemblies, Relocate Roadway Illumination Assemblies, Roadway Illumination Assembly Foundations, and Special Specifications relating to roadway lighting. All work, materials and services not shown on plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment and installation will be considered justification for rejection. Materials and installation shall comply with the applicable provisions of the National Electrical Code and National Electrical Manufacturers Association standards. Where manufacturer's provide warranties or guarantees as a customary trade practice, Contractor shall furnish to the State such warranties or guarantees.

The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Erection and/or removal of poles and luminaires located near any overhead electrical lines shall be accomplished using established industry and utility safety practices and in accordance with laws governing such work. The Contractor shall consult with the appropriate utility company prior to beginning such work.

II. ROADWAY ILLUMINATION ASSEMBLIES

A. General

1. Structural Support Design for Luminaires. Lighting standards shall be designed in accordance with the latest issue of the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals." All poles shall be designed for 80 mph wind loads. An additional 1.3 gust factor shall be applied to the wind loads. For transformer base poles, fabricator shall include transformer base and connecting hardware in design calculations and shop drawing submittals. Manufacturer's shop drawings shall include the ASTM designations for all material to be used. See paragraph II.B. for additional requirements for the transformer base.

2. Slip Joint Poles. Poles may be fabricated in two sections and field-assembled by the lap-joint method. The two sections shall telescope together with a lap length of not less than 1-1/2 times the shaft diameter at the lap joint. The longitudinal seam weld within 13 inches of the slip joint shall be a full penetration weld.

3. Mast Arm Attachments. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 55-pound luminaire having an effective projected area of 1.4 square feet.

4. Minor Damage Repair. The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, or damaged areas on galvanized poles and mast arms shall be thoroughly cleaned by wire brushing. The cleaned area shall be painted with two coats of zinc rich paint containing a minimum of 84% metallic zinc.

5. Pole Bonding Means. All shoe base poles, including poles on concrete traffic barriers, shall have a grounding lug with 1/2-13 NC female threads inside the pole near the hand hole, minimum of 3 full threads.

6. Hand Holes. All shoe base poles shall have hand holes with reinforcing frames and covers. The openings on all poles shall be approximately 4 inches x 10 inches located approximately 10 inches from the bottom of the pole and, except for poles mounted on concrete traffic barrier, shall be placed 90 degrees to mast arm unless otherwise noted on plans. For poles mounted on concrete median barrier, all hand holes shall be on the same side of the median.

7. CTB Poles. Poles installed on concrete traffic barrier shall also meet the requirements of CTB details.

8. J-Hooks. All poles shall be equipped with a J-hook inside the pole, near the top for supporting vertical conductors.

9. Base Plate Bolt Circle. For bolt circles for poles mounted on CTB, see CTBI (4). For poles placed on existing bridge brackets or existing foundations, bolt circle shall be coordinated with anchor bolts in place. For other bolt circles, See RID (3).

10. Steel Poles.

a. Steel poles shall be fabricated in accordance with the Item "Steel Structures." Longitudinal seam welds for pole sections shall have 60% minimum penetration. All welding shall be in accordance with the ANSI/ AWS Structural Welding Code D1.1. Two-section poles joined by circumferential welds will not be permitted, unless otherwise shown on the plans.

b. Pole components shall be constructed using the following materials:

Shaft: ASTM A-572 Grade 50 or ASTM A-595 Grade A (50 KSI min. yield) or ASTM A-36M50, in accordance with Item 4808. Galvanized in accordance with ASTM A-123.

Base Plate: ASTM A-27 Grade 65-35 or ASTM A-36 - galvanized in accordance with ASTM A-123.

Mast Arm Connector: ASTM A-27 Grade 65-35 - galvanized in accordance with ASTM A-153 Class A.

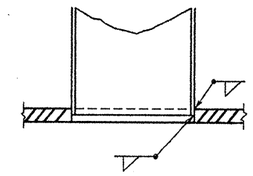
Mast Arms: Steel Pipe ASTM A-53 Grade A or B or ASTM A-501 or A-513 TY I with minimum 30 KSI yield and 20% elongation in 2 inches, galvanized in accordance with ASTM A-123.

Pole Cap: Pole cap shall be zinc die-cast, aluminum, or galvanized metal, secured by three stainless steel or galvanized screws.

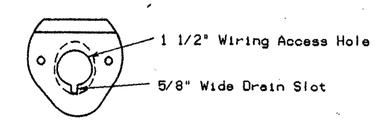
Pole Hardware: All bolts except mast arm connection bolts shall be stainless steel or standard steel galvanized ASTM A-153 Class C or D, or B-695 Class 50. Mast arm connection bolts shall be ASTM A-325, ASTM A-321 or ASTM A-193 Grade B-7, galvanized as above. Nuts and washers shall be compatible with the bolts and shall be stainless steel or steel, galvanized as above. Lock washers shall be provided on all bolted connections.

11. Aluminum Poles.

a. Aluminum poles shall be fabricated in accordance with "Structural Welding, Aluminum" ANSI/AWS D1.2.

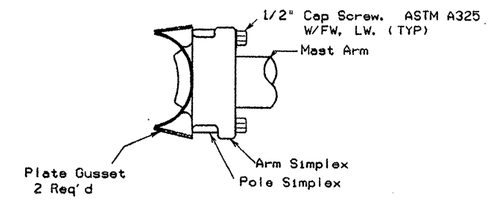


SECTION
POLE SHAFT TO BASE PLATE

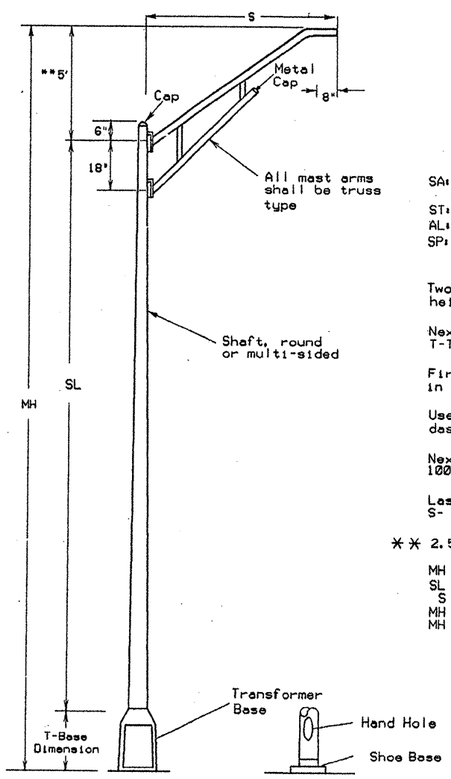


MAST ARM CONNECTOR

Steel Poles Only
Aluminum Pole Connector
Shall Be Clamp-on Type



MAST ARM TO POLE SHAFT CONNECTION



ROADWAY ILLUMINATION ASSEMBLY

EXPLANATION OF ROADWAY ILLUMINAION ASSEMBLY DESIGNATIONS

(TYPE SA 50 T - 8 - 8) (.4KW) S

SA: Pole and mast arm may be steel or aluminum.
ST: Pole and mast arm must be steel.
AL: Pole and mast arm must be aluminum.
SP: Special (ovalized) steel pole for installing on CTB. See stanard sheet CTBI (4).

Two numerical digits denote mounting height in feet.

Next letter denotes type of base, (S-Shoe Base, T-Transformer Base, B-Shoe Base Bridge Mount)

First number denotes length of mast arm in feet.

Use of second mast arm is indicated by second dashed number which denotes length in feet.

Next three figures indicate luminaire rating (1 KW= 1000 watts, .4 KW= 400 watts, etc.)

Last letter indicates the type of lamp (M- Mercury, S- High Pressure Sodium, L- Low Pressure Sodium).

** 2.5' for poles with 4' mast arms.

MH = Mounting Height
SL = Shaft Length
S = Spread (Mast arm length)
MH = SL + 5' + (T-Base dimension)
MH = SL + 5' (Shoe Base)

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

ROADWAY ILLUMINATION DETAILS

RID (1) - 92

ORIGINAL DRAWING DATE: 81-92		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
DN.: K. A. B.	REVISIONS	15	6	NH 90(191)M, Etc.			333
CK.: T. B.		COUNTY		CONTROL	SECTION	JOB	TOTAL SHEETS
DN.: R. E. S.		BEXAR		2452	02	023	1604
CK.: T. B.							

Maintenance and Operations Division (D-18) 7593/100 [illegible]

II. A. 11. b. Pole components shall be constructed using the following material:

Shaft: ASTM B-221 or B-241 Alloy 6063-T6, ASTM B-209 Alloy 5086-H34, ASTM B-221 Alloy 6005-T5.

Base Flange: ASTM B-26 Alloy 356.0-T6 or ASTM B-108 Alloy A356.0-T6. (Structural strength test required).

Mast Arm Fittings: ASTM B-209 Alloy 6061-T6 or ASTM B-221 Alloy 6005-T5.

Mast Arms: ASTM B-241 Alloy 6061-T6 or Alloy 6063-T6.

Pole Cap: ASTM B-209 Alloy 5086-H32 or ASTM B-108 or B-26 Alloy 356.0-T6.

Bolts: Stainless Steel AISI 300. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133K or equal.

12. Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.
13. Installation of High Strength Bolts. The tightening of nuts on high strength bolts shall be in accordance with the Item "Structural Bolting."
14. Roadway Illumination Assembly poles shall be erected plumb and true. Top of foundation shall be struck level and shims used to plumb pole, except that for shoe base poles leveling nuts may be used. Leveling nuts shall not be used under transformer bases. Grout will not be placed between base plate or flange and the foundation.
15. In each pole, continuous color-coded stranded No. 12 AWG copper Type XHHW or other approved XLP conductors shall be connected to the line side of each ballast.
16. Acorn nuts will not be allowed for attaching pole to transformer base or foundation. Nut covers will not be allowed.

B. Transformer Base

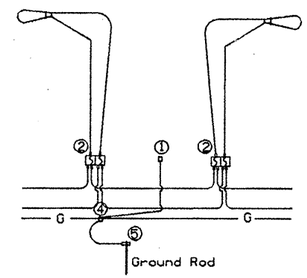
1. Transformer base shall be cast from aluminum, ASTM B-108 or B-26 Alloy 356.0-T6, and shall be furnished with four washers or lugs as recommended by the manufacturer. Transformer base bolt circles (Top and Bottom) shall match bolt circles for poles and foundations shown on RID (3).
2. Transformer base shall be approximately 15-20 inches high and shall have a door approximately 13 inches X 8 inches X 9-1/4 inches or as otherwise approved by the Engineer. Screw or bolts for attachment of door to base shall be stainless steel. Four machine bolts with four nuts, eight flat washers and four lock washers, galvanized ASTM A-153 Class C or D, or B-695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A-563 Grade DH, galvanized. A 1/2-13 NC female threaded grounding lug shall be provided inside the transformer base.
3. Transformer bases shall meet the breakaway requirements of the AASTHO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 1985 edition, and shall have been tested by FHWA-approved methods.
4. Transformer bases shall have been structurally tested to meet or exceed the full designed plastic moment capacity of the pole.
5. Certification of the plastic moment load test and FHWA breakaway requirement test shall be submitted with shop drawings. Shop drawings shall show transformer base model number and manufacture/logo.
6. Aluminum transformer bases shall be stamped, incised or by other approved permanent means, marked to show fabricators name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.
7. Doors for transformer bases shall be made of plastic, fiberglass or other non-aluminum material approved by the Engineer.
8. Transformer bases shall be cleaned by grit blast cleaning after heat treatment.

C. All Luminaires

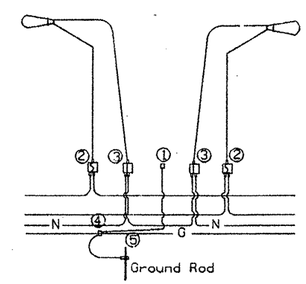
1. The luminaire housing shall be cast or drawn from a non-ferrous alloy and shall be free of cracks and excessive porosity. All nuts, screws, clips, washers and attaching hardware shall be made of stainless steel; steel electro-zinc-plated, minimum thickness 0.0002 inch with olive green drab or yellow chromate conversion coating; steel coated with an acidic chromate-phosphate-binder system primer, top coated with a polytetrafluoroethylene modified silicon primer, bright metallic in color, meeting the requirements of General Motors automotive specification GM 164M; or other approved conversion coatings except that brackets may be made from pre-galvanized steel. All threaded surfaces used in the housing shall be lubricated with a silicone grease.
2. The slipfitter shall securely clamp the luminaire to the mast arm. A positive means of vertical adjustment shall be provided. The refractor or lens shall be clear glass. The optic assembly shall be provided with resilient gaskets and so constructed that a positive seal against weather and other contaminants will be maintained. The luminaire shall be designed to permit easy removal of the refractor from the luminaire but shall provide a positive means of preventing an unintentional separation. The latch shall provide a positive means of maintaining closure of the luminaire. The socket shell shall be nickel plated and shall be rigidly attached to a high grade porcelain mogul base which shall extend and enclose the metal shell. A locking means shall be incorporated in the shell of the socket to positively resist the removal of the lamp. Reflectors shall be polished aluminum and shall not be painted.
3. Mast-arm mounted luminaires, except underpass luminaires, shall be provided with a leveling indicator which is clearly visible from the ground. Leveling indicator shall be sensitive to one (1) degree (maximum) changes in position at any point within five (5) degrees (minimum) of the level position. Leveling indicator shall have markings at three (3) and five (5) degrees. Unless otherwise directed by the Engineer, mast-arm mounted luminaires will be installed in the level position.
4. Underpass luminaires shall be fused internally. Fuses shall be 10 amp time-delay type.

II. A. 14. Fabrication Tolerances

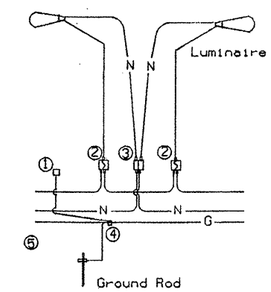
Part	Dimension	Tolerance
Pole Assembly	Shaft length	±1 in.
	I.D. of outside piece of slip fitting pieces	+1/8 in., -1/16 in.
	O.D. of inside piece of slip fitting pieces	+1/32 in., -1/8 in.
	Shaft diameter: other	+ 3/16 in.
	Out of "round"	1/4 in.
	Straightness of shaft	± 1/4 in. in 10 ft.
	Twist in shaft	4° in 50 ft.
	Perpendicular to baseplate	1/8 in. in 24 in.
	Pole centered on baseplate	± 1/4 in.
	Location of Attachments	± 1/4 in.
Arm Assembly	Arm Length	± 3 in.
	Arm Rise	± 1 3/4 in. in 10 ft.
	Arm Diameter	± 3/16 in.
	Overall length or width	± 1/4 in.
	Thickness	+1/4 in., -1/16 in.
	Deviation from flat	1/8 in. in 12 in.
	Spacing between holes	±3/32 in.
	Anchor bolt hole size	±1/16 in.
Anchor Bolt	Length	+ 1 in., -1/4 in.
	Threaded length	+1 1/2 in., -1/8 in.
	Galvanized length (if required)	+ 8 in., -1/4 in.
Miscellaneous	Bolt hole spacing	± 1/16 in.
	Strut location in truss arms	± 1 1/2 in.



FOR THREE-WIRE CIRCUIT-CENTER GROUNDED
LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.



FOUR-WIRE CIRCUIT-CENTER GROUNDED
LUMINAIRES SERVED AT 240V
(240/480 VOLT SERVICE)



THREE WIRE CIRCUIT-OUTSIDE GROUNDED
LUMINAIRES SERVED AT 480V ON 480 VOLT 2 WIRE SERVICE OR LUMINAIRES SERVED AT 240V ON 240 VOLT 2 WIRE SERVICE.

NOTES:

1. Pole Bonding Connector Blackburn TTC3 or Weaver TGC3 or equal.
2. Fused Connector- Homac Flood Seal Series; Bussman HEB Series; Gould GEB Series; or equal. All fuses shall be time-delay types, 10 Amp (Littlefuse FLQ, Bussman FNQ or equal).
3. *Un-fused Connector- Homac Flood Seal Series; Bussman HEB Series; Gould GEB Series; or equal. Dummy / Neutral fuse shall be Bussman NTS-R-30 or equal.
4. Split Bolt or other connector.
5. Ground Rod Clamp - Blackburn GG58H, Burndy GKP635, or equal.

*For Transformer Base Poles. On Shoe Base Poles omit un-fused connector for neutral conductor.

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

ROADWAY ILLUMINATION DETAILS

RID (2) - 92

ORIGINAL DRAWING DATE: 12-92		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
CK.: K.A.B.	REVISIONS	15	6	NH 90(191)M, etc			334
CK.: T.B.		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DN.: R.E.S.		BEXAR		2452	02	023 etc	1604
CK.: T.B.							

II. D. High Pressure Sodium Vapor Luminaires

1. Photometrics

a. The U/P (SPL-CO) (.15KW)S (TY 1) and (TY 2) underpass luminaires shall be 150 watt high pressure sodium, IES TYPE M-C. The fixtures shall provide a minimum measured intensity of .2 footcandles in a rectangular area measuring 80 feet X 30 feet, when mounted 20 foot above the midpoint of either long side of the surface area.

b. The 250-watt mast-arm mounted luminaire shall be IES Type M-S and, when mounted 40 feet above the midpoint of either long side of a rectangular area 200 feet by 50 feet, shall provide a measured minimum intensity of 0.2 footcandle at any point on the surface of this area. Light intensities measured in footcandles along a line parallel to and 20 feet in from the long side of the previously defined rectangular area above which the luminaire is mounted shall decrease at a rate not to exceed 0.8 footcandle in any ten-foot interval along the aforementioned line from 10 to 70 feet on both sides of the luminaire and shall not be less than 0.6 footcandle at any point along such line.

The maximum to minimum footcandle uniformity ratio shall not exceed 20:1 within the above mentioned rectangular area.

c. The 400-watt mast-arm mounted luminaire shall be IES Type M-S and, when mounted 50 feet above the midpoint of either long side of a rectangular area 240 feet by 70 feet, shall provide a measured minimum intensity of 0.2 footcandle at any point on the surface of this area. Lighting intensities measured in footcandles along a line parallel to and 30 feet in from the long side of the previously defined rectangle above which the luminaire is mounted shall decrease at a rate not to exceed 0.8 footcandle in any ten-foot interval along the aforementioned line from 10 to 90 feet on both sides of the luminaire and shall not be less than 0.6 footcandle at any point along such line.

The maximum to minimum footcandle uniformity ratio shall not exceed 20:1 within the above mentioned rectangular area.

d. The luminaires shall meet the photometric requirements shown above, when energized at 100 percent of rated line voltage. Test will be run with the fixture in the level position as indicated on leveling indicator.

2. Ballasts

a. All ballasts shall be isolated-winding lag-type magnetic regulators designed to operate high pressure sodium lamps.

b. When the circuit voltage indicated on the plans is applied, the ballast input wattage during fluctuations of the test voltage of +10 and -10 percent shall not exceed the following:

Nominal Lamp Rating, Watts	Maximum Wattage Input
150	220
250	400
400	552

c. During fluctuation of the test voltage of +10 and -10 percent, the lamp wattage fluctuation shall not exceed a total of 20 percent and ballast shall maintain lamp wattage within the following limits:

Nominal Lamp Watts	Minimum Lamp Watts	Maximum Lamp Watts
150	110	180
250	175	370
400	280	475

d. The power factor of any ballast when tested at circuit voltage indicated in the plans shall be not less than 90 percent.

e. The electronic starting aid shall provide a starting pulse with an amplitude of 2500 volts minimum, 4000 volts maximum. The pulse width shall be a minimum of 0.8 microseconds at 2250 volts. The pulse shall occur when the open-circuit voltage is equal to or greater than 90 percent of peak open-circuit voltage. Pulse repetition rate shall be a minimum of one per cycle and pulse current shall be a minimum of 0.18 amperes. Electronic starting aids for mast-arm mounted poles shall be replaceable without the use of tools. The starting aid shall discontinue to pulse when the lamp starts.

f. Luminaires will be tested for satisfactory operation of the starter board under open-circuit (lamp-out) condition for a minimum of 72 hours. Any failures of starter boards will be considered grounds for rejection of the model starter board being supplied.

g. Ballasts shall permanently and clearly indicate the following: lamp type, catalog number, voltage rating, connection diagram, and manufacturer. Capacitors in all luminaires shall be non-PCB type.

3. Lamps

a. All lamps shall be new and shall be of recent manufacture.

b. High pressure sodium vapor lamps in the wattage range of 200 to 400 watts inclusive shall have a lamp voltage not greater than 108 volts when tested after thirty minutes burn-in. 150 watt lamps shall be rated for 55 volts.

c. All lamps shall be nickel plated mogul base.

4. Testing

a. Ballasts and luminaires will be tested using a lamp furnished for the same project.

b. Luminaires, ballasts, and lamps will be sampled and tested in accordance with the SDHPT Materials and Test Division's Manual of Testing Procedures.

III. ROADWAY ILLUMINATION ASSEMBLY FOUNDATIONS

A. Concrete and reinforcing steel for foundations will be included for payment under the Item "Roadway Illumination Assembly Foundations". Top 6 inches of foundation shall be formed and struck level.

B. Anchor bolts for all poles, except CTB-mounted poles, shall be A-36M55 in accordance with the Item "Medium-Strength, Mild Steel Anchor Bolts." Anchor bolts for CTB-mounted poles shall be steel, ASTM A-325 or A-321 threaded rod. Nuts for CTB anchor bolts shall be ASTM A-563 Grade D heavy hex, galvanized. The top 8 inches of all anchor bolts shall be galvanized per ASTM A-153. Anchor bolts in foundations shall be 1 1/4 inches x 30 inches for mounting heights 40 feet and greater, 1 inch x 30 inches for mounting heights less than 40 feet. Anchor bolts shall have top end threaded not less then 5 inches and furnished with galvanized hex nuts, flat and lock washers and template. The lower end of the bolt shall be threaded and furnished with nut and template. When bolts with rolled threads are furnished, bolt body need not be full size. See CTB details for anchor bolts in CTB. Anchor bolts and nuts shall have Class 2A and 2B fit. Nuts shall be tapped or chased after galvanizing.

C. Concrete shall be Class A or C in accordance with the Item "Concrete for Structures". Reinforcing steel shall meet the requirements of the Item "Reinforcing Steel".

D. A minimum of two conduits shall be installed in each foundation. See lighting layout sheets for locations of foundations with more than two conduits. Any unused conduits in foundations shall be capped on both ends.

E. Unless otherwise shown on the plans, breakaway roadway illumination assemblies should be located as shown in the placement table below. Non-breakaway illumination assemblies should be protected from vehicular impact (i.e. 2 ft. behind guard rail or mounted atop traffic barrier) or located outside the clear zone (except that 2.5 ft. from curb face is minimum desired for light poles on city streets, 45 mph or less, see design guidelines for further information.

Pole Placement, see Para. III. E.	
Roadway Functional Classification	Pole Offset (distance to transformer base, tolerance ± 6 in.)
Freeway mainlanes (roadways with full control of access)	15 ft. (minimum and typical) from lane edge
All curbed, 45 MPH or less design speed	2.5 ft., minimum (15 ft. desirable) from curb face
All others	10 ft., minimum* (15 ft. desirable) from lane edge

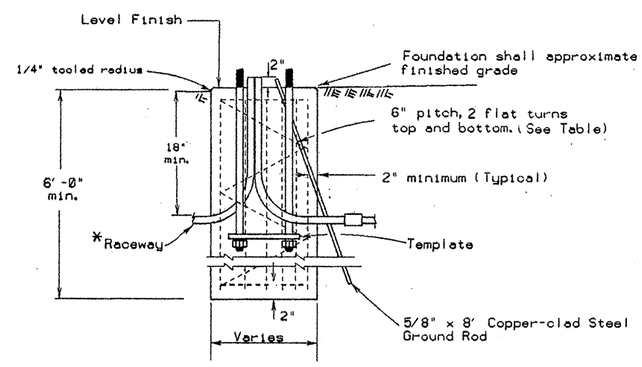
*or as close to ROW line as is practical

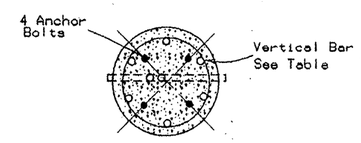
BOLT CIRCLES AND ANCHOR BOLTS

MOUNTING HEIGHT	POLE BASE PLATE	BOLT CIRCLE SHOE BASE	BOLT CIRCLE T-BASE	BOLT SIZE
LESS THAN 40 FEET	13 IN.	13 IN.	14 IN.	1 IN. X 30 IN.
40 FEET OR GREATER	15 IN.	15 IN.	17¼ IN.	1¼ IN. X 30 IN.

FOUNDATIONS

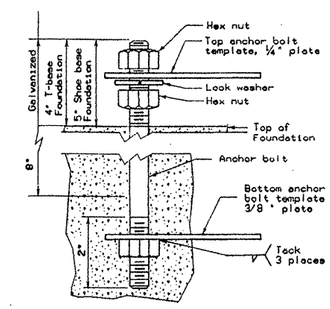
FND. TYPE	DRILL SHAFT DIA.	DRILL SHAFT LENGTH	REINFORCING BAR	REINFORCING SPIRAL
A	24 IN.	6 FT.	6-#4	#2
B	24 IN.	8 FT.	6-#5	#2
C	30 IN.	10 FT.	6-#6	#3





FOUNDATION DETAIL

*Min. 2" Dia. for duct cable, 18" radius bends. For conductor in conduit system, same size as system conduit with standard radius bends.



ANCHOR BOLT DETAIL

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

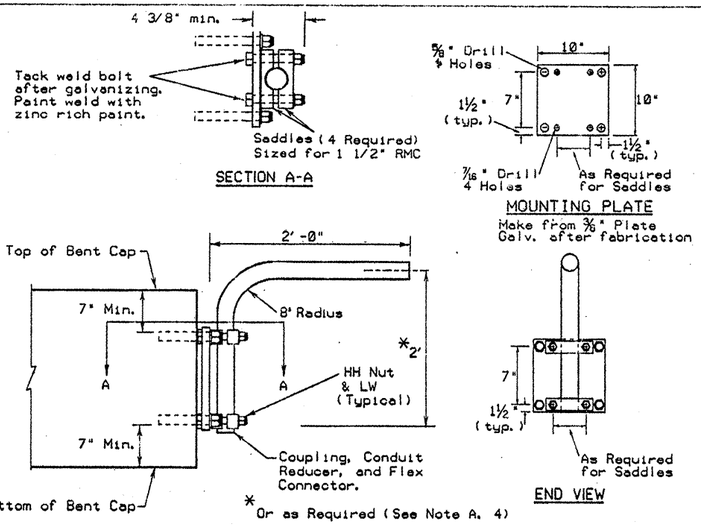
ROADWAY ILLUMINATION DETAILS

RID (3) - 92

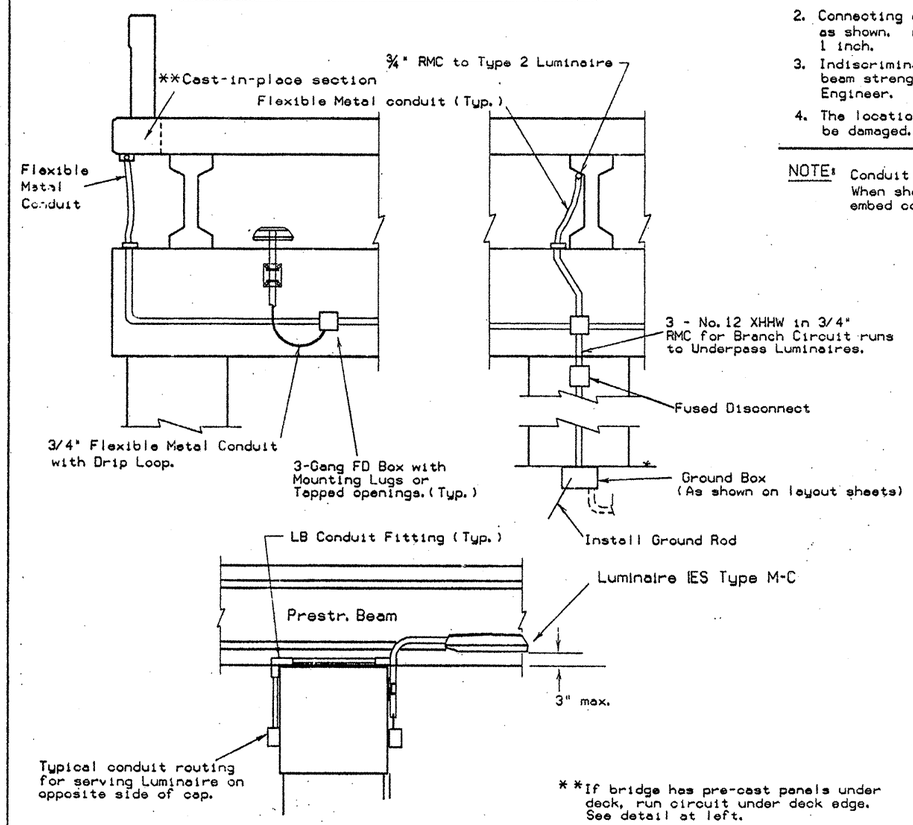
ORIGINAL DRAWING DATE: 01-92	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN:- K. A. B. / CK:- T. B. / DN:- R. E. S. / CK:- T. B. — REVISIONS	15	6	NH 90(191)M, etc	335

COUNTY	CONTROL	SECTION	JOB	HIGHWAY
BEXAR	2452	02	023	1604

Maintenance and Operations Division (D-18) ZFA3:(122,106) RID392.DGN



UNDERPASS LIGHTING ARM TYPE 1



U/P (SPL-CO)(.15 KW)S(TYPE 1)

NOTES:

A. ALL LUMINAIRES

1. Luminaire locations, conduit and conductor sizes and routing are typical and diagrammatic only. See project layout sheets for specific details.
2. All conductors and conduit will be paid for under the items "Conduit" and "Electrical Conductor." See lighting layout sheets.
3. A ground rod shall be installed and attached to the equipment grounding conductor in all ground boxes containing conduit that extends above ground. All RMC in these boxes shall have grounding bushings and shall be properly bonded.
4. Adjust conduit in saddles to place fixture height and orientation as required. See fixture orientation detail and layout sheet. Where practical place luminaires so that bottom of luminaire is above bottom of beam, maximum of 3 inches. (See detail).
5. All bolts, nuts and washers shall be galvanized, ASTM A-153.
6. Fabrication of brackets and support arms will not be paid for directly but shall be subsidiary to Item 610, "Roadway Illumination Assemblies."
7. A Heavy Duty, 480 volt or 600 volt, 30 amp fused disconnect switch in NEMA 3R enclosure shall be installed in circuits to switch underpass luminaires. Switch shall be mounted ten foot (minimum) above grade on columns or bent caps as approved by the Engineer. Contractor shall modify switch to allow pad-locking in the "ON" and in the "OFF" positions. 20 amp fuses shall be installed.

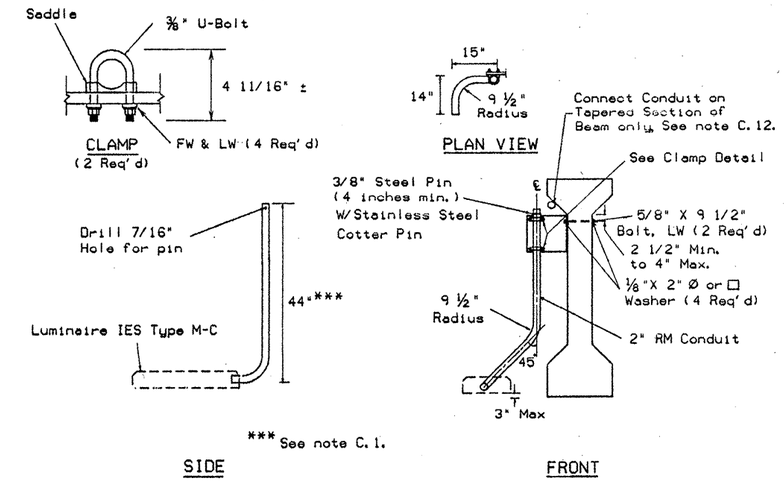
B. TYPE 1

1. Type 1 arm shaft shall be 1 1/2" rigid metal conduit (1.90" O.D., .145" wall).
2. Anchor bolts for Type 1 luminaire shall be 3/8 inch bolt or stud expansion anchors with minimum pull out of 3000 lb each, with 4 inch minimum embedment, and lock washers.
3. Attach conduit to plate with 4 saddles, 4 3/8" (min.) bolts, HHN & LW.

C. TYPE 2

1. Type 2 arm shaft shall be 2 inch rigid metal conduit (2.375" O.D., .154" wall). Reduce conduit length for Type C concrete beams. Field cutting and threading will be permitted.
2. Connecting conduit may be strapped to tapered section only of precast beams as shown. Anchor as approved by the Engineer. Maximum anchor depth is 1 inch.
3. Indiscriminate drilling into precast concrete beams may result in reduced beam strength. Drilling location and method shall be only as directed by Engineer. See location of underpass lighting mounting bracket detail.
4. The locations given in the table are such that reinforcing strands will not be damaged.

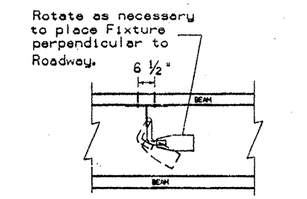
NOTE: Conduit on Columns, Caps, and Slab is shown surface mounted. When shown on the plans or required by the Engineer, Contractor shall embed conduit in concrete.



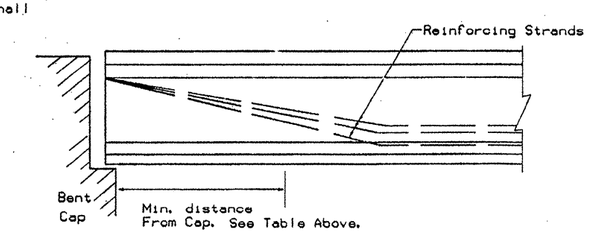
UNDERPASS LIGHTING ARM TYPE 2

Bridge Span Length	Minimum Distance From Bent Cap to Fixture Mounting Arm
<50'	10'
50'-70'	15'
70'-90'	20'
>90'	25'

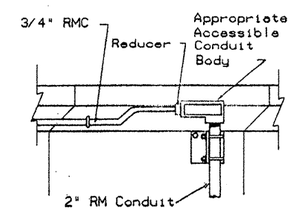
See detail below.



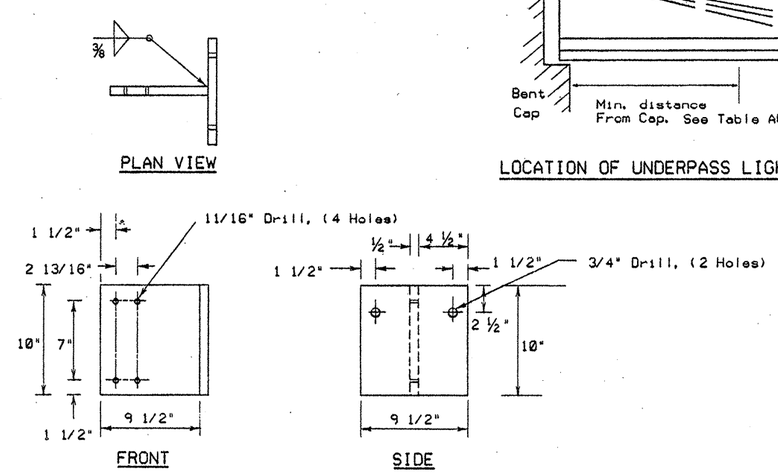
FIXTURE ORIENTATION
PLAN VIEW



LOCATION OF UNDERPASS LIGHT MOUNTING BRACKET



CONDUIT CONNECTION PROFILE
(TYPICAL)



BRACKET DETAIL

Make From 1/2" Plate (ASTM A-36)
Galvanize after fabrication, ASTM A-123

U/P (SPL-CO)(.15 KW)S(TYPE 2)

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

ROADWAY ILLUMINATION DETAILS

RID (4)-92

ORIGINAL DRAWING DATE: 01-92		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
DN.: K. A. B.	REVISIONS	15	6	NH 90 (191)M, etc			336
CK.: T. B.		COUNTY			CONTROL	SECTION	JOB	HIGHWAY
DN.: R. E. S.		BEXAR			2462	02	023	1604
CK.: T. B.								

Maintenance and Operations Division (D-18) ZFA3:(122,106) RID492.DGN

I. GENERAL REQUIREMENTS FOR ALL ELECTRICAL WORK

Faulty fabrication or poor workmanship in any material, equipment, or installation will be considered justification for rejection. Materials and installation shall comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Where manufacturers provide warranties or guarantees as a customary trade practice, Contractor shall furnish to the State such warranties or guarantees. The location of conductors, conduit, junction boxes, duct cable, ground boxes, transformer stations, and service poles are diagrammatic only and may be shifted by the Engineer to accommodate local conditions.

Grounding shall be as shown on the plans and in accordance with the NEC. Metallic conduit, lighting poles, and luminaires on bridge structures shall be grounded by connection to the grounding conductor and by installing a ground rod in each ground box or junction box, as shown on the plans, at bridge ends and in each ground box installed for underpass lighting. The bonding jumper shall be bare or, if insulated, shall be green. Ground rods, connectors, and bonding jumpers will not be paid for separately, but will be subsidiary to the various bid items.

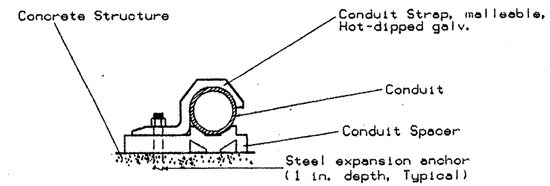
II. CONDUIT (ITEM 618)

A. Materials.

1. Conduit must be UL-approved for the intended use shown on plan sheets. Aluminum conduit will not be permitted unless shown on the plans.
2. Fittings for steel conduit shall be steel or malleable iron, threaded or compression type threadless, rain-tight. Die cast, set screw, indenter or push-on (socks) fittings will not be permitted.
3. Expansion joints for metallic conduit shall be provided with a grounding strap. Expansion joints for metallic conduit shall be Appleton UNYL 50 Series, OZ AX Series, or equal.
4. Junction boxes shall be cast iron, hot-dipped galvanized, or cast aluminum (surface-mountd only) unless otherwise noted on plans.
5. Surface-mounted junction boxes for conduit 1-1/4 inches and larger shall have a minimum wall thickness of 3/16 inch, Crouse Hinds Type WAB, Ø-Z Type YS, Adalet Type 3R, or approved equal, with mounting lugs, minimum size 6 inches x 6 inches x 4 inches, or as shown on the plans. For conduit one inch or smaller, surface-mounted boxes may be 4-1/2 inches (min), round, square, or rectangular, and approximately 3 inches deep, Crouse Hinds Type GRFX, Appleton Type JBDX, two-gang FD, or approved equal.
6. Flush-mounted junction boxes installed in concrete structures shall be minimum 6 in. x 6 in. x 4 in., Crouse Hinds Type WGB, O-Z Type YR, or approved equal.
7. Metal junction boxes shall be bonded to the grounding conductor.

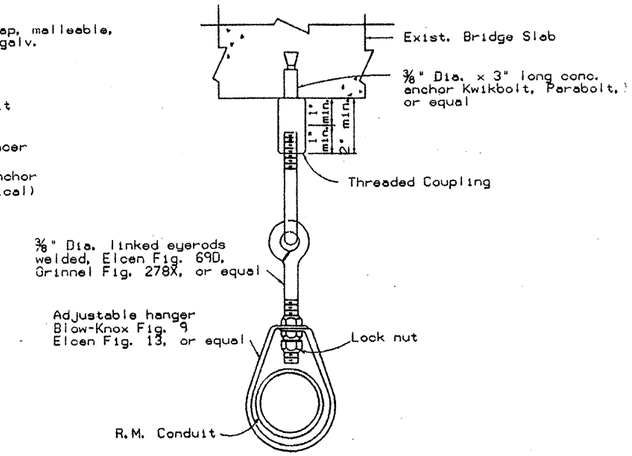
B. Construction Methods.

1. Continuous runs of conduit in excess of 150 feet attached to structures shall have expansion joints at mid-span or 150-foot intervals. Conduit in structures shall have expansion joints at structure expansion joints or as shown in plans.
2. Conduit hangers or straps shall be spaced at maximum intervals of 5 feet. When shown on the plans, hangers shall be used when hanging conduit from horizontal surfaces (See detail). Conduit spacers shall be used with metal conduit placed on surfaces of concrete structures (See conduit detail).
3. Conduit hangers or straps shall not be attached directly to prestressed concrete beams except as shown in the plans and approved by the Engineer.
4. Conduit placement beneath existing paved surfaces shall be accomplished by jacking or boring in accordance with the pertinent provisions of Article 476.3 "Construction" of the Item "Jacking, Boring, or Tunneling Pipe," unless otherwise noted on the plans. Jacking, boring, or tunneling will not be paid for directly but will be subsidiary to the Item "Conduit." The Contractor shall backfill and compact the bore pits to bottom of conduit prior to installing connecting conduit or duct cable, to prevent bending of this connection. Duct cable shall be extended through conduit casings in one continuous length.
5. For all conduit placed by trenching, trenching and backfilling shall be in accordance with the Item, "Excavation and Backfill for Sewers," except for measurement and payment. Trenching depth shall provide a minimum of 18 inch cover over conduit, unless noted otherwise on the plans.
6. With approval of the Engineer, conduit placed under new roadways may be trenched in subgrade and backfilled with excavated material. When approved by the Engineer, conduit may be trenched in sub-base but must be backfilled with cement-stabilized base. Conduit placed after base or surfacing operation has begun must be jacked or bored. Conduit placed under existing roadways, driveways or sidewalks shall be placed as directed by the Engineer or as shown on plans.
7. Open ends of all conduit and raceways shall be fitted with temporary caps or plugs to prevent entry of dirt, debris and rodents during construction.
8. Conduit entry into junction boxes shall be made weathertight using threaded fittings into hubs, or with sealing locknuts inside and out.
9. The ends of all metallic conduit terminating in a ground box, enclosure, junction box or light pole base shall be fitted with insulated grounding bushings unless bossed hubs are used. A bonding jumper shall be installed from grounding bushing to nearest ground rod, grounding lug, or grounding conductor. At service poles, bonding jumper shall be AWG Size No. 6. All other jumpers shall be minimum size AWG No. 8. Conduit used as casing under roadways for duct cable need not be grounded if duct extends full length through the casing.
10. Conduit ends shall be sealed with heat shrink boots or tubes with sealant, silicone caulking or shall be sealed by other methods approved by the Engineer. Sealing shall be done after completion of any required pull tests.
11. All conduit entering ground boxes and pole bases and used to carry individual conductors shall be furnished with bell end fittings or bushings.
12. Where called for on the plans, trenched conduit shall be placed on a 2-inch sand cushion and backfilled with a minimum of 6 additional inches of sand fill.
13. Conduits entering ground boxes shall be placed so that the conduit ends shall be not less than 5 inches nor more than 9 inches from the box cover (See ground box detail).



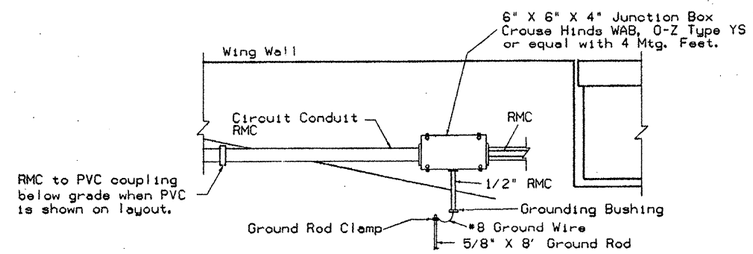
CONDUIT STRAP DETAIL

(Attachment to concrete surfaces)
(See para. II.B.2)



CONDUIT HANGER DETAIL

(Attachment to horizontal surfaces)
(See II.B.2)



NOTES

1. Conduit shall be 2" RMC for duct cable entry to junction box.
2. Ground rod clamp to be Blackburn GG 5/8H, Weaver W5/8 or equal.
3. Conduit for ground wire shall have grounding type bushing.
4. Surface mounting shown, for conduit to be placed in structure use flush-mounted box, Crouse Hinds WEB, O-Z Type YU or equal.
5. Bond junction box to grounding conductor.

CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

CONDUIT (ITEM 618)

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

ELECTRICAL DETAILS

ED (1) - 92

ORIGINAL DRAWING DATE: 01-92		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
DN.: K. A. B.	REVISIONS	15	6	NH 90(191)M, etc		337A
CK.: T. B.		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DN.: R. E. S.		BEXAR		2452	02	023	IH 10
CK.: T. B.							

Maintenance and Operations Division (D-18) ZFAD(122,106) ED192.DGN etc

III. ELECTRICAL CONDUCTORS (ITEM 620).

A. MATERIALS

1. All conductors shall be of annealed copper meeting the requirement of ASTM B-3 or B-8 and the NEC.
2. Insulated conductors shall be NEC Type XHHW or Type USE(XLP). Conductors in circuits containing two or more insulated conductors shall be color-coded at each accessible point (i.e., ground boxes, pole bases, junction boxes). Color-coding for No. 10 and smaller shall be by continuous jacket color. Color-coding of electrical conductors No. 8 or larger may be by continuous jacket color or colored tape. Tape marker shall consist of half-lap layer of tape covering a six inch length of jacket.
3. Insulated conductors shall be marked in accordance with Article 310 of the NEC, and shall meet the requirements of Underwriters Laboratories' Standards.
4. Bonding conductors No. 8 and smaller, tied to ground rods, shall be solid. Connection of bonding conductor to ground rod shall be made using UL listed connectors designed for such purpose.
5. Neutral conductors shall be insulated and shall be white, or black with white tape marking. White shall not be used for any other conductor. Grounding conductors shall be bare or if insulated shall have green jacket or green tape marking. Green shall not be used for any other conductor.

B. CONSTRUCTION METHODS.

1. A non-metallic pull rope shall be used in pulling conductor in non-metallic conduit.
2. After installation and prior to connecting ends, each continuous run of insulated conductor shall have a minimum D.C. insulation resistance of five megohms when tested at 1000 volts D.C. All or part of conductor system may be tested at the Engineers' option. Conductors exhibiting an insulation resistance of less than five megohm shall be replaced or otherwise corrected by the Contractor at his own expense.
3. After conductor is placed in conduit, a pull test will be made on conductors. When any length of conductor cannot be freely pulled the Contractor shall make any needed alterations or repairs at his expense.
4. Conductors in illumination poles shall be supported by a J-hook in top of pole.
5. A sufficient length of conductor shall be left in ground boxes (two feet minimum to point of splice, three feet minimum when conductor is pulled through with no splice), enclosures, and pole bases (one foot minimum) for making up connections.
6. Splices shall be made only at locations permitted by the Engineer and shall be made with approved compression sleeves or split bolt connectors. Splices shall be insulated with heavy-wall heat shrink tubing containing factory-applied sealant. Heat shrink sleeves shall lap conductor insulation a minimum of 2 inches on both sides of the splice. If split bolt connectors are used, connectors shall be covered with two half-lap layers of rubber tape or heat shrink tape before insulation is applied.
7. When approved by the Engineer, wire nuts may be used for No. 8 and smaller conductors in above-ground junction boxes, but not in pole bases or ground boxes. Wire nuts shall be positioned upright to prevent the accumulation of water.

IV. DUCT CABLE (ITEM 622).

A. MATERIALS.

Duct cable shall be the type manufactured by extruding the duct around the conductors in one operation at the manufacturing plant. Duct cable consisting of conductors pulled into the duct after the duct is extruded will be rejected. Wire in duct cable shall be type XHHW in accordance with the material requirement of Item 620, "Conductors".

B. CONSTRUCTION METHODS.

1. Duct cable shall be placed by the open trench method, except where otherwise noted, at a minimum depth of 18 inches unless otherwise indicated. Bends in duct cable shall be made in the manner recommended by the manufacturer. Minimum bending radius shall be 15 inches for 1-inch duct and 18 inches for 1-1/4 inch duct.
   Handling of duct cable reels and installation of duct shall be as recommended by the manufacturer. Duct entering ground boxes shall be placed so that the duct ends shall be not less than 5 inches nor more than 9 inches from the box cover. Duct for duct cable is designed as a conduit system and shall be considered as such in NEC interpretations. Duct shall not be spliced. Ends of duct shall be cut neat and straight and shall be reamed to remove sharp edges.
2. All ducts entering ground boxes shall be securely lashed together in vertical position. After duct cable has been installed, a pull test will be made on conductors. If conductors cannot be freely pulled, Contractor shall replace or otherwise adjust installation to free up the conductors. Duct cable ends shall be sealed with approved compound or with heat-shrink material after pull test is completed.
3. Where noted on plans, duct cable shall be placed on a 2-inch sand cushion and backfilled with a minimum 6 inches of sand.
4. Duct cable shall be encased in conduit when shown on the plans. Duct cable shall be extended through the conduit casing in one continuous length.

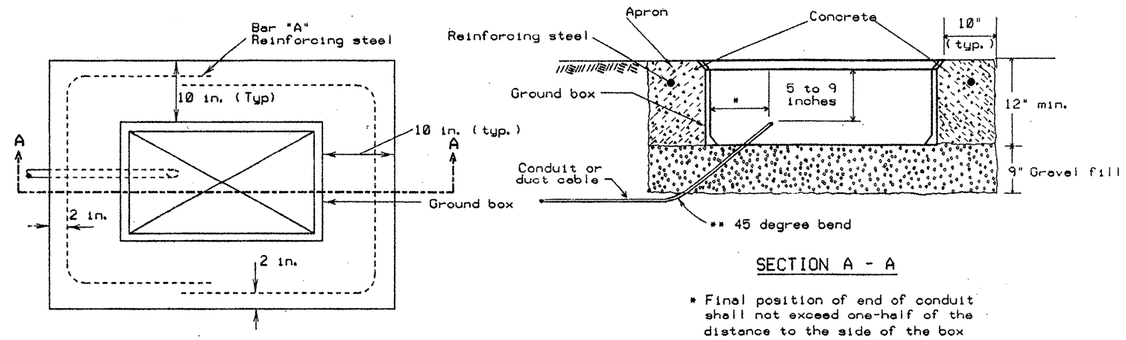
V. GROUND BOX (ITEM 624).

A. MATERIALS.

1. Ground boxes shall be concrete or polymer concrete, as required by the descriptive code shown elsewhere.
2. All ground boxes and covers shall be permanently marked with manufacturer's name or logo and manufacturer's model number.
3. Covers shall be bolted down. Bolt holes shall be arranged to drain dirt.
4. When steel covers are required, covers shall be provided with a grounding lug with 1/2 - 13 NC female threads on the underside of the cover.
5. Concrete ground boxes shall be constructed of reinforced concrete as detailed elsewhere on the plans. Concrete shall be in accordance with Item 421, "Concrete for Structures", except for measurement and payment. Reinforcing steel shall be in accordance with Item 440, "Reinforcing Steel", except for measurement and payment.
6. Polymer Concrete boxes shall meet the following requirements:
   a. Boxes shall be manufactured from Reinforced Polymer Concrete (RPM) composed of borosilicate glass fiber, a catalyzed polyester resin and an aggregate. Side walls may be fiber reinforced polymer.
   b. Minimum inside dimensions shall be as follows (width x length x depth):
      Type A shall be 12 inches x 23 inches x 11 inches, (122311)
      Type B shall be 12 inches x 23 inches x 22 inches, (122322)
      Type C shall be 16 inches x 29 inches x 11 inches, (162911)
      Type D shall be 16 inches x 29 inches x 22 inches, (162922)
      Type E shall be 12 inches x 23 inches x 17 inches, (122317)
   c. Bottom edge of box or extension shall be footed with a minimum 1 1/4 inch flange.
   d. Ground boxes shall be rated for heavy duty loading (20,000 lbs. over a 10 in. by 10 in. area of the lid and 600 lbs. per sq. ft. side wall). The model of ground box proposed shall have been tested by a laboratory independent of the manufacturer to meet loading requirements. Certification of such tests shall be submitted to the Engineer for approval.
   e. Covers shall be 2 inch (nominal) thick polymer concrete. Cover shall be secured with two 1/2 inch stainless steel bolts. Bolts shall be captive and shall withstand a minimum of 70 ft-lbs torque and shall have a minimum 750 lbs straight pull out strength. Covers shall be skid resistant, minimum 0.5 coefficient of friction. Covers shall be interchangeable between manufacturers and shall conform to the dimensions shown below. Cover shall be legibly imprinted with the words "Danger, High Voltage," in minimum 2 inch letters. When required, other cover lettering shall be as shown elsewhere on the plans.

B. CONSTRUCTION METHODS.

1. Steel covers shall be bonded to grounding conductor with a 3 foot jumper, Blackburn TTC4 or Burndy KC22B2 connector and split bolt connector.
2. Where indicated on the plans, ground box will be encased in concrete apron as detailed below. Construction of apron including concrete and reinforcing steel shall not be paid for directly but shall be subsidiary to the ground box. Field bending of reinforcing steel will be allowed.
3. A minimum gravel fill of 9 inches shall be placed under each ground box.
4. The Contractor may cut the necessary conduit holes in box extensions only. Holes must be 18 inches or more below the cover.



PLAN VIEW

SECTION A - A

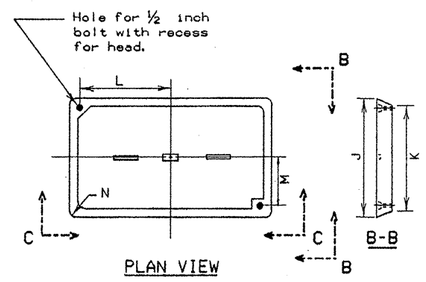
* Final position of end of conduit shall not exceed one-half of the distance to the side of the box opposite of the conduit entry.

** 90 degree when approved by the Engineer.

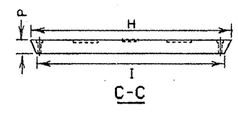
APRON FOR GROUND BOXES

(Where required by plan note)

Class A concrete apron reinforced with No. 3 reinforcing steel. Subsidiary to Item 624.



PLAN VIEW



C-C

GROUND BOX COVER

GROUND BOX COVER DIMENSIONS

BOX	DIMENSIONS (INCHES)							
SIZE	H	I	J	K	L	M	N	P
12 in x 23 in	23¼	23	13¾	13½	9⅞	5⅛	1⅜	2
16 in x 29 in	30½	30¼	17½	17¼	13¼	6¾	1⅜	2

ELECTRICAL CONDUCTORS (ITEM 620)
DUCT CABLE (ITEM 622)
GROUND BOXES (ITEM 624)

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

ELECTRICAL DETAILS

ED (2) - 92

ORIGINAL DRAWING DATED 01-92		STATE DISTRICT	FEDERAL AID PROJECT		SHEET
DN:- K. A. B.	REVISIONS	15	6	NH 90(191)M, etc	337B
CK:- T. B.		COUNTY		CONTROL SECT. / JOB	HIGHWAY
DN:- R. E. S.		BEXAR		0452 02 1023 etc	1604
CK:- T. B.					

SERVICE POLE NOTES

Faulty fabrication or poor workmanship in any material, equipment, or installation will be considered justification for rejection. Materials and installation shall comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Where manufacturers provide warranties or guarantees as a customary trade practice, Contractor shall furnish to the State such warranties or guarantees. The location of conductors, conduit, junction boxes, duct cable, ground boxes, transformer stations, and service poles are diagrammatic only and may be shifted by the Engineer to accommodate local conditions.

All material shall be new and unused. Alternate material equal to or better than those specified may be substituted with the approval of the Engineer. The Contractor shall contact the utility company for metering requirements and any additional requirements and shall comply with all utility company requirements.

All work, materials, services, and incidentals, whether or not specifically shown on the plans, which may be necessary to obtain electrical power and for a complete and proper service pole installation as shown on the plans, shall be performed, furnished and installed by the Contractor except that the costs involved in extending primary lines to service pole locations will be paid for under Force Account work. When primary line extensions are required, the Contractor shall consult with the appropriate utility company to determine costs and requirements and shall coordinate the utility company's work as approved by the Engineer.

All conduit and conductors required for service poles shall be in accordance with the materials and construction methods articles of the Items, "Conduit" and "Electrical Conductors" respectively.

Lugs on circuit breakers and contactors shall be large enough to accept branch circuit conductors sized as shown on the plans. Where branch circuit conductors are enlarged to reduce voltage drop beyond the capacity of lugs, the lugs shall be changed or distribution blocks shall be installed in the service enclosure to splice branch circuit conductors to the maximum wire size for which the circuit breaker or lighting contactor is rated to accept.

1. Safety switch. Shall be placed ahead of meter, when switch is required. The switch shall be of the heavy duty type, unfused, NEMA 3R enclosure and equipped with a solid neutral (s/n) assembly. Switch shall be UL listed and shall be rated as service entrance equipment. Switches shall be rated 480VAC (min.) for 240 / 480V services and rated 240VAC (min.) for 120 / 240V services. The Contractor shall modify switch to allow padlocking in the "on" position.
2. Meter. Where metering is required, utility company will provide the meter base. The Contractor shall install the meter base.
3. Service Assembly Enclosure. Enclosure shall be sized to provide adequate wiring space in accordance with NEC. All external screws shall be type 302 stainless steel. All enclosures shall be fitted with equipment-mounting panels installed inside enclosure on collar studs or tapped bosses. Panels shall be 12-gauge steel or 0.10"-thick aluminum, primed and painted white. All enclosure doors shall have stainless steel closure clamps and provisions for padlocking. Conduit entries into the top of enclosures shall have threaded hubs. Enclosure / disconnect combination shall be UL listed and rated as service entrance equipment. Two 1/8 inch drain holes shall be placed in bottom of enclosure at opposite corners. All enclosures shall be permanently labeled "Danger High Voltage" on the front of the door, minimum one inch letters. The service pole descriptive code specifies that the enclosure shall be one of the following types:
   a. GS: Galvanized steel enclosures shall be NEMA 3R-rated, constructed of 14-guage galvanized steel, with piano hinged door, and drip shield.
   b. SS: Stainless steel enclosure shall be NEMA 3R-rated, with piano hinged door constructed of 14 guage Type 304 stainless steel. All hardware including hinge pin shall be stainless steel.
   c. AL: Aluminum enclosures shall be NEMA 3R-rated, with piano hinged door constructed from 0.08 inch thick aluminum. All hardware including hinge pin shall be stainless steel.
   d. NM: Non-metallic enclosures shall conform to NEMA standard for Type 3R enclosures and shall be constructed of molded fiberglass, PVC, or other material approved by the Engineer.
4. Main Disconnect. Main disconnect device shall be a fusible switch or circuit breaker, as shown on Service Pole Summary. Switch shall be UL and NEMA-rated Type HD (heavy duty), flange mounted or front mounted in the service assembly enclosure. Switch shall be two pole, rated 240 volts or 480 volts as required. Switch shall have clips for Class R fuses. Circuit breaker shall be UL and NEMA-rated thermal-magnetic circuit breaker, flange-mounted or front mounted in the service assembly enclosure. Breaker shall be two-pole, (one-pole 480V for Ty. B), rated 480 volts or 240 volts as required. Circuit breakers shall have a minimum interrupting rating of 14,000 Amps. Voltage and amperage rating of switches and breakers shall be as shown elsewhere on Service Pole Summary. Switch and breaker handles shall be capable of padlocking in "On" and in "Off" positions. Main disconnect shall be operable from the outside of the enclosure and shall be interlocked to prevent the service assembly enclosure door from being opened with disconnect in the "On" position. The interlock shall have a manual override such that the main disconnect is capbable of being turned "On" with the enclosure door open.
5. Lightning Arrester. Arresters shall be MOV-type secondary surge arresters rated 650 volts for 480V services and 175 volts for 120 / 240V services and shall meet ANSI, IEEE, UL, and NEMA Standards. Mounting brackets shall be provided for mounting the arresters inside the service assembly enclosures or at the top of pole, as required elsewhere.
6. Fuse Blocks. Fuse blocks shall be rated 600 volts (min.) and shall accept a 13/32" x 1/2" fuse. Fuse blocks shall be furnished with integral insulated fusepullers and be suitable for mounting to the back panel of the enclosure. Fuses for 120 / 240 volt service shall be rated 250 volts (min.) and fuses for 480 volt service shall be rated 500 volts (min.). Fuses shall be 3 amp, dual-element (time-delay) fuses.
7. Control Transformer. Control transformer shall be rated 250 sealed VA and a minimum inrush rating of 1200 VA at 30 percent power factor. Voltage rating shall be 480-120 volts.
8. Control Station ("H-O-A" Switch). Control station shall be a maintained-contact, three position selector switch in a NEMA 1 enclosure. Switch shall be rated 600 volts and shall be fitted with "Hand-Off-Auto" legend.
9. Photo Electric Control. shall consist of a photocell, internal lightning arrester and relay mounted inside a weatherproof enclosure with standard 3-prong twist lock photocell plug and receptacle. The enclosure shall be made of poly-acrylic with clear acrylic window. Enclosure chassis shall be molded phenolic plastic. The photocell shall have a polyethylene gasket, and shall have a hermetically sealed cadmium sulfide cell. The arrester shall have an enclosed type expulsion arrester rated 2.0 kV sparkover with 10,000 amps follow-through. Relay shall be time delay type with normally closed contacts. Photo electric control shall be rated 1800 VA, 105-285 volts. Turn-on range shall be 1 ± 0.5 footcandles, turn-off range two footcandles higher than turn-on. Photo electric control for enclosure mounting shall consist of a hermetically sealed cadmium sulfide photocell and thermal relay in a polycarbonate housing. The photocell window shall be designed to fit a 1/2 inch knock-out. Control shall be rated for 120 volts or 240 volts as required, with a load rating of 1000 VA, and shall be UL listed. Enclosure mounted photocell shall be mounted in the side of the enclosure.

Lighting Contactor. Lighting contactor shall be a NEMA lighting contactor, two-pole, electrically held type designed to control high pressure sodium lighting loads, with silver alloy double break contacts rated at 480 volts or 600 volts.

11. Power Distribution Terminal Blocks. Power distribution terminal blocks shall be rated for 600 volts and shall be used for line side connections to branch circuit breakers where more than one circuit breaker is required. Lugs on blocks shall be properly sized for conductors being used. Only one conductor shall be placed under each lug. Blocks shall have line lugs for one (min.) conductor per phase and load lugs for four (min.) conductors per phase.
12. Neutral/Ground Bus. Neutral/ground bus shall be a factory-made insulated, groundable bus with properly sized lugs for grounding and neutral conductors.
13. Branch Circuit Breakers. Unless otherwise shown on the plans, circuit breakers shall be the molded case thermal-magnetic type. Circuit breaker voltage shall be compatible with their use. Single pole circuit breakers shall be used for 480 volt type B service. Circuit breakers shall have a minimum interrupting capacity of 10,000 amps.
14. Circuit Breaker Panelboard. Panelboard shall be a commercial/industrial type with bolt-on branch breakers in a NEMA 3R enclosure. Panelboard for 480 volt service shall be a MLO (Main Lugs Only) 240/480 or 277/480 volt three-wire single phase, S/N panelboard. Panelboards shall be UL-listed and shall meet Federal Specification W-P-115b, Type 1, Class 1 requirements and shall have a minimum of 12 one-pole spaces. Tandem and half-width breakers will not be allowed. Conduit entries into the top of enclosure shall have threaded hubs.
15. Load Center. Load center shall be a circuit breaker panelboard rated 120/240 volts three wire, single phase, S/N in NEMA 3R enclosure. Main breaker shall have a minimum rating of 70 amps and shall have space for a minimum of six full size breakers. Tandem and half-width breakers will not be allowed. Load centers shall be UL listed, and shall meet Federal Specification W-P-115b, Type 1, Class 2 requirements. Load center shall have a threaded hub conduit entry for conduit entering the top of the enclosure. Load centers shall be rated as service entrance equipment.

EXPLANATION OF SERVICE POLE DESCRIPTIVE CODE

SERV POLE TY X(XXX/XXX)XXX(XX)XX(X)XX(X)

Schematic Type

Service Voltage (V_1, V_2)

Main Disconnect Amp Rating

SS= Safety switch ahead of meter
NS= No switch ahead of meter and/or no meter required

Enclosure Type
GS= Galvanized steel
SS= Stainless steel
AL = Aluminum
NM= Non-metallic

Photocell (when req'd) and Lightning Arrester Location
T= Top of pole
E= Enclosure mounted

Service Support Type
TP= Timber pole
SP= Steel pole
SF= Steel frame
OT= Pole by others
EX= Existing pole
TS= Switch gear to be placed on traffic signal pole
RT= Rectangular structural tubing

O= Overhead service
U= Underground service

Example: SERV POLE TYA(240/480) 060(NS)GS(T)TP(O)

SERVICE POLES NOTES

(ITEM 628)

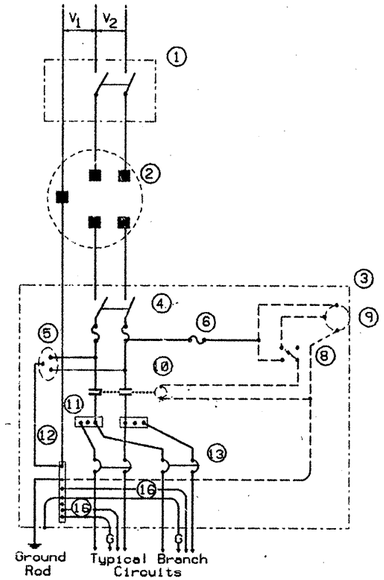
STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

ELECTRICAL DETAILS
ED (3) - 92

ORIGINAL DRAWING DATE: 01-92		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
DN.: K.A.B.	REVISIONS	15	6	NH 90(191)M, Etc			337C
CK.: T.B.		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DW.: R.E.S.		BEXAR		2452	02	023	1604
CK.: T.B.							

Maintenance and Operations Division (D-18) ZFA3:[122,106] ED392

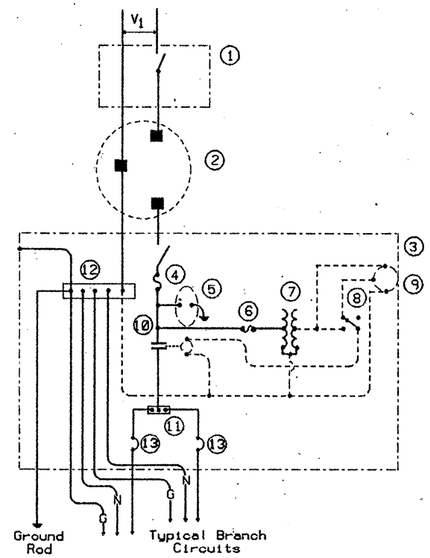
PLOTTED 03-01-93



SCHEMATIC TYPE A

THREE WIRE

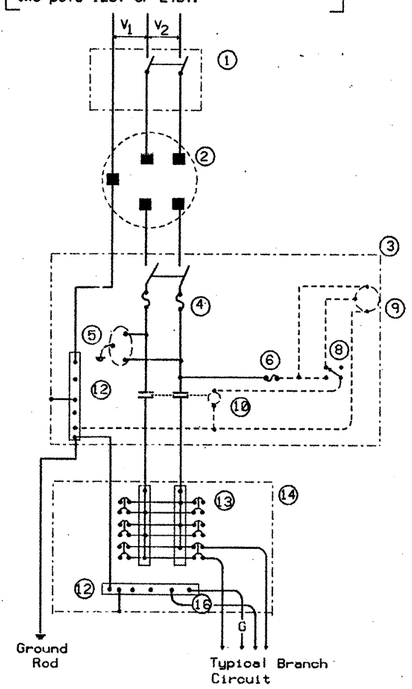
Maximum branch circuit size: 100 amps for two pole 480V, 125 amps for one or two pole 120V or 240V.



SCHEMATIC TYPE B

TWO WIRE

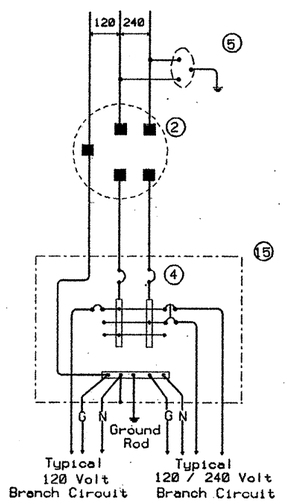
Maximum branch circuit size: 50 amps for one pole 480V, 125 amps for one pole 120V or 240V.



SCHEMATIC TYPE C

THREE WIRE

Maximum branch circuit size: 100 amps for two pole 480V, 125 amps for two pole 120V or 240V.



SCHEMATIC TYPE D

120/240 VOLTS - THREE WIRE

Install photocell and lighting contactor when shown on service pole summary.

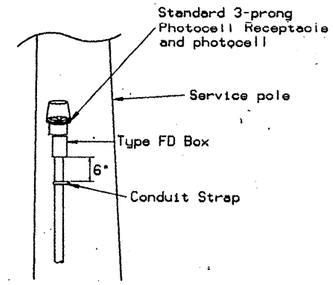
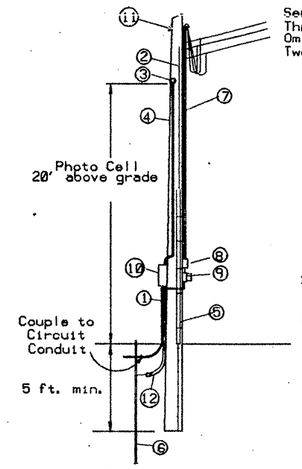


PHOTO ELECTRIC CONTROL TOP MOUNTED

SCHEMATIC LEGEND

1. Safety Switch (when required)
2. Meter (when required)
3. Service Assembly Enclosure
4. Main Disconnect (Switch or Breaker- See Summary, shown elsewhere)
5. Lightning Arrestor
6. Fuse Block
7. Control Transformer (480-120 Volts) (for Type B only)
8. Control Station ("H-O-A" Switch)
9. Photo Electric Control (enclosure-mounted shown)
10. Lighting Contactor
11. Power Distribution Terminal Blocks
12. Neutral/Ground Bus
13. Branch Circuit Breaker (See Summary shown elsewhere)
14. Circuit Breaker Panelboard (See Summary shown elsewhere)
15. Load Center
16. Neutral conductor (when required)

——— Power Wiring
- - - - - - - Control Wiring



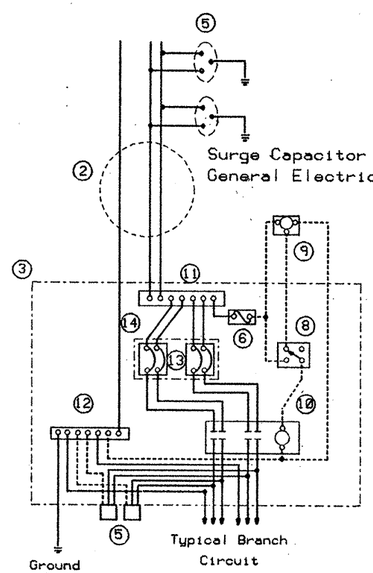
1 - RM conduit -same size as branch circuit conduit
2 - No. 6 bare ground wire to butt-wrap ground
3 - Photo Electric Control and 1/2" RM conduit - See detail
4 - Class 5 pole, 30' minimum or as otherwise required by NESC and utility company
5 - Ground wire moulding - 8' min.
6 - 5/8" X 8' Copper clad ground rod
7 - Service conduit and conductors - See Summary shown elsewhere
8 - Safety switch (when required)
9 - Meter (when required)
10 - Service enclosure
11 - Lightning arrestor (top mounted)
12 - No. 6 bare grounding electrode conductor in 1/2" PVC to ground rod

SERVICE SUPPORT TYPE TP (O)

(timber pole, overhead service, typical arrangement)

TIMBER POLE NOTES

1. For projects requiring more than 10 timber transformer and/or service poles, poles shall be preservative-treated in accordance with the Item "Timber Preservative and Treatment".
2. For projects requiring 10 or fewer timber poles, treatment shall be as stated above. Contractor may purchase poles locally provided that preservative treatment meets requirements stated above, the source and treatment are documented and the poles are marked in accordance with ANSI 05.1.
3. Conduit and conductors attached to service pole and underground within 12 inches of service pole shall not be paid for directly but shall be subsidiary to the service pole.
4. Install photo electric control on North side of pole or in service enclosure as required.
5. Attach service enclosure with galvanized channel (Unistrut, Kindorf, or equal). Gain pole two places to provide flat surfaces. Paint ends of channel with zinc rich paint.



Surge Capacitor Westinghouse No. 1N02180A05
General Electric No. 9L18BAB301 Or Equal

SCHEMATIC TYPE S

240/480 VOLTS - THREE WIRE

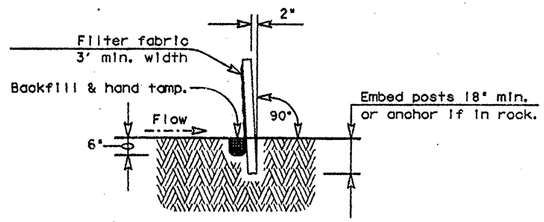
SERVICE POLE SCHEMATICS
SERVICE SUPPORT TYPE TP (OVERHEAD)
(ITEM 628)

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

ELECTRICAL DETAILS
ED (4) - 92
(DIST. 15)

ORIGINAL DRAWING DATE: 01-92		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.: K. A. B.	REVISIONS	15	6	NH 90(191)H, etc	3370
CK.: T. B.		COUNTY		CONTROL / SECTION / JOB	HIGHWAY
DN.: R. E. S.		BEXAR		2452 / 02 / 023	1604
CK.: T. B.					

OSA3: [317152]ED492D15 DGN. 1



SECTION A-A

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

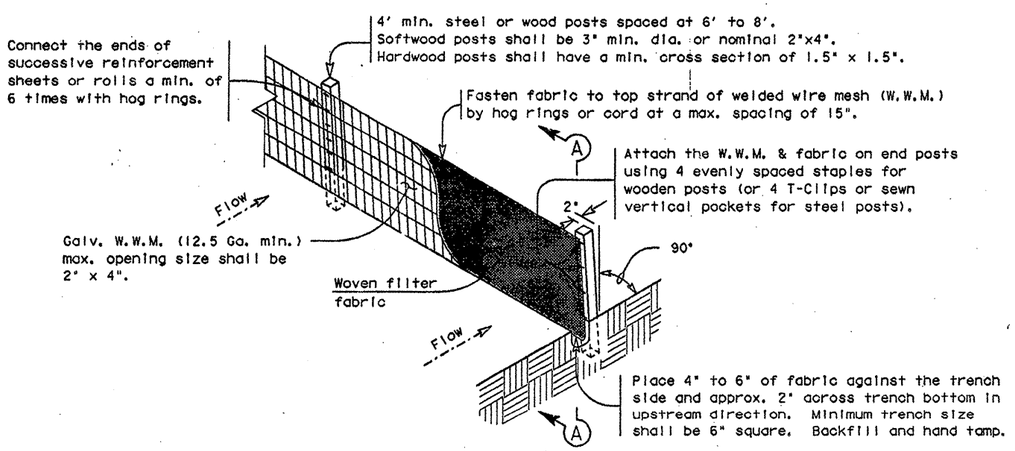
Sediment control fence should be sized to filter a max. flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

PLAN SHEET LEGEND

Sediment Control Fence —— SCF ——

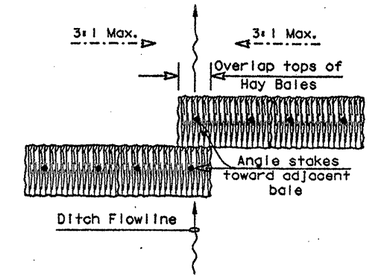
GENERAL NOTES

1. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

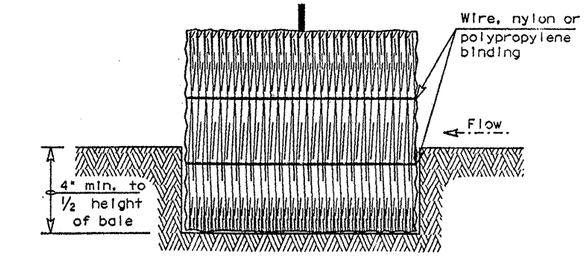


TEMPORARY SEDIMENT CONTROL FENCE

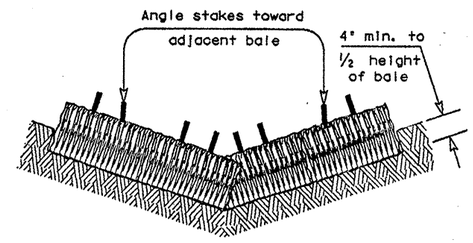
—— SCF ——



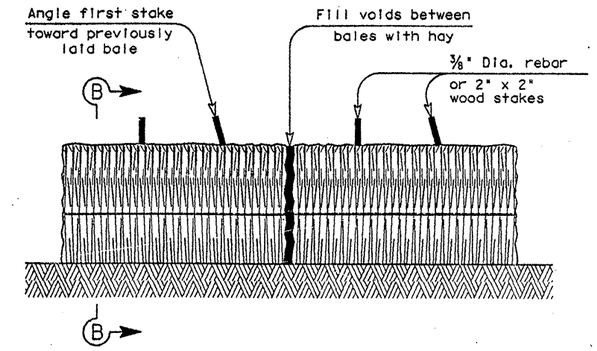
PLAN VIEW



SECTION B-B



PROFILE VIEW



BALED HAY FOR EROSION CONTROL

—— BH ——

PLANS SHEET LEGEND

Baled Hay —— BH ——

GENERAL NOTES

1. Hay bales shall be a minimum of 30" in length and weigh a minimum of 50 Lbs.
2. Hay bales shall be bound by either wire or nylon or polypropylene string. The bales shall be composed entirely of vegetable matter.
3. Hay bales shall be embedded in the soil a minimum of 4" and where possible ½ the height of the bale.
4. Hay bales shall be placed in a row with ends tightly abutting the adjacent bales. The bales shall be placed with bindings parallel to the ground.
5. Hay bales shall be securely anchored in place with ⅜" Dia. rebar or 2" x 2" wood stakes, driven through the bales. The first stake shall be angled towards the previously laid bale to force the bales together.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

BALED HAY USAGE GUIDELINES

A Baled Hay Installation may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A two year storm frequency may be used to calculate the flow rate to be filtered. The installation should be sized to filter a maximum flow thru rate of 5 GPM/FT^2 of cross sectional area. Baled hay may be used at the following locations:

1. Where the runoff approaching the baled hay flows over disturbed soil for less than 100'. If the slope of the disturbed soil exceeds 10%, the length of slope upstream the baled hay should be less than 50'.
2. Where the installation will be required for less than 3 months.
3. Where the contributing drainage area is less than ½ acre.

For Baled Hay Installations in small ditches, the additional following considerations apply:

1. The ditch sideslopes should be graded as flat as possible to maximize the drainage flowrate thru the hay.
2. The ditch should be graded large enough to contain the overtopping drainage when sediment has filled to the top of the baled hay.

Bales should be replaced usually every 2 months or more often during wet weather when loss of structural integrity is accelerated.

TEXAS DEPARTMENT OF TRANSPORTATION

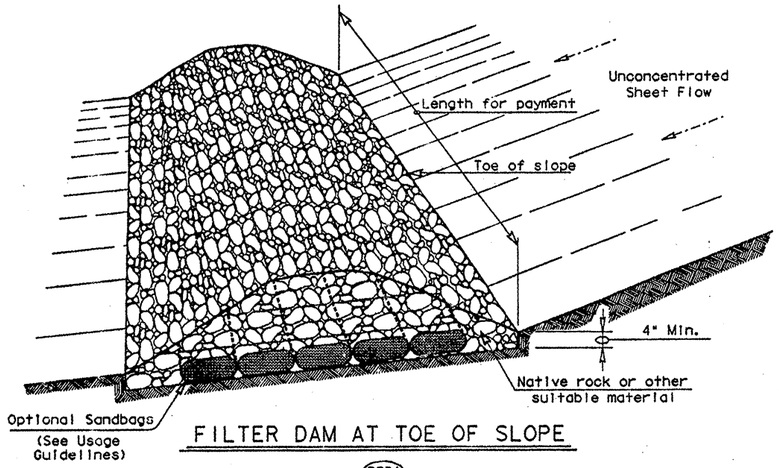
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & BALED HAY

EC(1)-93

MODIFICATIONS	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
	6	TEXAS	NH 90(191)M, Etc.				338
	STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
	15	Bexar		2452	2	23, Lr 1604	

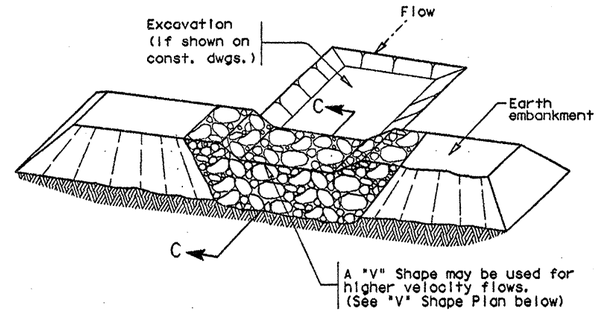
HIGHWAY DESIGN DIVISION (D-8)



FILTER DAM AT TOE OF SLOPE

RFD1

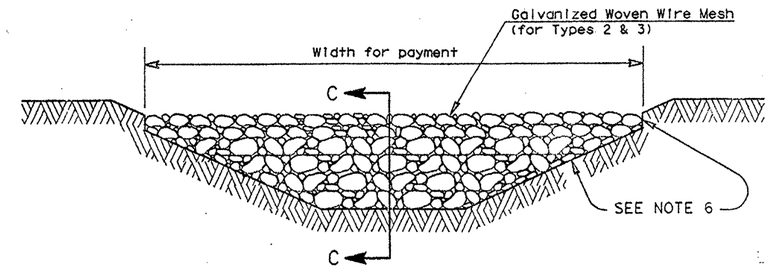
TYPE 1



FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2

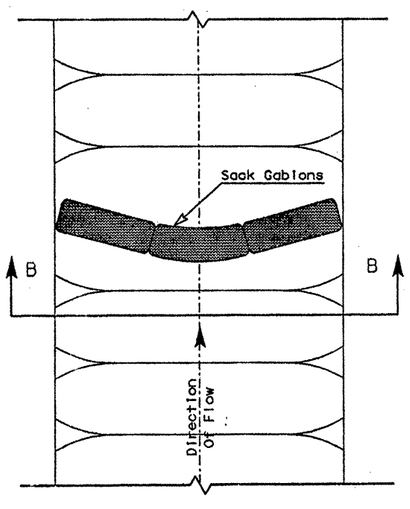
TYPE 1 OR TYPE 2



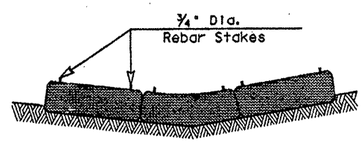
FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

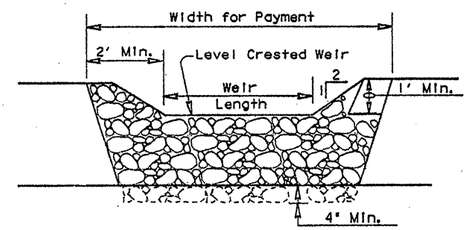
TYPE 1 OR TYPE 2



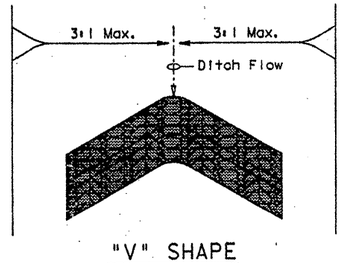
PLAN VIEW



SECTION B-B

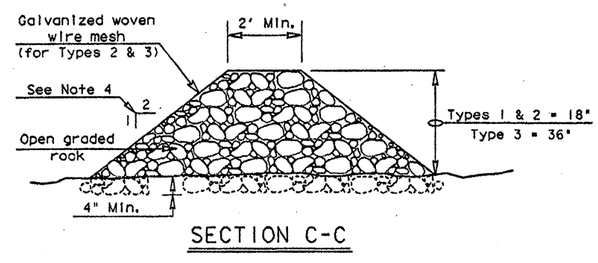


PROFILE



"V" SHAPE

(Plan View)



SECTION C-C

PLANS SHEET LEGEND

Type 1 Rock Filter Dam — RFD1

Type 2 Rock Filter Dam — RFD2

Type 3 Rock Filter Dam — RFD3

ROCK FILTER DAM USAGE GUIDELINES

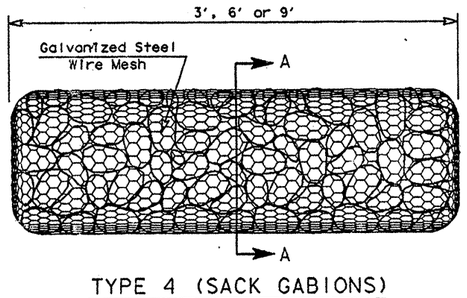
Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approx. 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

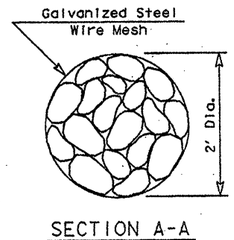
Type 2 (18" high with wire mesh): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions): Type 4 May be used in ditches and smaller channels to form an erosion control dam.



TYPE 4 (SACK GABIONS)



SECTION A-A

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. In stream use the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with 3/4" dia. rebar stakes.
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

TEXAS DEPARTMENT OF TRANSPORTATION

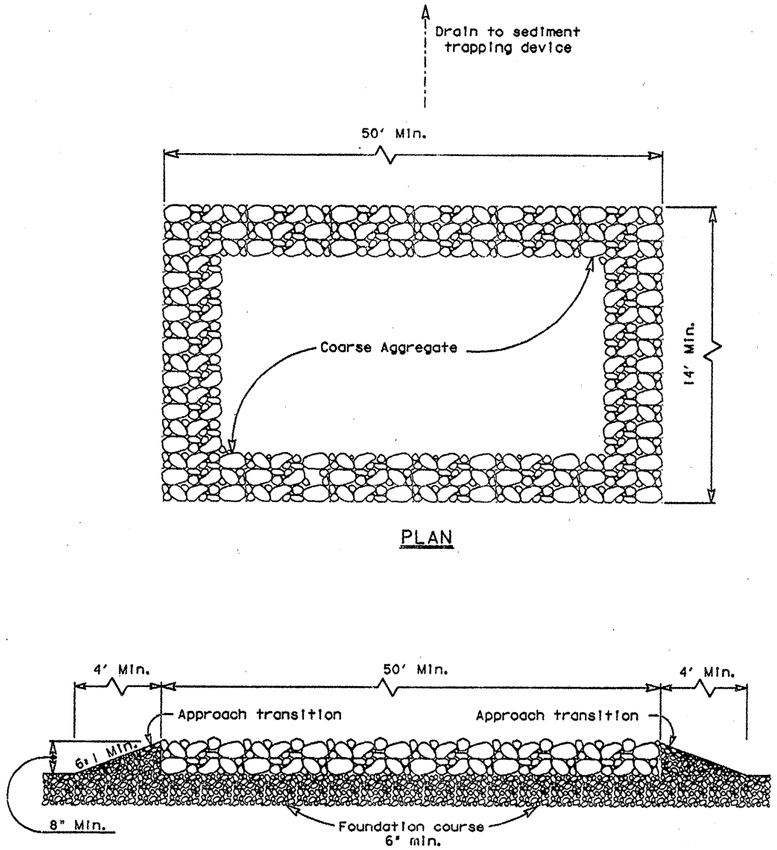
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-93

MODIFICATIONS	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
	6	TEXAS	NH 90(191)M, etc.			359
	STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
	15	Bexar	2452	2	23	Lp 1604

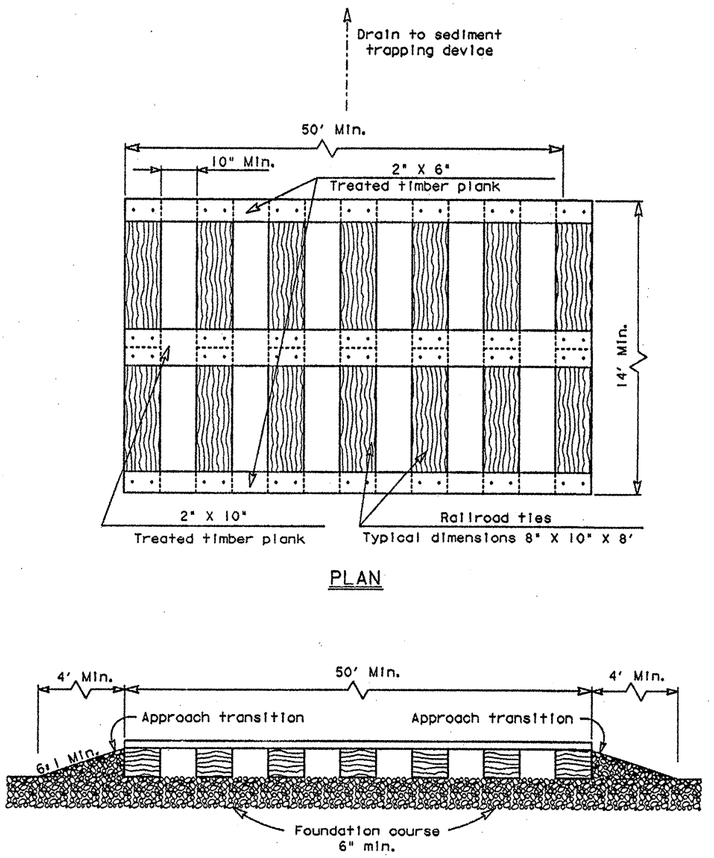
HIGHWAY DESIGN DIVISION (D-8)



PLAN

PROFILE

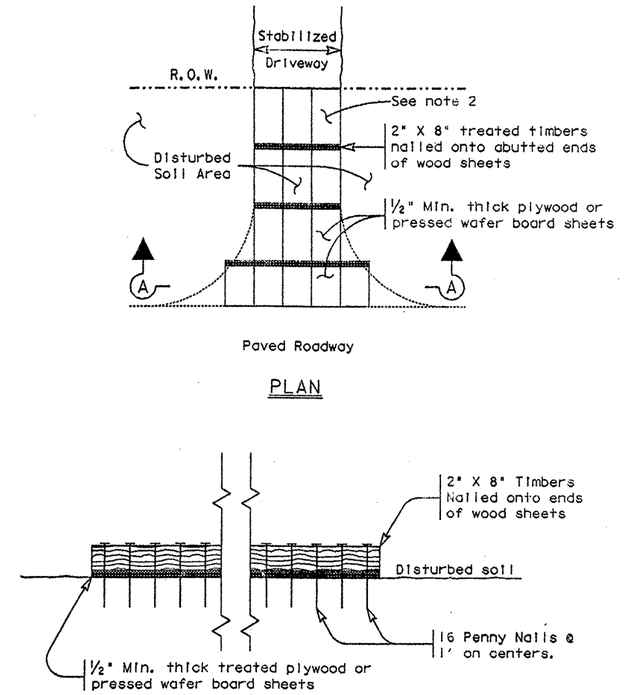
CONSTRUCTION EXIT (TYPE 1)



PLAN

PROFILE

CONSTRUCTION EXIT (TYPE 2)



PLAN

SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

GENERAL NOTES

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

GENERAL NOTES

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

GENERAL NOTES

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

TEXAS DEPARTMENT OF TRANSPORTATION

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-93

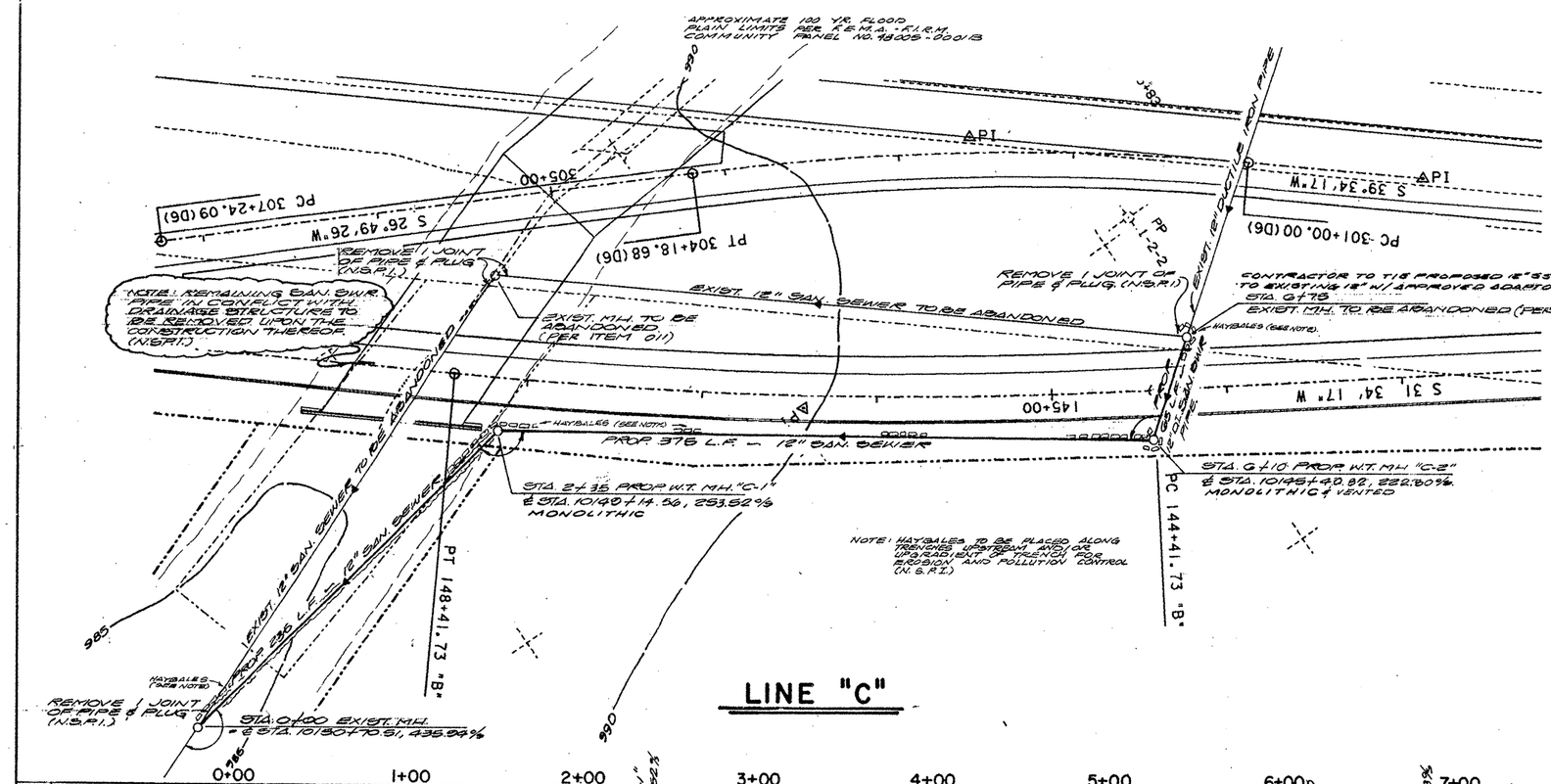
MODIFICATIONS	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
	6	TEXAS	NH 90(191)M, Etc.			339A
	STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
	15	Bexar	2452	2	23	Lp 1604

HIGHWAY DESIGN DIVISION (D-8)

1 2 3

1" x 22"

SCALE: 1" = 40' HORZ.
1" = 4' VERT.



CORROSION PROTECTION FOR DUCTILE IRON PIPE

ALL DUCTILE IRON PIPE USED IN THIS SYSTEM SHALL BE CORROSION PROTECTED ON BOTH THE INTERIOR AND EXTERIOR SURFACES. INTERIOR SURFACES SHALL BE CEMENT OR MORTAR WITH ASPHALTIC COATING, CORE TAR, EPOXY OR EQUIVALENT (N.S.P.I.)

CONTRACTOR TO CONTACT THE PARAGON CABLE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION AT 222-9961 OR 222-9962.

THE EXISTENCE AND LOCATION OF UNDERGROUND CABLE INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE. CONTRACTOR TO CONTACT THE TELEPHONE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION AT 954-4102. CONTRACTOR HAS THE RESPONSIBILITY TO PROTECT AND SUPPORT TELEPHONE COMPANY PLANT DURING CONSTRUCTION.

EXISTING UTILITIES

- E = ELECTRIC
  - OH = OVERHEAD
  - UG = UNDERGROUND
- C = CABLE T.V.
- G = GAS
- S = SANITARY SEWER
- W = WATER
- U.T. = UNDERGROUND TELEPHONE
- O.T. = OVERHEAD TELEPHONE
- ○ = MANHOLE
- ⊡ = WATER VALVE
- ⊿ = GAS VALVE
- ⊙ = POWER POLE
- = FIRE HYDRANT
- ⊙ = LIGHT POLE

TRENCH EXCAVATION PROTECTION

Contractor and/or Contractor's independently retained employee or structural design/geotechnical/safety/ equipment consultant, if any, shall review these plans and available geotechnical information and the anticipated installation site(s) within the project work area in order to implement contractor's trench excavation safety protection systems, programs and/or procedures for the project described in the contract documents. The Contractor's implementation of these systems, programs and/or procedures shall provide for adequate trench excavation safety protection that comply with as a minimum, OSHA standards for trench excavations. Specifically, Contractor and/or Contractor's independently retained employee or safety consultant shall implement a trench safety program in accordance with OSHA standards governing the presence and activities of individuals working in and around trench excavation.

CALL C.P.S. LOCATOR AT 227-3606 48 HOURS BEFORE BEGINNING ANY EXCAVATION.

DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181, C.P.S. MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES THAT ARE IN THE PROJECT AREA.

CONTRACTOR TO CONTACT THE TELEPHONE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION AT 954-4102. CONTRACTOR HAS THE RESPONSIBILITY TO PROTECT AND SUPPORT TELEPHONE COMPANY PLANT DURING CONSTRUCTION.

WHEN SEWER LINES ARE INSTALLED IN THE VICINITY OF WATER MAINS, SUCH INSTALLATION SHALL BE IN STRICT ACCORDANCE WITH THE TEXAS DEPARTMENT OF HEALTH "RULES AND REGULATIONS FOR PUBLIC WATER SYSTEMS" (1988 OR ANY REVISIONS THERETO). (NO SEPARATE PAY ITEM)

SHEET TOTALS

ITEM NO.	EST	UNIT	DESCRIPTION
8012 001	675	L.F.	TRENCH EXC. PROTECT.
5040	65	L.F.	12" SS (DI) (8'-10')
5040 011	2	EA.	S.S. (ABAND. EX. M.H.)
5040 013	1	CY.	CONC. CRADLES
5040 040	48	CY.	S.S. (CELL. PENC.) (CLASS A)
5040 045	2	EA.	S.S. (M.H.) (RING. END.)
5040 047	2	EA.	S.S. (M.H.) (COMP.) (0'-6')
5040	130	L.F.	12" S.S. (6'-8')
5040	479	L.F.	12" S.S. (8'-10')
5040 051	5	L.F.	S.S. (M.H.) (EXTRA DEPTH)
5040 001	78	C.Y.	CONC. ENCASEMENT
**	MONOLITHIC WATERTIGHT		

STATE OF TEXAS — REGISTERED PROFESSIONAL ENGINEER

11-9-90

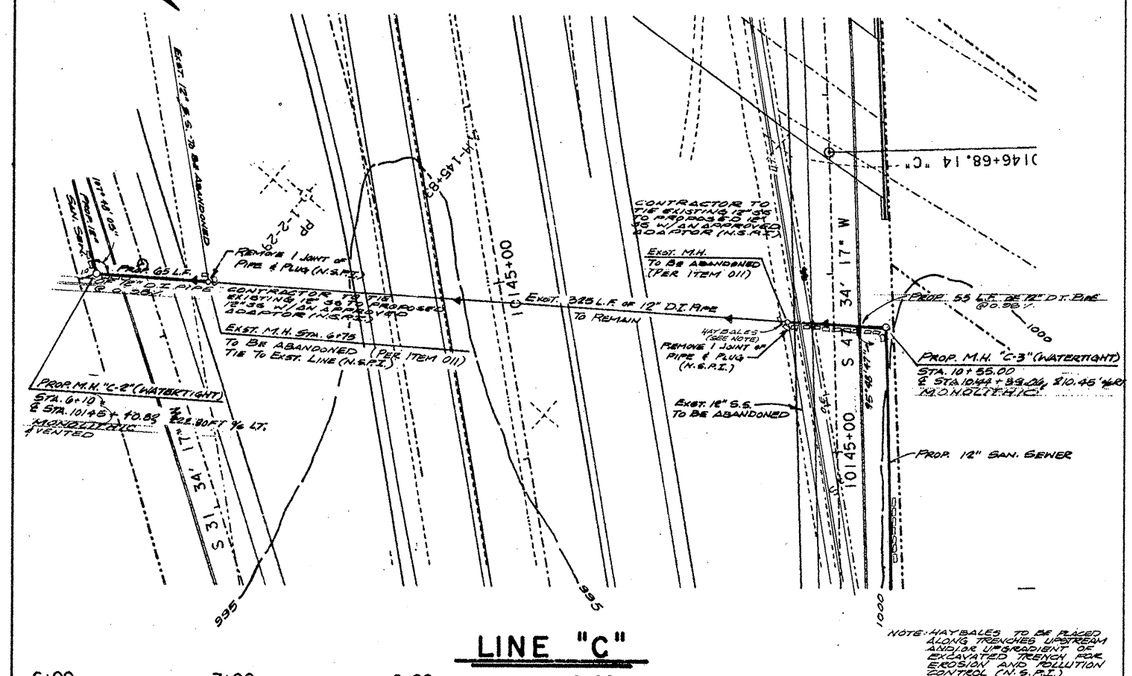
SANITARY SEWER LAYOUT

SHEET 1 OF 8

C. A. Bolner & Associates, Inc.
CONSULTING ENGINEERS
0622-02-00

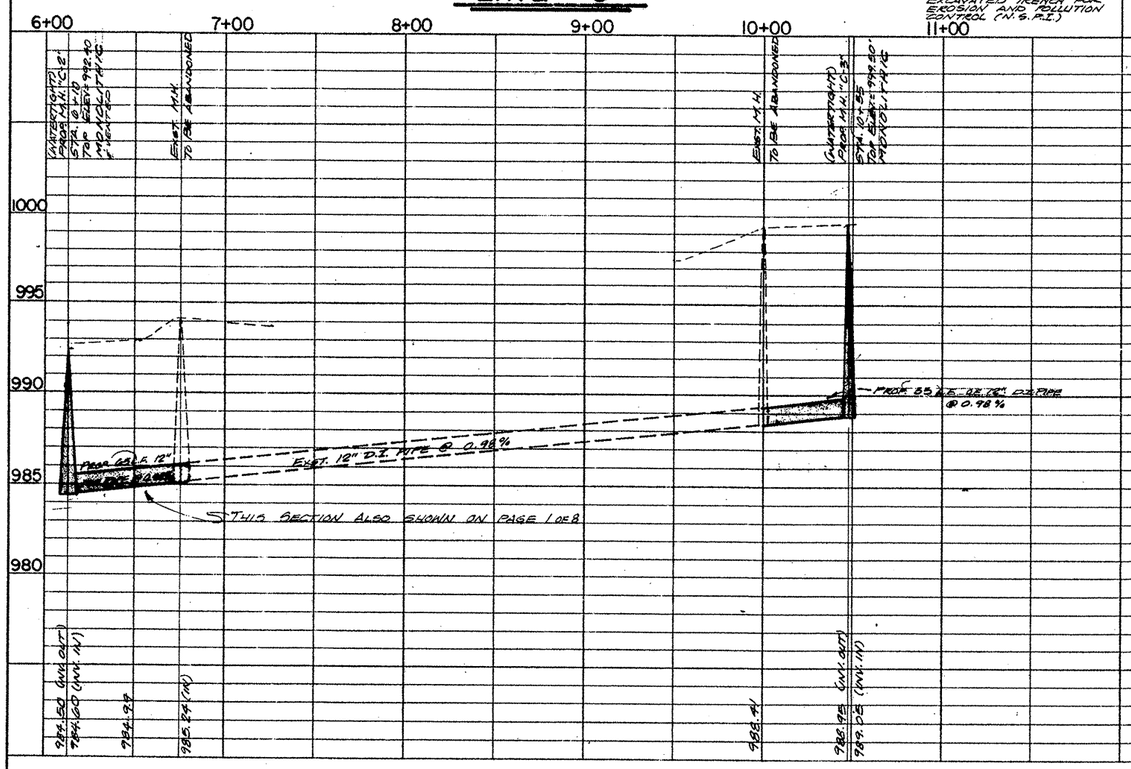
STATE	FEDERAL AID PROJECT NO.			SHEET NO.
TEXAS				3-2
COUNTY	CONT.	SECT.	JOB	HWY. NO.
BEXAR	2452	01	Q23	LP1604

SCALE: 1"=40' HORZ.
1"=4' VERT.



NOTE: HAYBALES TO BE PLACED ALONG TRENCHES UPSTREAM AND/OR UPGRADIENT OF EXCAVATED TRENCH FOR EROSION AND POLLUTION CONTROL (N.S.P.I.)

LINE "C"



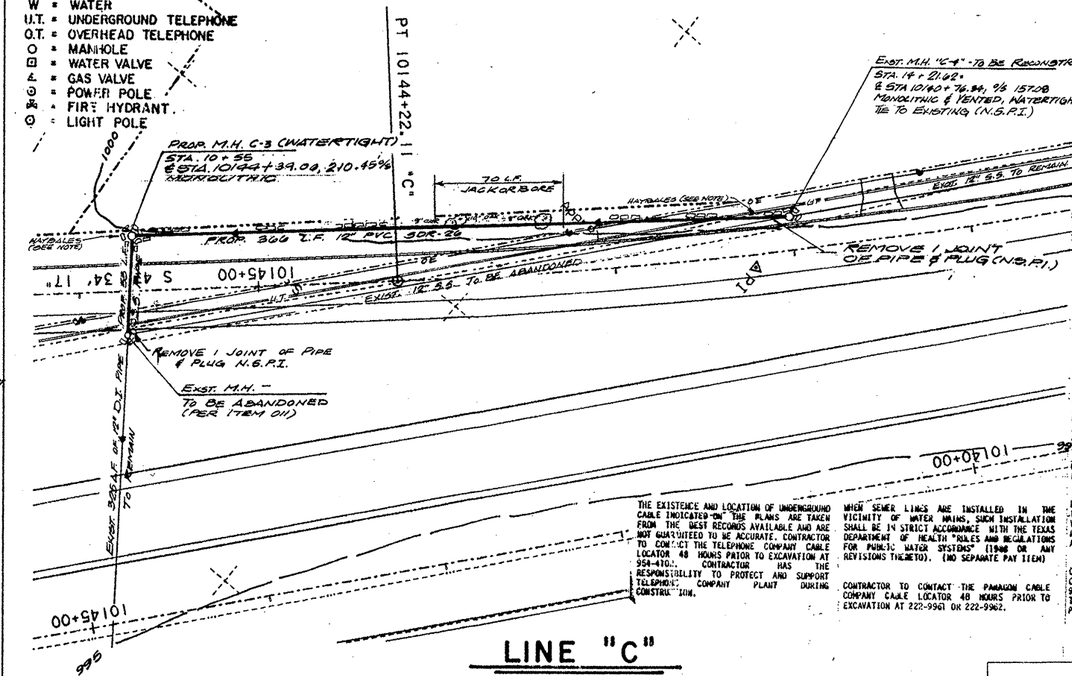
EXISTING UTILITIES

- E = ELECTRIC
  - OH = OVERHEAD
  - UG = UNDERGROUND
- C = CABLE T.V.
- G = GAS
- S = SANITARY SEWER
- W = WATER
- U.T. = UNDERGROUND TELEPHONE
- O.T. = OVERHEAD TELEPHONE
- ○ = MANHOLE
- ⊡ = WATER VALVE
- ⊿ = GAS VALVE
- ⊙ = POWER POLE
- = FIRE HYDRANT
- ⊙ = LIGHT POLE

CORROSION PROTECTION FOR DUCTILE IRON PIPE

ALL DUCTILE IRON PIPE USED IN THIS SYSTEM SHALL BE CORROSION PROTECTED ON BOTH THE INTERIOR AND EXTERIOR SURFACES. INTERIOR SURFACES SHALL BE CEMENT OR MORTAR WITH ASPHALTIC COATING, COAL TAR, EPOXY OR EQUIVALENT (N.S.P.I.)

SCALE: 1"=40' HORZ.
1"=4' VERT.



TRENCH EXCAVATION PROTECTION

Contractor and/or Contractor's independently retained employee or structural design/geotechnical/safety/ equipment consultant, if any, shall review these plans and available geotechnical information and the anticipated installation site(s) within the project work area in order to implement contractor's trench excavation safety protection systems, programs and/or procedures for the project described in the contract documents. The Contractor's implementation of these systems, programs and/or procedures shall provide for adequate trench excavation safety protection that comply with as a minimum, OSHA standards for trench excavations. Specifically, Contractor and/or Contractor's independently retained employee or safety consultant shall implement a trench safety program in accordance with OSHA standards governing the presence and activities of individuals working in and around trench excavation.

CALL C.P.S. LOCATOR AT 227-3606 48 HOURS BEFORE BEGINNING ANY EXCAVATION.

DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181, C.P.S. MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES THAT ARE IN THE PROJECT AREA.

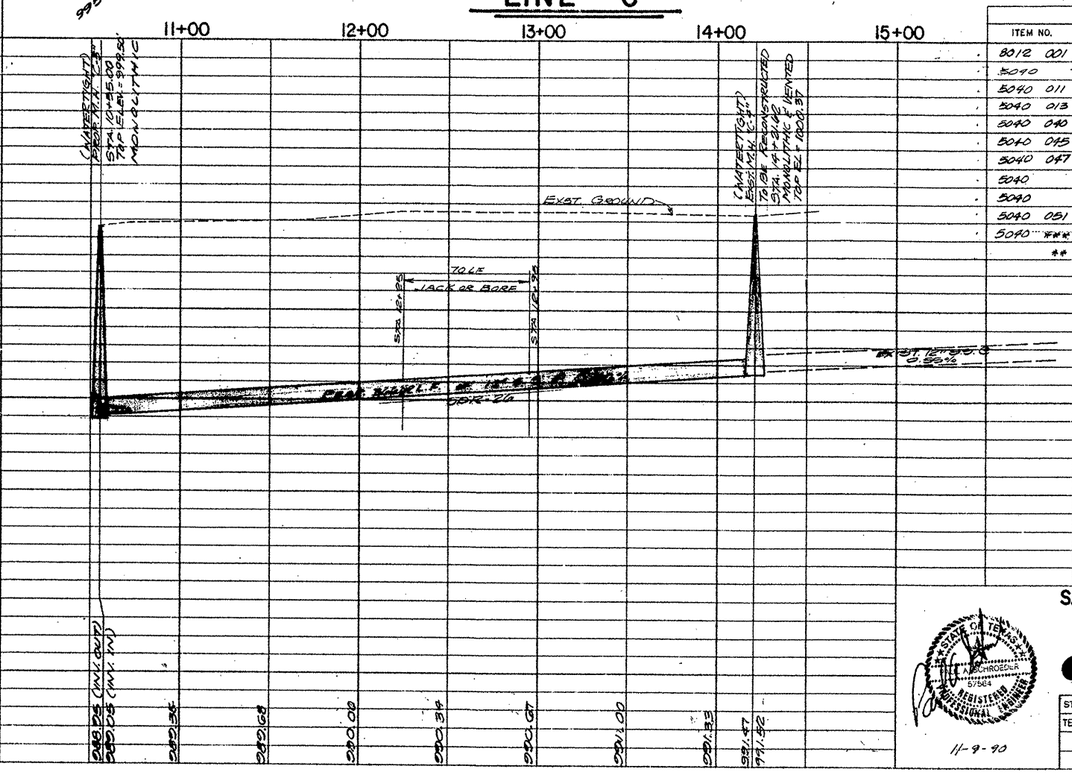
CONTRACTOR TO CONTACT THE TELEPHONE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION AT 954-4102. CONTRACTOR HAS THE RESPONSIBILITY TO PROTECT AND SUPPORT TELEPHONE COMPANY PLANT DURING CONSTRUCTION.

THE EXISTENCE AND LOCATION OF UNDERGROUND CABLE INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE. CONTRACTOR TO CONTACT THE TELEPHONE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION AT 954-4102. CONTRACTOR HAS THE RESPONSIBILITY TO PROTECT AND SUPPORT TELEPHONE COMPANY PLANT DURING CONSTRUCTION.

WHEN SEWER LINES ARE INSTALLED IN THE VICINITY OF WATER MAINS, SUCH INSTALLATION SHALL BE IN STRICT ACCORDANCE WITH THE TEXAS DEPARTMENT OF HEALTH "RULES AND REGULATIONS FOR PUBLIC WATER SYSTEMS" (1988 OR ANY REVISIONS THERETO). (NO SEPARATE PAY ITEM)

CONTRACTOR TO CONTACT THE PANAMON CABLE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION AT 222-9961 OR 222-9962.

LINE "C"



SHEET TOTALS

ITEM NO.	EST	UNIT	DESCRIPTION
8012 001	428	L.F.	TRENCH EXC. PROTECT
5040	65	LF	12" S.S. (10'-12')
5040 011	1	EA	S.S. (ABAND. M.H.)
5040 013	1	C.Y.	S.S. (CONC. CRADLE)
5040 040	58	C.Y.	S.S. (SEL. BDNG) (CLASS 4)
5040 045	2	EA.	S.S. (M.H.) (RING & COV.)
5040 047	2	EA	** S.S. (M.H.) (COVER) (0'-6')
5040	150	LF	12" S.S. (8'-10')
5040	217	L.F.	12" S.S. (10'-12')
5040 051	8	L.F.	** S.S. (M.H.) (COVER) DEPTH
5040 ***	70	L.F.	S.S. (12") JACK/BORE

** MONOLITHIC WATERTIGHT

STATE OF TEXAS
JOHN A. CHROESKA
57564
REGISTERED PROFESSIONAL ENGINEER
11-9-90

SANITARY SEWER LAYOUT

SHEET 2 OF 8

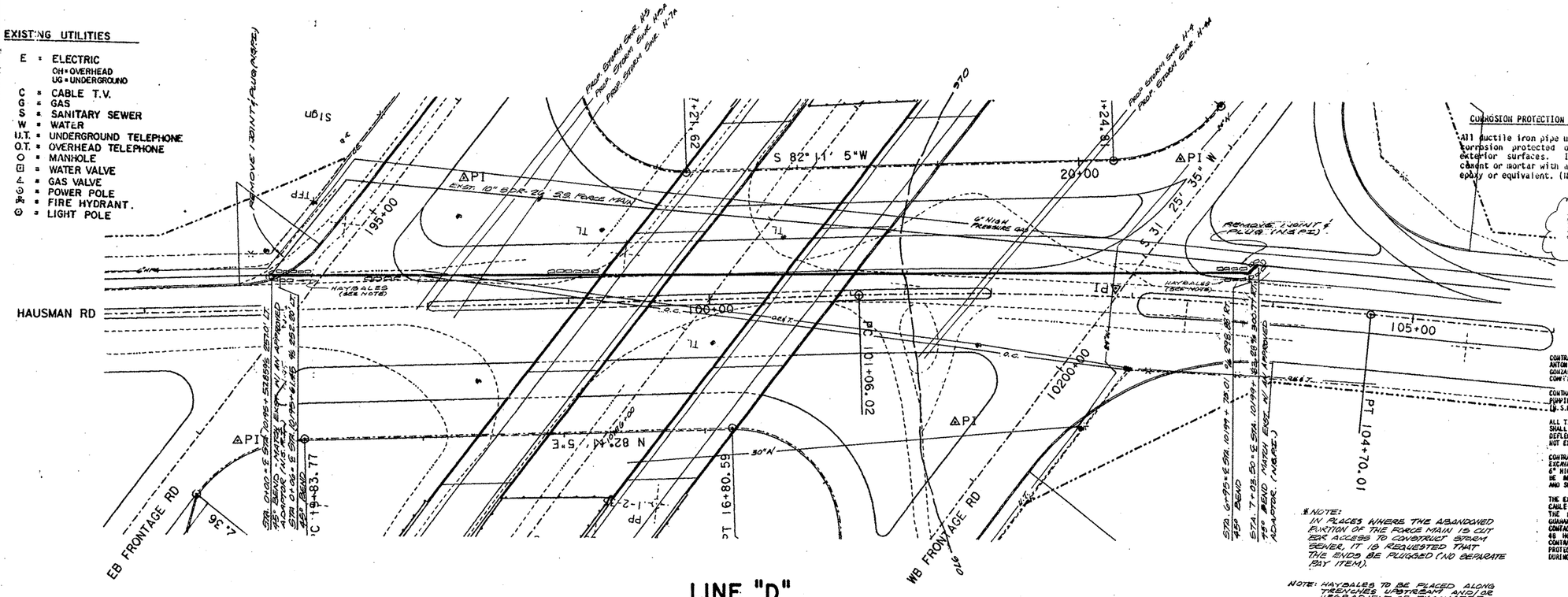
C. A. Bolner & Associates, Inc.
CONSULTING ENGINEERS

STATE	FEDERAL AID PROJECT NO.			SHEET NO.
TEXAS				341
COUNTY	CONT.	SECT.	JOB	HWY. NO.
BEXAR	2452	01	023	LP1604

NOTES

EXISTING UTILITIES

- E = ELECTRIC
  - OH = OVERHEAD
  - UG = UNDERGROUND
- C = CABLE T.V.
- G = GAS
- S = SANITARY SEWER
- W = WATER
- U.T. = UNDERGROUND TELEPHONE
- O.T. = OVERHEAD TELEPHONE
- ○ = MANHOLE
- ⊡ = WATER VALVE
- ⚠ = GAS VALVE
- ⊙ = POWER POLE
- = FIRE HYDRANT.
- ⊙ = LIGHT POLE



*NOTE:
IN PLACES WHERE THE ABANDONED PORTION OF THE FORCE MAIN IS CUT BEYOND ACCESS TO CONSTRUCT STORM SEWER, IT IS REQUESTED THAT THE ENDS BE PLUGGED (NO SEPARATE PAY ITEM).

NOTE: HAYBALES TO BE PLACED ALONG TRENCHES UPSTREAM AND/OR DOWNSTREAM OF EXCAVATION TO PREVENT EROSION AND POLLUTION CONTROL (N.S.P.I.)

CORROSION PROTECTION FOR DUCTILE IRON PIPE

All ductile iron pipe used in this system shall be corrosion protected on both the interior and exterior surfaces. Interior surfaces shall be cement or mortar with asphaltic coating, coal tar, epoxy or equivalent. (N.S.P.I.)

CONTRACTOR TO NOTIFY DREW FORREST UTILITIES 48 HRS. PRIOR TO EXCAVATION AT 695-8781.

SCALE: 1"=40' HORZ.
1"=4' VERT.

TRENCH EXCAVTION PROTECTION

Contractor and/or Contractor's independently retained employee or structural design/geotechnical/safety/ equipment consultant, if any, shall review these plans and available geotechnical information and the anticipated installation site(s) within the project work area in order to implement contractor's trench excavation safety protection systems, programs and/or procedures for the project described in the contract documents. The Contractor's implementation of those systems, programs and/or procedures shall provide for adequate trench excavation safety protection that comply with as a minimum, OSHA standards for trench excavations. Specifically, Contractor and/or Contractor's independently retained employee or safety consultant shall implement a trench safety program in accordance with OSHA standards governing the presence and activities of individuals working in and around trench excavation.

HAUSMAN RD

CONTRACTOR TO CONTACT THE CITY OF SAN ANTONIO SEWER MAINTENANCE DEPT., MR. GUS GONZALES AT 533-5192 48 HOURS PRIOR TO CONTACTING ANY WORK ON THE FORCE MAIN

CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PUMPING AND/OR TEMPORARY BYPASSES NECESSARY (N.S.P.I.)

ALL TIE-INS TO EXISTING 10" FORCE MAIN SHALL BE MADE AFTER 9:00 P.M. DEFLECTION AT ANY MECHANICAL JOINT SHALL NOT EXCEED 5°

CONTRACTOR SHALL USE EXTREME CAUTION WHEN EXCAVATING IN THE VICINITY OF THE EXISTING 6" HIGH PRESSURE GAS MAIN; CONTRACTOR WILL BE RESPONSIBLE FOR THE PROPER PROTECTION AND SUPPORT THEREOF DURING CONSTRUCTION

THE EXISTENCE AND LOCATION OF UNDERGROUND CABLE INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE. CONTRACTOR TO CONTACT THE TELEPHONE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION AT 954-4102. CONTRACTOR HAS THE RESPONSIBILITY TO PROTECT AND SUPPORT TELEPHONE COMPANY PLANT DURING CONSTRUCTION.

CALL C.P.S. LOCATOR AT 227-3606 48 HOURS BEFORE BEGINNING ANY EXCAVATION.

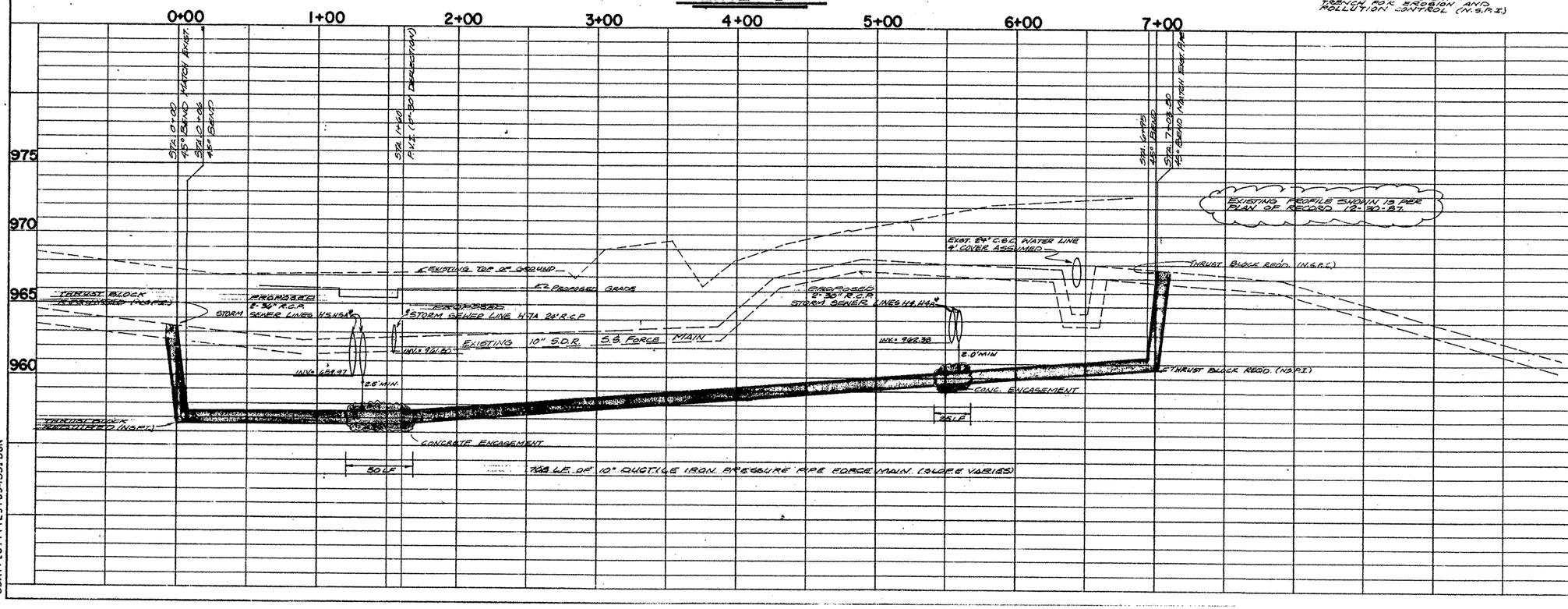
DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181, C.P.S. MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES THAT ARE IN THE PROJECT AREA.

CONTRACTOR TO CONTACT THE TELEPHONE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION AT 954-4102. CONTRACTOR HAS THE RESPONSIBILITY TO PROTECT AND SUPPORT TELEPHONE COMPANY PLANT DURING CONSTRUCTION.

WHEN SEWER LINES ARE INSTALLED IN THE VICINITY OF WATER MAINS, SUCH INSTALLATION SHALL BE IN STRICT ACCORDANCE WITH THE TEXAS DEPARTMENT OF HEALTH "RULES AND REGULATIONS FOR PUBLIC WATER SYSTEMS" (1988 OR ANY REVISIONS THERETO). (NO SEPARATE PAY ITEM)

CONTRACTOR TO CONTACT THE PARAGON CABLE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION AT 222-9961 OR 222-9962.

LINE "D"



ITEM NO.		SHEET TOTALS EST	UNIT	DESCRIPTION
5040	040	77	C.Y.	S.B.(BEL. GD) (CLN. GRVL.)
8042		708	L.F.	SD. 10" D.I. PIPE
8020		4	EA.	10" BENDS
8012	001	708	L.F.	TRENCH EXCA., PROT.
5040	001	9	C.Y.	CONC. ENCASEMENT

STATE OF TEXAS REGISTERED PROFESSIONAL ENGINEER

11-9-90

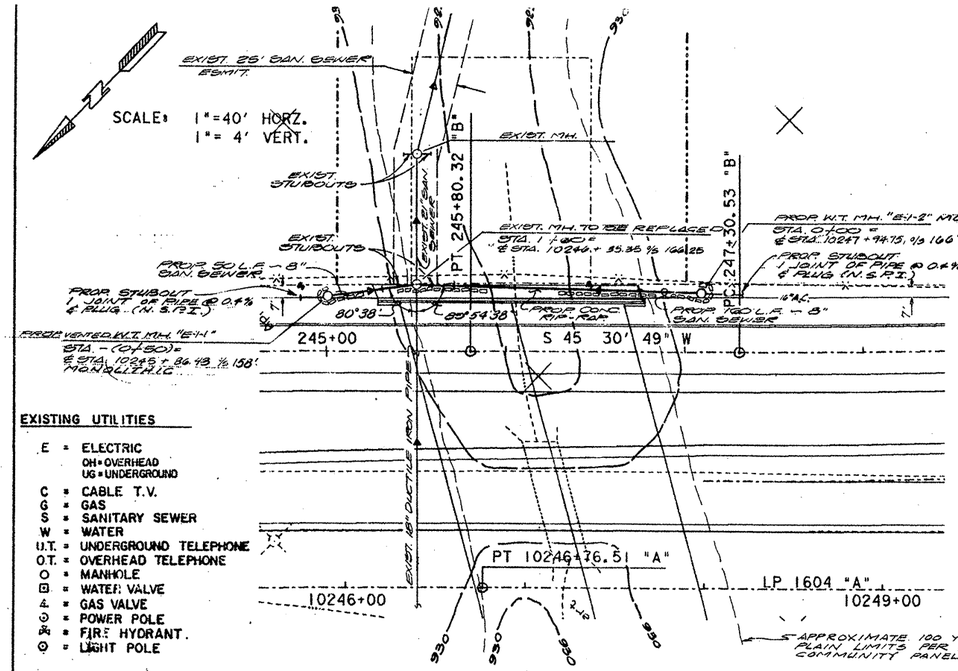
SANITARY SEWER LAYOUT

SHEET 3 OF 8

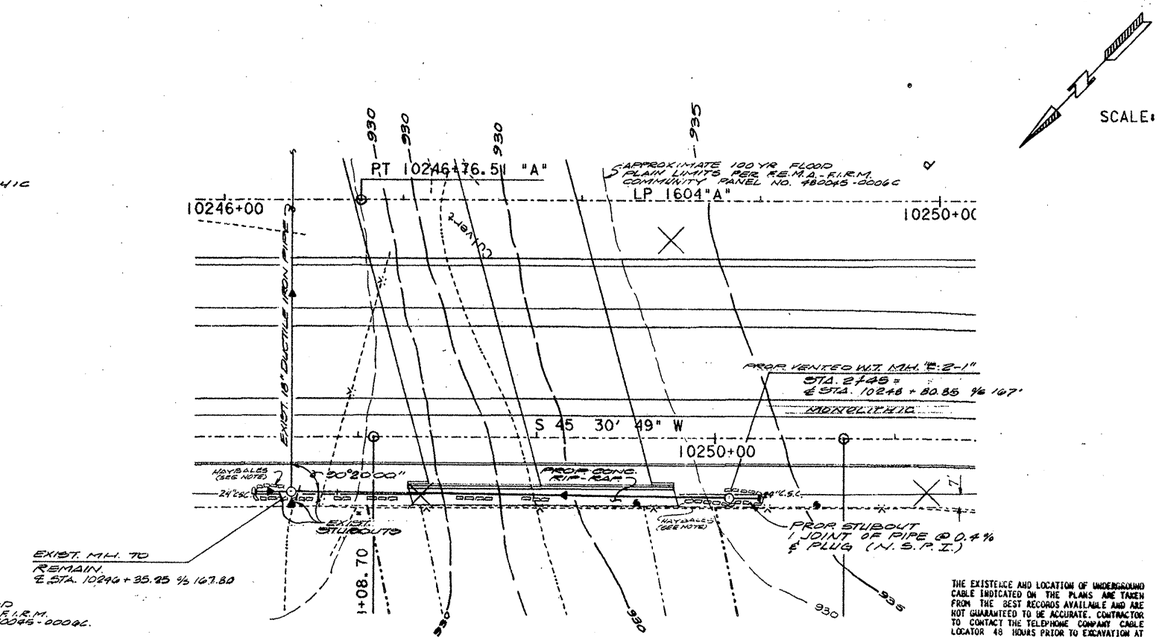
C. A. Bolner & Associates, Inc.
CONSULTING ENGINEERS
0629-22-00

STATE	FEDERAL AID PROJECT NO.			SHEET NO.
TEXAS				342
COUNTY	CONT.	SECT.	JOB	HWY. NO.
BEXAR	2452	02	042	LP1604

UDAI=[3171123160455.DGN



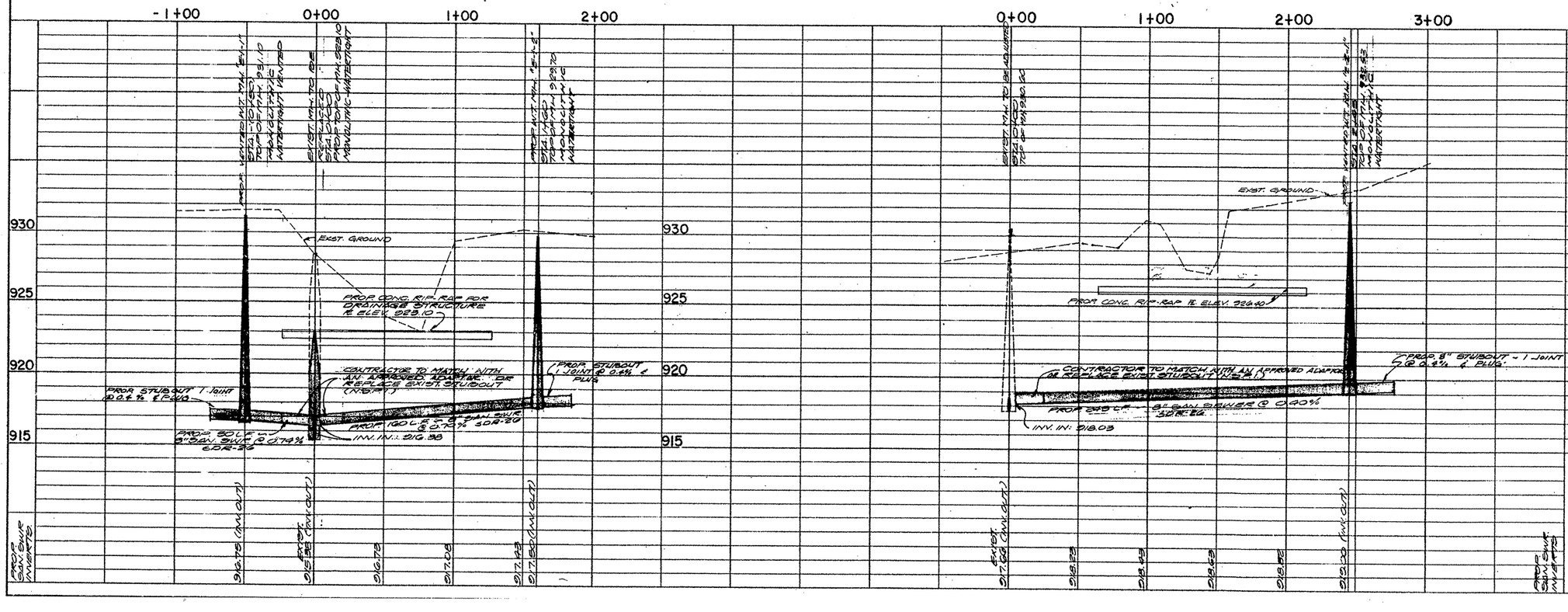
LINE "E-1"



LINE "E-2"

NOTE: HAYBALES TO BE PLACED ALONG TRENCHES UPSTREAM AND/OR DOWNSTREAM OF EXCAVATED TRENCH FOR EROSION AND POLLUTION CONTROL (N.S.P.I.)

LINE "E"



EXISTING UTILITIES

- E = ELECTRIC
  - OH = OVERHEAD
  - UG = UNDERGROUND
- C = CABLE T.V.
- G = GAS
- S = SANITARY SEWER
- W = WATER
- U.T. = UNDERGROUND TELEPHONE
- O.T. = OVERHEAD TELEPHONE
- ○ = MANHOLE
- ⊡ = WATER VALVE
- ⚠ = GAS VALVE
- ⊙ = POWER POLE
- ☒ = FIRE HYDRANT
- ⊙ = LIGHT POLE

TRENCH EXCAVATION PROTECTION

Contractor and/or Contractor's independently retained employee or structural design/geotechnical/safety/ equipment consultant, if any, shall review these plans and available geotechnical information and the anticipated installation site(s) within the project work area in order to implement contractor's trench excavation safety protection systems, programs and/or procedures for the project described in the contract documents. The Contractor's implementation of these systems, programs and/or procedures shall provide for adequate trench excavation safety protection that comply with as a minimum, OSHA standards for trench excavations. Specifically, Contractor and/or Contractor's independently retained employee or safety consultant shall implement a trench safety program in accordance with OSHA standards governing the presence and activities of individuals working in and around trench excavation.

CALL C.P.S. LOCATOR AT 227-3606 48 HOURS BEFORE BEGINNING ANY EXCAVATION.

DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181, C.P.S. MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES THAT ARE IN THE PRIVATE AREA.

CONTRACTOR TO CONTACT THE TELEPHONE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION AT 954-4107. CONTRACTOR HAS THE RESPONSIBILITY TO PROTECT AND SUPPORT TELEPHONE COMPANY PLANT DURING CONSTRUCTION.

THE EXISTENCE AND LOCATION OF UNDERGROUND CABLE INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE. CONTRACTOR TO CONTACT THE TELEPHONE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION AT 954-4102. CONTRACTOR HAS THE RESPONSIBILITY TO PROTECT AND SUPPORT TELEPHONE COMPANY PLANT DURING CONSTRUCTION.

WHEN SEWER LINES ARE INSTALLED IN THE VICINITY OF WATER MAINS, SUCH INSTALLATION SHALL BE IN STRICT ACCORDANCE WITH THE TEXAS DEPARTMENT OF HEALTH "RULES AND REGULATIONS FOR PUBLIC WATER SYSTEMS" (1988 OR ANY REVISIONS THERETO). (NO SEPARATE PAY ITEM)

CONTRACTOR TO CONTACT THE PARAMOUN CABLE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION AT 222-9901 OR 222-9962.

Revised 7-30-91

SHEET TOTALS

ITEM NO.	EST	UNIT	DESCRIPTION
8012 001	515	L.F.	TRENCH EXC. PROT.
5040 010	1	EA.	S.S. (ADJUST M.H.)
5040 013	2	C.Y.	S.S. (CONC. CRADLE)
5040	515	L.F.	S.S. (8") (P.V.C.) (6'-8')
5040 040	26	C.Y.	S.S. (SAN. BDG.) (CLL. 4"-6")
5040 067	4	EA.	** S.S. (M.H.) (CAST) (0'-6')
5040 051	84	L.F.	** S.S. (M.H.) (EXT. DEPTH)
5040 045	4	EA.	S.S. (M.H.) (RING & LID)

** MONOLITHIC WATERTIGHT

930
925
920
915

SANITARY SEWER LAYOUT

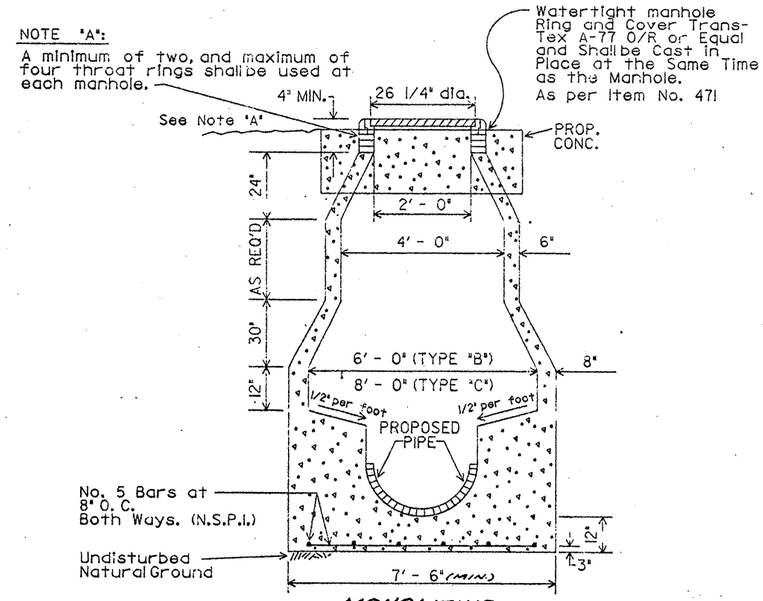
SHEET 4 OF 8

C. A. Bolner & Associates, Inc.
CONSULTING ENGINEERS
0629-02-00

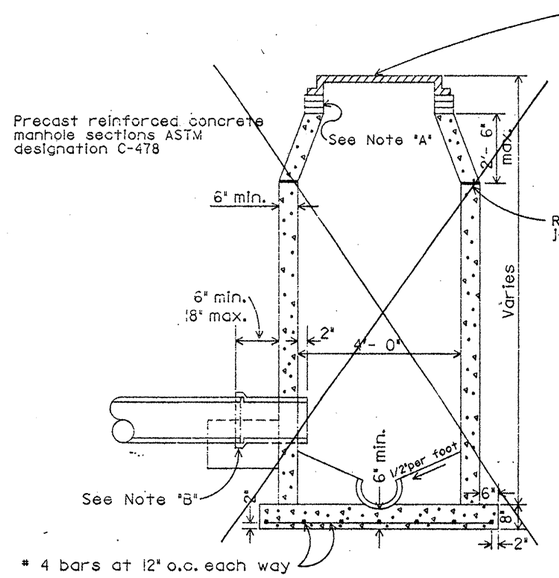
11-9-90

STATE	FEDERAL AID PROJECT NO.			SHEET NO.
TEXAS				343
COUNTY	CONT.	SECT.	JOB	HWY. NO.
BEXAR	2452	01	023	LP1604

NOTE "A":
A minimum of two, and maximum of four throat rings shall be used at each manhole.

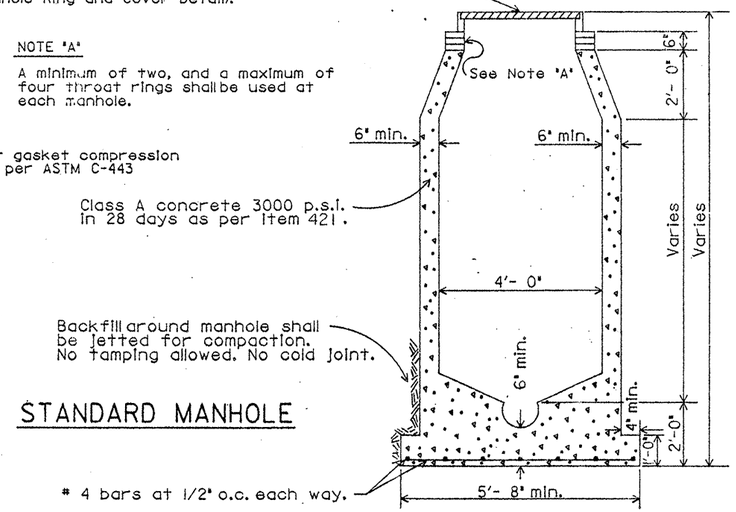


MONOLITHIC
PROPOSED TYPICAL SANITARY SEWER STRUCTURE
6' & 8' MANHOLE (TYPE "B & C")
As per Item 015



PRECAST MANHOLE
As per Item no. 014

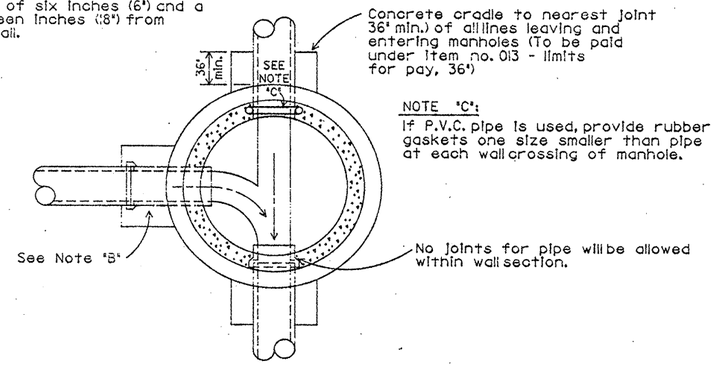
NOTE "A"
A minimum of two, and a maximum of four throat rings shall be used at each manhole.



STANDARD MANHOLE

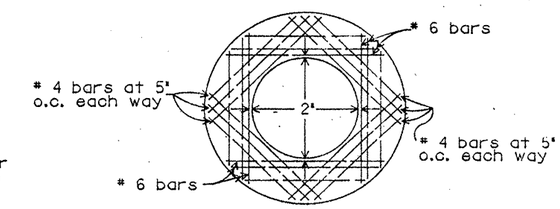
MONOLITHIC MANHOLE

NOTE "B":
Sewer pipe connecting to manholes above the lowest sewer shall project two inches (2") from the inside wall, and be installed with a joint a minimum of six inches (6") and a maximum of eighteen inches (18") from outside manhole wall.



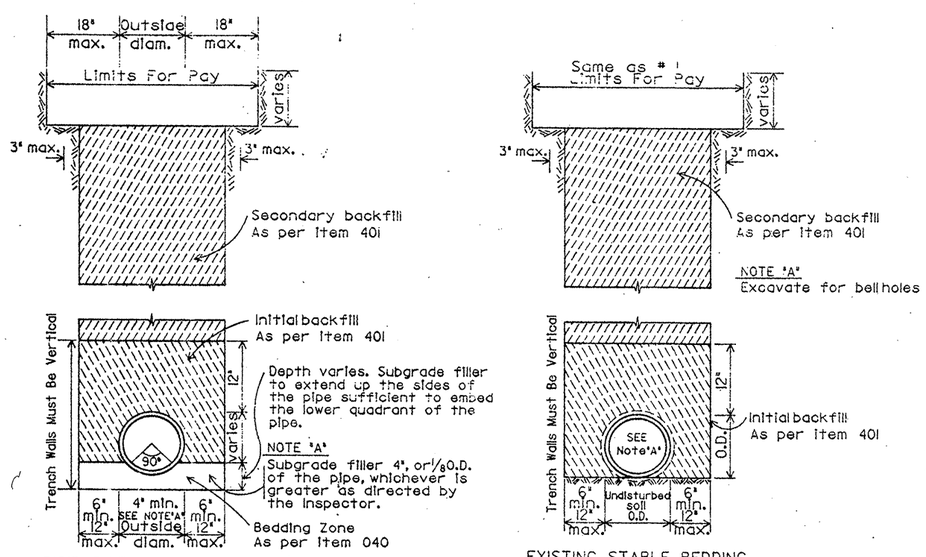
NOTE "C":
If P.V.C. pipe is used, provide rubber gaskets one size smaller than pipe at each wall crossing of manhole.

MANHOLE FLOOR PLAN



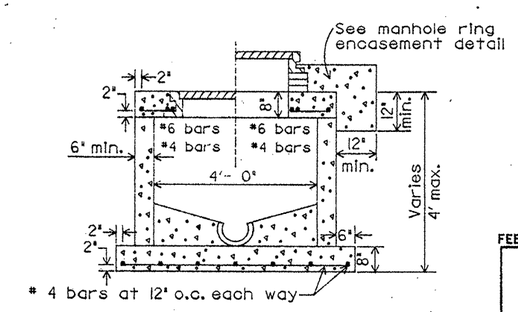
TOP SLAB

PIPE LAID IN TRENCH



RIGID PIPE-UNSTABLE or UNACCEPTABLE CONDITIONS
FLEXIBLE PIPE-ALL CONDITIONS

EXISTING STABLE BEDDING CONDITIONS (RIGID PIPE)



SHALLOW MANHOLE
PRECAST OR MONOLITHIC
As per item no. 036

FEBRUARY 1987

NOTE: 1) PAY ITEMS SHOWN ARE S.D.H.P.T. ITEM NO.
2) N.S.P.I. DENOTES NO SEPARATE PAY ITEMS

TYPICAL SECTIONS
SANITARY SEWER STANDARDS
PIPE SIZES THRU 24"

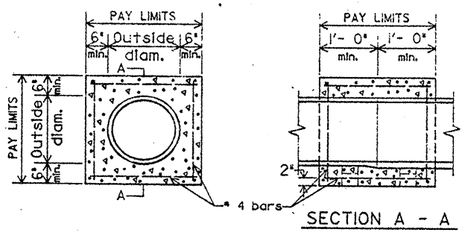
SHEET 5 OF 8

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					344
STATE DIST. NO.	COUNTY		CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
	BEXAR		2452	01	023	LP1604

PREPARED BY: CITY OF SAN ANTONIO DEPT. OF PUBLIC WORKS
REVIEWED BY: C. A. BOLNER & ASSOC.
0629-02-00

CONCRETE JOINTING COLLAR

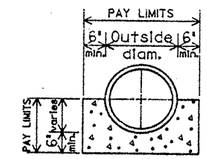
As per item no. 5040



SECTION A - A

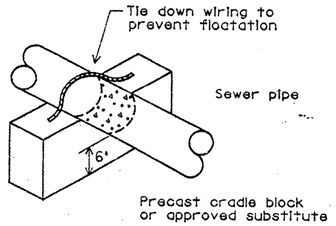
After centering pipe ends, wrap joints with 3 in. wide polyvinyl tape or rubber adapter, Can Tex. I-70A or equal.

Pipe sections to be blocked & supported similar to encasement detail below subject to approval.

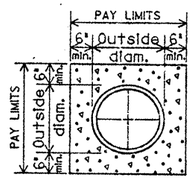


TYPICAL CONCRETE CRADLE

As per item no. 013

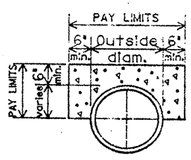


TYPICAL SUPPORT FOR ENCASEMENT OR CRADLE



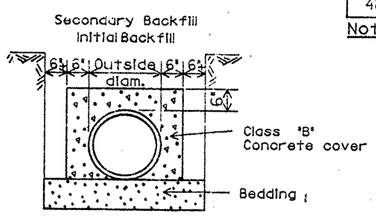
TYPICAL CONCRETE ENCASE.

As per item no. 043



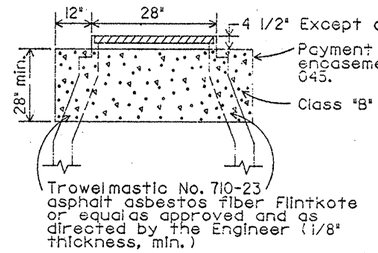
TYPICAL CONCRETE SADDLE

As per item no. 5040

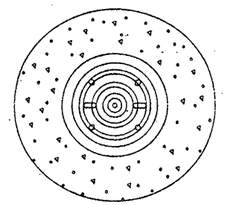


CONCRETE COVER FOR FLEXIBLE PIPE

To be used wherever trench width is greater than 2 ft. plus O.D. As per item 043.



NOTE : Manhole ring encasement is required on all manholes except manholes in new, or existing streets, where, as directed by the Engineer, item 046, may be used in lieu of this requirement. Dimensions of concrete encasement placed in accordance with item 046, shall not be less than dimensions specified for this detail.



MANHOLE RING ENCASEMENT DETAIL

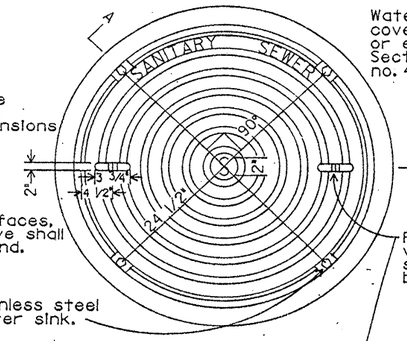
(ALL MANHOLES)

As per item no. 045

MANHOLE RING & COVER DETAIL

NOTE : Standard Manhole Ring And Cover: All applicable dimensions shall conform to the dimensions shown here.

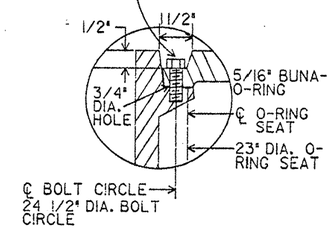
NOTE : The Bearing Surfaces, and O-Ring Groove shall be machine ground.

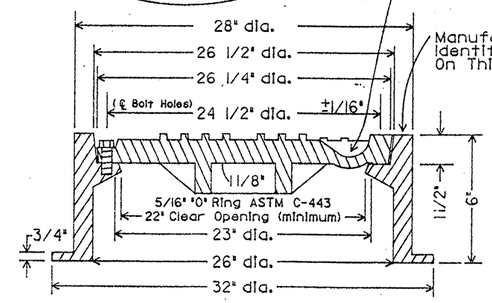


Watertight manhole ring and cover. Trans-Tex A-77 O.R., or equal, as shown. (See Section "A-A") As per item no. 471.

Pick slot (11/8" vertical clear space) with lifting bar (1" Diameter).

4 - 5/8" x 1- 3/4" stainless steel bolts 1- 1/2" sq. counter sink. (evenly spaced).





SECTION "A-A"

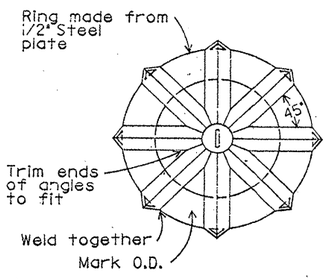
NOTE : All dimensions may vary except the diameter of the lid, and the diameter of the center line of the bolt holes, and the minimum diameter of the clear opening. The combined weight of the manhole ring and cover must be at least 400lbs.

			MANDREL O. D.				RING O. D.			
SIZE	A	B	PSM (SDR-41)	PSM (SDR-35)	PSM (SDR-26)	LARGE DIA. RIBBED	PSM (SDR-41)	PSM (SDR-35)	PSM (SDR-26)	LARGE DIA. RIBBED
6"	4.0"	4"	5.62	5.56	5.43	——	4.91	4.85	4.72	——
8"	5.3"	6"	7.52	7.45	7.28	——	6.81	6.74	6.57	——
10"	6.7"	6"	9.41	9.32	9.10	——	8.70	8.61	8.39	——
12"	8.0"	8"	11.20	11.08	10.83	——	10.49	10.37	10.12	——
15"	10.0"	9"	13.71	13.57	13.26	——	13.00	12.86	12.55	——
18"	12.0"	11"	——	16.58	——	16.72	——	15.89	——	16.01
21"	14.0"	12"	——	19.56	——	19.66	——	18.85	——	18.95
24"	16.0"	15"	——	22.00	——	22.26	——	21.29	——	21.55
27"	18.0"	16"	——	24.80	——	25.10	——	24.09	——	24.39
30"	20.0"	18"	——	——	——	27.94	——	——	——	27.23
36"	24.0"	21"	——	——	——	33.63	——	——	——	32.92
40"	26.8"	24"	——	——	——	37.41	——	——	——	36.70
48"	32.0"	29"	——	——	——	44.99	——	——	——	44.28

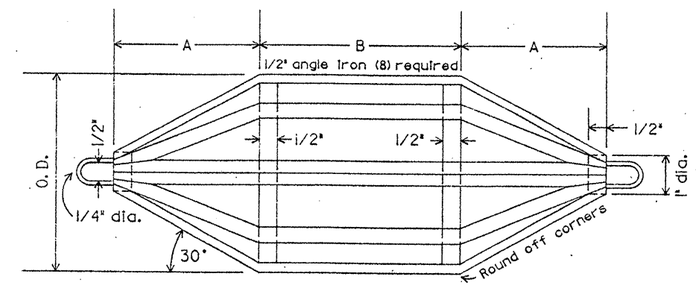
Note: Standards For All PVC Pipe Shall Conform To Mimimum Of ASTM D3033.

CHART

GO, NO GO DEFLECTION TESTING MANDREL



END VIEW



SIDE OR TOP VIEW

NOTE : After construction is completed, true O. D. dimension for the full length of "B" to 0.010 inch by tool and lathe or grinding.

FEBRUARY 1987

NOTE: 1) PAY ITEMS SHOWN ARE S.D.H.P.T. ITEM NO. 2) N.S.P.I. DENOTES NO SEPARATE PAY ITEMS

TYPICAL SECTIONS SANITARY SEWER STANDARDS

PIPE SIZES THRU 24"

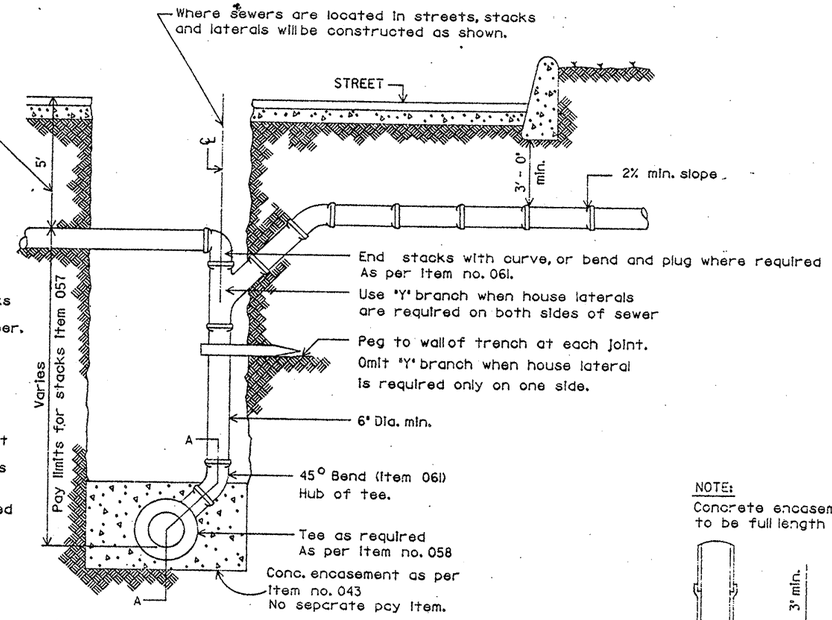
SHEET 6 OF 8

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				345
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
	BEXAR	2452	01	023	LP1604

PREPARED BY: CITY OF SAN ANTONIO DEPT OF PUBLIC WORKS

REVIEWED BY: C. A. BOLNER & ASSOC.

0629-02-00



NOTE 'A':

Typical: Where crossfall exists, elevation of top of stacks shall be shown on plans, as directed by the Engineer.

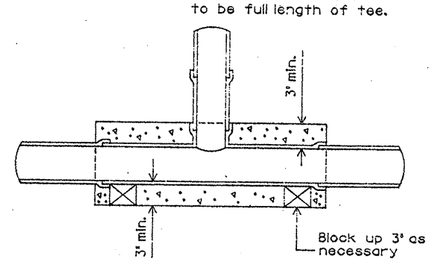
Typical: Stacks shall be required where top of sewer main is at a depth of eight feet (8'), or greater. However, where stacks are required, they shall be shown on the PLANS, as directed by the Engineer, based on elevations of the sewer main, streets, natural ground, and building to be serviced.

TYPICAL STACK DETAIL

As per Item no. 057

NOTE:

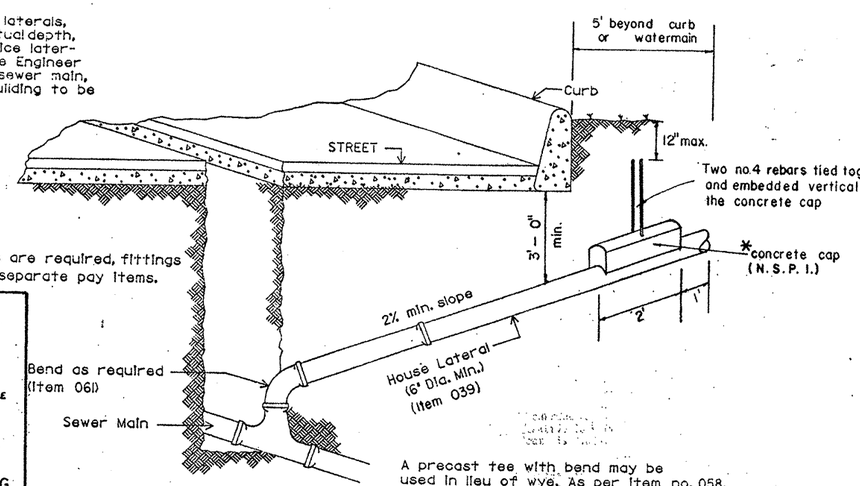
Concrete encasement to be full length of tee.



SECTION A - A

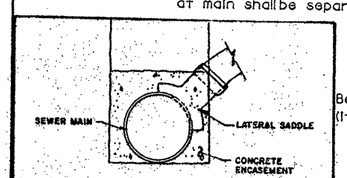
NOTE:

Depth and grade of service laterals, as shown, are typical only. Actual depth, alignment and grade of service laterals shall be determined by the Engineer based on elevations of the sewer main, street, natural ground and building to be serviced.



Where no stacks are required, fittings at main shall be separate pay items.

HOUSE LATERAL DETAIL



*LATERAL CONNECTION TO EXISTING SEWER MAIN

NOTE: THE SADDLE SHALL BE PERMANENTLY BONDED TO THE EXISTING MAIN BY THE USE OF COMPOUNDS OR CLAMPS AS RECOMMENDED BY THE MANUFACTURER. CONCRETE ENCASEMENT SHALL EXTEND LATERALL ALONG THE MAIN ONE (1) FOOT EITHER SIDE OF THE SADDLE.

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN STRICT CONFORMANCE WITH APPLICABLE PROVISION OF "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION".
2. MANHOLE RINGS AND COVERS SHALL BE TRANS - TEX A77, OR EQUAL. WHEN WATERTIGHT MANHOLE RINGS AND COVERS ARE SPECIFIED, THEY SHALL BE TRANS - TEX A77 'O' RING, OR EQUAL.

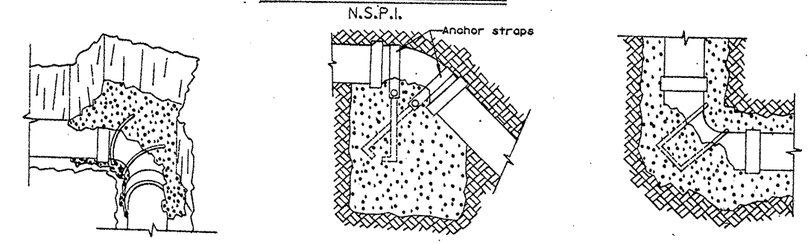
3a. MATERIAL FOR SANITARY SEWER PIPE MUST BE THE SAME FROM MANHOLE TO MANHOLE. CHANGES IN TYPE OF PIPE MAY BE MADE, ONLY, AT MANHOLES, OR SPECIAL STRUCTURES, EXCEPT AS APPROVED BY THE SEWER ENGINEER.

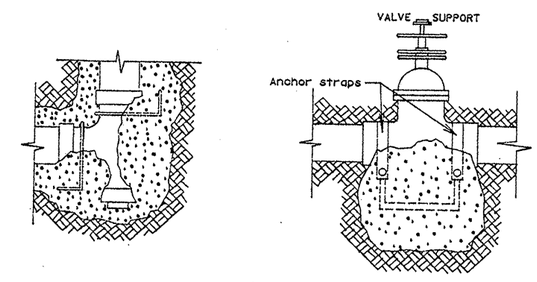
b. ADAPTORS AND CONCRETE COLLARS SHALL BE USED, ONLY, AS DIRECTED BY THE ENGINEER, AND AS APPROVED BY THE SEWER ENGINEER.

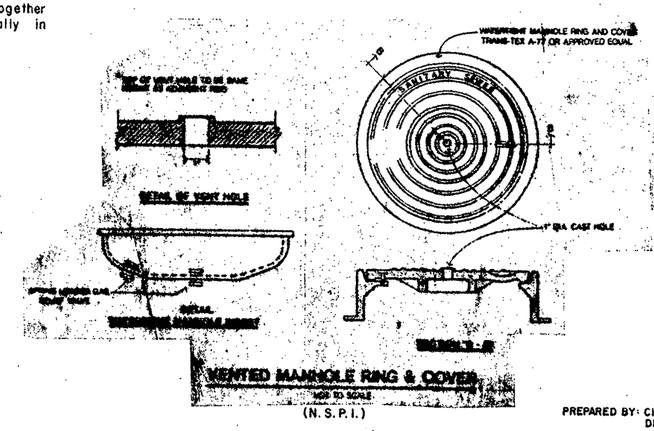
4. ALL SEWER PIPE WITH LESS THAN THREE (3') FEET OF COVER SHALL BE CONCRETE ENCASED, AS PER ITEM NO. 043.
5. ALL FORCE MAINS SHALL BE PROVIDED WITH THRUST BLOCKS, WHERE CHANGES IN DIRECTION OCCUR, AT TEES, BENDS, CROSSES, CHANGES IN SIZE, STOPS (DEAD ENDS), VALVES AND/OR AS SHOWN BELOW, OR AS DIRECTED BY THE ENGINEER.

TYPICAL THRUST BLOCKS

N.S.P.I.







(N.S.P.I.)

NOTES:

1. THE GAS RELEIF VALVE OR VACUUM RELIEF VALVE SHALL NOT COME INTO CONTACT WITH THE MANHOLE COVERS IN THE EVENT OF 360° AXIAL ROTATION (FLIPPING) UPON REMOVAL OR REPLACEMETN OF MANHOLE COVER.
2. THE MANHOLE INSERT AND EACH OF IT'S COMPONENTS, THE VALVE BODIES, THE VALVE SPRINGS AND THE GASKET SHALL BE MANUFACTURED OF PLASTIC, STAINLESS STEEL OR OTHER CORROSION PROOF MATERIAL, TO THE SATISFACTION OF THE CITY OF SAN ANTONIO.
3. MANHOLE COVER INSERTS SHALL BE FRE INDUSTRIES, INC. "INFLOW PROTECTOR-COVER", PRECO INDUSTRIES, LTD. "SEWER GUARD" OR APPROVED EQUAL, AND INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING NECESSARY FIELD MEASUREMENTS FOR THE MANUFACTURER PRIOR TO PRODUCTION.
4. FOR VENTED MANHOLES PROVIDE 1 - 1" DIAMETER VENT HOLE AT APPROXIMATE LOCATION AS SHOWN. PROVIDE VENTED MANHOLE INSERTS IN ACCORDANCE WITH GOVERNING SPECIFICATIONS.

FEBRUARY 1987

NOTE: 1) PAY ITEMS SHOWN ARE S.D.H.P.T. ITEM NO.
2) N.S.P.I. DENOTES NO SEPARATE PAY ITEMS

TYPICAL SECTIONS SANITARY SEWER STANDARDS

PIPE SIZES THRU 24"

SHEET 7 OF 8

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					346
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.	
	BEXAR	2452	01	023	LP1604	

11-9-90

PREPARED BY: CITY OF SAN ANTONIO DEPT. OF PUBLIC WORKS

REVIEWED BY: C. A. BOLNER & ASSOC.

* AMMENDED BY: C. A. BOLNER & ASSOC.

0029-02-00 06-0890

EDWARD'S AQUIFER RECHARGE ZONE
SANITARY SEWER SYSTEM
GENERAL NOTES

SEPTEMBER 13, 1993 – SAWS – Sanitary Sewer

GENERAL

1. This project is within the Edwards Aquifer Recharge Zone. All materials and construction procedures within the scope of this contract shall be approved by the San Antonio Water System (SAWS) and comply with:

   A. Current "City of San Antonio Standard Specifications for Public Works Construction", and "ERZD Special Specifications".

   B. Texas Natural Resource Conservation Commission's Edwards Aquifer Rules [31 TAC 313.5 and 31 TAC 317.2].

   C. Texas Natural Resource Conservation Commission's Design Criteria for Sewerage Systems [31 TAC 317.1, 31 TAC 317.2, 31 TAC 317.3 and 31 TAC 317.13].

   D. The Texas Department of Transportation (TXDOT) Standard Specifications.

2. The Texas Natural Conservation Commission's District 8 office shall be notified at least 7 working days in advance of any preconstruction conference [31 TAC 313.5(e)(1)].

MANHOLES

3. All manholes must be watertight, either monolithic, cast-in-place concrete structures or prefabricated manholes specifically approved by SAWS and Texas Natural Resource Conservation Commission for use in the Recharge Zone. In either case, the manholes shall have watertight rings and covers. Wherever they are within the 100 year floodplain, the manhole covers shall have gaskets and be bolted. Every fourth manhole in sequence shall have an alternate means of venting [31 TAC 313.5(c)(1) and 31 TAC 317.2(c)(5)(F)].

4. All manholes shall be constructed so that the top of the ring is at least four(4) inches above the finished grade of the surrounding ground except when located in paved areas. In paved areas, the manhole ring shall be flush with pavement.

PIPING

5. The kind and description of the pipe is shown on the plans (IF PVC, give "SDR" and ASTM/ANSI designations, class). The minimum pressure rating at water line crossings shall be 150 psi.

6. The use of asbestos cement pipe will be prohibited under this contract. All ductile iron pipe used in this system shall be corrosion protected on both the interior and exterior surfaces. All corrosion protection shall be applied and installed in such a manner as to maintain a continuously protected surface after final pipe installation.

7. All PVC sewer pipe with over 14 feet of cover shall be extra strength, minimum pipe stiffness of 115 psi.

8. All sewer pipes shall have compression or mechanical joints as per 31 TAC 313.5(c)(2)(ii).

9. Sewer pipe connections to pre-cast manholes will be compression joints as approved by SAWS. Mechanical joint "Boot type" connections alone will not be allowed. "Boot type" joints may be used in conjunction with compression joints as approved by SAWS. Sewer pipe connections to monolithic manholes will be as shown on the Standard Detail Sheet. Any changes from these methods must be approved by SAWS.

10. A. New collection lines must be constructed with "stub-outs" for the connection of anticipated extensions. The "stub-outs" must be constructed as per 31 TAC 313.5(c)(7).

    B. When sewer laterals are to be connected to existing sewer mains and no stub-out has been earlier provided, the connection must be made with an approved service saddle as per 31 TAC 313.5(c)(7).

    C. When present, service laterals shall be concrete capped as per 402ERZD.2.11. See this Sheet for details. A stake shall be set opposite the end of the lateral in line with the street stakes.

11. All trenching, bedding and backfill shall be done in accordance with appropriate ASTM/ANSI specifications [Reference 31 TAC 317.2(a)(5)(A). ASTM C 12 (ANSI A106.2) or ASTM D-2321 (ANSI (K65.171)].

12. Sand is not allowed as bedding or backfill in trenches that have been blasted [31 TAC 313.5(c)(6)].

12A. Sewer lines within the 5 year floodplain require concrete encasement/capping.

BLASTING

13. When allowable, blasting shall be performed in accordance with appropriate criteria established by the National Fire Protection Association [31 TAC 313.5(c)(6)].

14. Blasting for sewer line excavation must be done in such a manner as to minimize the fracturing of rock beyond the required excavation. The Contractor shall consider the elevation of the existing sanitary sewer main in relation to the blasting charge and the relative direction of existing and proposed trenches. Blasting within such areas shall be accomplished only by qualified blasting contractors who hold blasting licenses from a qualified agency such as the San Antonio Fire Department in Bexar County. Any damage to existing sanitary sewers resulting from blasting shall be repaired and retested by the Contractor at his own expense.

15. No blasting shall be performed within 75 feet of existing utilities.

TESTING

16. All sewer lines must be tested in accordance with the following Texas Natural Resource Conservation Commission Edwards Rules, 31 TAC 313.5:

    A. 313.5(c)(4): Certification by Texas Registered Professional Engineer that sewer lines are constructed as per 31 TAC 313.5 and 31 TAC 317.2.

    B. 313.5(c)(9): When applicable, all sanitary sewer service laterals must be inspected and certified in accordance with 31 TAC 313.5(c)(9).

    C. 313.5(c)(10):
       i. 313.5(c)(10)(A): Deflection test is required for flexible and semi-rigid pipe conducted after final backfill has been in place at least 30 days.
       ii. 313.5(c)(10)(B): Infiltration and/or exfiltration and/or low-pressure air test. If Infiltration/Exfiltration Test is performed, it must be in accordance with 31 TAC 313.5(c)(10)(B)(i). If Air Test is performed, it must be in accordance with 31 TAC 313.5(c)(10)(B)(ii).
       iii. 313.5(c)(10)(C): All manholes and wet wells must be tested separately and independently of the collection lines.

17. Sewer lines shall be tested from manhole to manhole.

18. In areas where a new sanitary sewer manhole is to be constructed over an existing sanitary sewer system, it shall be the Contractor's responsibility to test the existing manholes before construction. After the proposed manhole(s) has been built, the Contractor shall re-test the existing system to the satisfaction of the construction inspector. Testing shall conform to the Texas Natural Resource Conservation Commission Edwards Aquifer Protection Rules, 31 TAC 313.5 (No separate pay item).

RECHARGE FEATURES, SPOILS, TRENCH EXCAVATION

19. Sewer lines that bridge caverns or solution channels shall be constructed in a manner that will maintain the structural integrity of the line. If any significant recharge features are discovered during construction, all construction activity near the significant recharge feature will be immediately suspended and not proceed until the Texas Natural Resource Conservation Commission has reviewed and approved the methods proposed to protect the aquifer from any potential adverse impact [31 TAC 313.5(e)(2) and 31 TAC 313.5(c)(11)].

20. Contractor is responsible for removal of all waste materials upon project completion. The Contractor shall not permanently place any waste materials in the 100-year flood plain without first obtaining an approved Flood Plain Development permit.

    The Contractor shall not place any materials on the Recharge Zone of the Edwards Aquifer without an approved Water Pollution Abatement Plan from the Texas Natural Resource Conservation Commission [31 TAC 313.4 and 31 TAC 313.9].

21. Contractor and/or Contractor's independently retained employee or structural design/geotechnical/safety/equipment consultant, if any, shall review these plans and available geotechnical information and the anticipated installation site(s) within the project work area in order to implement Contractor's trench excavation safety protection systems, programs and/or procedures. The Contractor's implementation of the systems, programs and/or procedures shall provide for adequate trench excavation safety protection that complies with as a minimum, OSHA standards for trench excavations. Specifically, Contractor and/or Contractor's independently retained employee or safety consultant shall implement a trench safety program in accordance with OSHA standards governing the presence and activities of individuals working in and around trench excavation.

WATER LINE CROSSINGS

22. When sewer lines are installed in the vicinity of water mains such installation shall be in strict accordance with the Texas Natural Resource Conservation Commission's Rules (31 TAC 317.13 Appendix E). No separate pay items.

23.

    A. Where the minimum 9 foot separation distance between sewer lines and water lines/mains cannot be maintained, the wastewater line shall be constructed of cast iron, ductile iron, or PVC meeting the ASTM specification for both pipes and joints of 150 psi. If PVC is used, one length of 150 psi sewer pipe (SDR-26,C-900, etc. ASTM/ANSI Specificati be centered on the water lines.

    B. The separation distance shall not be less than 6 inches;

    C. Sewer lines shall be located under the water mains unless otherwise approved by the Texas Water Commission.

24. No extra pay items shall be allowed for work called for on the plans but not included on the bid schedule. This incidental work will be required and shall be included in the pay item to which it relates.

EROSION AND SEDIMENTATION

25. A. The Texas Natural Resource Conservation Commission requires erosion and sedimentation control for construction of sewer collection systems. Developer or authorized representative shall provide erosion and sedimentation control as noted on the project's plan and profile sheets.

    B. At a minimum, these controls shall consist of rock berms and/or silt fences constructed parallel to and down gradient from the trenches. The rock berm or silt fences shall be installed in a manner such that any rainfall runoff shall be filtered. Hay bales shall not be used for temporary erosion and sedimentation controls.

    C. All temporary erosion and sedimentation controls must be installed prior to construction, shall be maintained during construction, and shall be removed when vegetation is established and the construction area is stabilized [31 TAC 313.5(c)(12)]. Additional protection may be necessary if excessive solids are being discharged from the site.

26. All temporary erosion and sedimentation controls shall be removed by the Contractor at final acceptance of the project by the San Antonio Water System.

27. Placement of such controls shall be in accordance with the Construction Plans. Actual locations may vary slightly from the plans, but will be verified by the Engineer/Inspector in the field prior to sewer line construction. The Contractor and City Inspector shall inspect the controls at weekly intervals and after every significant rainfall to insure significant disturbance to the structures has not occurred. Sediment deposited after a significant rainfall shall be removed from the site or placed in an approved designated soil disposal area.

28. PAYMENT for "Erosion and Sedimentation Control" shall be made under Item 101 "Preparing Right-of-Way".

GENERAL

29. A copy of all testing reports shall be forwarded to the San Antonio Water System Construction Inspection Division.

30. Contractor is to notify and make arrangements with the San Antonio Water System Construction Inspection Division at 704-7111, 48 hours prior to excavation.

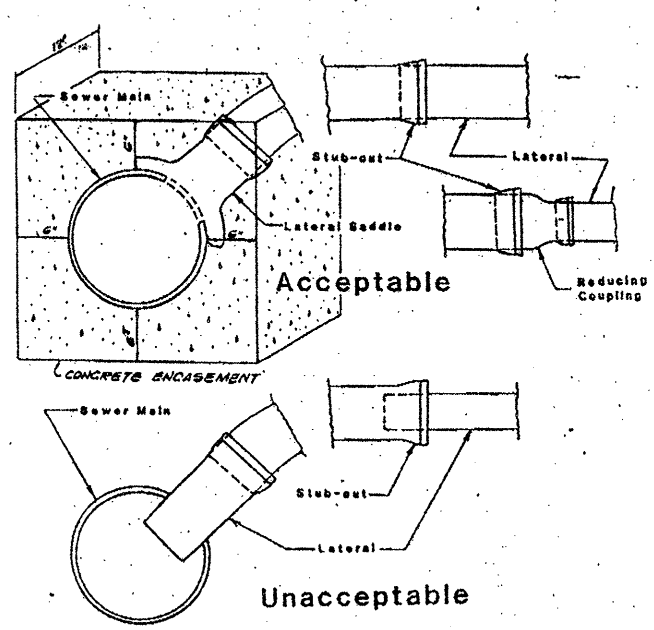
31. It shall be the Contractor's responsibility to locate utility service lines as required for construction.

San Antonio Water System	704-7106 (Water)
	704-7160 (Sewer)
Drainage	299-8048
Telephone	954-4102
City Public Service	978-2000
Paragon Cable	222-9961/9962

32. Contractor shall maintain service to all existing sanitary sewers at all times during construction.

33. Due to Federal Regulations Title 49, Part 192.181, City Public Service must maintain access to gas valves at all times. The Contractor must protect and work around any gas valves that are in the project areas.

LATERAL CONNECTION TO EXISTING SEWER MAIN/STUB-OUT



NOTES:

The saddle shall be permanently bonded to the existing main by the use of compounds or clamps as recommended by the manufacturer.

34. After construction, testing may be done by T.V. camera by the SAWS forces and observed by Inspector, Sewer Engineering personnel, and Contractor as camera is run through the lines. Any abnormalities, such as broken pipe or misaligned joints, must be replaced by the Contractor at his expense.

35. Water jetting the backfill within a street will not be permitted. Sanitary sewer trenches subject to traffic shall conform to City of San Antonio Standard Specifications for Public Works Construction, paragraphs 400.4 – 2 (d) or (e).

36. No testing will be performed prior to 30 days from complete installation of the sanitary sewer lines.

    The following sequence will be strictly adhered to:
    1. Pull mandrel
    2. Perform air test
    3. Pull wiper (after street has been asphalted in new subdivisions)

37. Where required, concrete encasement shall be placed for full width of the trench to a plane 6" above the top of the pipe, as shown on the Standard Detail Sheet.

38. A minimum of 3 feet of cover is to be maintained over the sanitary sewer main and laterals at subgrade, otherwise concrete encasement will be required.

39. Sanitary sewer main connections made directly to existing manholes will require successful testing of the manhole in accordance with City of San Antonio Standard Specifications for Public Works Construction, Item 404.4-10.

40. The developer dedicates the sanitary sewer mains upon completion by the developer and acceptance by the San Antonio Water System. The San Antonio Water System will own and maintain said sanitary sewer mains which are located within this particular subdivision.

41. Work completed by the Contractor which has not received a work order or the consent of the San Antonio Water System Construction Inspection Division will be subject to removal and replacement by and at the expense of the Contractor.

42. All manholes to be abandoned are to be lowered two (2) feet below grade and filled with gravel. Rings and Covers shall be salvaged and delivered to the SAWS Maintance Yard. The rings and covers of the manholes shall be removed in all cases but shall not be reused for new manholes. If directed in the Engineer, drainage holes shall be drilled in the bottom of manhole walls prior to backfilling.

43. All sewer mains to be abandoned shall be purged and drained prior to plugging. The sewer mains shall then be permanently plugged at the manholes into which they discharge.

44. It shall be the responsibility of the contractor to notify and make arrangements with the San Antonio Water System Construction Inspections Division at telephone number 704-7111, 48 hours prior to beginning work.

45. Contractor shall be responsible for restoring to its original, or better condition any damages done to existing fences, concrete islands, curbs, or concrete driveways. (No separate pay item)

46. Contractor to support and keep tract storm drains and inlet structures. Any damages incurred will be at contractor's expense.

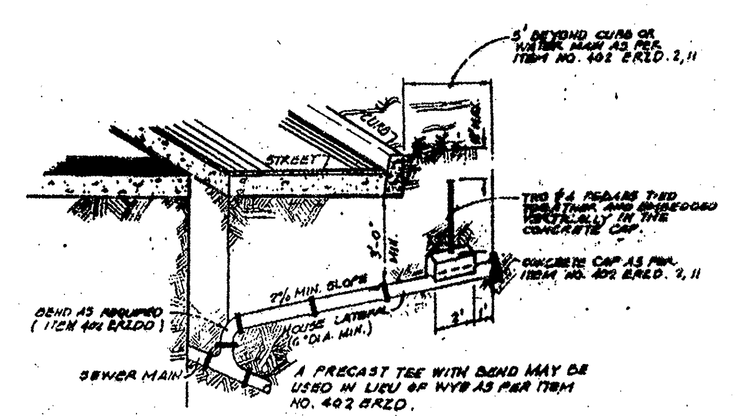
47. Leakage testing. All pressure pipe installations shall be tested for leakage. Copies of all test results shall be made available to the commission upon request. Leakage shall be defined as the quantity of water that must be supplied into the pipe, or any valved section thereof, to maintain pressure within 5 pounds per square inch of the specified test pressure after the air in the pipeline has been expelled. The test pressure shall be either a minimum of 25 pounds per square inch gauge or 1.5 times the maximum force main design pressure, whichever is larger. The maximum amount calculated, remedial action within the allowable limit.

L= (S)(D)(P0.5)/133,200
where L=leakage in gal/hr
S= length of pipe in ft
D= inside diameter of pipe in inches
P= pressure in pounds per square inch

SUMMARY OF QUANTITIES

		SHEET NO.	1	2	3	4	
ITEM NO.	UNIT	DESCRIPTION	LINE "C"	LINE "C"	LINE "D"	LINE "E"	TOTAL
	L.S.	MOBILIZATION					
8012 001	L.F.	TRENCH EXCAVATION PROTECTION	675	425	708	515	2323
5040 009	L.F.	12" SS (D.I.) (8'-10')	65				65
5040 009	L.F.	12" SS (D.I.) (10'-12')		55			55
5040 010	EA.	S.S. (ADJUST MANHOLE)				1	2 *
5040 001	EA.	S.S. (ABANDON MANHOLE)	2	1			3
5040 013	C.Y.	CONC. CRADLES	1	1		2	4
5040 038	L.F.	S.S. (8") (P.V.C.) (6'-8')				515	515
5040 040	C.Y.	S.S. (SELECT BEDDING)(CLEAN GRVL)	48	33	77	26	184
5040 045	EA.	S.S. (MANHOLE) (RING ENCASEMENT)	2	2		4	8
5040 047	EA.	** S.S. (MANHOLE) (COMP.) (0'-6')	2	2		4	8
5040 049	L.F.	12" S.S. (6'-8')	136				136
5040 049	L.F.	12" S.S. (8'-10')	479	150			629
5040 049	L.F.	12" S.S. (10'-12')		217			217
5040 051	V.F.	** S.S. (M.H.) (EXTRA DEPTH)	5	8		24	37
	L.F.	10" FORCEMAIN DUCTILE IRON PRESSURE PIPE			708		708
	EA.	10" BENDS (M.J.)			4		4
5040 001	C.Y.	CONCRETE ENCASEMENT	78		9		87
5040 ***	L.F.	JACK/BORE 12" S.S.		70			70

* THE ADDITIONAL MANHOLE TO BE ADJUSTED IS LOCATED AT THE RED ROBIN INTERSECTIONFOR CONTRACTOR'S
** MONOLITHIC WATER TIGHT



HOUSE LATERAL DETAIL 402 ERZD

Lateral line will be ductile iron or PVC SDR 26 or equal and extend five feet (5') beyond the curb, or water main, whichever is farther from the main. All connections of the lateral line to the main will be by an approved saddle, or manufactured tee or wye. Breaking of a main to tie in a lateral or use of cement or other grout material in making of joints or connections is prohibited. Two feet (2') of the lateral will be concrete capped, commencing one foot (1') from end of pipe and ending three feet (3') from end of pipe. The location of the lateral pipe end will be marked up two (2) #4 rebars tied together and embedded vertically in the concrete cap and extending vertically to within twelve inches (12") of top of curb. Backfill requirements are the same as other 402ERZD, Sanitary Sewers.

48. The contractor shall provide access, for the delivery of mail by the U.S. Postal Service.

49. The contractor shall provide access to residents and businesses.

50. Whenever power poles are adjacent to the proposed sanitary sewer, the contractor shall provide proper shoring or other suitable support during construction of the sanitary sewer, in which methods must be approved by the Utility Company Maintenance Department.

51. The contractor shall maintain two-way traffic at all times on all streets during construction.

52. The contractor shall call the City Water Board locator 48 hours prior to excavation to verify same at telephone number 225-7461, Ext. 388.

53. All excavation shall be unclassified and shall include all materials encountered, regardless of their nature or the manner in which they are removed.

54. Contractor shall preserve all construction stakes, marks, etc. Any construction stakes marks, marks etc., destroyed or removed by the by the contractor or his employees shall be replaced at the contractor's expense.

55. All laterals will be ductile iron or PVC SDR-28 or equal and must extend a minimum of five (5) feet beyond the water main (where applicable). All connections of the lateral line to the main will be by an approved saddle (see detail sheet). Breaking of a main will be by an approved saddle cement or other grout material in making joints or connections is prohibited. Two (2) feet of the lateral will be concrete capped, commencing one (1) foot from the end of the pipe and ending three (3) feet by two (2) #4 rebars tied together and embedded vertically to within twelve (12) inches of the surface. Backfill requirements are the same as described in the technical specifications for this project. Note: There are no proposed laterals in this project.

56. Call C.P.S. locator at 227-3606 48 hours before beginning any excavation.

57. Contractor to contact the telephone company cable locator 48 hours prior to excavation at 954-4102. Contractor has the responsibility to protect and support telephone company plant during construction.

58. Contractor to contact the Paragon Cable Company locator 48 hours prior to excavation at 222-9961 or 222-9962.

59. The existence and location of underground cable indicated on the plans are taken from the best records available and are not guaranteed to be accurate. Contractor to contact the telephone company Cable locator 48 hours prior to excavation at 954-4102. contractor has the responsibility to protect and support telephone company plant during construction.

60. All hay bales shown on the plans shall be replaced with silt screen fence. (N.S.P.I.)

61. N.S.P.I. – Denotes "No Separate Pay Item".

STATE OF TEXAS
PAUL A. SCHROEDER
67564
REGISTERED PROFESSIONAL ENGINEER

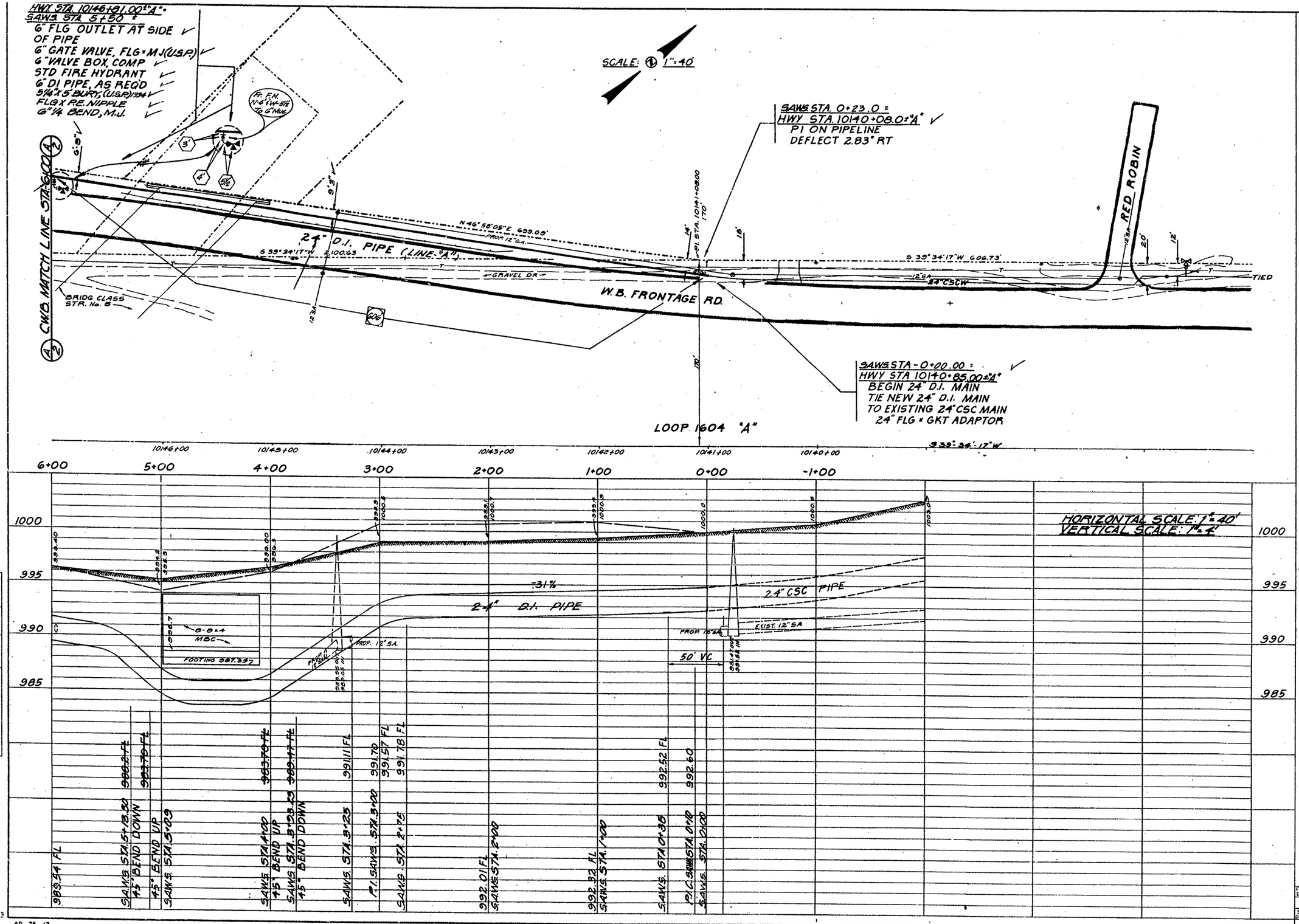
ACES
ALAMO CONSULTING ENGINEERING & SURVEYING, INC.

ACES JOB NO. 0697-00

THIS SHEET REVISED 10/5/93

SHEET 8 OF 8 SHEETS

STATE	FEDERAL AID PROJECT NO.			SHEET NO.
TEXAS	CPR 90(192) M			347
COUNTY	CONT.	SECT.	JOB	HWY. NO.
BEXAR		01	023	LP160



NOTES

PIPE: D.I. - U.S. PIPE (TYTON JOINT)
VALVES: 6" - U.S. PIPE R.S.
16" U.S. PIPE
24" MUELLER
30" MUELLER
36" MUELLER
2" AR. VAL. - CRISPIN MODEL UL-20
1" AR. VAL. - CRISPIN MODEL UL-10
F.H. - U.S.P. 5¼" x 5 BURY METROPOLITAN 1994
FITTING - U.S. PIPE (M.J.) & (TR. FLEX)

CONTRACTOR: GILBERT CONST.
INSPECTOR: SLAGLE, MIKE
COMPLETE: 2-13-96

"AS-BUILT"

STEVEN RENNEKER 50924 10-21-96

3-31-93

7/9/91 2-7-92

S.A.W.S. JOB 90-5051

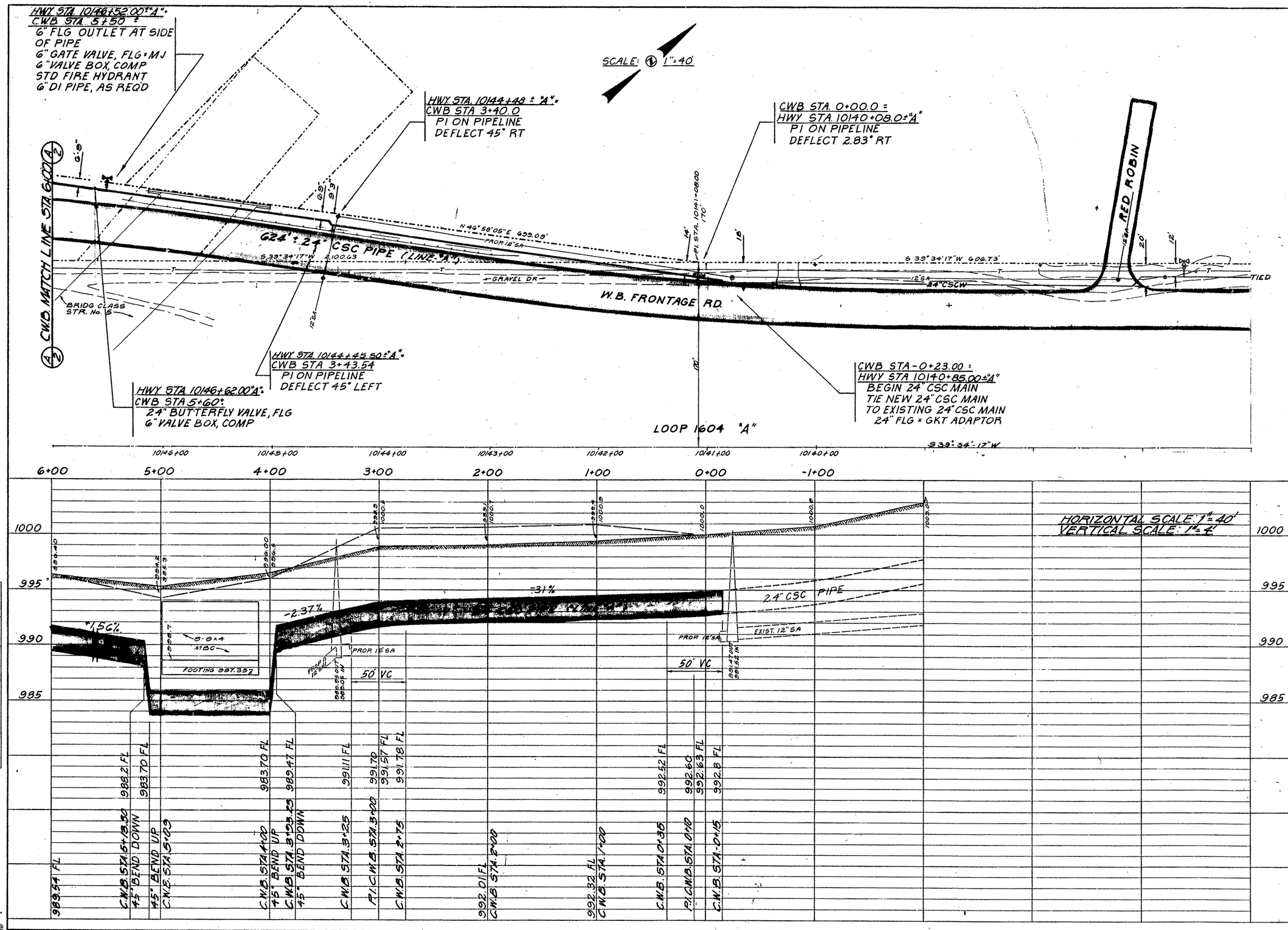
SHEET 1 OF 24

BLK MAP No.: 110-630, 112-632, 112-634, 114-636

SEC. No.: 3-O, 3-P, 3-Q, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				248
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	BASE	02	023	LP 1604

AD - 75 - 17



NOTES

3-31-93

2-7-92

CWB JOB 90-5051

SHEET 1 OF 24

BLK MAP No.:
110-630, 112-632
112-634, 114-636

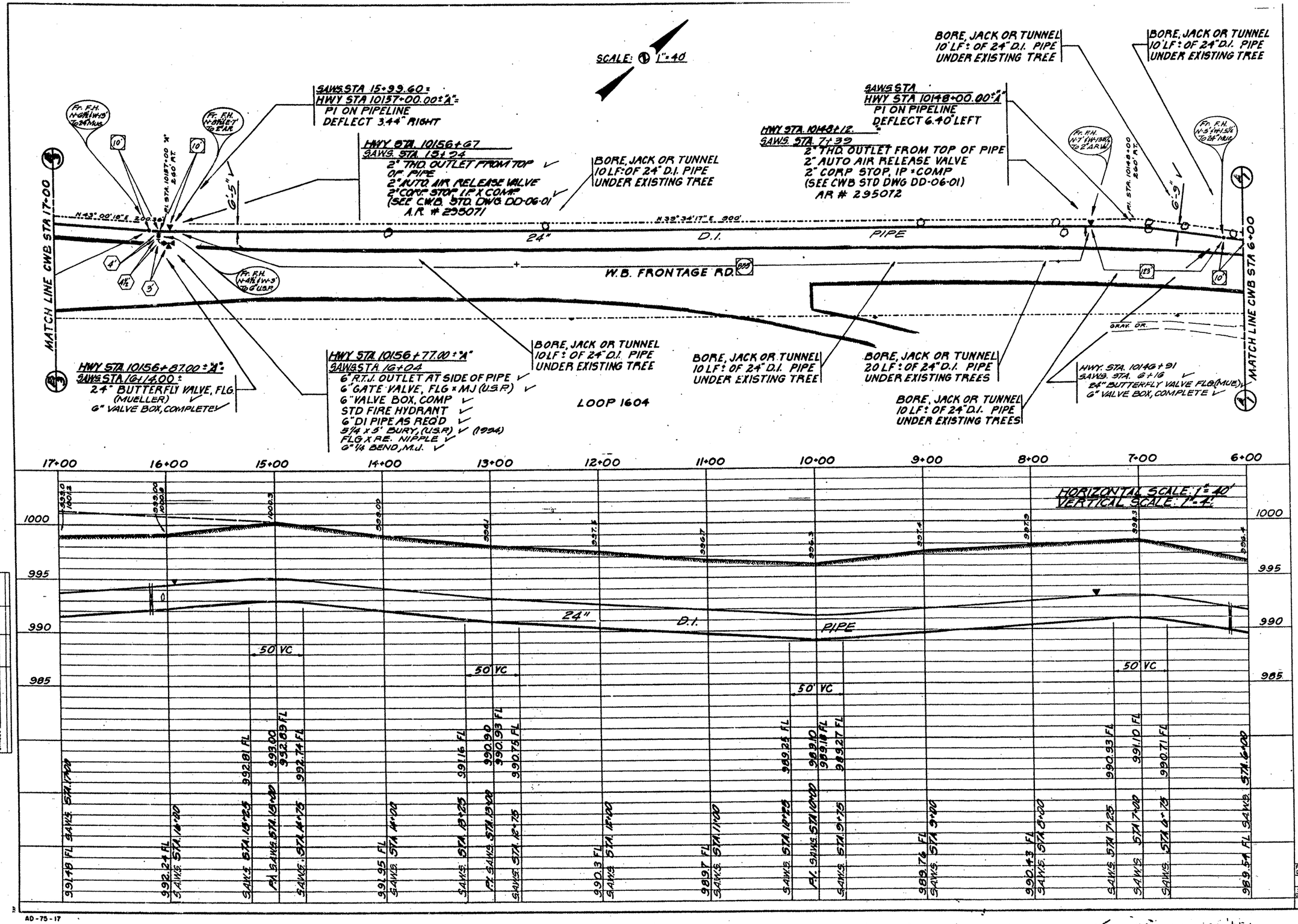
SEC. No.: 3-O, 3-P
3-Q, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				348
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

PLOTTED BY | CHECKED | DATE

TOPOGRAPHY
GROUND PROFILE
ROADWAY LAYOUT
GRADES

AD-75-17



NOTES

"AS-BUILT"

STEVEN RENNEKER 50924 REGISTERED PROFESSIONAL ENGINEER 3-31-96

3-31-93

2-7-92

S.A.W.S. JOB 90-5051

SHEET 2 OF 24

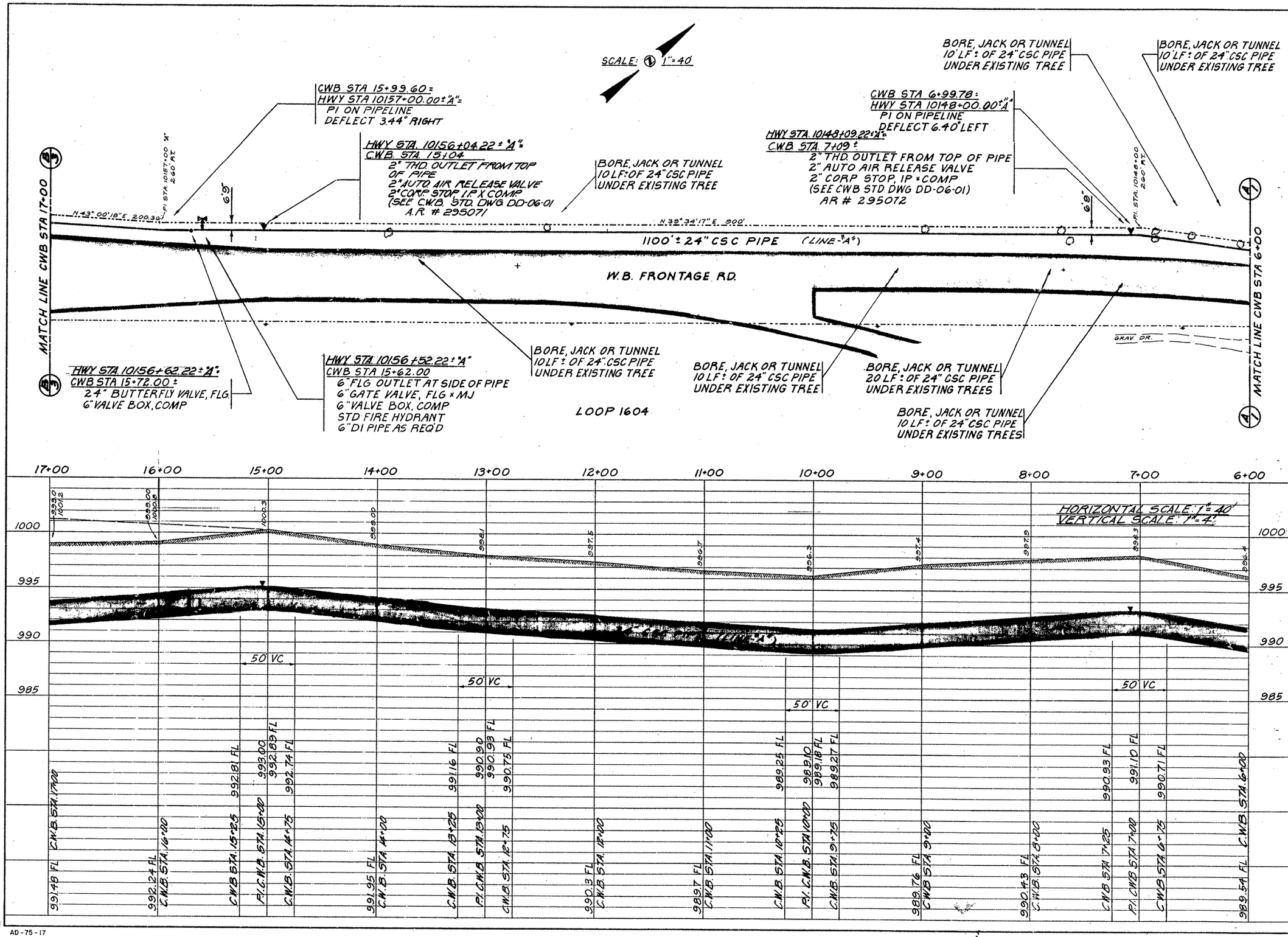
BLK MAP No.: 110-630, 112-632, 112-634, 114-636

SEC. No.: 3-O, 3-P, 3-Q, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS		349

STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP 1604

AD-75-17



NOTES

PLOTTED BY	CHECKED	DATE
TOPOGRAPHY		
FORMER PROFILE		
ROADWAY LAYOUT		
GRADES		

3-31-93

2-7-92

CWB JOB 90-5051

SHEET 2 OF 24

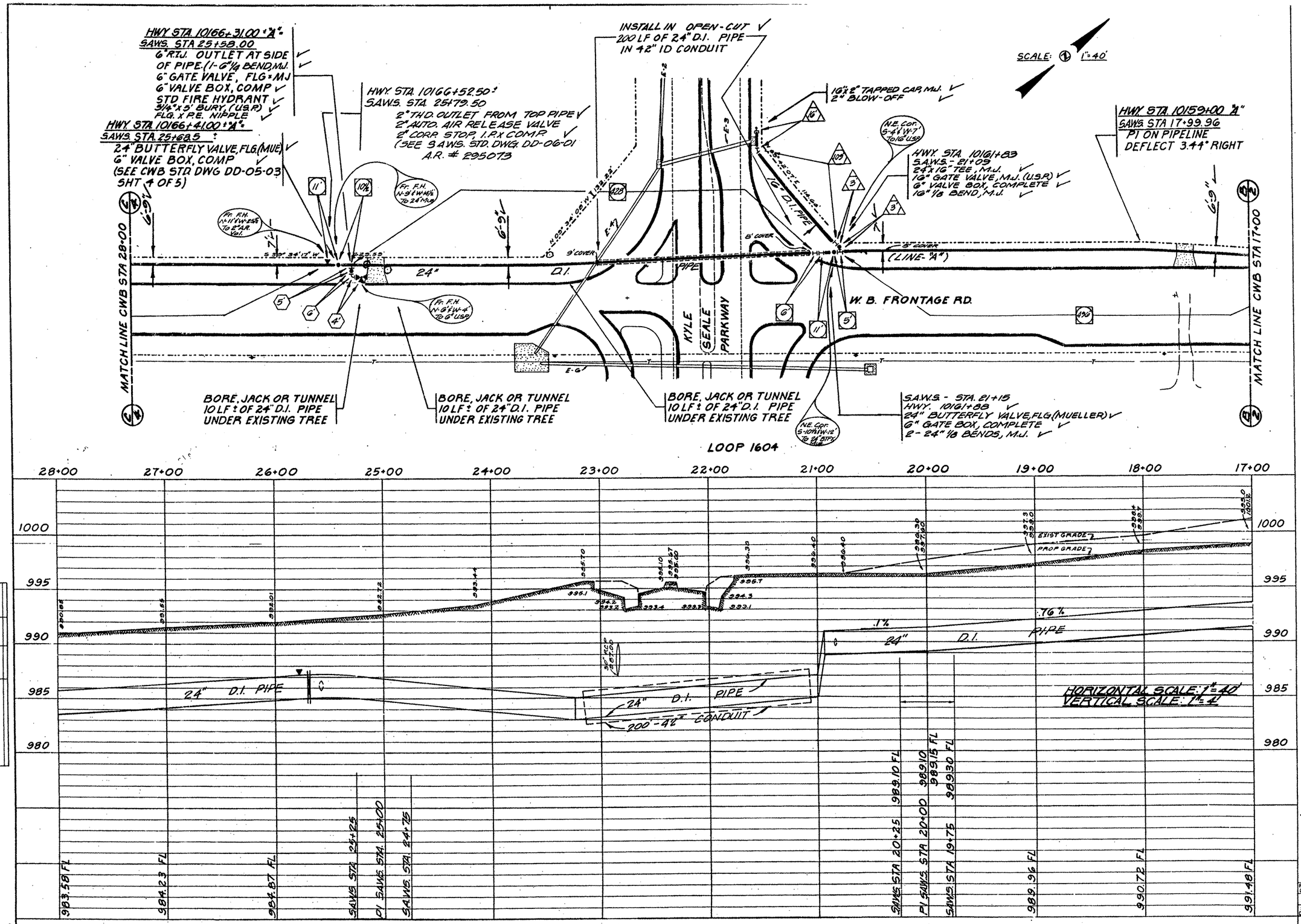
BLK MAP No.:
110-630, 112-632
112-634, 114-636

SEC. No.: 3-O, 3-P
3-Q, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				349
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP 1604

AD-75-17

NOTES



"AS-BUILT"

STATE OF TEXAS
STEVEN RENNEKER
50924
REGISTERED PROFESSIONAL ENGINEER

3-31-93

2-7-92

S.A.W.S. JOB 90-5051

SHEET 3 OF 24

BLK MAP No.: 110-630, 112-632, 112-634, 114-636

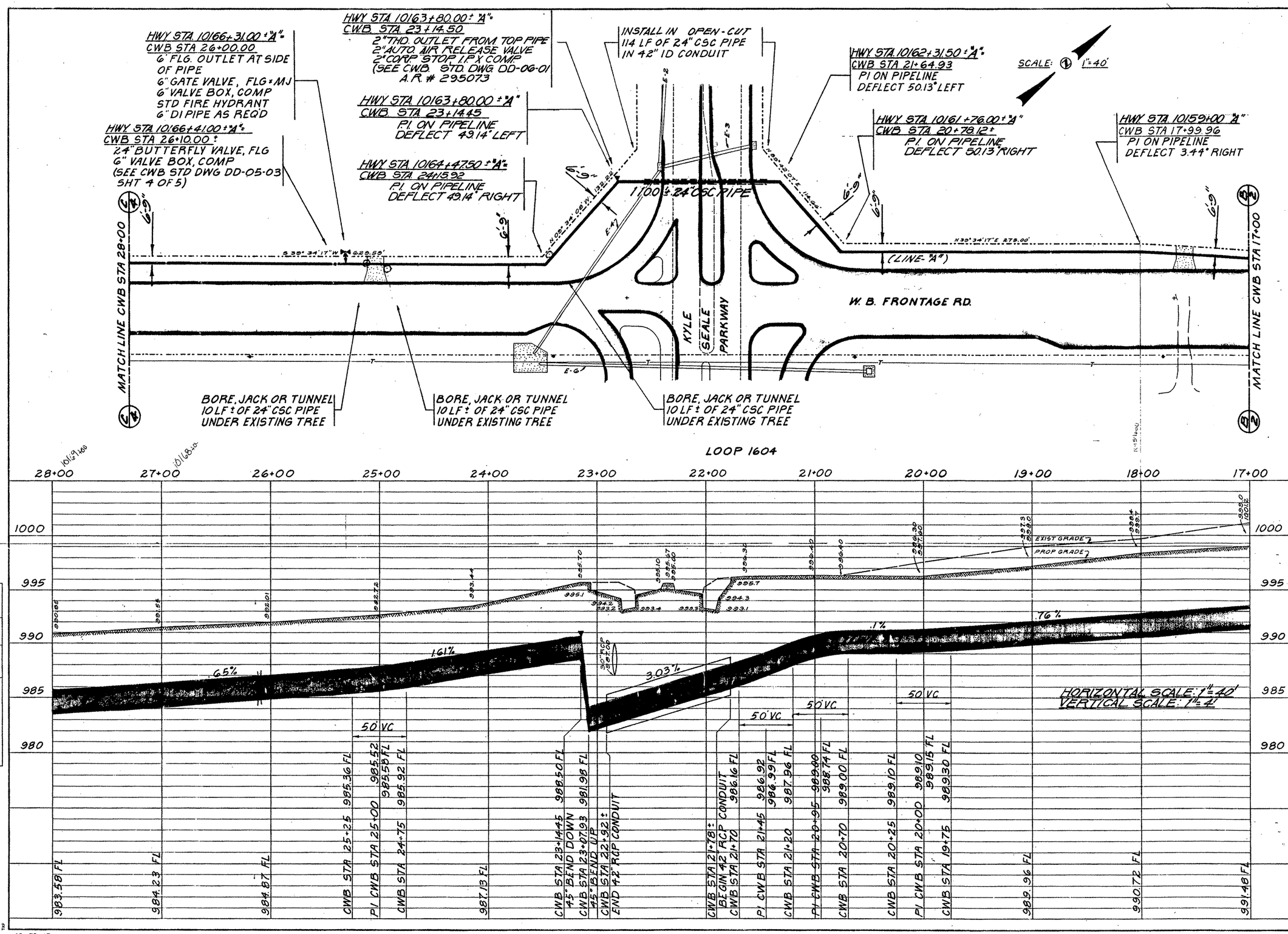
SEC. No.: 3-Q, 3-P, 3-O, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				350
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
13	BEXAR	2452	02	023	LP1604

PLOTTED BY | CHECKED | DATE

TOPOGRAPHY
GROUND PROFILE
ROADWAY LAYOUT
GRADES

AD-75-17



NOTES

3-31-93

2-7-92

CWB JOB 90-5051

SHEET 3 OF 24

BLK MAP No.: 110-630, 112-632, 112-634, 114-636

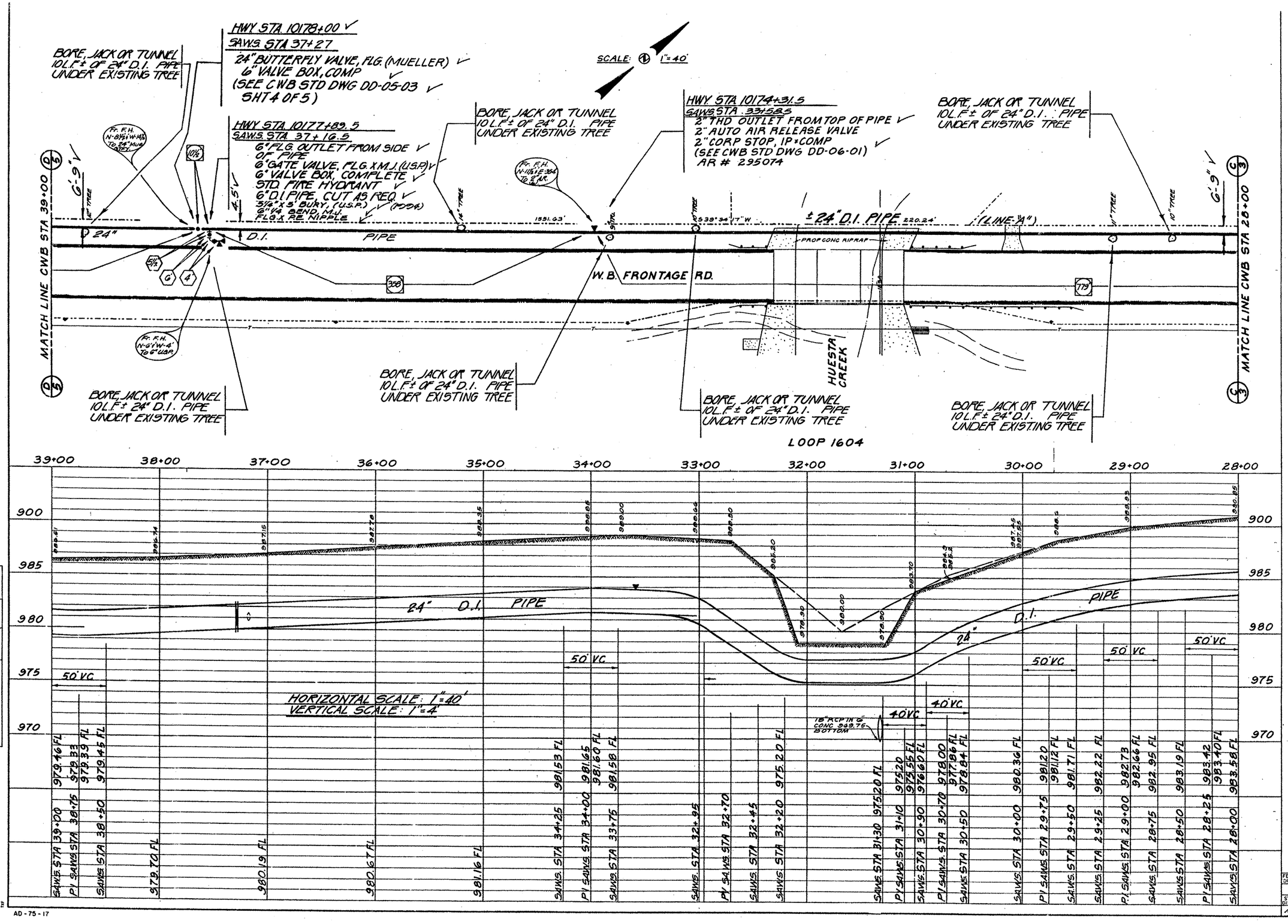
SEC. No.: 3-Q, 3-P, 3-O, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				350
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

PLOTTED BY | CHECKED | DATE

TOPOGRAPHY
GROUND PROFILE
ROADWAY LAYOUT
GRADES

AD-75-17



NOTES

"AS-BUILT"

STEVEN RENNEKER 50924 REGISTERED PROFESSIONAL ENGINEER 10-21-96

3-31-93

LEE JOSEPH CHEGIN 50951 REGISTERED PROFESSIONAL ENGINEER

2-7-92

SAWS JOB 90-5051

SHEET 4 OF 24

BLK MAP No.: 110-630, 112-632, 112-634, 114-636

SEC. No.: 3-O, 3-P, 3-Q, 3-R

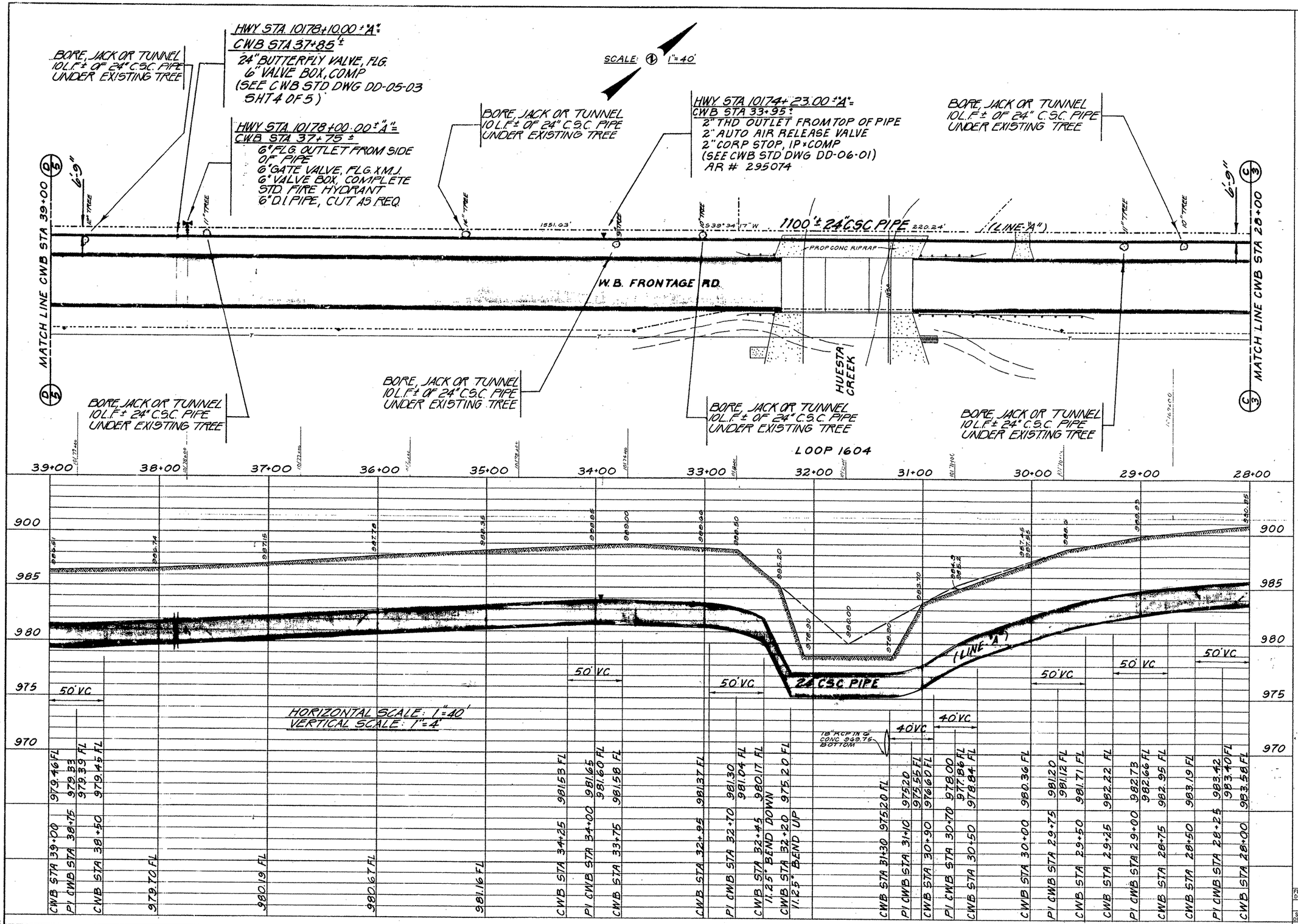
FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO	SHEET NO.
6	TEXAS		351

STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

PLOTTED BY | CHECKED | DATE

TOPOGRAPHY
GROUND PROFILE
ROADWAY LAYOUT
GRADES

AD-75-17



NOTES

3-31-93

2-7-92

CWB JOB 90-5051

SHEET 4 OF 24

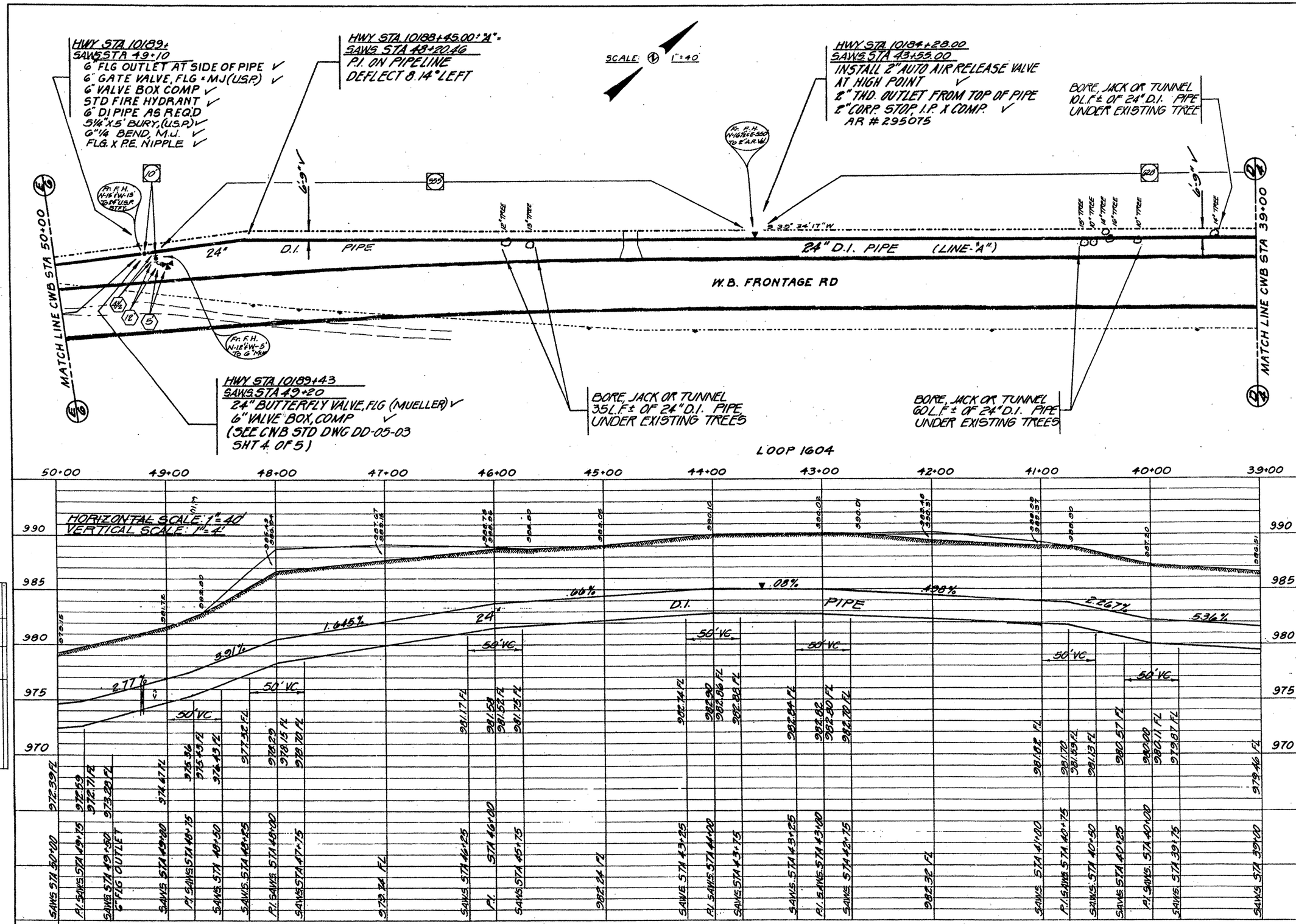
BLK MAP No.:
110-630, 112-632
112-634, 114-636

SEC. No.: 3-O, 3-P
3-Q, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				331
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

PLOTTED BY	CHECKED	DATE
TOPOGRAPHY		
GROUND PROFILE		
ROADWAY LAYOUT		
GRADES		

AD-75-17



NOTES

"AS-BUILT"

STEVEN RENNEKER 50924 REGISTERED PROFESSIONAL ENGINEER

3-31-93

2-7-92

S.A.W.S. JOB 90-5051
SHEET 5 OF 24

BLK MAP No.:
110-630, 112-632
112-634, 114-636

SEC. No.: 3-O, 3-P
3-Q, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				352
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

NOTES

HWY STA 10189+40.00±"A":
CWB STA 49+50.00
6" FLG OUTLET AT SIDE OF PIPE
6" GATE VALVE, FLG × MJ
6" VALVE BOX COMP
STD FIRE HYDRANT
6" DI PIPE AS REQ'D

HWY STA 10188+45.00±"A":
CWB STA 48+20.46
P.I. ON PIPELINE
DEFLECT 8.14° LEFT

SCALE: (1) 1" = 40'

HWY STA 10184+24.50±"A":
CWB STA 44+00.00
INSTALL 2" AUTO AIR RELEASE VALVE
AT HIGH POINT
2" THD. OUTLET FROM TOP OF PIPE
2" CORP STOP I.P. X COMP.
AR # 295075

BORE, JACK OR TUNNEL
10 L.F.± OF 24" C.S.C. PIPE
UNDER EXISTING TREE

6'-9"

12" TREE
13" TREE
S 39° 34' 17" W
1100'± 24" CSC PIPE (LINE "A")
W.B. FRONTAGE RD
18" TREE
16" TREE
14" TREE
16" TREE
10" TREE
14" TREE

MATCH LINE CWB STA 50+00
MATCH LINE CWB STA 39+00

HWY STA 10189+50.00±"A":
CWB STA 49+60.00
24" BUTTERFLY VALVE, FLG
6" VALVE BOX, COMP
(SEE CWB STD DWG DD-05-03
SHT 4 OF 5)

BORE, JACK OR TUNNEL
35 L.F.± OF 24" C.S.C. PIPE
UNDER EXISTING TREES

BORE, JACK OR TUNNEL
60 L.F.± OF 24" C.S.C. PIPE
UNDER EXISTING TREES

LOOP 1604

50+00 49+00 48+00 47+00 46+00 45+00 44+00 43+00 42+00 41+00 40+00 39+00

HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'

990 985 980 975 970

.66% .08% .498% 2.267% 5.36%
1.645% 3.01% 2.77%
(LINE "A")
50' VC

CWB STA 50+00 — 972.39 FL
P.I. CWB STA 49+75 — 972.59 — 972.71 FL
CWB STA 49+50 6" FLG OUTLET — 973.28 FL
CWB STA 49+00 — 974.47 FL
P.I. CWB STA 48+75 — 975.36 — 975.43 FL
CWB STA 48+50 — 976.43 FL
CWB STA 48+25 — 977.32 FL
P.I. CWB STA 48+00 — 978.29 — 978.15 FL
CWB STA 47+75 — 978.72 FL
979.74 FL
CWB STA 46+25 — 978.17 FL
P.I. CWB STA 46+00 — 981.58 — 981.54 FL
CWB STA 45+75 — 981.75 FL
982.34 FL
CWB STA 43+25 — 982.74 FL
P.I. CWB STA 44+00 — 982.90 — 982.86 FL
CWB STA 43+75 — 982.83 FL
CWB STA 43+25 — 982.84 FL
P.I. CWB STA 43+00 — 982.82 — 982.80 FL
CWB STA 42+75 — 982.70 FL
982.32 FL
CWB STA 41+00 — 981.82 FL
P.I. CWB STA 40+75 — 981.70 — 981.59 FL
CWB STA 40+50 — 981.13 FL
CWB STA 40+25 — 980.57 FL
P.I. CWB STA 40+00 — 980.00 — 980.11 FL
CWB STA 39+75 — 979.87 FL
CWB STA 39+00 — 979.46 FL

PLOTTED BY	CHECKED	DATE
TOPOGRAPHY		
GROUND PROFILE		
ROADWAY LAYOUT		
GRADES		

3-31-93

STATE OF TEXAS — LEE JOSEPH CHALLIN — 3-31-93

7-9-91

2-7-92

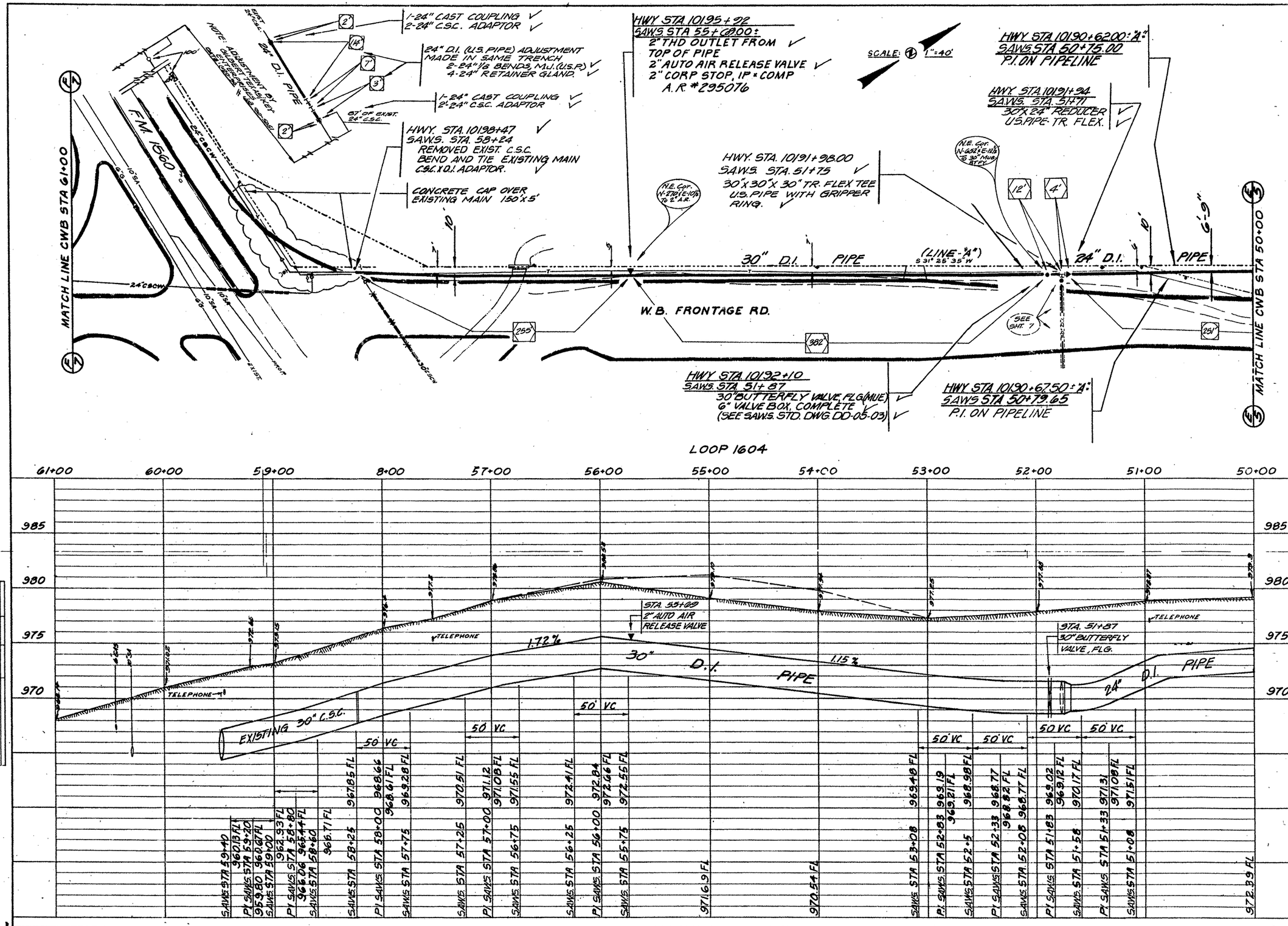
CWB JOB 90-5051
SHEET 5 OF 24

BLK MAP No.:
110-630, 112-632
112-634, 114-636

SEC. No.: 3-O, 3-P
3-Q, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				352
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	32	023	LP 1604

AD-75-17



NOTES

"AS-BUILT"

STEVEN RENNEKER 50924 LICENSED PROFESSIONAL ENGINEER 10-21-96

3-31-93

LEE JOSEPH 33461 LICENSED PROFESSIONAL ENGINEER 7-1-93

2-7-93

SAWS JOB 90-5051
SHEET 6 OF 24

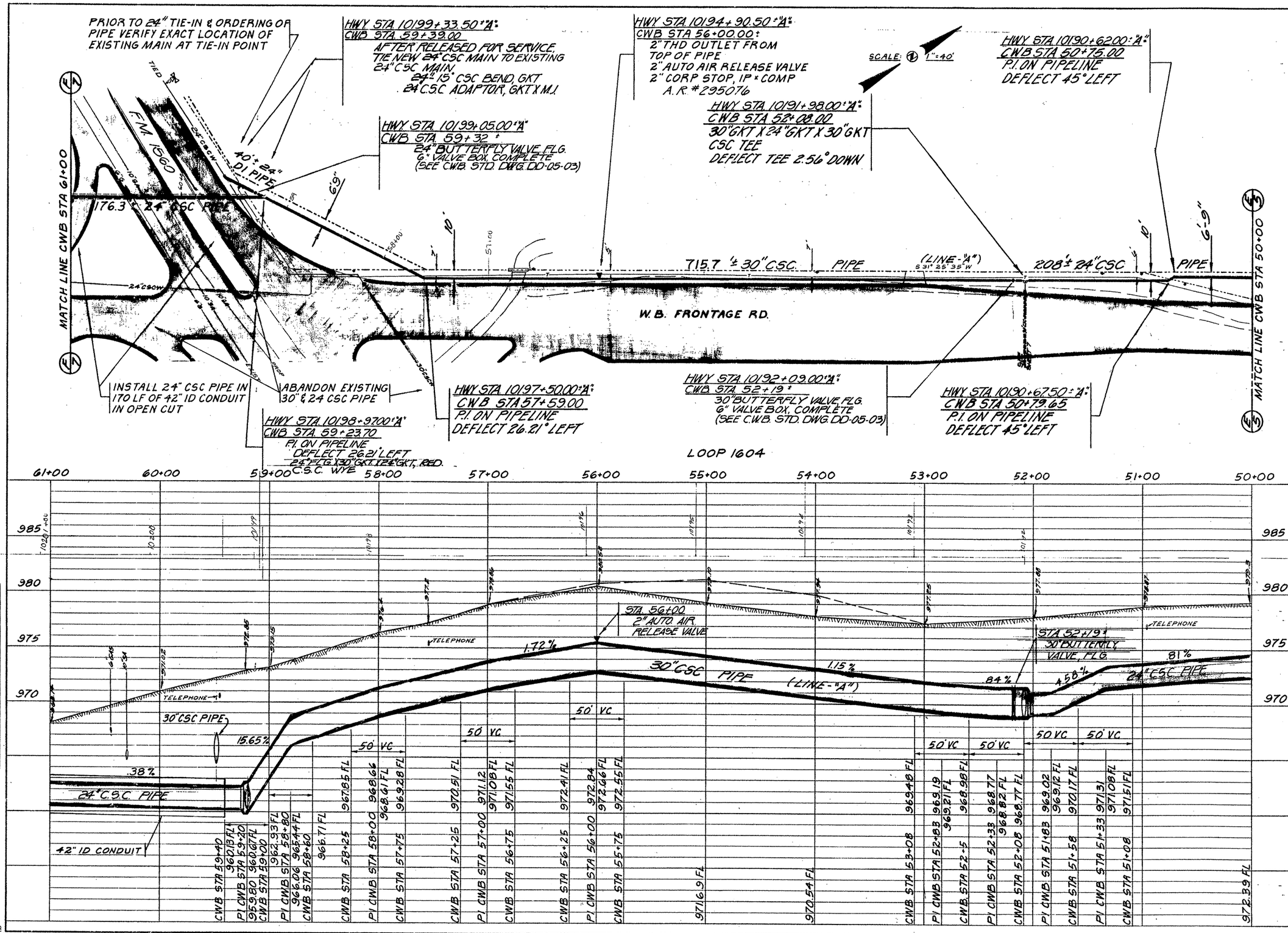
BLK. MAP No.: 110-630
112-632, 112-634
114-634, 114-636

SEC. No.: 3-O, 3-P
3-Q, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS		353
STATE DIST. NO.	COUNTY	CONT. NO. / SECT. NO. / JOB NO.	HIGHWAY NO.
15	BEXAR	0002 / 03	LP 1604

PLOTTED BY	CHECKED	DATE
TOPOGRAPHY:		
GROUND PROFILE:		
ROADWAY LAYOUT:		
GRADES		

AD-76-17



NOTES

PLOTTED BY	CHECKED	DATE
TOPOGRAPHY		
GROUND PROFILE		
ROADWAY LAYOUT		
GRADES		

3-31-93

2-7-92

CWB JOB 90-5051

SHEET 6 OF 24

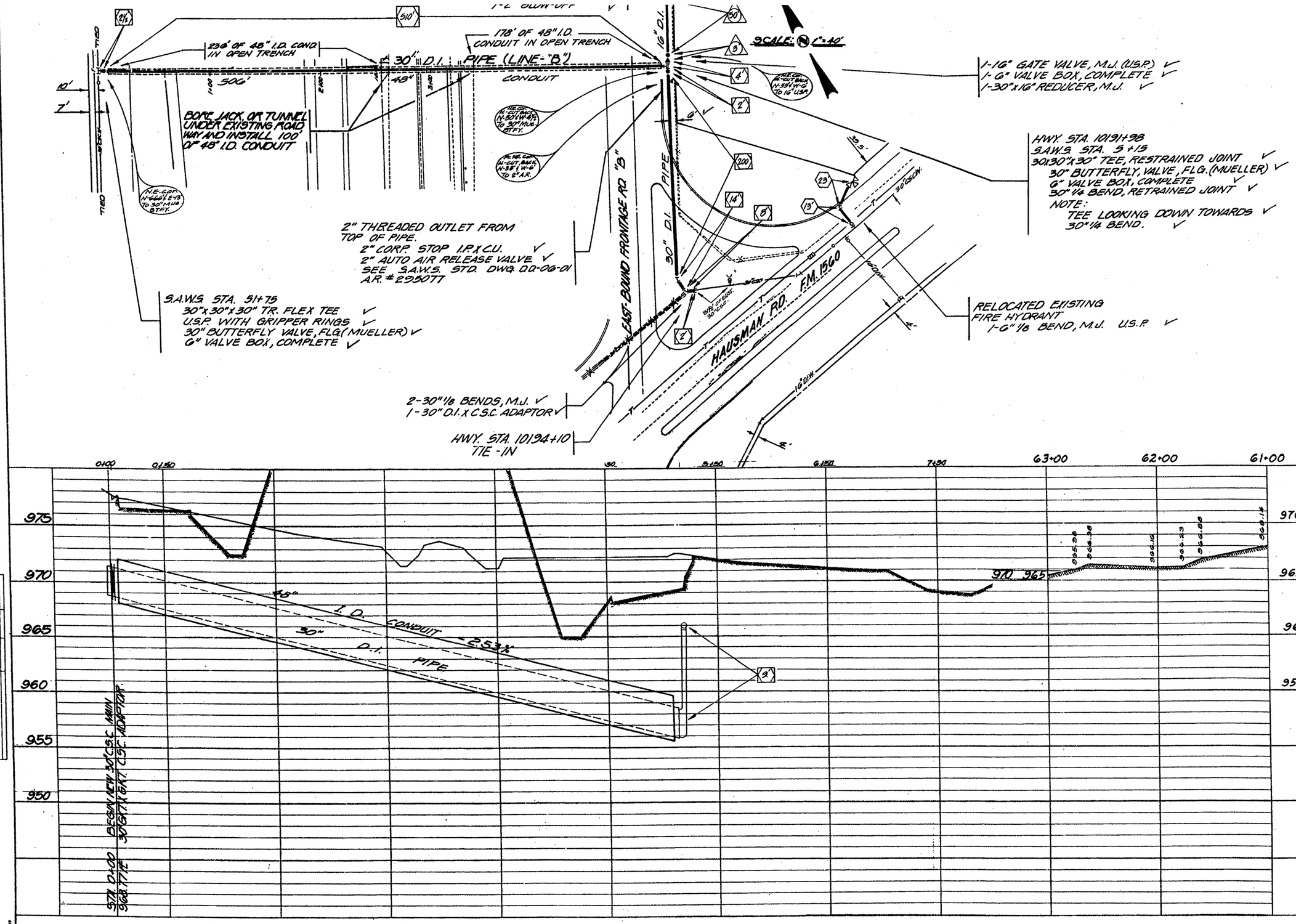
BLK. MAP No.: 110-630
112-632, 112-634
114-634, 114-636

SEC. No.: 3-O, 3-P
3-Q, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					353
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.		HIGHWAY NO.
15	BEXAR	2452	02	023		LP1604

AD-75-17

NOTES



"AS-BUILT"

STEVEN RENNEKER
50924
REGISTERED
PROFESSIONAL ENGINEER
10-21-96

3-31-9

2-7-92

S.A.W.S. JOB 90-5031

SHEET 7 OF 24

BLK MAP NO.: 110-630

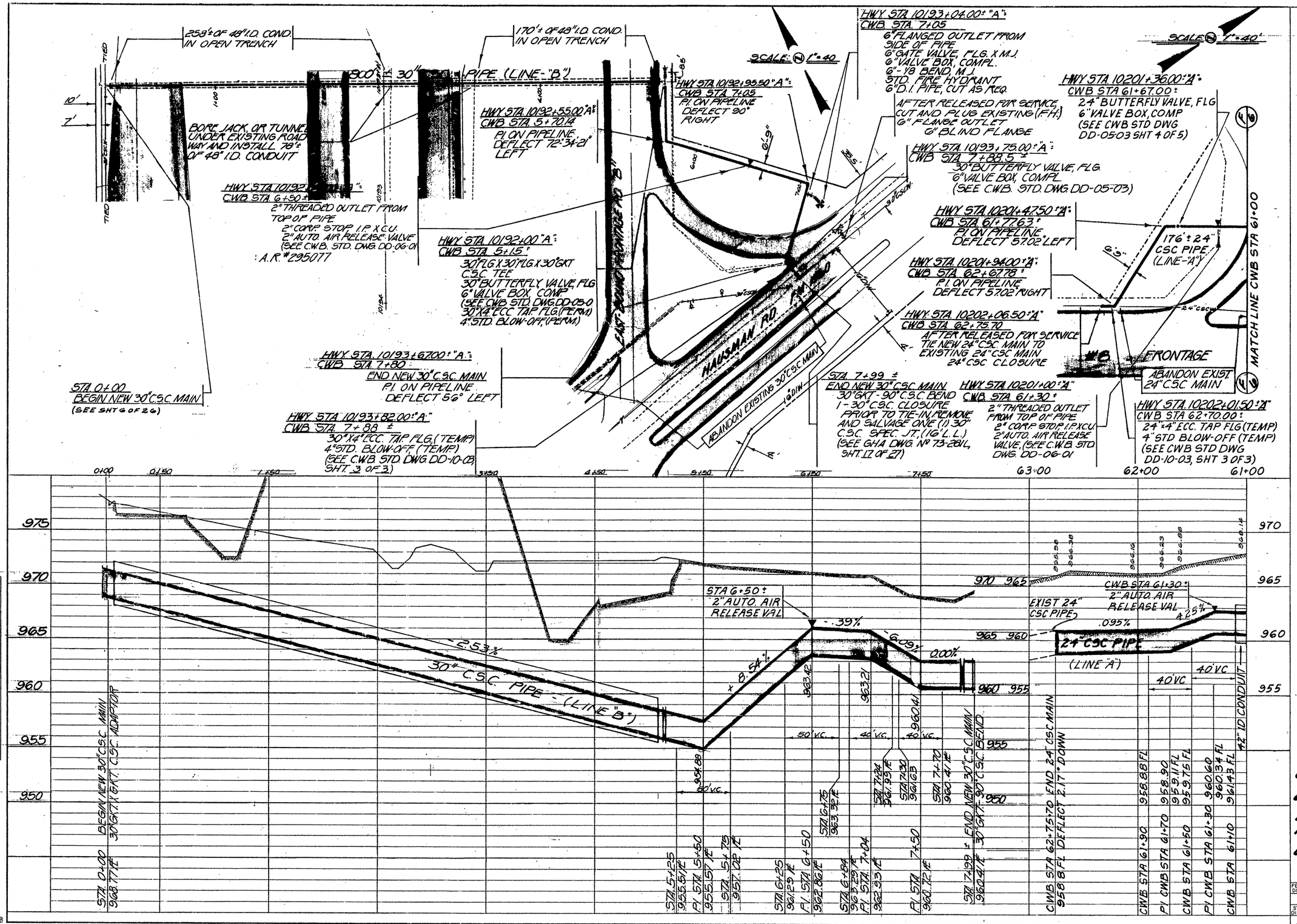
SEC. NO.: 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO			SHEET NO.
6	TEXAS				354
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

PLOTTED BY	CHECKED	DATE
TOPOGRAPHY		
CONDUIT PROFILE		
ROADWAY LAYOUT		
GRADES		

AD-75-17

NOTES



PLOTTED BY	CHECKED	DATE
TOPOGRAPHY		
GROUND PROFILE		
ROADWAY LAYOUT		
GRADES		

3-31-93

7-9-91

2-7-92

CWB JOB 90-5051

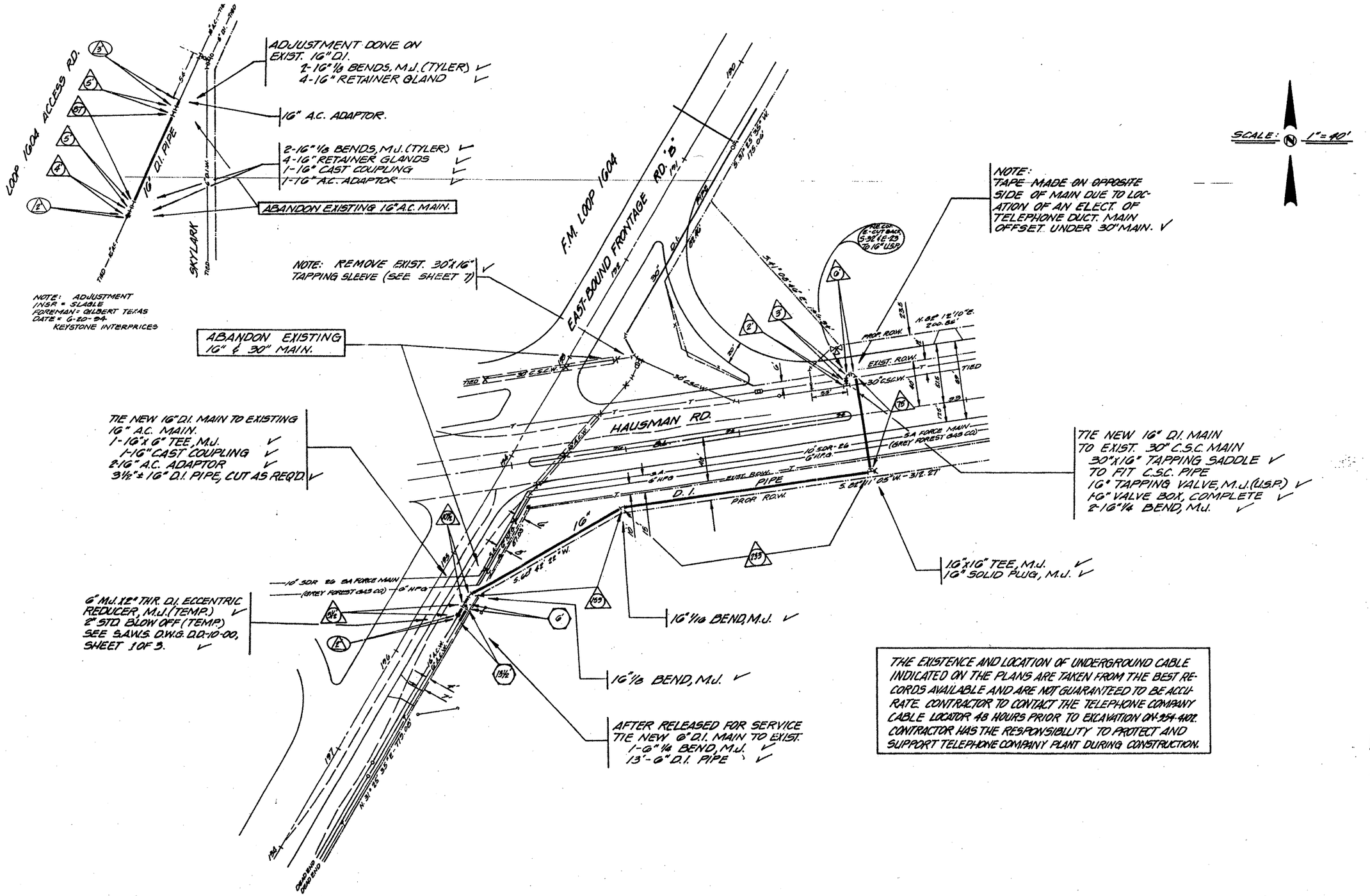
SHEET 7 OF 24

BLK MAP NO.: 110-630

SEC. NO.: 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				354
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP160A

AD-75-17



SCALE: 1" = 40'

THE EXISTENCE AND LOCATION OF UNDERGROUND CABLE INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE. CONTRACTOR TO CONTACT THE TELEPHONE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION 04-354-4402. CONTRACTOR HAS THE RESPONSIBILITY TO PROTECT AND SUPPORT TELEPHONE COMPANY PLANT DURING CONSTRUCTION.

"AS-BUILT"

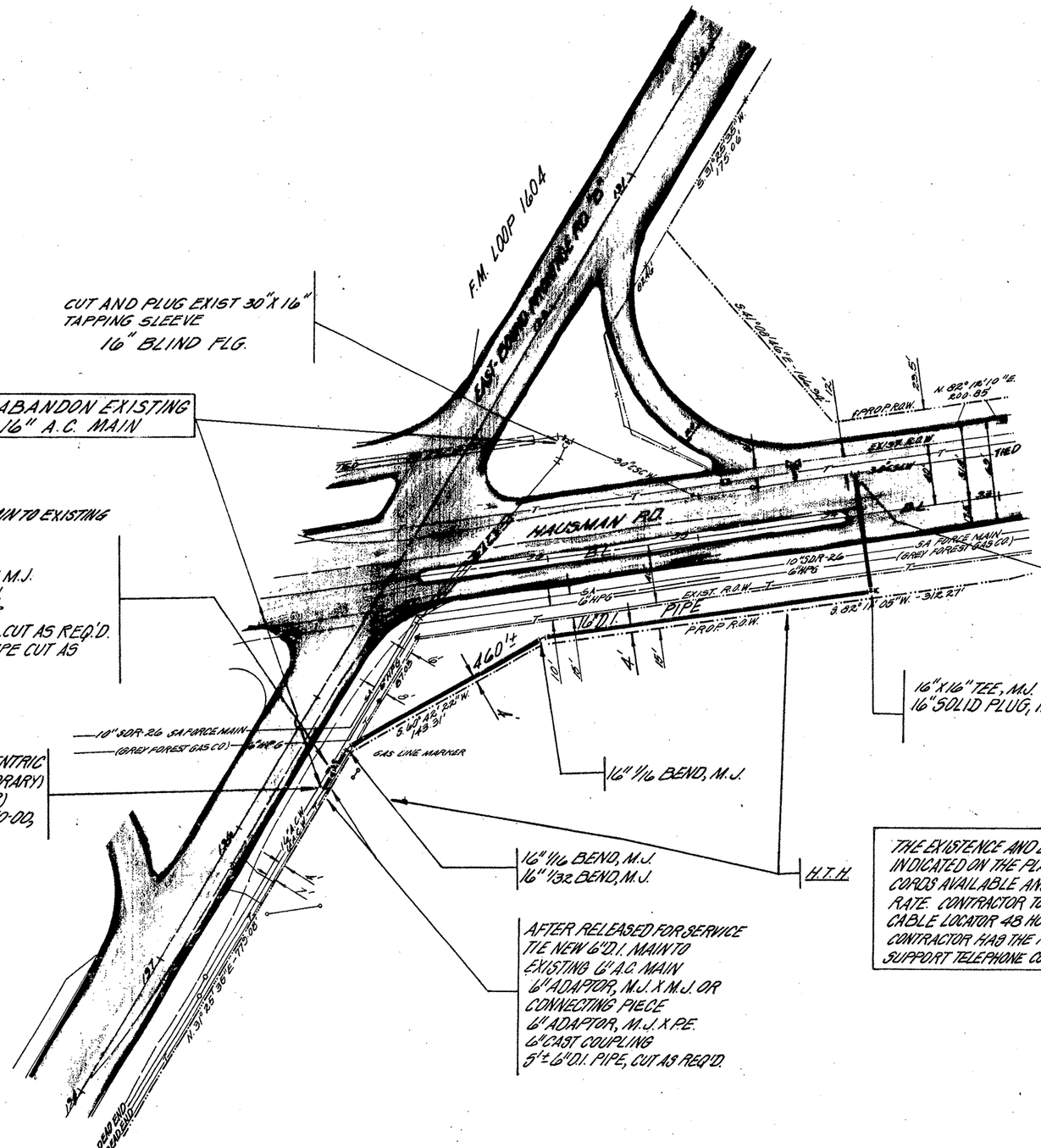
STEVEN RENNEKER 50924 PROFESSIONAL ENGINEER STATE OF TEXAS
10-21-96

3-31-93
2-7-92

STATE OF TEXAS PROFESSIONAL ENGINEER
STATE OF TEXAS PROFESSIONAL ENGINEER

S.A.W.S. JOB 90-5051
SHEET 8 OF 24
BLK MAP NO.: 110-630
SEC. NO.: 3-R, 3-O

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS					359
STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR		9456	02	023	LP1604



SCALE: 1" = 40'

CUT AND PLUG EXIST 30" X 16" TAPPING SLEEVE
16" BLIND FLG.

ABANDON EXISTING 16" A.C. MAIN

TIE NEW 16" D.I. MAIN TO EXISTING 16" A.C. MAIN.
16" X 16" TEE, M.J.
16" X 6" REDUCER, M.J.
16" 1/4 BEND, M.J.
16" A.C. ADAPTOR
5'± 16" D.I. PIPE, CUT AS REQ'D.
5'± 16" A.C.M.O.A. PIPE CUT AS REQ'D.

6" M.J. X 2" THR. D.I. ECCENTRIC REDUCER, M.J. (TEMPORARY)
2" STD. BLOW-OFF (TEMP.)
SEE C.W.B. STD. DWG. DD-10-00, SHEET 1 OF 3.

TIE NEW 16" D.I. MAIN TO EXIST. 30" C.S.C. MAIN.
30" X 16" TAPPING SADDLE TO FIT C.S.C. PIPE
16" TAPPING VALVE, M.J.
6" VALVE BOX, COMPLETE

16" X 16" TEE, M.J.
16" SOLID PLUG, M.J.

16" 1/16 BEND, M.J.

16" 1/16 BEND, M.J.
16" 1/32 BEND, M.J.

AFTER RELEASED FOR SERVICE
TIE NEW 6" D.I. MAIN TO EXISTING 6" A.C. MAIN
6" ADAPTOR, M.J. X M.J. OR CONNECTING PIECE
6" ADAPTOR, M.J. X P.E.
6" CAST COUPLING
5'± 6" D.I. PIPE, CUT AS REQ'D.

THE EXISTENCE AND LOCATION OF UNDERGROUND CABLE INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE. CONTRACTOR TO CONTACT THE TELEPHONE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION ON 254-4102. CONTRACTOR HAS THE RESPONSIBILITY TO PROTECT AND SUPPORT TELEPHONE COMPANY PLANT DURING CONSTRUCTION.

3-31-93
2-7-92

STATE OF TEXAS — LEE KISSEN CHEEK — 53047 — PROFESSIONAL ENGINEER

STATE OF TEXAS — STEVEN MCCRAW — 50624 — REGISTERED PROFESSIONAL ENGINEER

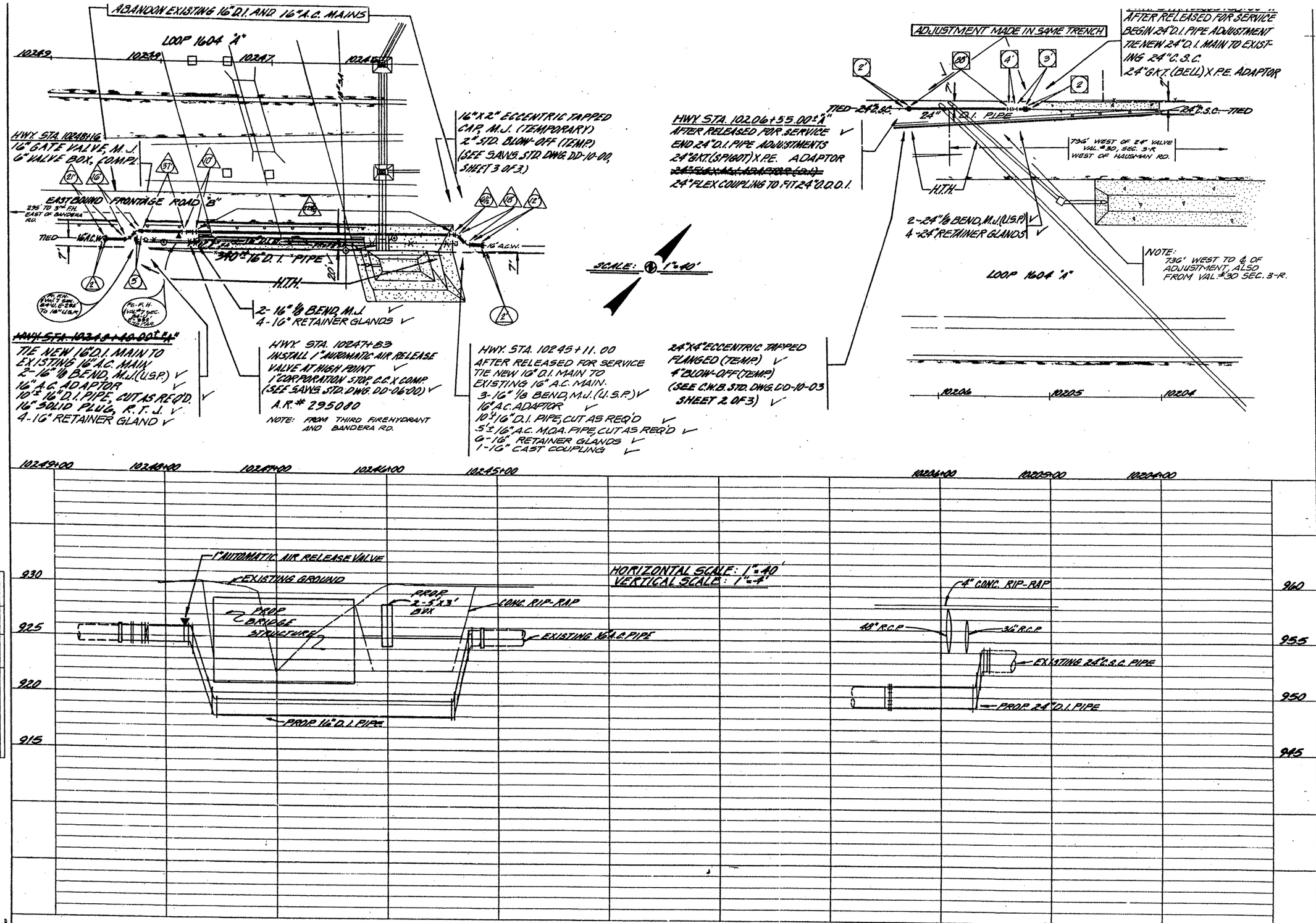
CWB JOB 90-5051

SHEET 8 OF 24

BLK MAP NO.: 110-630

SEC. NO.: 3-R, 3-O

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			SHEET NO.
6	TEXAS				353
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR	3452	02	023	LP1604



NOTES

"AS-BUILT"

STEVEN RENNEKER 50924 REGISTERED PROFESSIONAL ENGINEER

3-31-93

2-7-92

S.A.W.S. JOB 90-5051

SHEET 9 OF 24

BLK. MAP No.: 106-626, 108-626, 108-628

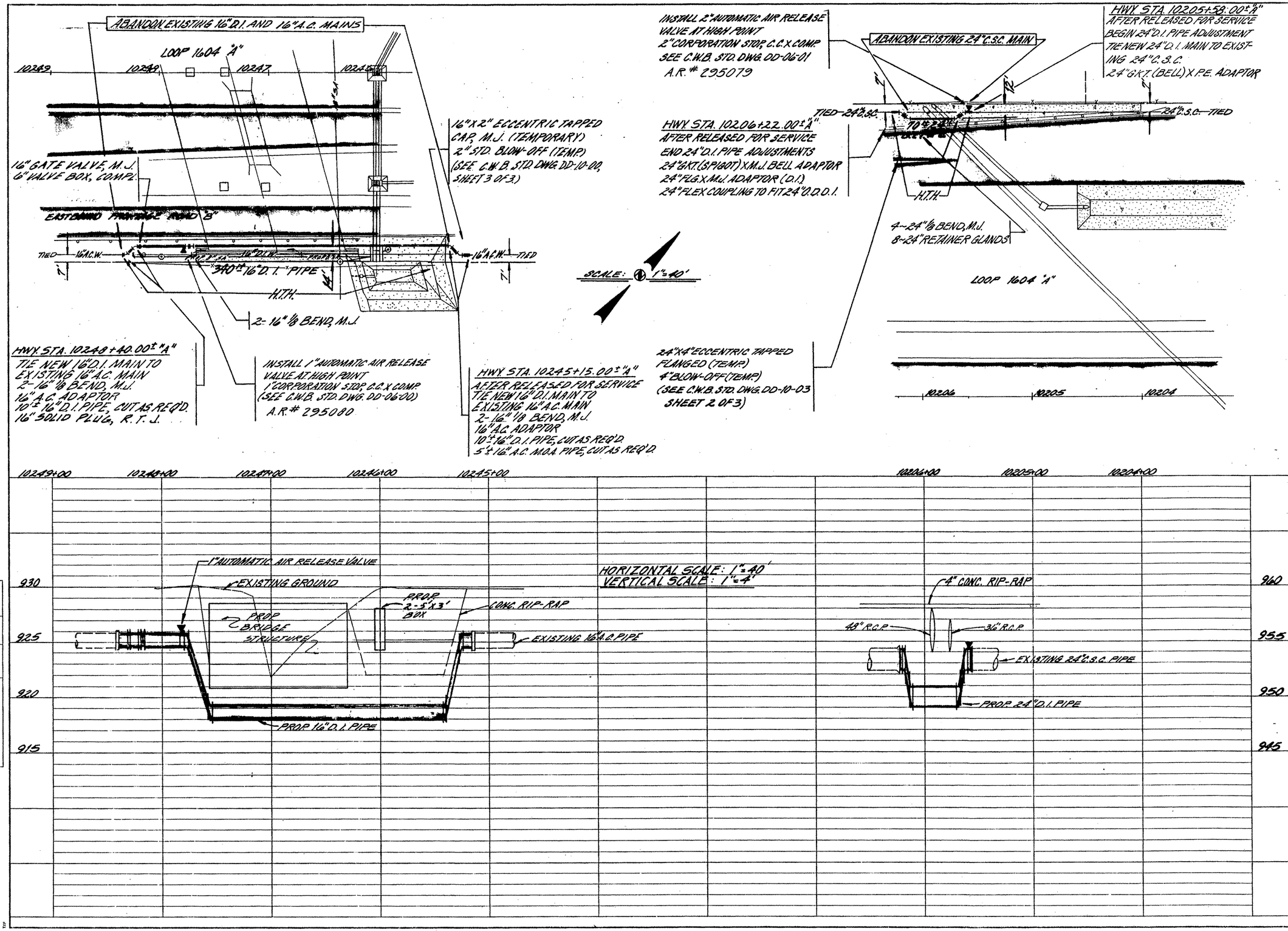
SEC. NO.: 84-U

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				356
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	3452	02	023	LP1604

PLOTTED BY | CHECKED | DATE

TOPOGRAPHY
GROUND PROFILE
ROADWAY LAYOUT
GRADES

AD-75-17



NOTES

PLOTTED BY	CHECKED	DATE
TOPOGRAPHY		
GROUND PROFILE		
ROADWAY LAYOUT		
GRADES		

3-31-93

2-7-92

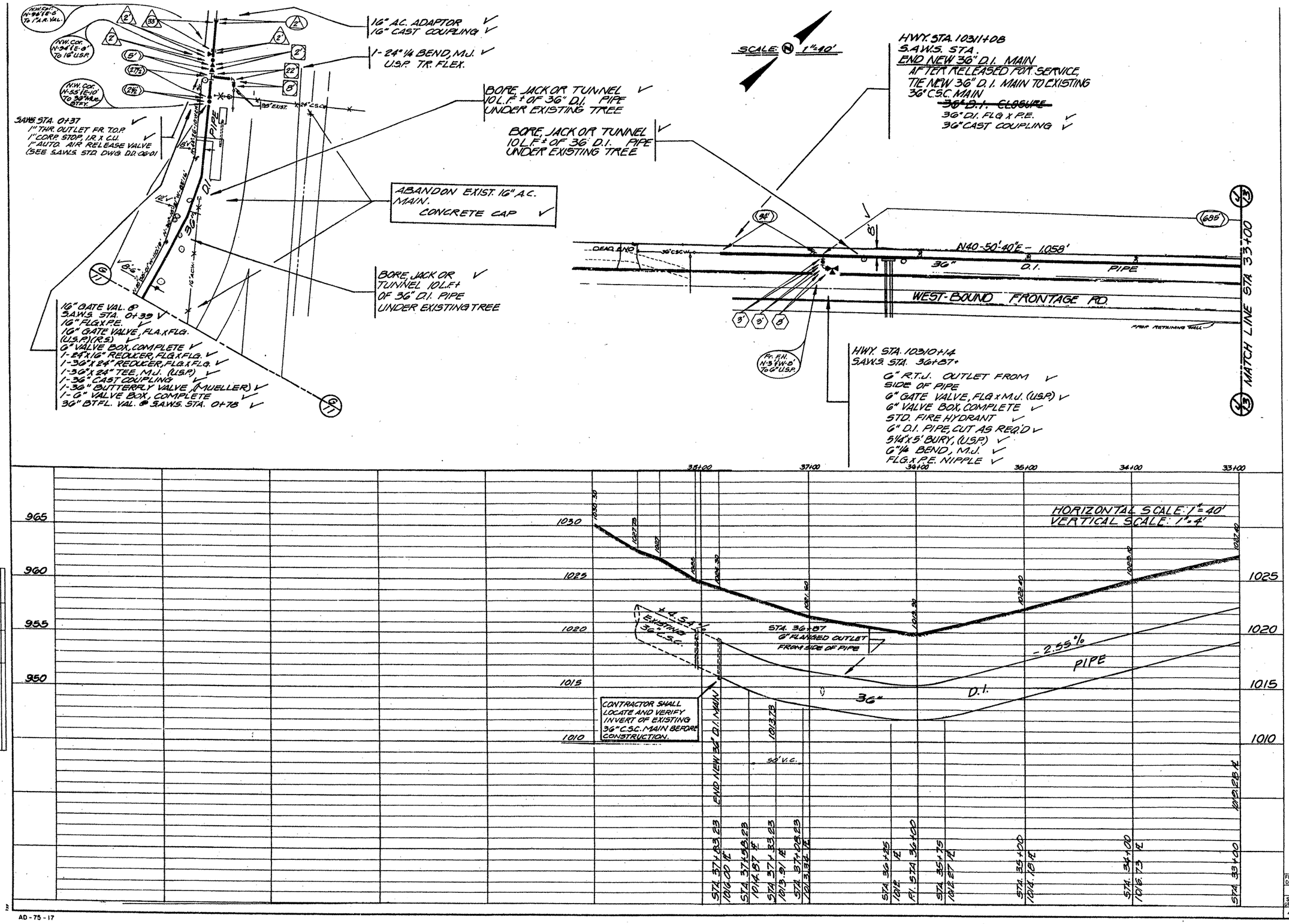
CWB JOB 90-5051

SHEET 2 OF 24

BLK. MAP NO.: 106-626, 108-626 108-628

SEC. NO.: 84-U

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					2556
STATE DIST. NO.	COUNTY		CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR		2452	02	023	LP1604



NOTES

"AS-BUILT"

STEVEN RENNEKER 50924 REGISTERED PROFESSIONAL ENGINEER

10-31-96

3-31-93

2-7-92

S.A.W.S. JOB 90-5051
SHEET 10 OF 24

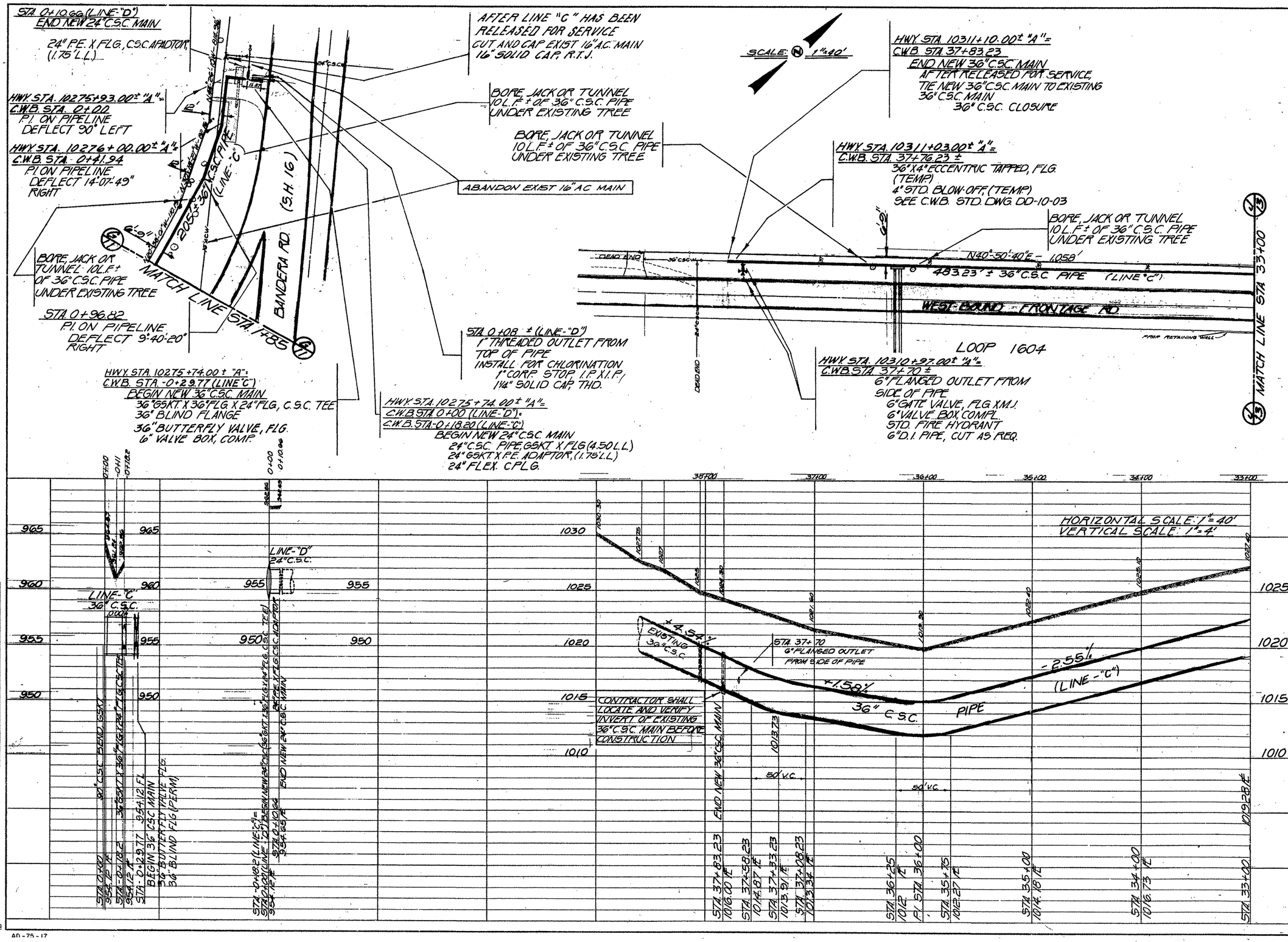
BLK. MAP No.:
110-630, 112-632
112-634, 114-636

SEC. No.: 3-O, 3-P
3-Q, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO			SHEET NO
6	TEXAS				357
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

PLOTTED BY	CHECKED	DATE
TOPOGRAPHY		
GROUND PROFILE		
ROADWAY LAYOUT		
GRADES		

AD-75-17



NOTES

3-31-93

2-7-92

CWB JOB 90-5051
SHEET 10 OF 24

BLK. MAP No.:
110-630, 112-632
112-634, 114-636

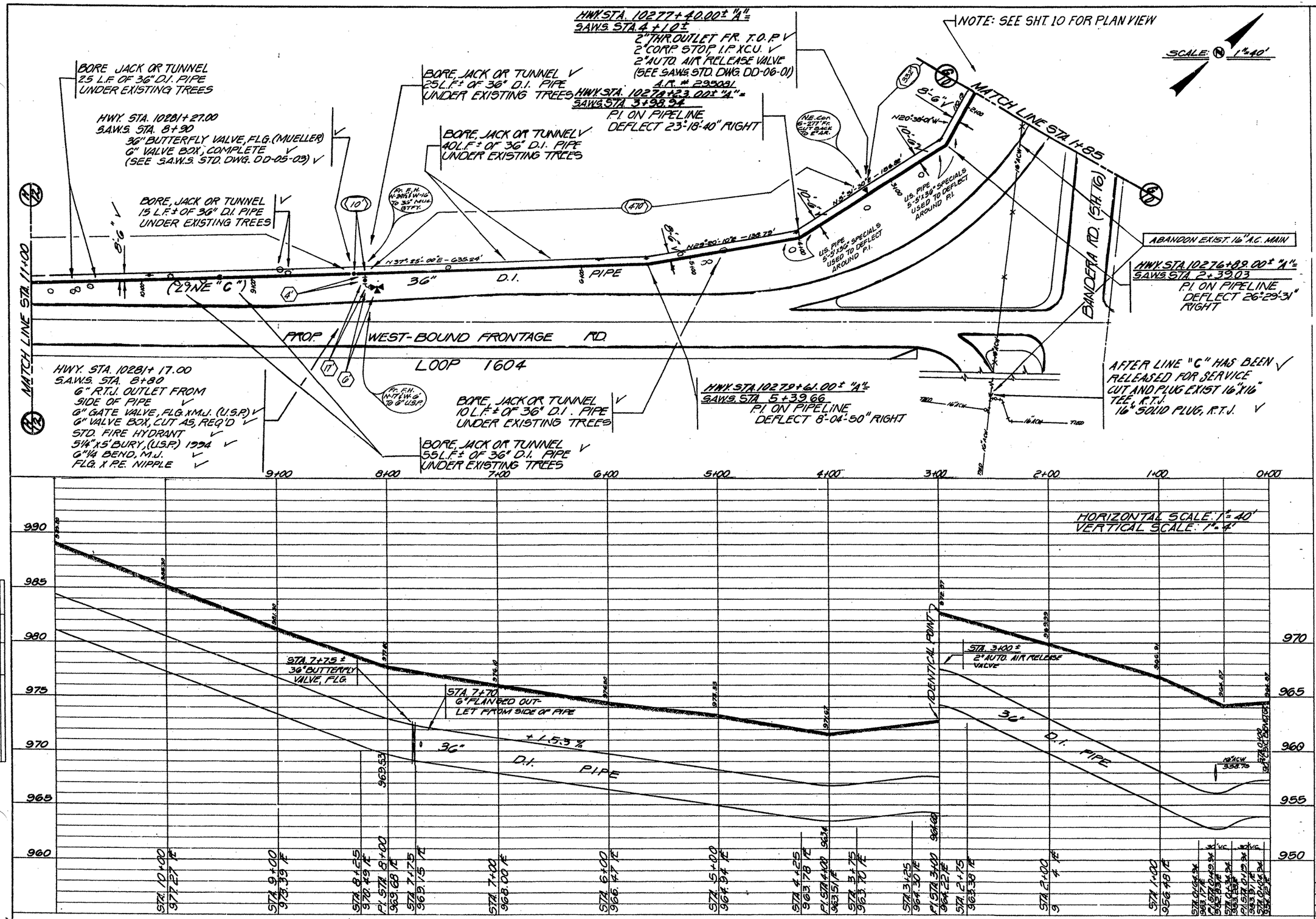
SEC. No.: 3-O, 3-P
3-Q, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				357
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

	DATE
TOPOGRAPHY	
GROUND PROFILE	
ROADWAY LAYOUT	
GRADES	

PLOTTED BY | CHECKED

AD-75-17



NOTES

"AS-BUILT"

STEVEN RENNEKER 50924 REGISTERED PROFESSIONAL

10-21-96

3-31-93

2-7-92

SAWS JOB 90-5051
SHEET 11 OF 24

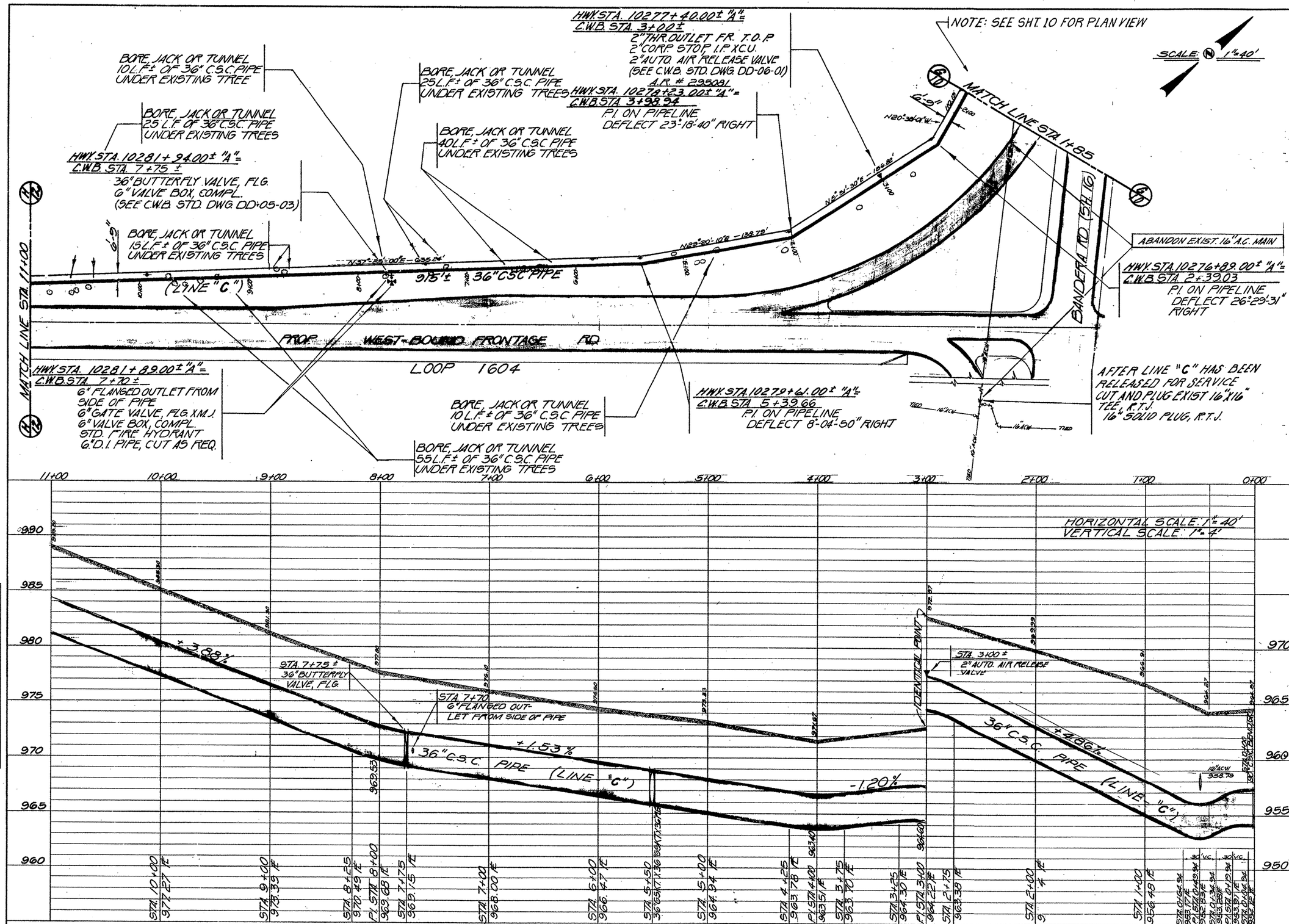
BLK. MAP No.: 110-630
112-632, 112-634
114-634, 114-636

SEC. No.: 3-O, 3-P
3-Q, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				358
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

TOPOGRAPHY
GROUND PROFILE
ROADWAY LAYOUT
GRADES

AD-75-17



NOTES

PLOTTED BY | CHECKED | DATE
TOPOGRAPHY
GROUND PROFILE
ROADWAY LAYOUT
GRADES

3-31-93

7/9/91

2-7-92

CWB JOB 90-5051
SHEET 11 OF 24

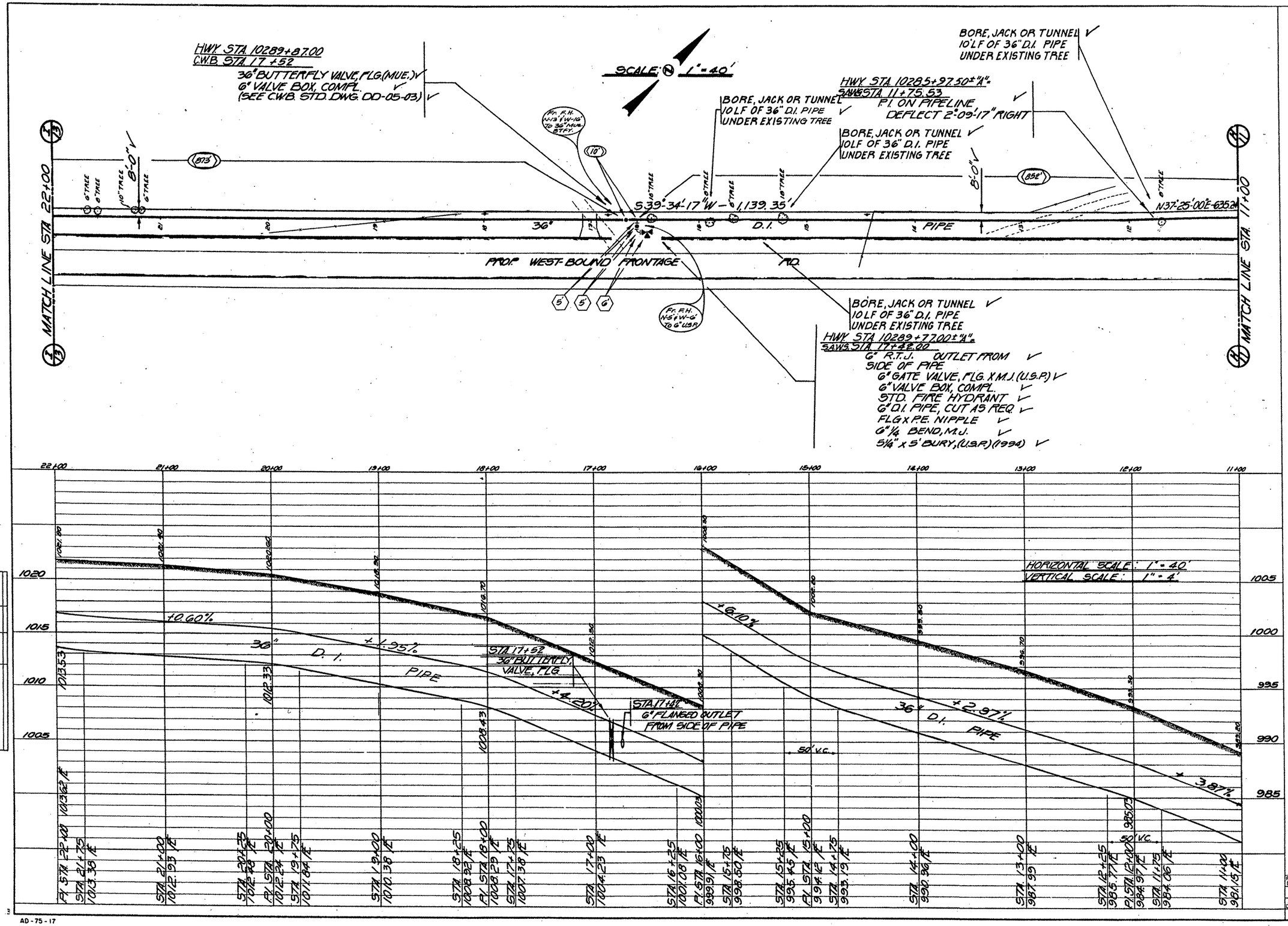
BLK. MAP No.: 110-630
112-632, 112-634
114-634, 114-636

SEC. No.: 3-O, 3-P
3-Q, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					358
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.	
15	BEXAR	2452	02	023	LP/LOOP	

AD-75-17

NOTES



PLOTTED BY	CHECKED	DATE
TOPOGRAPHY		
GROUND PROFILE		
ROADWAY LAYOUT		
GRADES		

"AS-BUILT"

STEVEN RENNEKER
50924
REGISTERED
PROFESSIONAL ENGINEER
10-8-96

3-31-92

2-7-92

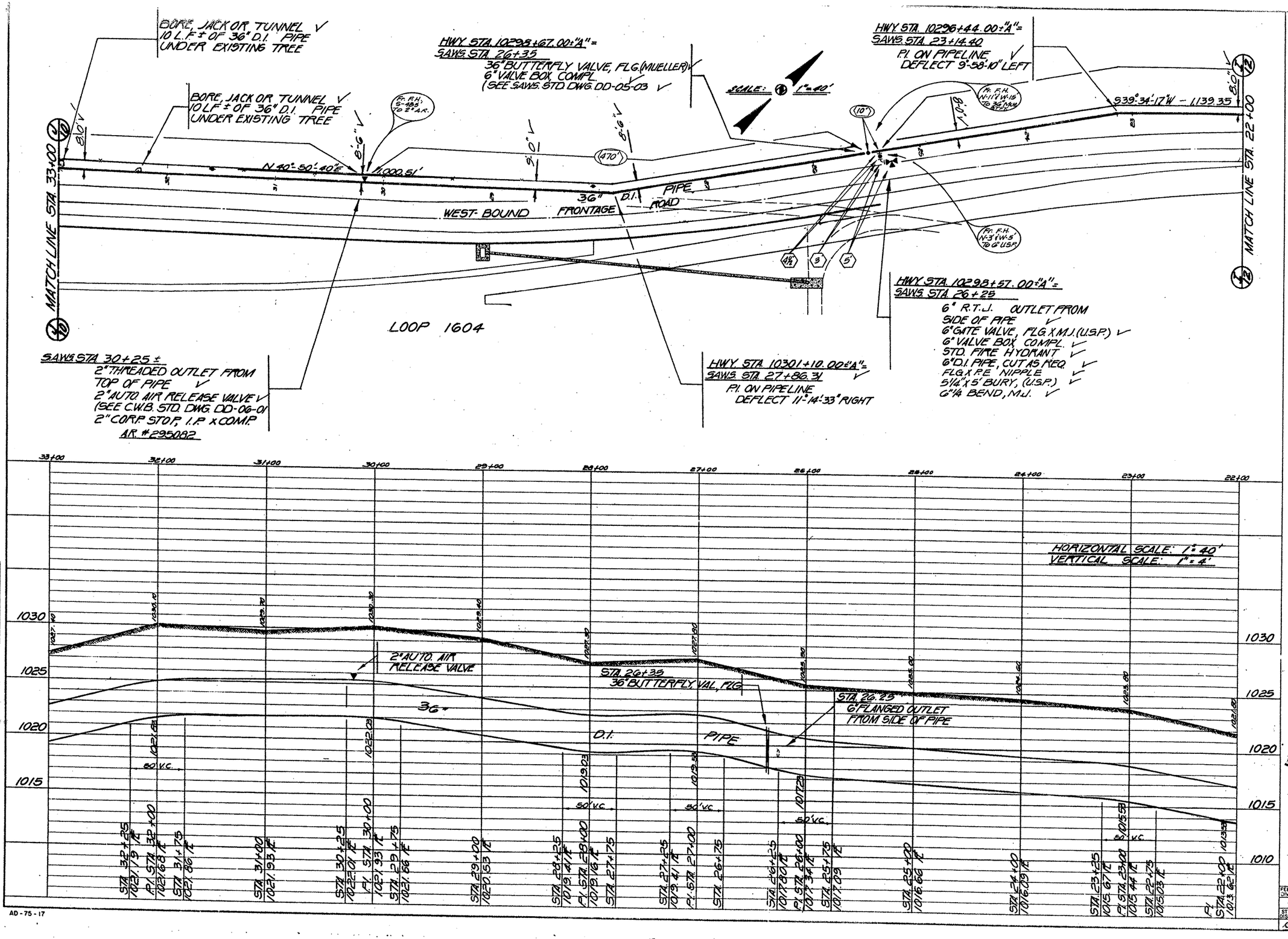
SAWS JOB 90-5051
SHEET 12 OF 24

BLK. MAP No.: 110-630
112-632, 112-634
114-634, 114-636

SEC. No.: 3-O, 3-P
3-Q, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				359
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2456	02	023	LP1604

AD-75-17



NOTES

"AS-BUILT"

STATE OF TEXAS
STEVEN RENNEKER
50924
10-21-96

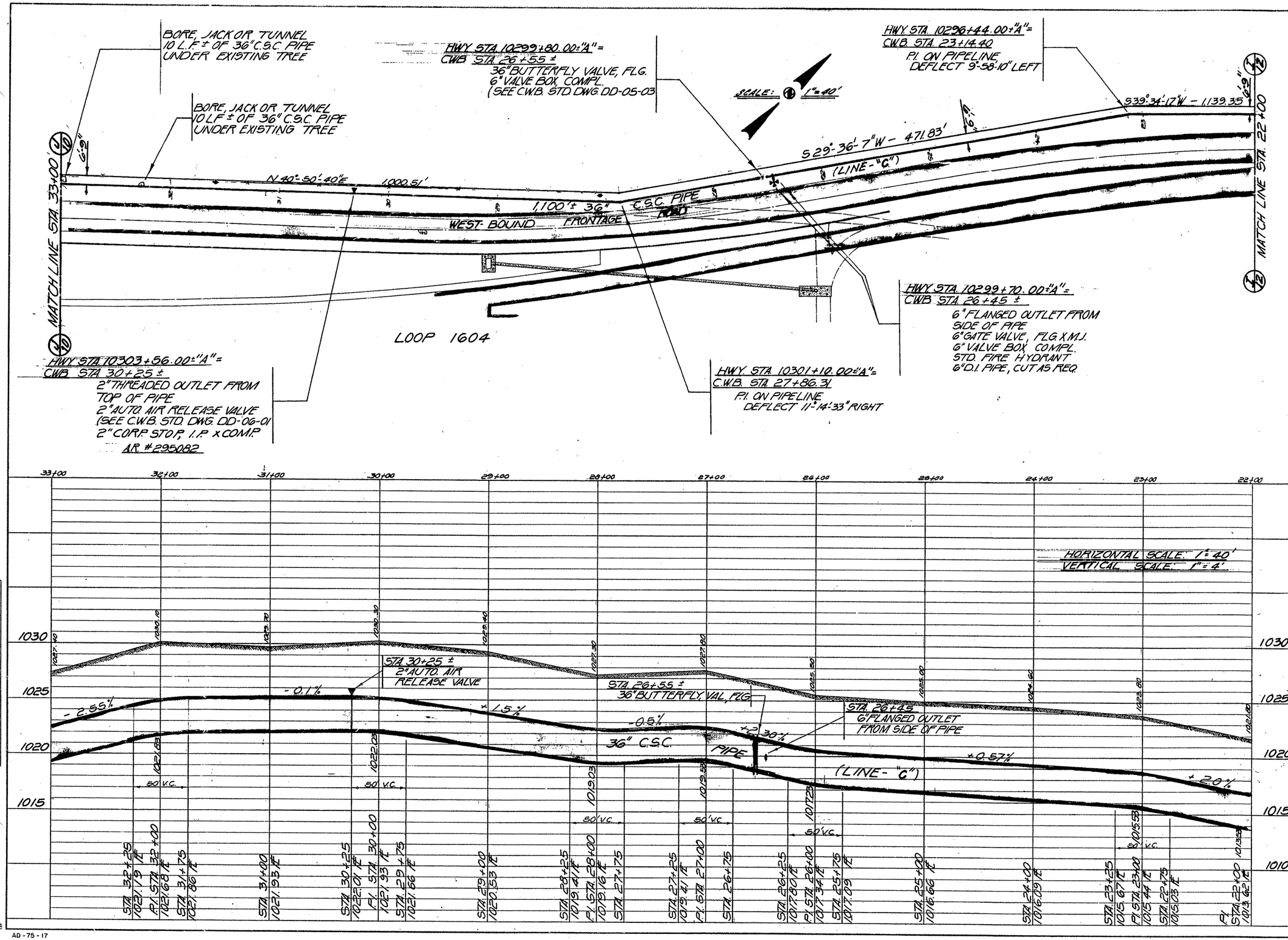
3-31-93

STATE OF TEXAS
STEVEN RENNEKER
50924
2-7-92

SAWS JOB 90-5051
SHEET 13 OF 24
BLK. MAP No.: 110-630
112-632, 112-634
114-634, 114-636
SEC. No.: 3-O, 3-P
3-O, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO			SHEET NO.
6	TEXAS				24
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2152	02	023	LP 1604

TOPOGRAPHY:
ROADWAY PROFILE
ROADWAY LAYOUT
GRADES



NOTES

TOPOGRAPHY
GROUND PROFILE
ROADWAY LAYOUT
GRADES

3-31-93

2-7-92

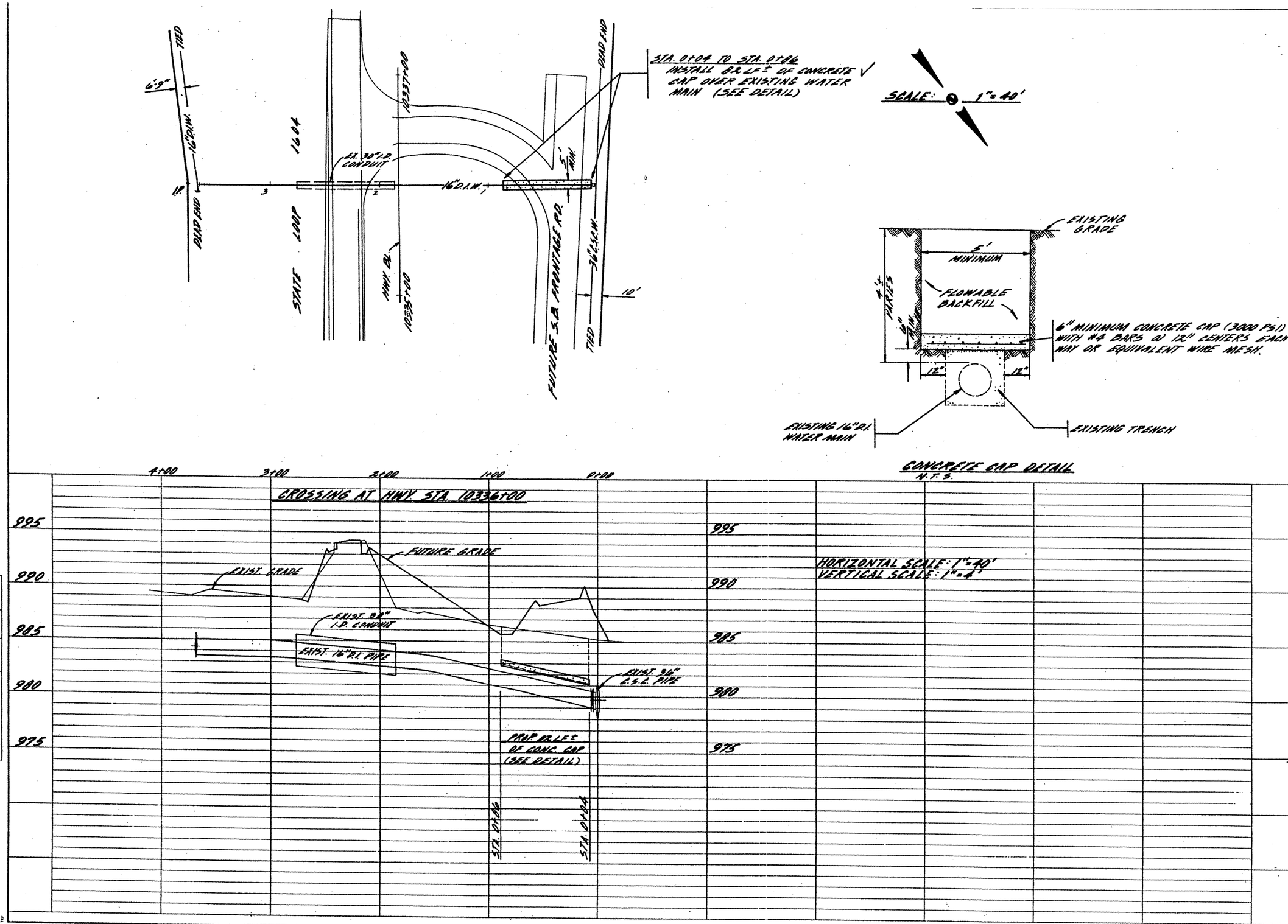
CWB JOB 90-5051
SHEET 13 OF 24

BLK. MAP NO.: 110-630
112-632, 112-634
114-634, 114-636

SEC. NO.: 3-O, 3-P
3-O, 3-R

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				360
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP1604

AD-75-17



NOTES

"AS-BUILT"

STEVEN RENNEKER 50924 10-21-96

3-31-93

CWB JOB 90-5051

SHEET 14 OF 24

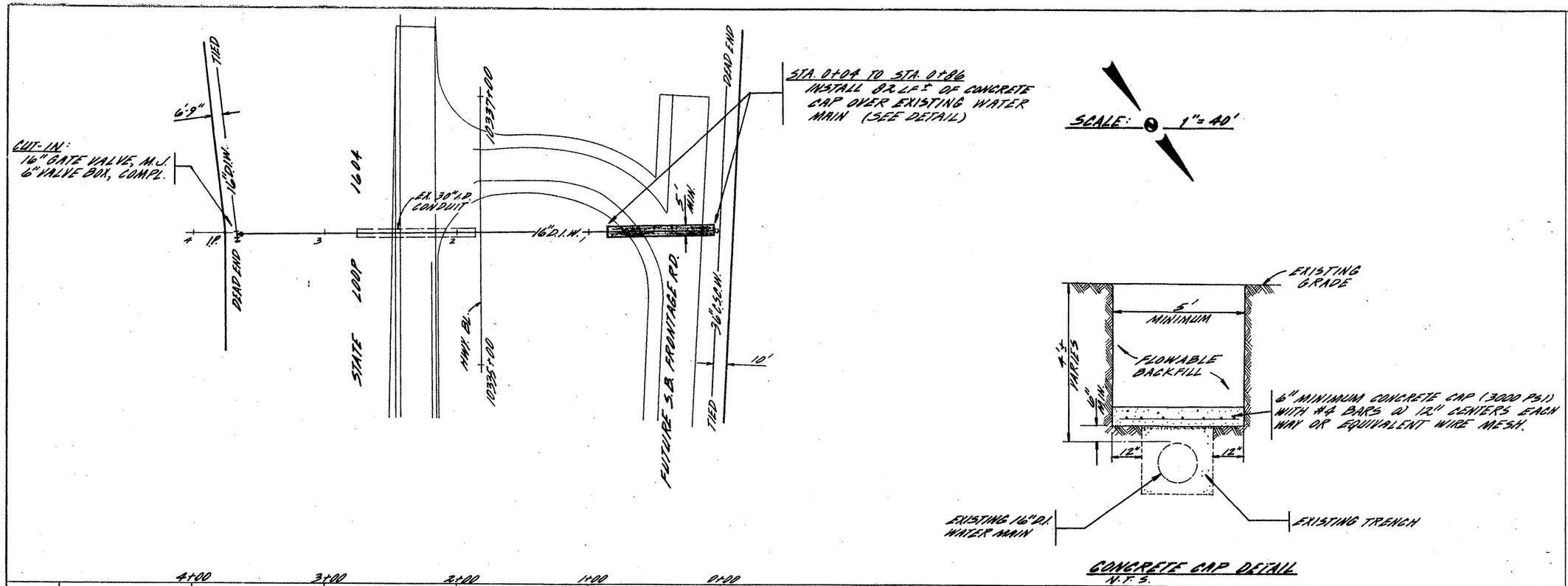
BLK. MAP NO.: 100-620

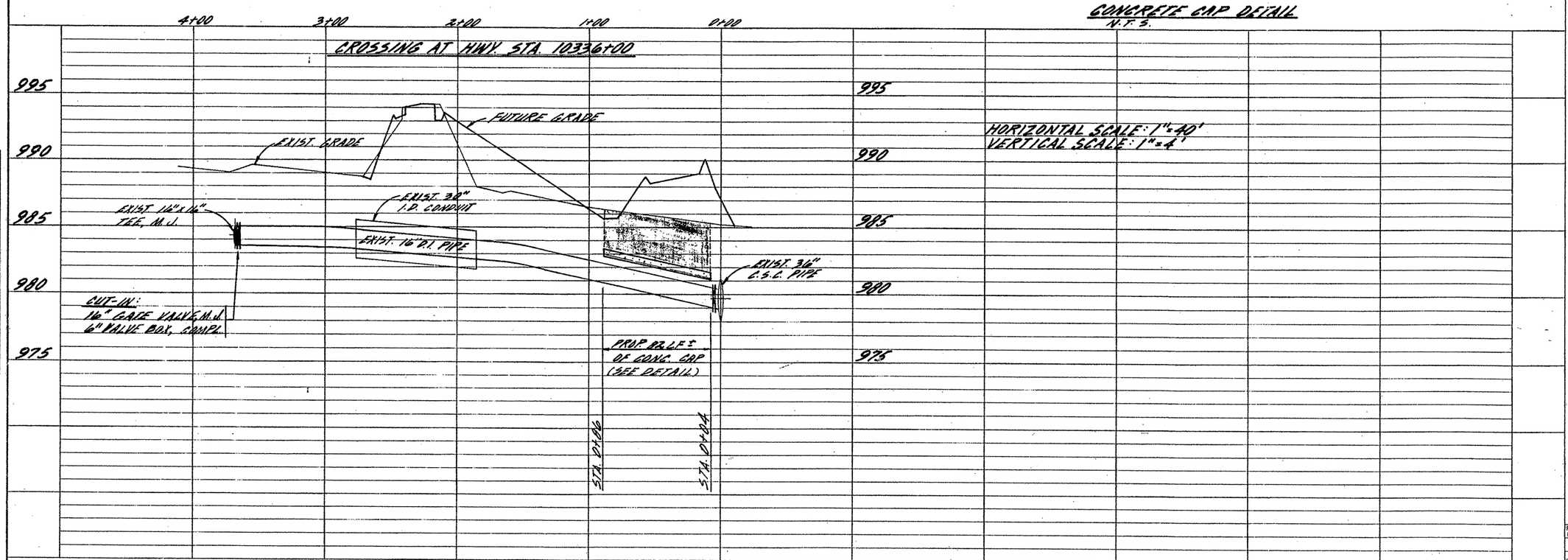
SEC. NO.: 82-T

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				363
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP 1604

TOPOGRAPHY	PLOTTED BY	CHECKED	DATE
GROUND PROFILE			
ROADWAY LAYOUT			
GRADES			

AD-75-17





NOTES

PLOTTED BY	CHECKED	DATE
TOPOGRAPHY:		
GROUND PROFILE		
HORIZONTAL LAYOUT		
GRADES		

3-31-93

STATE OF TEXAS
STEVEN RENNEKER
50924
PROFESSIONAL ENGINEER

CWB JOB 90-5051
SHEET 14 OF 24
BLK. MAP NO.: 100-620
SEC. NO.: 82-T

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
6	TEXAS					363
STATE DIST. NO.	COUNTY		CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR		2452	02	023	UP 1604

AD-75-17

WATER MAINS
BILL OF MATERIALS
ESTIMATED QUANTITIES

ITEM	UNIT	SHEET 1	SHEET 2	SHEET 3	SHEET 4	SHEET 5	SHEET 6	SHEET 7	SHEET 8	SHEET 9	SHEET 10	SHEET 11	SHEET 12	SHEET 13	SHEET 14	2452-02-023 TOTAL	2452-01-028 TOTAL	AS-BUILT TOTAL
		2452-02-023											2452-01-028					
TRENCH EXCAV. PROTECTION	LF	624	1,020	1,070	1,030	995	1,140	898	470	365	648	735	1,060	1,080	82	8995 LF	2222 LF	11,186.5 LF
HYDROSTATIC PRESSURE TEST	EA						1	1	1	1	1					6 EA	0	3 EA.
FIRE HYDRANT W/6IN VALVE & BOX	EA	1	1	1	1	1		1			1	1				8 EA	2 EA	9 EA.
CAST IRON FITTINGS	TON							0.81	2.39	5.47	0.44					9.27 TONS	0	10.3 TONS
CUT & REPL ASP PAV W/6IN ASPH TREATED BASE	SF			346			185		79							610 SF	0	390 SF
PIPE WTR MAIN (6 IN) (DI)	LF								5							5 LF	0	19.5 LF
MAIN TIE-IN (COMPL) (6 IN)	EA								1							1 EA	0	1 EA.
TEMP BLOW-OFF (2 IN) (COMPL)	EA								1	1						2 EA	0	1 EA.
PIPE WTR MAIN (36 IN) (D.I.) (BORE, JACK OR TNL)	LF										40	180	40	20		220 LF	60 LF	280 LF
PIPE WTR MAIN (36 IN) D.I.	LF										648	735	1,060	1,080		1383 LF	2140 LF	3557 LF
PIPE WTR MAIN (6 IN) D.I.F.H.	LF																	181 LF
PIPE WTR MAIN (30 IN) (D.I.)	LF						716	294								1,010 LF	0	898.5 LF
PIPE WTR. MAIN (30 IN) (D.I.) (IN CONDUIT	LF							506								506 LF	0	506 LF
PIPE WTR. MAIN (24" IN) (D.I.)	LF	624	1,020	956	1,030	995	214	176								5,015 LF	0	4,718 LF
PIPE WTR MAIN (24 IN) (D.I.) (BORE, JACK OR TNL)	LF		80	30	70	105										285 LF	0	285 LF
PIPE WTR MAIN (24 IN) (D.I.) (IN CONDUIT)	LF			114			170									284 LF	0	200 LF
PIPE WTR MAIN (24 IN) (DI)	LF						40			70						110 LF	0	225 LF
PIPE WTR MAIN (16 IN) (DI)	LF								465	290						755 LF	0	1,163 LF
PIPE WTR MAIN (16 IN) (AC)	LF								5	5						10 LF	0	13 LF
CONDUIT (42 IN) (ID) (OPEN CUT)	LF			114			170									284 LF	0	200 LF
CONDUIT (48 IN) (ID) (BORE, JACK OR TUNNEL)	LF							78								78 LF	0	100 LF
CONDUIT (48 IN) (ID) (OPEN CUT)	LF							428								428 LF	0	406 LF
BUTTERFLY VALVE (COMP W/BOX) (36 IN)	EA										1	1	1	1		2 EA	2 EA	4 EA
BUTTERFLY VALVE (COMP W/BOX) (30 IN)	EA						1	2								3 EA	0	3 EA
BUTTERFLY VALVE (COMP W/BOX) (24 IN)	EA	1	1	1	1	1	1									7 EA	0	6 EA
AUTO AIR RELEASE VALVE, COMP (2 IN)	EA		2	1	1	1	1	2		1		1		1		10 EA	1 EA	9 EA
AUTO AIR RELEASE VALVE, COMP (1 IN)	EA									1						1 EA	0	2 EA
BLOW-OFF (2" PERM)	EA							1								1 EA	0	2 EA
BLOW OFF (4" TEMP.)	EA							2		1	1					4 EA	0	3 EA
TAP SLV & VALVE 30 IN X 16 IN	EA								1							1 EA	0	1 EA
36" TIE-IN	EA										1					1 EA	0	1 EA
30" TIE-IN	EA						1	1								1 EA	0	2 EA
24" TIE-IN	EA	1								2	1					6 EA	0	6 EA.
16" TIE-IN	EA								1	2						3 EA	0	6 EA.
16" GATE VALVE (COMP W/BOX) (16 IN)	EA														1	0	1 EA	4 EA.
CONCRETE CAP OVER MAIN	SF						750								410	750 SF	410 SF	1,160 SF.

STATE OF TEXAS
STEVEN RENNEKER
50924
REGISTERED PROFESSIONAL ENGINEER
10-22-96

STATE OF TEXAS
LEE JOSEPH CULBERSON
REGISTERED PROFESSIONAL ENGINEER
19881
3-31-93

STATE OF TEXAS
JOSEPH P. SCHUTZ
50924
REGISTERED PROFESSIONAL ENGINEER
8-7-02

S.A.W.S. JOB 90-5051
SHEET 15 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS				24
STATE DIST. NO.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	HIGHWAY NO.
15	BEXAR	2452	02	023	LP/WM

WATER MAINS
BILL OF MATERIALS
ESTIMATED QUANTITIES

ITEM	UNIT	SHEET 1	SHEET 2	SHEET 3	SHEET 4	SHEET 5	SHEET 6	SHEET 7	SHEET 8	SHEET 9	SHEET 10	SHEET 11	SHEET 12	SHEET 13	SHEET 14	2452-02-023 TOTAL	2452-01-028 TOTAL
		2452-02-023											2452-01-028				
TRENCH EXCAV. PROTECTION	LF	624	1,020	1,070	1,030	995	1,140	898	470	365	648	735	1,060	1,080	82	8995 LF	2222 LF
HYDROSTATIC PRESSURE TEST	EA							2	1	2	1					6 EA	0
FIRE HYDRANT W/6IN VALVE & BOX	EA	1	1	1	1	1		1			1	1	1	1		8 EA	2 EA
CAST IRON FITTINGS	TON							0.81	2.39	5.47	0.44					9.27 TONS	0
CUT & REPL ASP PAV W/6IN ASPH TREATED BASE	SF			346			185		79							610 SF	0
PIPE WTR MAIN (6 IN) (DI)	LF								5							5 LF	0
MAIN TIE-IN (COMPL) (6 IN)	EA								1							1 EA	0
TEMP BLOW-OFF (2 IN) (COMPL)	EA								1	1						2 EA	0
PIPE WTR MAIN (36 IN) (CSC) (BORE, JACK OR TNL)	LF										40	180	40	20		220 LF	60 LF
PIPE WTR MAIN (36 IN) (CSC)	LF										648	735	1,060	1,080		1383 LF	2140 LF
PIPE WTR MAIN (30 IN) (CSC)	LF						716	294								1,010 LF	0
PIPE WTR MAIN (30 IN) (CSC) (IN CONDUIT)	LF							506								506 LF	0
PIPE WTR MAIN (24 IN) (CSC)	LF	624	1,020	956	1,030	995	214	176								5,015 LF	0
PIPE WTR MAIN (24 IN)(CSC) (BORE, JACK OR TNL)	LF		80	30	70	105										285 LF	0
PIPE WTR MAIN (24 IN) (CSC) (IN CONDUIT)	LF			114			170									284 LF	0
PIPE WTR MAIN (24 IN) (DI)	LF						40			70						110 LF	0
PIPE WTR MAIN (16 IN) (DI)	LF								465	290						755 LF	0
PIPE WTR MAIN (16 IN) (AC)	LF								5	5						10 LF	0
CONDUIT (42 IN) (ID) (OPEN CUT)	LF			114			170									284 LF	0
CONDUIT (48 IN) (ID) (BORE, JACK OR TUNNEL)	LF							78								78 LF	0
CONDUIT (48 IN) (ID) (OPEN CUT)	LF							428								428 LF	0
BUTTERFLY VALVE (COMP W/BOX) (36 IN)	EA										1	1	1	1		2 EA	2 EA
BUTTERFLY VALVE (COMP W/BOX) (30 IN)	EA						1	2								3 EA	0
BUTTERFLY VALVE (COMP W/BOX) (24 IN)	EA	1	1	1	1	1	1	1								7 EA	0
AUTO AIR RELEASE VALVE, COMP (2 IN)	EA		2	1	1	1	1	2		1		1		1		10 EA	1 EA
AUTO AIR RELEASE VALVE, COMP (1 IN)	EA									1						1 EA	0
BLOW-OFF (4" PERM)	EA							1								1 EA	0
BLOW-OFF (4" TEMP)	EA							2		1	1					4 EA	0
TAP SLV & VALVE 30 IN X 16 IN	EA								1							1 EA	0
36" TIE-IN	EA										1					1 EA	0
30" TIE-IN	EA							1								1 EA	0
24" TIE-IN	EA	1					1	1		2	1					6 EA	0
16" TIE-IN	EA								1	2						3 EA	0
16" GATE VALVE (COMP W/BOX) (16 IN)	EA														1	0	1 EA
CONCRETE CAP OVER MAIN	SF														410	0	410 SF

STATE OF TEXAS
JOSEPH CHEUNG
PROFESSIONAL ENGINEER

7/1/91

STATE OF TEXAS
50924
REGISTERED PROFESSIONAL ENGINEER

2-7-92
3-31-93

C.W.B. JOB 90-5051
SHEET 15 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS					364
STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR		2452	02	023	LP/LDR

GENERAL NOTES

CONTRACTOR

1. VERIFY THE EXACT LOCATION OF UNDERGROUND UTILITIES AND DRAINAGE STRUCTURES WHETHER SHOWN ON PLANS OR NOT.

SANITARY SEWER	270-4370	GAS	227-3211
STORM DRAIN	299-7011	ELECTRIC	227-3211
TELEPHONE	954-4102		

2. DISINFECT NEW MAINS WITH HTH WHERE NOTED ON PLANS.

3. FURNISH AND INSTALL TEMPORARY BLOW-OFFS IN ACCORDANCE WITH DETAILS PROVIDED AND JUMPER CONNECTIONS AS REQUIRED OR AS DIRECTED BY THE CONSTRUCTION INSPECTION.

4. ALL ELEVATIONS FOR CITY WATER BOARD FACILITY ADJUSTMENTS WILL BE REFERENCED FROM BENCH MARKS ESTABLISHED FOR THIS PROJECT BY THE STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION (SDH&PT).

5. SALVAGE EXISTING FIRE HYDRANTS AND OTHER MATERIALS AS DIRECTED BY THE CONSTRUCTION INSPECTOR AND TRANSPORT TO A DESIGNATED STORAGE LOCATION.

6. AFTER THE NEW MAINS HAVE BEEN RELEASED FOR SERVICE AND SERVICE LINES HAVE BEEN TRANSFERRED TO THE NEW MAINS, ABANDON EXISTING MAINS WHERE SHOWN ON THE PLANS.

7. TRENCH EXCAVATION PROTECTION SHALL BE ACCOMPLISHED AS REQUIRED BY THE PROVISIONS OF PART 1926, SUBPART P-EXCAVATION, TRENCHING, AND SHORING OF THE OCCUPATIONAL SAFETY AND HEALTH'S STANDARDS AND INTERPRETATIONS THE CONTRACTOR SHALL ALSO COMPLY WITH THE PROVISIONS INCLUDED IN ITEM #700, TRENCHING EXCAVATION PROTECTION, CITY OF SAN ANTONIO STANDARDS SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.

8. CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/GEOTECHNICAL/SAFETY EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND ANY AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITES WITHIN THE PROJECT WORK AREA IN ORDER TO DEVELOP THE CONTRACTOR'S PLANS TO IMPLEMENT THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S PLANS SHALL PROVIDE FOR ADEQUATE TRENCH SAFETY SYSTEMS THAT COMPLY WITH AS A MINIMUM OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL DEVELOP AND IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

9. THE MAXIMUM INTERRUPTION FOR TIE-INS OF THE 24 AND 30-INCH WATER MAIN SHALL NOT EXCEED 24 HOURS. NO INTERRUPTION WILL BE ALLOWED BETWEEN MARCH 1 AND SEPTEMBER 30. THE 24-INCH WATER MAIN SHALL NOT BE INTERRUPTED UNTIL THE CONTRACTOR HAS COMPLETED NEW WATER MAIN CONSTRUCTION ADJACENT TO THE EXISTING WATER MAIN AND HAS ALL REQUIRED MATERIALS TO COMPLETE THE TIE-IN ON SITE.

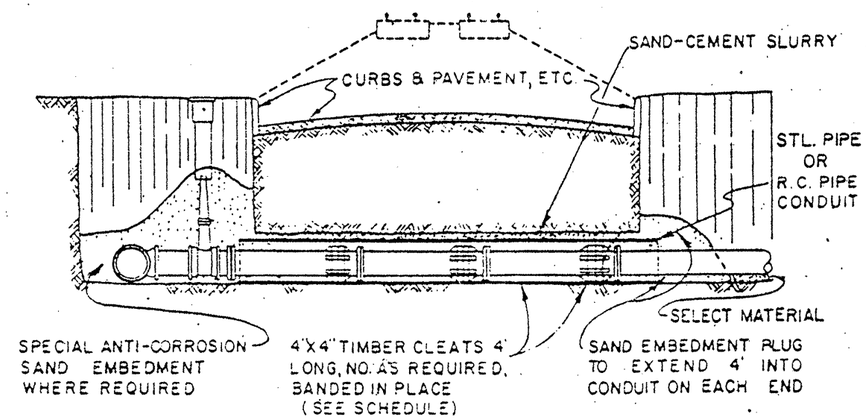
CITY WATER BOARD

1. MR. ROYCE MCDONALD, CONSTRUCTION INSPECTION DIVISION, OR HIS DESIGNATED REPRESENTATIVE, SHALL NOTIFY AT LEAST 48 HOURS PRIOR TO STARTING CONSTRUCTION:

   MR. RAYMOND METCALF, SDH&PT AT 696-1110

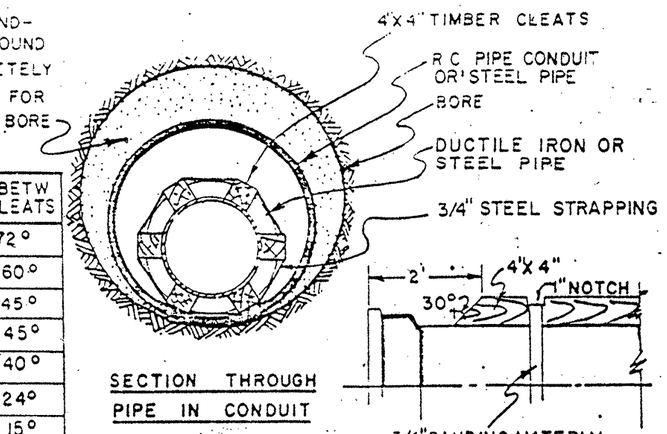
2. DISINFECT NEW MAINS BY MACHINE CHLORINATION, UNLESS OTHERWISE INDICATED.

NOTE: ALIGNMENT AND GRADE OF CONDUIT WILL BE SPECIFIED ON THE CONSTRUCTION PLANS.



PRESSURE PUMP SAND-CEMENT SLURRY AROUND CONDUIT TO COMPLETELY FILL ANNULAR VOID FOR ENTIRE LENGTH OF BORE

SIZE	NO CLEATS PER TIE	∢ BETW CLEATS
8"	5	72°
12"	6	60°
16"	8	45°
20"	8	45°
24"	9	40°
30"	15	24°
36"	24	15°



SECTION THROUGH PIPE IN CONDUIT

CLEAT DETAIL

APPROVED Richard D. Fuller	INSTALLATION OF PIPE IN CONDUIT	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-00-02 SHEET 1 OF 1
DATE 2-12-65		
REVISION JUNE 1988 PP		

SAWS JOB 90-3031 SHEET 16 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.	SHEET NO.
6	TEXAS		24
STATE DIST. NO.	COUNTY	CONT. / SECT. / JOB	HIGHWAY NO.
15	BEXAR		

GENERAL NOTES

CONTRACTOR

1. VERIFY THE EXACT LOCATION OF UNDERGROUND UTILITIES AND DRAINAGE STRUCTURES WHETHER SHOWN ON PLANS OR NOT.

   SANITARY SEWER _____270-4370 GAS_____227-3211
   STORM DRAIN _____299-7011 ELECTRIC_____227-3211
   TELEPHONE_____954-4102

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CITY WATER BOARD

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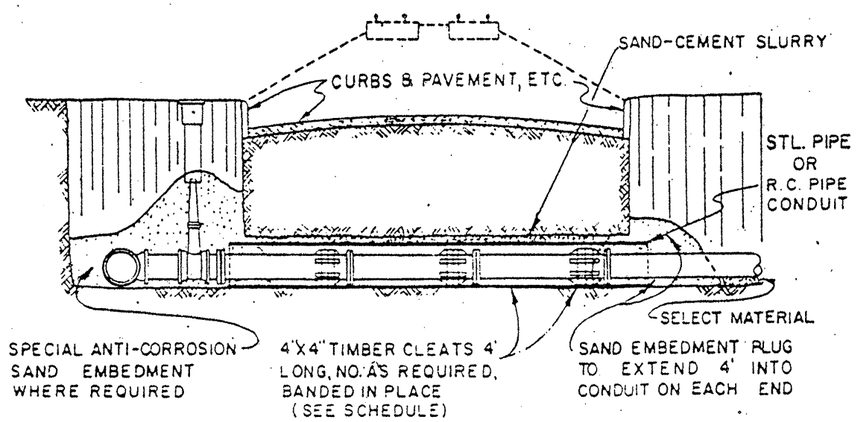
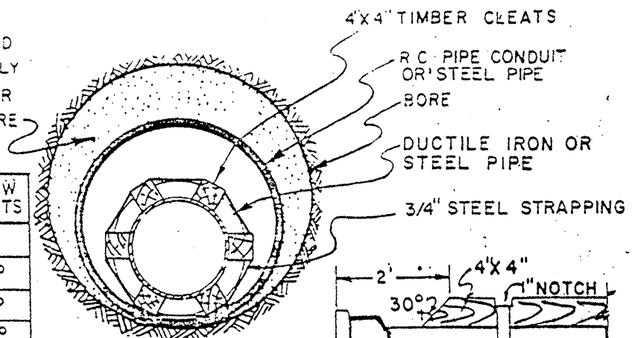
   MR. RAYMOND METCALF, SDH&PT AT 696-1110

2. DISINFECT NEW MAINS BY MACHINE CHLORINATION, UNLESS OTHERWISE INDICATED.

NOTE: ALIGNMENT AND GRADE OF CONDUIT WILL BE SPECIFIED ON THE CONSTRUCTION PLANS.



PRESSURE PUMP SAND-CEMENT SLURRY AROUND CONDUIT TO COMPLETELY FILL ANNULAR VOID FOR ENTIRE LENGTH OF BORE



SECTION THROUGH PIPE IN CONDUIT

CLEAT DETAIL

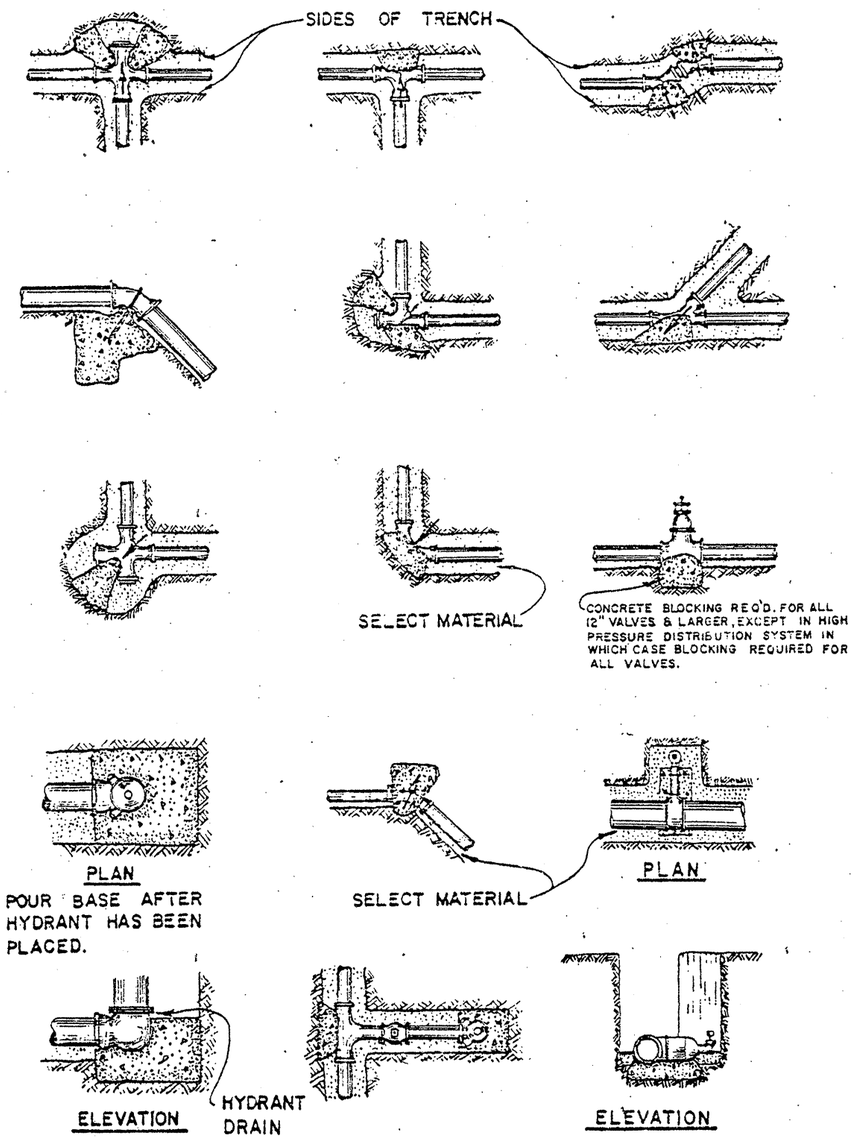
SIZE	NO CLEATS PER TIE	∡ BETW CLEATS
8"	5	72°
12"	6	60°
16"	8	45°
20"	8	45°
24"	9	40°
30"	15	24°
36"	24	15°

APPROVED [signature]	INSTALLATION OF PIPE IN CONDUIT	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-00-02 SHEET 1 OF 1
DATE 2-12-65		
REVISION JUNE 1988 PP		

2-7-92
3-31-93

CWB JOB 90-5051
SHEET 16 OF 24

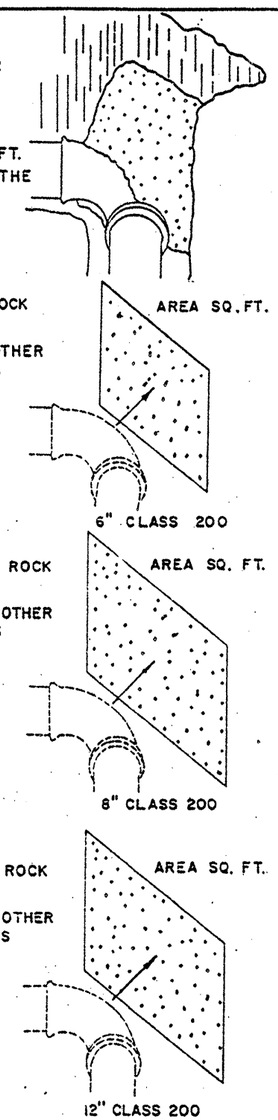
FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS					365
STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR		3452	02	023	UP1604



APPROVED [signature]	THRUST BLOCKING FOR FITTINGS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-03-00 SHEET 1 OF 1
DATE 2-12-65		
REVISION JUNE 1988		

THRUST BLOCKING DESIGN

TYPICAL BLOCKING FOR 90° BENDS



BLOCKING AREA FOR 200 P.S.I. TESTS & 175 P.S.I. WORKING PRESSURES.

ON BASIS OF 200 P.S.I. WATER PRESSURE USED FOR TESTS, THE BLOCKING REQUIRED FOR TO TYPES OF SOILS IS NOTED BELOW. IN ONE CASE, A SOIL PRESSURE OF 5000 P.S.I. IS USED FOR ROCK EXCAVATION AND FOR SOILS OTHER THAN ROCK A 3000 P.S.I. BEARING SOIL PRESSURE IS USED. THE DISTRIBUTION ON SYSTEM IS DESIGNED TO OPERATE WITH A MAXIMUM WATER PRESSURE OF 175 P.S.I. ALL CALCULATIONS APPLY TO A.C. PIPE CLASS 200 AND DUCTILE IRON PIPE CLASS 2. P.V.C. PIPE CLASS 200 (SDR 13.5)

SQUARE FEET OF BLOCKING REQUIRED FOR ROCK EXCAVATION

SIZE PIPE	TEES & DEAD ENDS	90° BENDS	45° BENDS	22 1/2° BENDS
6"	2	2	1	1
8"	3	4	2	1
12"	6	9	5	2
16"	11	15	8	4

SQUARE FEET OF BLOCKING REQUIRED FOR OTHER THAN ROCK EXCAVATION

SIZE PIPE	TEES & DEAD ENDS	90° BENDS	45° BENDS	22 1/2° BENDS
6"	3	4	2	1
8"	4	6	4	2
12"	10	14	8	4
16"	18	25	14	7

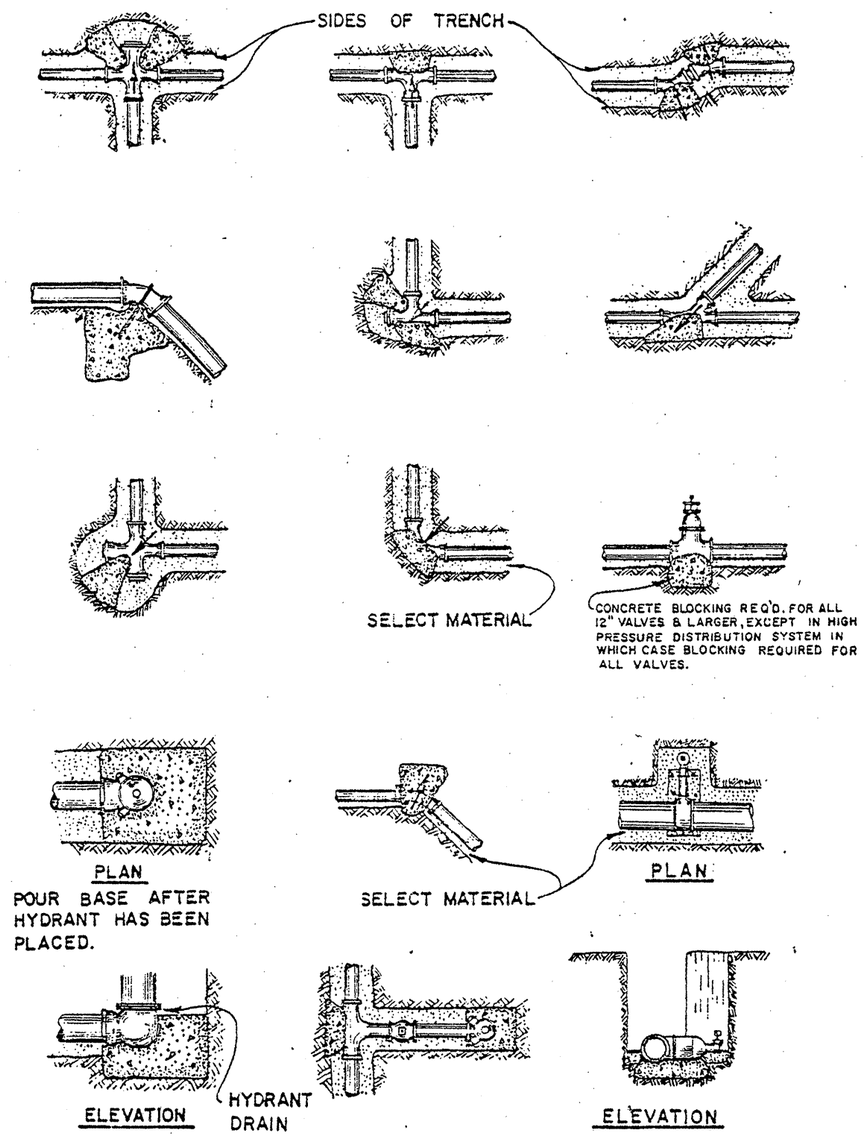
ANCHORAGE AND BLOCKING SHALL BE PROVIDED IN MANNER AS INDICATED BY STD. DWGS. DD-03-00 AND DD-03-01 IN ACCORDANCE WITH SECTION 5.4 ANCHORING BLOCKING STANDARD SPECIFICATIONS FOR WATER WORKS CONSTRUCTION EXCEPT THAT 2000 P.S.I. CONCRETE SHALL BE USED IN LIEU OF 1500 P.S.I. CONCRETE.

TRANSIT 2000 P.S.I. CONCRETE MIX SHALL BE USED; HOWEVER FOR SMALL VOLUME REQUIREMENTS CONCRETE MIXED AT JOB SITE WILL BE ACCEPTABLE ONLY IF A CONCRETE MIXER IS USED, ALL AGGREGATE SHALL BE CLEAN AND THE FIELD MIX SHALL BE IN THE RATIO OF 1:3:4 AND CONTAIN NOT LESS THAN 4 SACKS OF CEMENT PER CU. YD.

APPROVED [signature]	THRUST BLOCKING FOR HIGH PRESSURE SYSTEM	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-03-01 SHEET 1 OF 1
DATE 21 January 1976		
REVISION JUNE 1988		

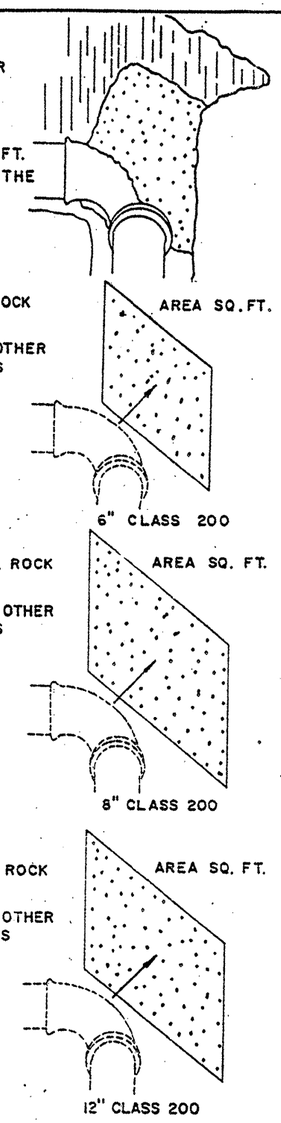
S.A.W.S. JOB NO. 5051
SHEET 1C OF 22

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.
6	TEXAS	
STATE DIST. NO.	COUNTY	CONT. / SECT. / JOB
15	BEXAR	



APPROVED [signature]	THRUST BLOCKING FOR FITTINGS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-03-00 SHEET 1 OF 1
DATE 2-12-65		
REVISION JUNE 1988		

TYPICAL BLOCKING FOR 90° BENDS



BLOCKING AREA FOR 200 P.S.I. TESTS & 175 P.S.I. WORKING PRESSURES.

THRUST BLOCKING DESIGN

ON BASIS OF 200 P.S.I. WATER PRESSURE USED FOR TESTS, THE BLOCKING REQUIRED FOR TO TYPES OF SOILS IS NOTED BELOW. IN ONE CASE, A SOIL PRESSURE OF 5000 P.S.I. IS USED FOR ROCK EXCAVATION AND FOR SOILS OTHER THAN ROCK A 3000 P.S.I. BEARING SOIL PRESSURE IS USED. THE DISTRIBUTION ON SYSTEM IS DESIGNED TO OPERATE WITH A MAXIMUM WATER PRESSURE OF 175 P.S.I. ALL CALCULATIONS APPLY TO A.C. PIPE CLASS 200 AND DUCTILE IRON PIPE CLASS 2. P.V.C. PIPE CLASS 200 (SDR 13.5)

SQUARE FEET OF BLOCKING REQUIRED FOR ROCK EXCAVATION

SIZE PIPE	TEES & DEAD ENDS	90° BENDS	45° BENDS	22 1/2° BENDS
6"	2	2	1	1
8"	3	4	2	1
12"	6	9	5	2
16"	11	15	8	4

SQUARE FEET OF BLOCKING REQUIRED FOR OTHER THAN ROCK EXCAVATION

SIZE PIPE	TEES & DEAD ENDS	90° BENDS	45° BENDS	22 1/2° BENDS
6"	3	4	2	1
8"	4	6	4	2
12"	10	14	8	4
16"	18	25	14	7

ANCHORAGE AND BLOCKING SHALL BE PROVIDED IN MANNER AS INDICATED BY STD. DWGS. DD-03-00 AND DD-03-01 IN ACCORDANCE WITH SECTION 5.4 ANCHORING BLOCKING STANDARD SPECIFICATIONS FOR WATER WORKS CONSTRUCTION EXCEPT THAT 2000 P.S.I. CONCRETE SHALL BE USED IN LIEU OF 1500 P.S.I. CONCRETE.

TRANSIT 2000 P.S.I. CONCRETE MIX SHALL BE USED; HOWEVER FOR SMALL VOLUME REQUIREMENTS CONCRETE MIXED AT JOB SITE WILL BE ACCEPTABLE ONLY IF A CONCRETE MIXER IS USED, ALL AGGREGATE SHALL BE CLEAN AND THE FIELD MIX SHALL BE IN THE RATIO OF 1:3:4 AND CONTAIN NOT LESS THAN 4 SACKS OF CEMENT PER CU. YD.

APPROVED [signature]	THRUST BLOCKING FOR HIGH PRESSURE SYSTEM	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-03-01 SHEET 1 OF 1
DATE 21 January 1976		
REVISION JUNE 1988		

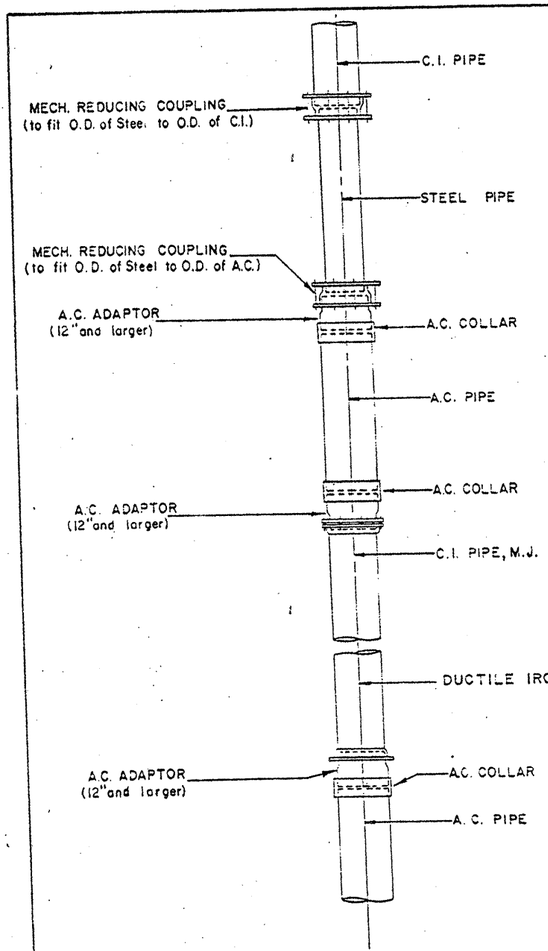
STATE OF TEXAS — JOE WALTER CULBERTSON — REGISTERED PROFESSIONAL ENGINEER — 3-31-93

STATE OF TEXAS — PETER [illegible] — REGISTERED PROFESSIONAL ENGINEER — 50924

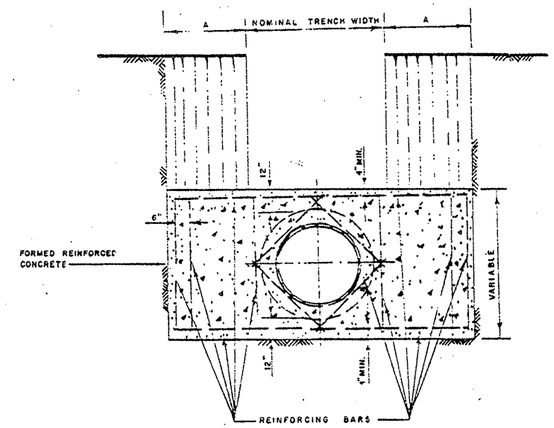
2-7-02

CWB JOB 90-5051
SHEET 17 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			SHEET NO.
6	TEXAS				306
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR	2452	02	023	VARIOUS



APPROVED Richard D. Fisher	PIPE COUPLINGS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-00-01 SHEET 1 OF 1
DATE 2-12-65		
REVISION JUNE 1988 PP		



END VIEW OF REACTION BLOCK

MAIN SIZE	A (MIN.)	REINFORCING BAR SIZE	BEARING SURFACE REQUIRED (IN SQ. FT.)
6"	12"	# 4	3
8"	12"	# 4	5
12"	16"	# 4	8
16"	18'	# 4	12
20"	28'	# 6	16
24"	28'	# 6	23
30"	36"	# 5	36
36"	36"	# 5	50
42"	36"	# 5	70

APPROVED F.P. Underwood	CONCRETE REACTION BLOCK FOR BUTTERFLY VALVE & BLOW-OFF ASSEMBLIES ON A. C., D.I. & C.S.C. MAINS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-05-03 SHEET 5 OF 5
DATE 9 JUNE 1982		
REVISION		

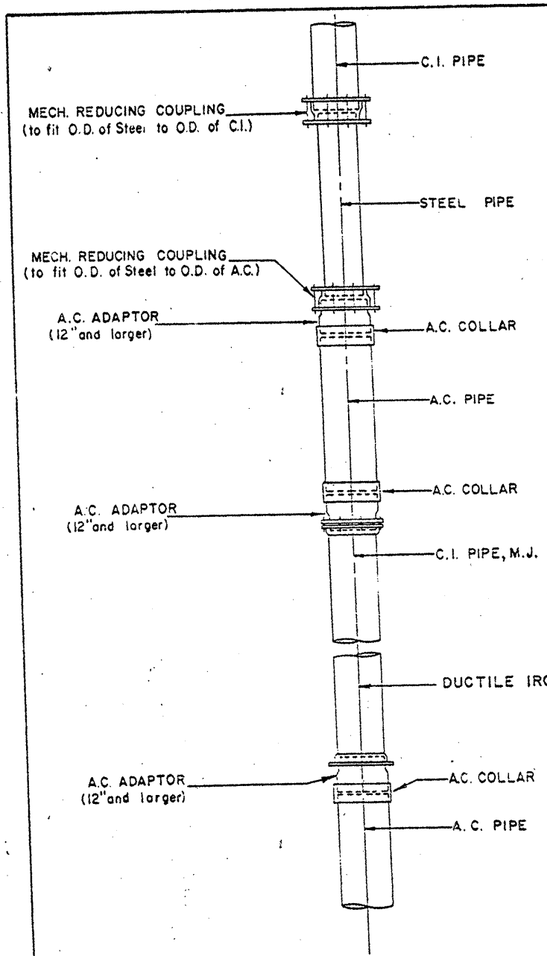
3-31-93

7/9/91

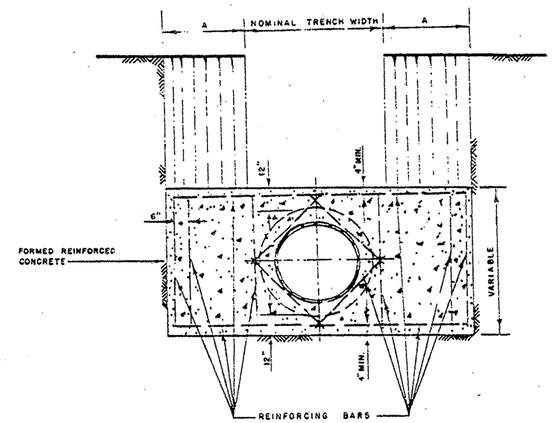
2-7-92

S.A.W.S. JOB 90-5051
SHEET 18 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS					367
STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR		3452	02	023	LP1604



APPROVED [signature]	PIPE COUPLINGS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-00-01 SHEET 1 OF 1
DATE 8-12-65		
REVISION JUNE 1988 PP		



END VIEW OF REACTION BLOCK

MAIN SIZE	A (MIN.)	REINFORCING BAR SIZE	BEARING SURFACE REQUIRED (IN SQ. FT.)
6"	12"	# 4	3
8"	12"	# 4	5
12"	18"	# 4	8
16"	18"	# 4	12
20"	28"	# 5	16
24"	28"	# 5	23
30"	36"	# 5	36
36"	36"	# 5	50
42"	36"	# 5	70

APPROVED [signature]	CONCRETE REACTION BLOCK FOR BUTTERFLY VALVE & BLOW-OFF ASSEMBLIES ON A.C., D.I. & C.S.C. MAINS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-05-03 SHEET 5 OF 5
DATE 9 JUNE 1982		
REVISION		

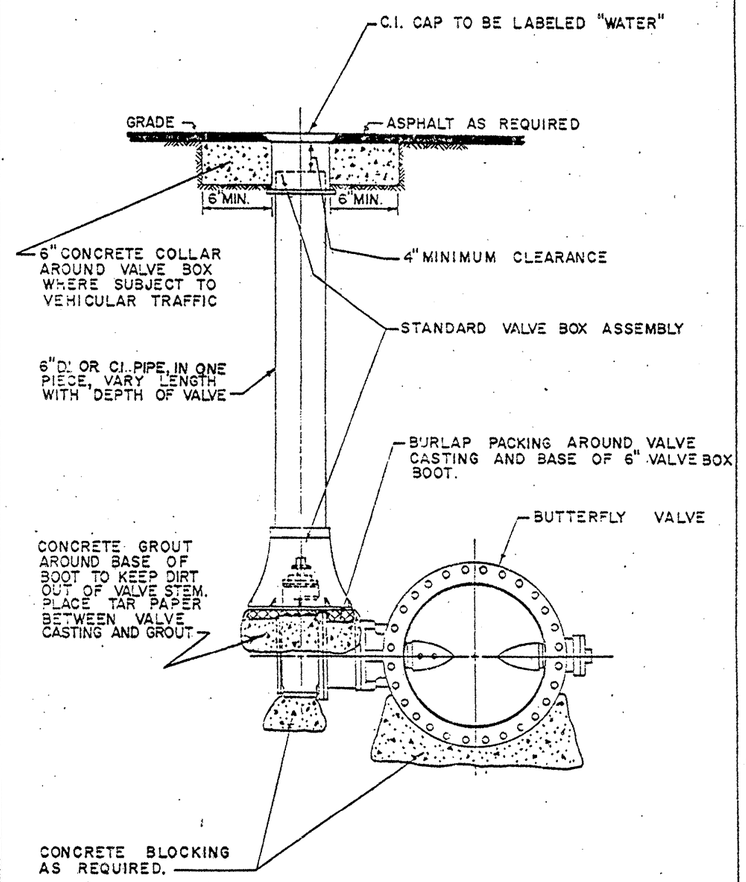
3-31-93

7991

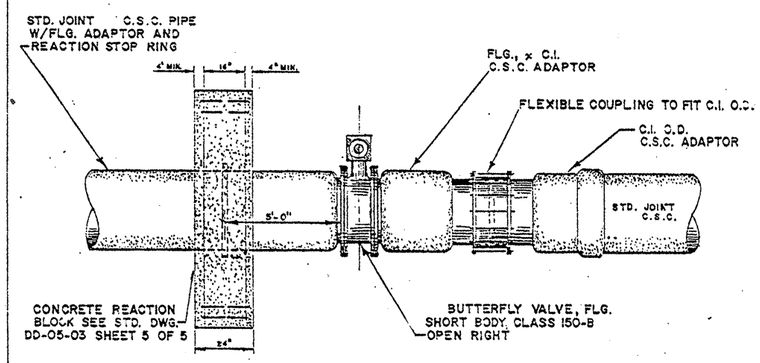
2-7-92

CWB JOB 90-5051
SHEET 18 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			SHEET NO.
6	TEXAS				367
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR	2352	02	023	LP1604



APPROVED [signature]	INSTALLATION OF BURIED BUTTERFLY VALVE WITH VALVE BOX, COMPLETE	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-05-03 SHEET 1 OF 5
DATE 2-12-65		
REVISION JUNE 1988		



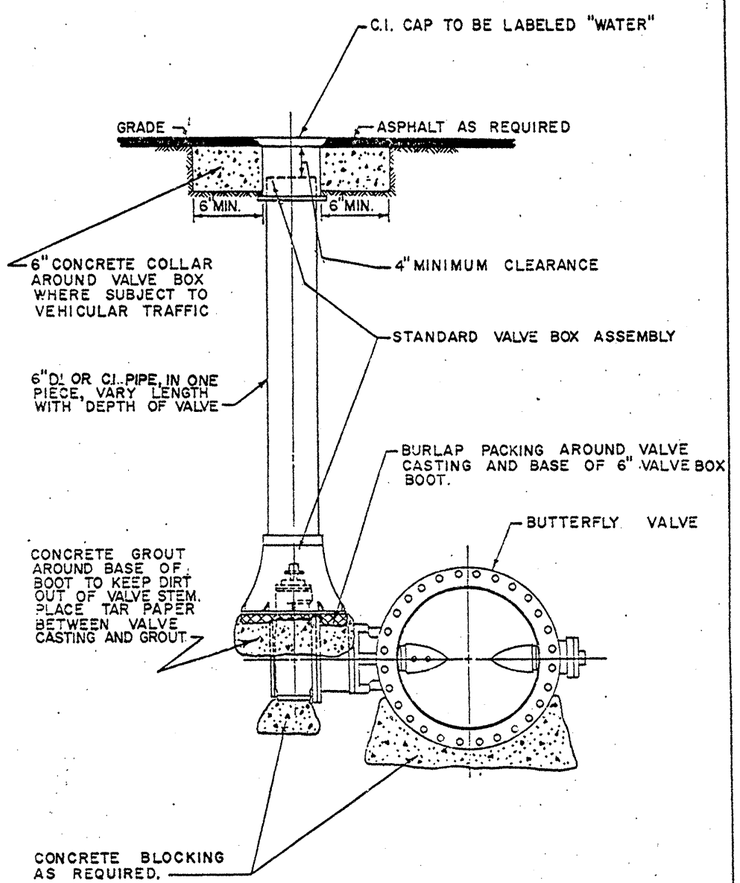
APPROVED [signature]	TYPICAL BUTTERFLY VALVE ARRANGEMENT FOR C.S.C. PIPE	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-05-03 SHEET 4 OF 5
DATE: 11/1/69		
REVISION: JUNE 1988		

3-31-93

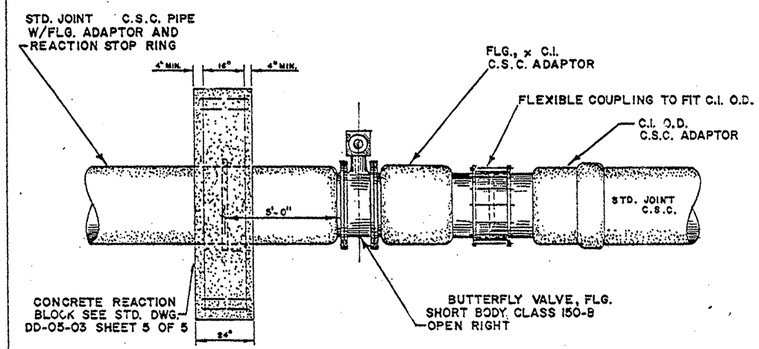
2-7-92

S.A.W.S. JOB 90-5051
SHEET 19 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				
6	TEXAS					
STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HI-WAY
15	BEXAR		0452	02	023	VARIOUS



APPROVED [signature]	INSTALLATION OF BURIED BUTTERFLY VALVE WITH VALVE BOX, COMPLETE	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-05-03 SHEET 1 OF 5
DATE 2-12-65		
REVISION JUNE 1988		



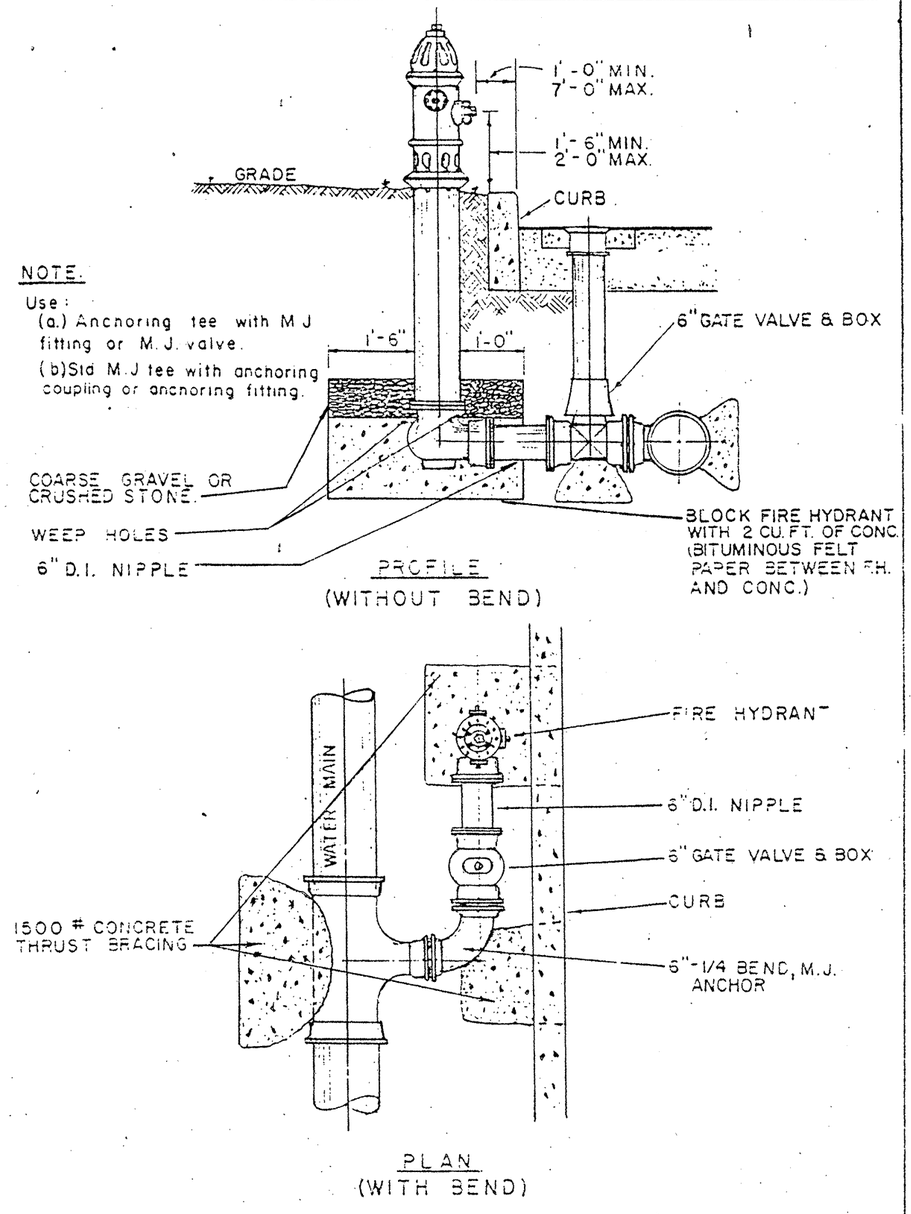
APPROVED [signature]	TYPICAL BUTTERFLY VALVE ARRANGEMENT FOR C.S.C. PIPE	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-05-03 SHEET 4 OF 5
DATE: 1/11/69		
REVISION: JUNE 1988		

3-31-93

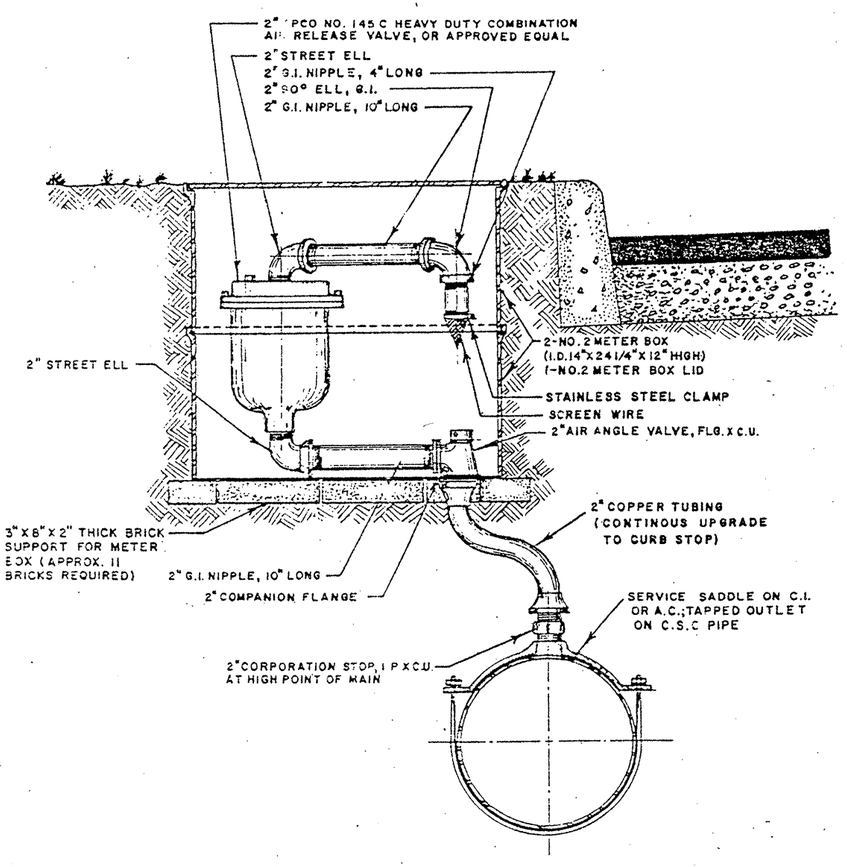
2-7-92

CWB JOB 90-5051
SHEET 19 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS					308
STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR		2452	02	023	VARIOUS



APPROVED Hugh R Anderson	FIRE HYDRANT INSTALLATION	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-08-00 SHEET 1 OF 1
DATE 1/1/69		
REVISION JUNE 1988		



APPROVED Hugh R Anderson	INSTALLATION OF 2" AIR RELEASE VALVE	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-06-01 SHEET 1 OF 1
DATE 21 August 1971		
REVISION JUNE 1988		

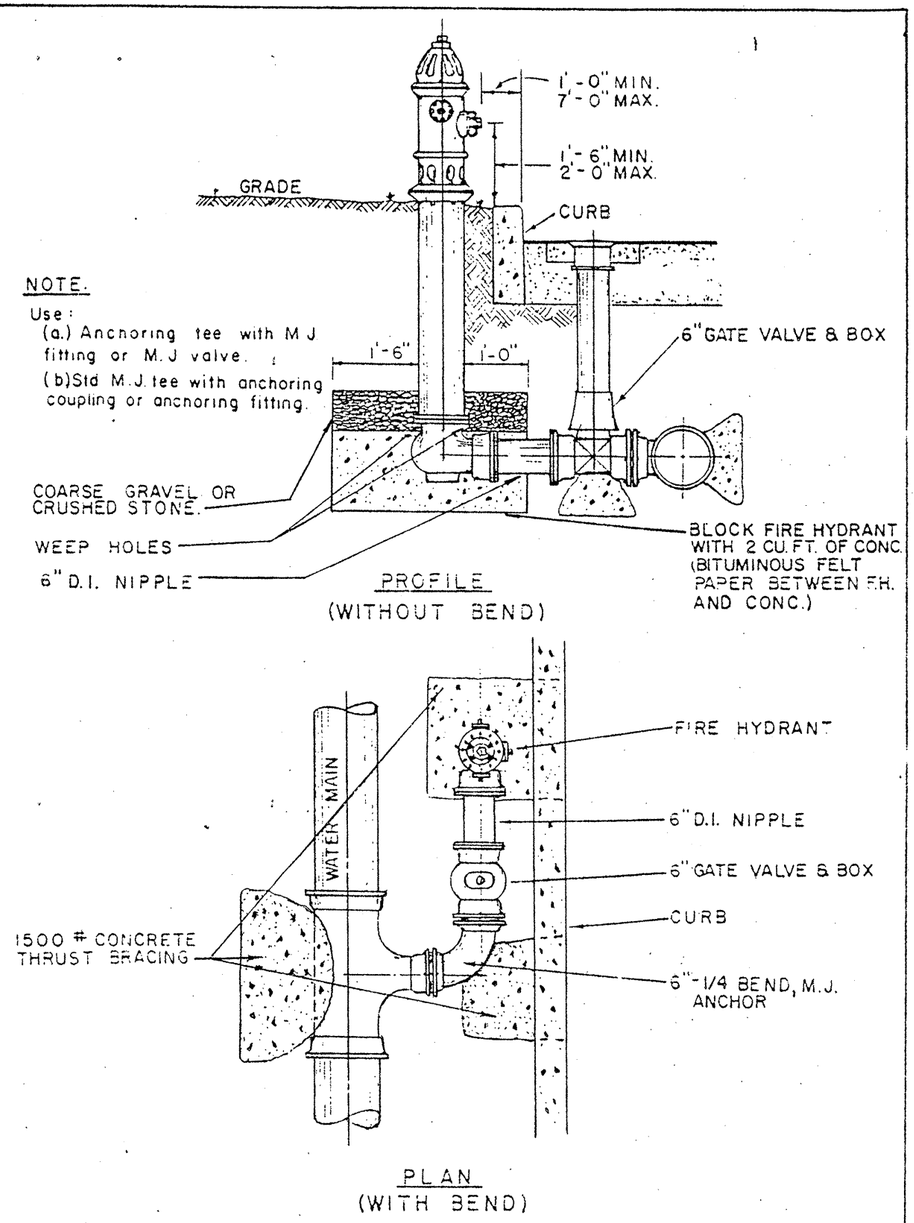
STATE OF TEXAS
LEE JOSEPH GRAHAM
6594
REGISTERED PROFESSIONAL ENGINEER
7991

STATE OF TEXAS
STEVEN RHINEHARTER
50924
REGISTERED PROFESSIONAL ENGINEER

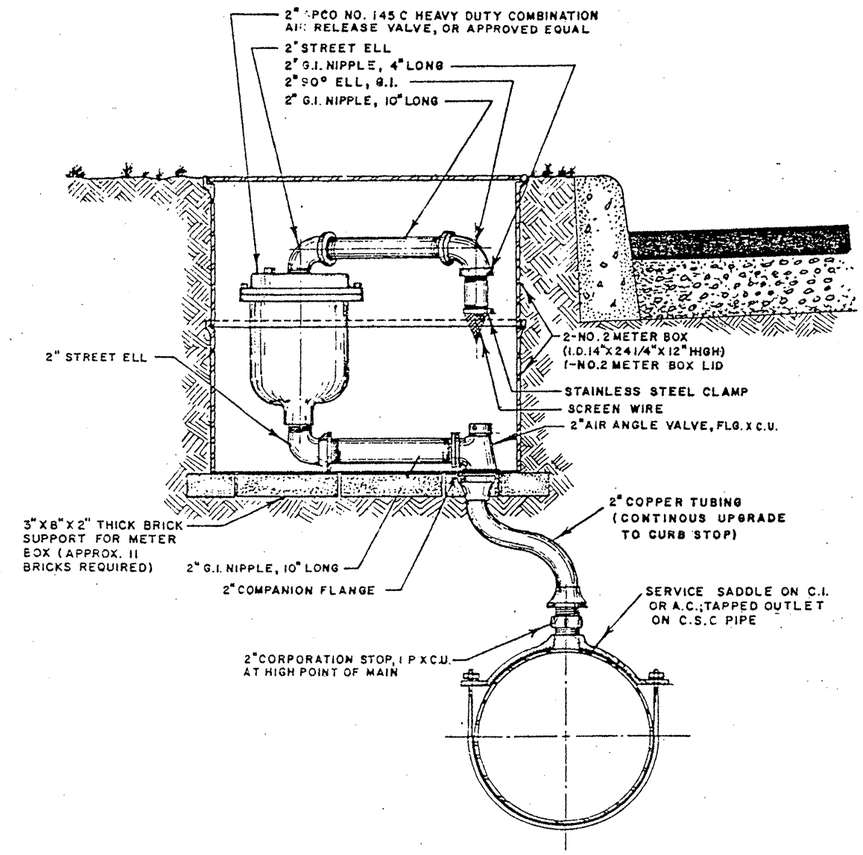
2-7-92
3-31-93

SAWS JOB 90-5051
SHEET 20 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.	SHEET NO.
6	TEXAS		209
STATE DIST. NO.	COUNTY	CONT. SECT. JOB	HIGHWAY NO.
15	BEXAR	2452 02 023	171604



APPROVED Hugh R Anderson	FIRE HYDRANT INSTALLATION	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-08-00 SHEET 1 OF 1
DATE 1/1/69		
REVISION JUNE 1988		



APPROVED Hugh R Anderson	INSTALLATION OF 2" AIR RELEASE VALVE	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-06-01 SHEET 1 OF 1
DATE 27 August 1971		
REVISION JUNE 1988		

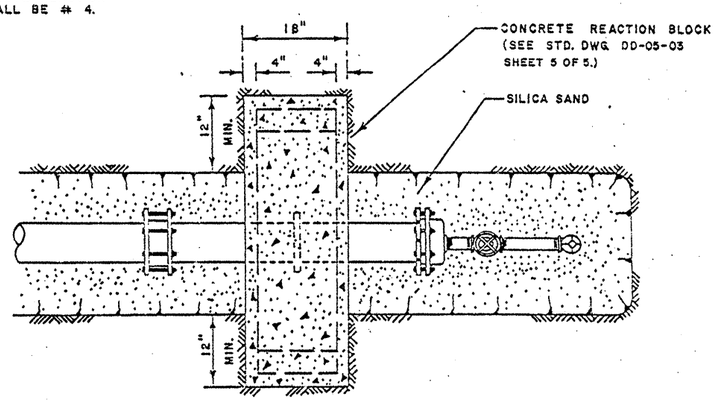
STATE OF TEXAS
LEE WESLEY DUNAR
REGISTERED PROFESSIONAL ENGINEER
7994

STATE OF TEXAS
STEVEN MICHAEL SCHAFER
REGISTERED PROFESSIONAL ENGINEER
8-7-92
3-31-93

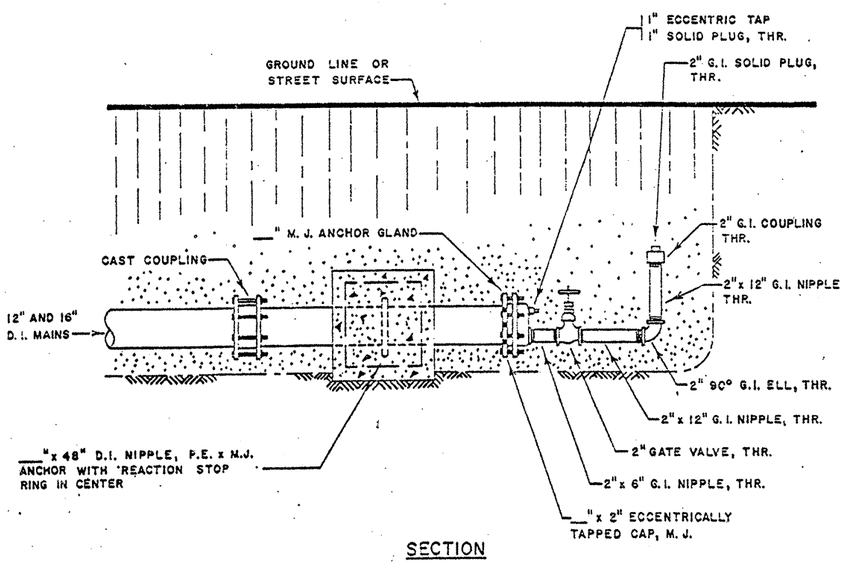
CWB JOB 90-5051
SHEET 20 OF 24

FED. RD. DIV. NO. 6	STATE TEXAS	FEDERAL AID PROJECT NO.			SHEETS NO. 269
STATE PROJECT NO.	COUNTY	CONT. SECT.	JOB	HIGHWAY NO.	
15	BEXAR	2452 02 023	LP1604		

NOTES:
1. EMBED ALL EXTERIOR METAL SURFACES IN SAND.
2. ALL REINFORCING BARS IN THE CONCRETE REACTION BLOCK SHALL BE # 4.

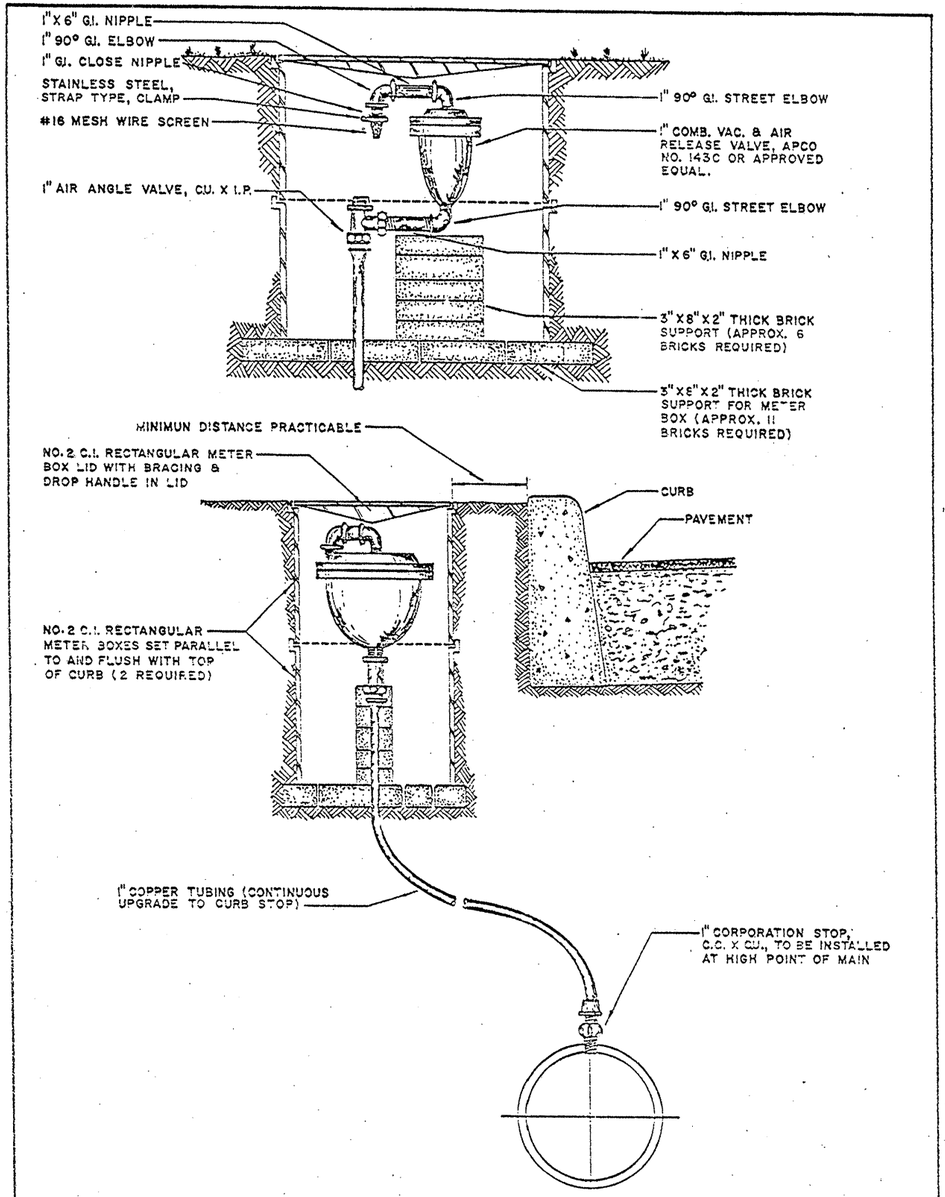


PLAN



SECTION

APPROVED H.R. Anderson	2" TEMPORARY BLOW-OFF ASSEMBLY ON 12" AND 16" D. I. MAINS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-10-00 SHEET 3 OF 3
DATE 9 JUNE 1982		
REVISION JUNE 1988		



APPROVED H.R. Anderson	INSTALLATION OF 1" AIR RELEASE VALVE	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-06-00 SHEET 1 OF 2
DATE 12 FEB. 1965		
REVISION JUNE 1988		

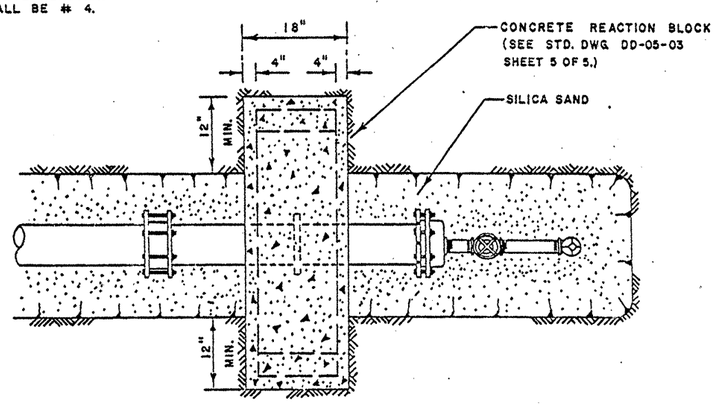
STATE OF TEXAS — LEE JOSEPH KOBER — 37969 — PROFESSIONAL ENGINEER — 3-31-93

STATE OF TEXAS — STEVEN RAUSCHKOLB — 50924 — REGISTERED PROFESSIONAL ENGINEER — 2-7-92

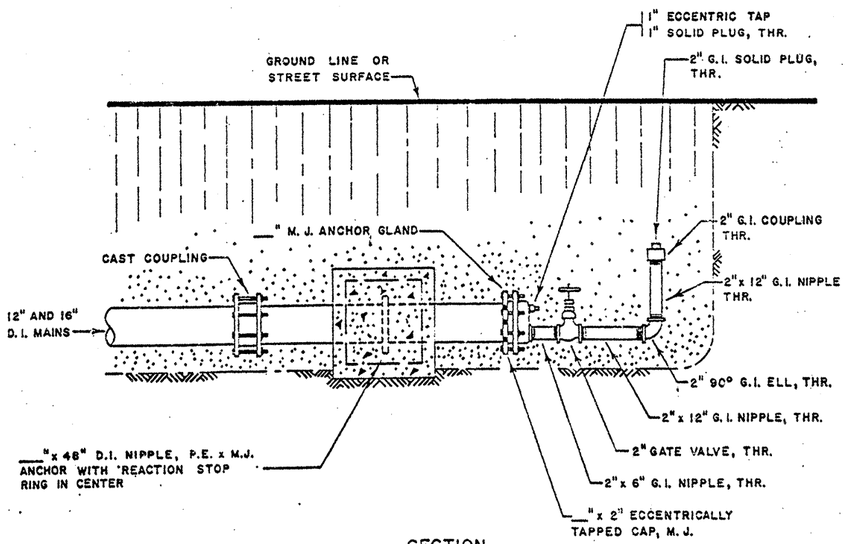
S.A.W.S. JOB 90-5051
SHEET 21 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			SHEET NO.
6	TEXAS				370
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR	3457	02	023	LP1604

NOTES:
1. EMBED ALL EXTERIOR METAL SURFACES IN SAND.
2. ALL REINFORCING BARS IN THE CONCRETE REACTION BLOCK SHALL BE # 4.

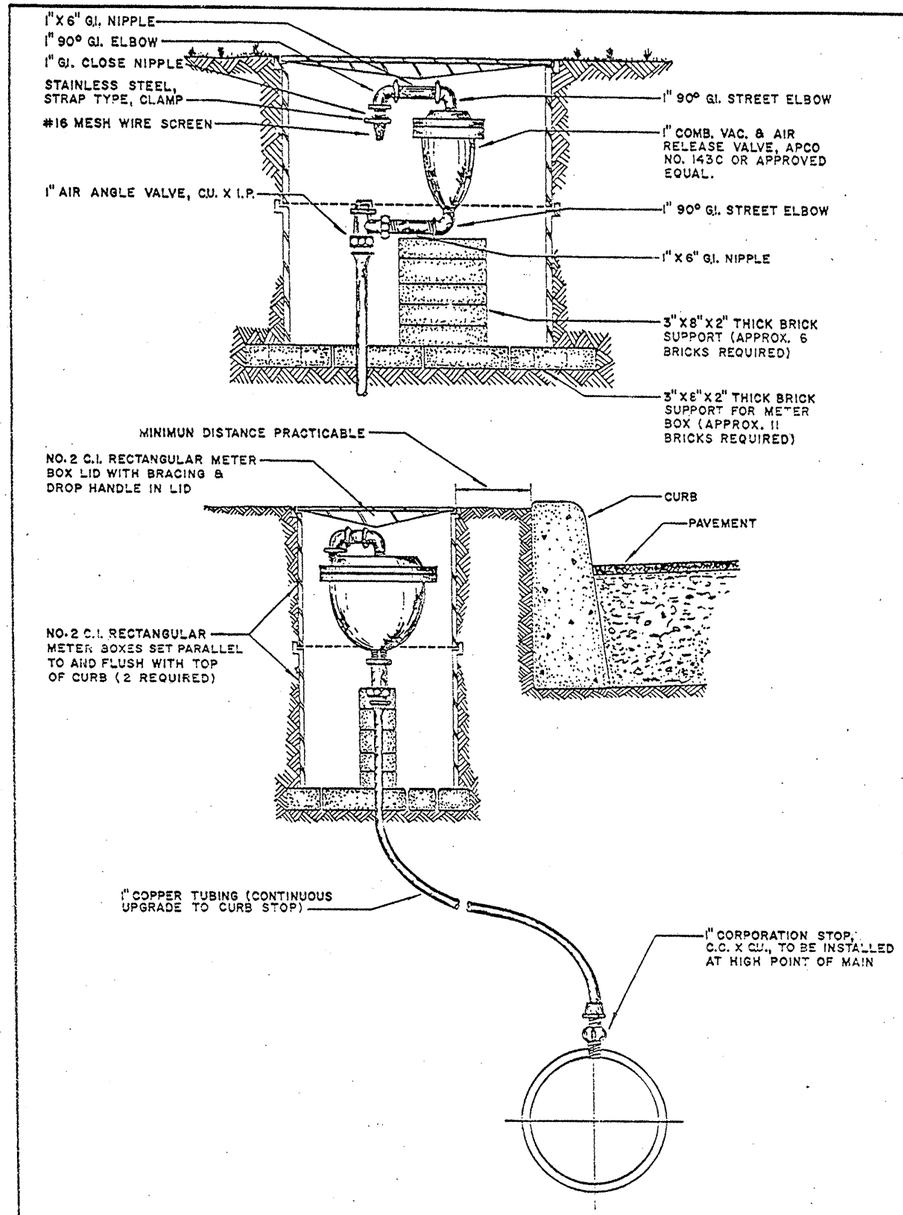


PLAN



SECTION

APPROVED Hugh R. Anderson	2" TEMPORARY BLOW-OFF ASSEMBLY ON 12" AND 16" D. I. MAINS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-10-00 SHEET 3 OF 3
DATE 9 JUNE 1982		
REVISION JUNE 1988		



APPROVED Hugh R. Anderson	INSTALLATION OF 1" AIR RELEASE VALVE	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-06-00 SHEET 1 OF 2
DATE 12 FEB. 1965		
REVISION JUNE 1988		

STATE OF TEXAS
LEE WOODY BOWEN
1991
PROFESSIONAL ENGINEER
3-31-93

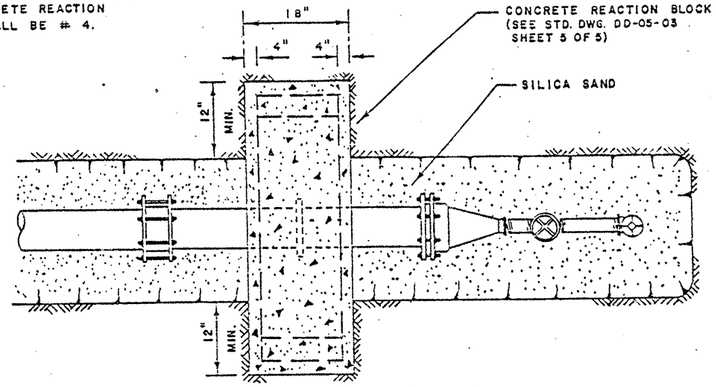
STATE OF TEXAS
REVIEW REQUIRED
2-7-92

CWB JOB 90-5851
SHEET 21 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.	SHEET NO.
6	TEXAS		270

STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR	2452	02	023	LP160A

NOTES:
1. EMBED ALL EXTERIOR METAL SURFACES IN SILICA SAND.
2. ALL REINFORCING BARS IN THE CONCRETE REACTION BLOCK SHALL BE # 4.



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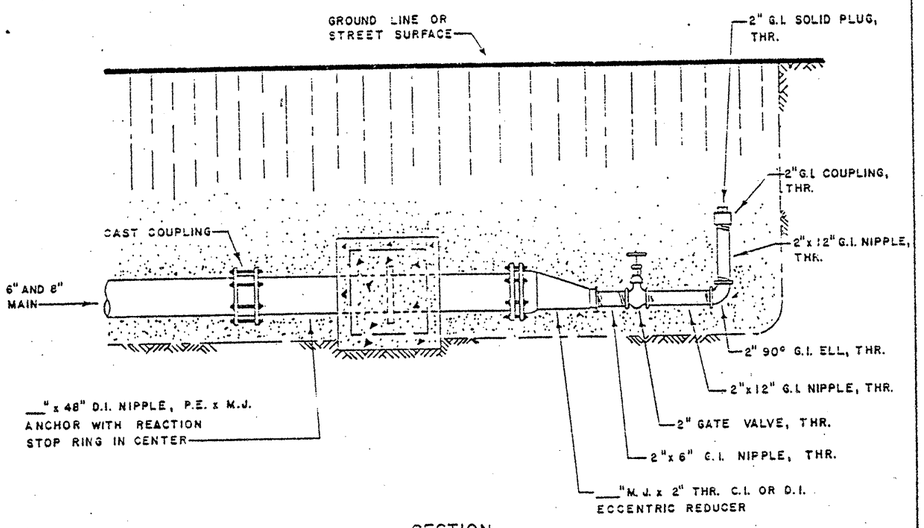
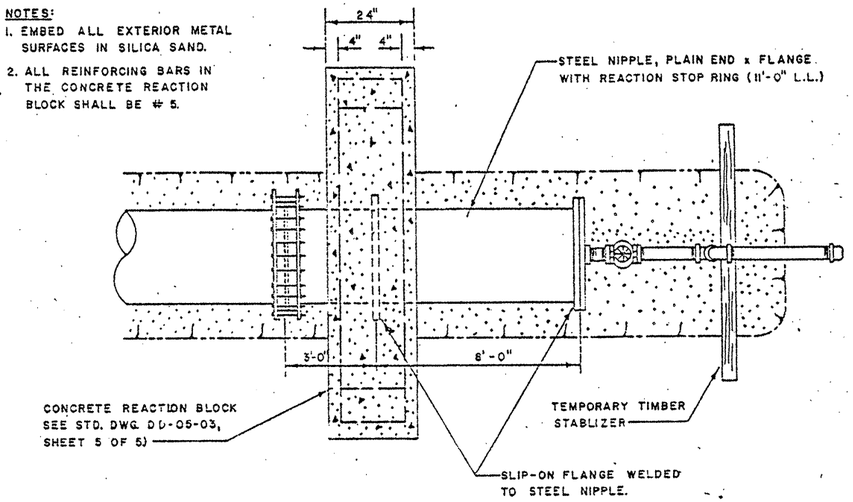


SECTION

APPROVED H.R. Anderson	2" TEMPORARY BLOW-OFF ASSEMBLY ON 6" AND 8", A.C. AND D.I. MAINS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-10-00 SHEET 1 OF 3
DATE 9 JUNE 1982		
REVISION JUNE 1988		

NOTES:
1. EMBED ALL EXTERIOR METAL SURFACES IN SILICA SAND.
2. ALL REINFORCING BARS IN THE CONCRETE REACTION BLOCK SHALL BE # 5.



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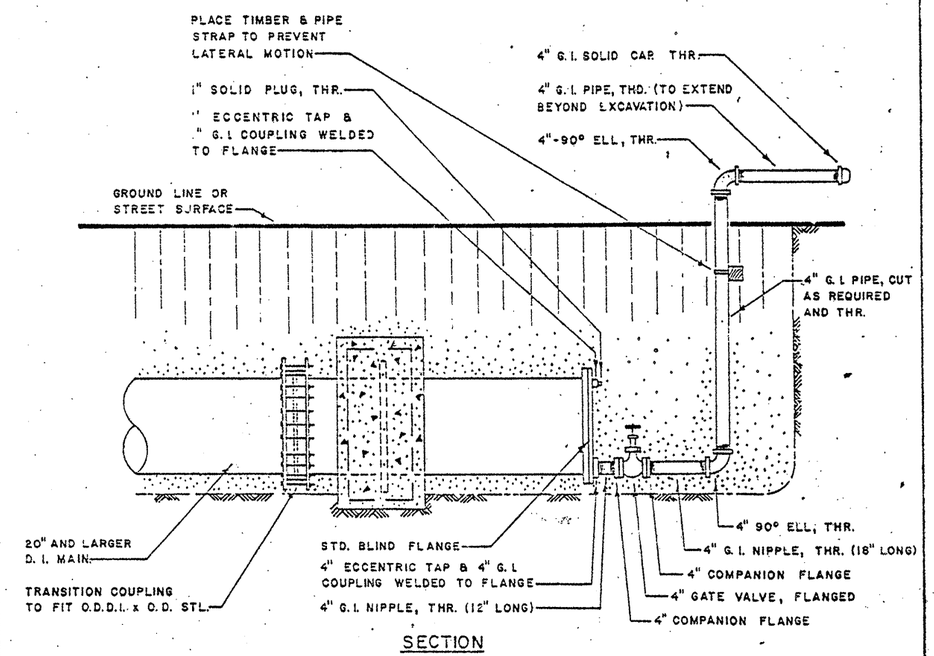


SECTION

APPROVED H.R. Anderson	4" TEMPORARY BLOW-OFF ASSEMBLY 20" AND LARGER D.I. MAINS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-10-03 SHEET 2 OF 3
DATE 9 JUNE 1982		
REVISION JUNE 1988		

STATE OF TEXAS — JOSEPH [illegible] — REGISTERED PROFESSIONAL ENGINEER

3-31-93

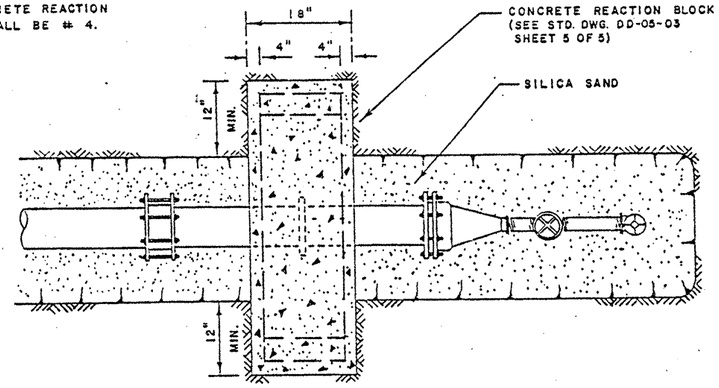
STATE OF TEXAS — MARCUS RUDNICKER — REGISTERED PROFESSIONAL ENGINEER

2-7-92

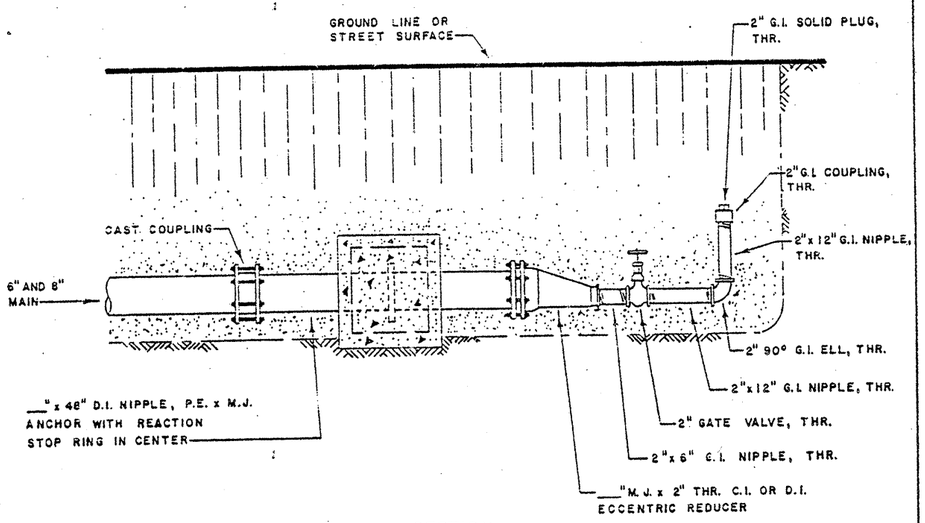
SAWS JOB 90-5051
SHEET 22 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.	SHEET NO.
6	TEXAS		371
STATE DIST. NO.	COUNTY	CONT. / SECT. / JOB / HIGHWAY NO.	
15	BEXAR	2452 02 023 LP1604	

NOTES:
1. EMBED ALL EXTERIOR METAL SURFACES IN SILICA SAND.
2. ALL REINFORCING BARS IN THE CONCRETE REACTION BLOCK SHALL BE # 4.



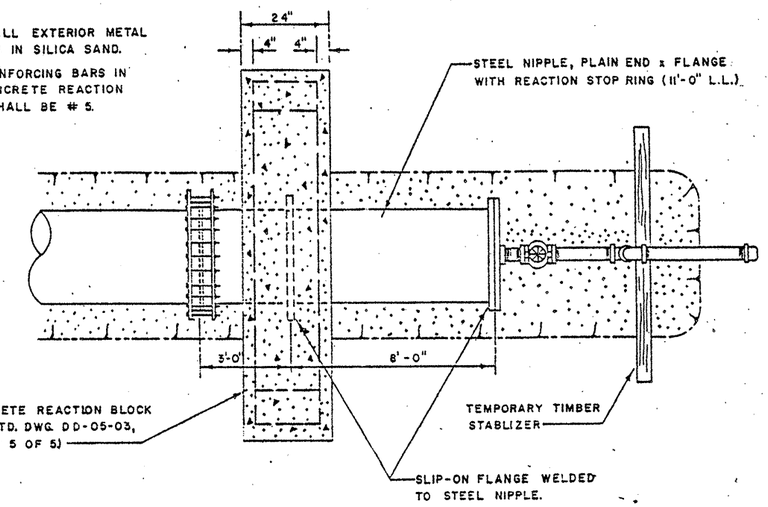
PLAN



SECTION

APPROVED H.R. Anderson	2" TEMPORARY BLOW-OFF ASSEMBLY ON 6" AND 8", A.C. AND D.I. MAINS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-10-00 SHEET 1 OF 3
DATE 9 JUNE 1982		
REVISION JUNE 1988		

NOTES:
1. EMBED ALL EXTERIOR METAL SURFACES IN SILICA SAND.
2. ALL REINFORCING BARS IN THE CONCRETE REACTION BLOCK SHALL BE # 5.



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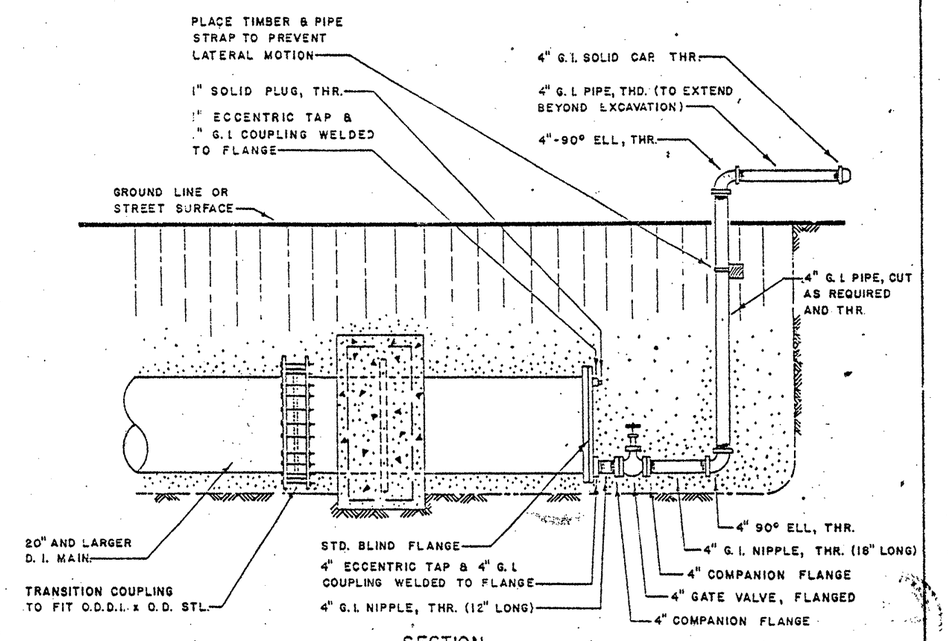


SECTION

APPROVED H.R. Anderson	4" TEMPORARY BLOW-OFF ASSEMBLY 20" AND LARGER D.I. MAINS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-10-03 SHEET 2 OF 3
DATE 9 JUNE 1982		
REVISION JUNE 1988		

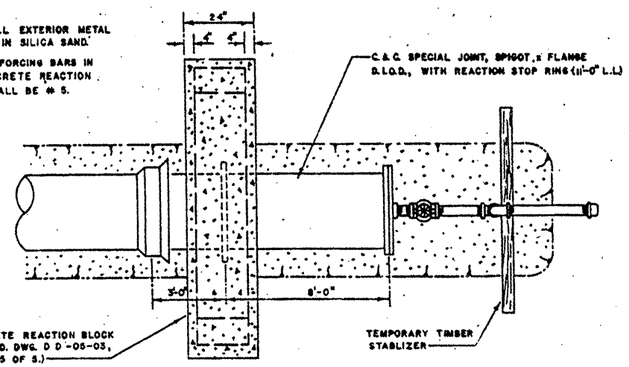
STATE OF TEXAS — THE KNOWN EXPIRES 1991 — REGISTERED PROFESSIONAL ENGINEER
3-31-93

STATE OF TEXAS — BRENCH INCORPORATED — ENGINEERING COMPANY — 5680
8-7-91

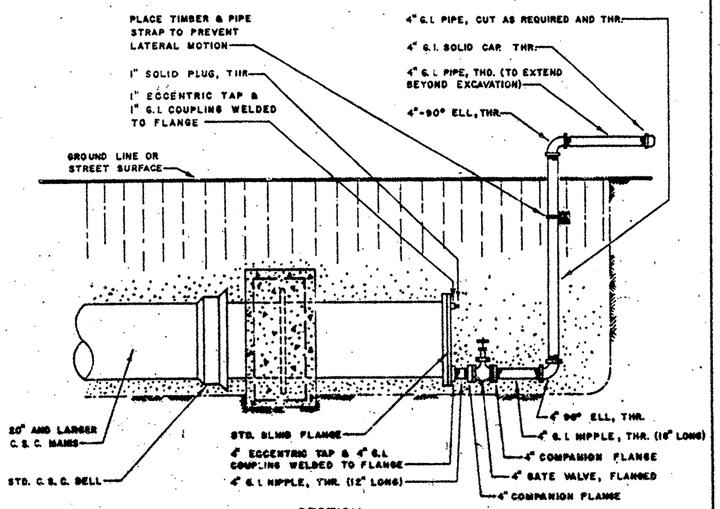
CWB JOB 905051
SHEET 22 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.	SHEET NO.
6	TEXAS		371
STATE DIST. NO.	COUNTY	CONT. | SECT. | JOB	HIGHWAY NO.
15	BEXAR	2452 02 023	LP1604

NOTES:
1. EMBED ALL EXTERIOR METAL SURFACES IN SILICA SAND.
2. ALL REINFORCING BARS IN THE CONCRETE REACTION BLOCK SHALL BE # 5.



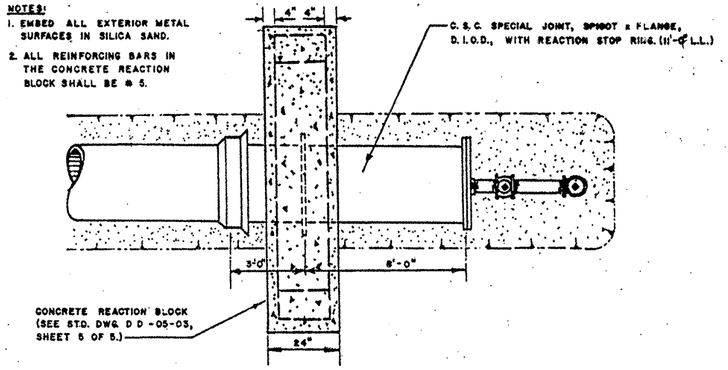
PLAN



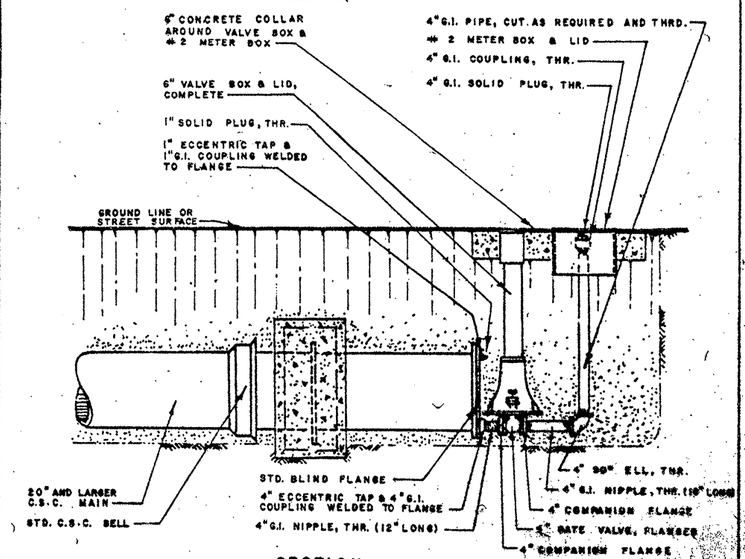
SECTION

APPROVED J.R. Anderson	4" TEMPORARY BLOW-OFF ASSEMBLY 20" AND LARGER C.S.C. MAINS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-10-03 SHEET 3 OF 3
DATE 9 JUNE 1982		
REVISION JUNE 1988		

NOTES:
1. EMBED ALL EXTERIOR METAL SURFACES IN SILICA SAND.
2. ALL REINFORCING BARS IN THE CONCRETE REACTION BLOCK SHALL BE # 5.



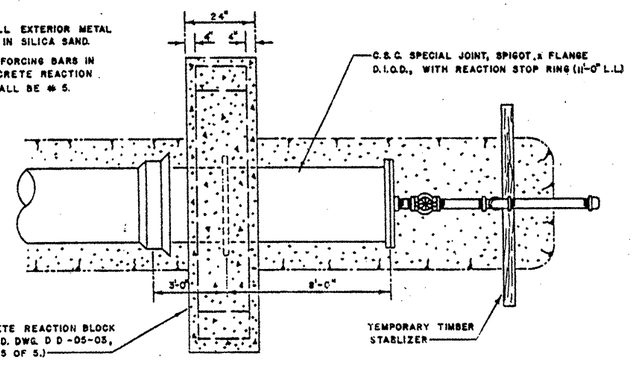
PLAN



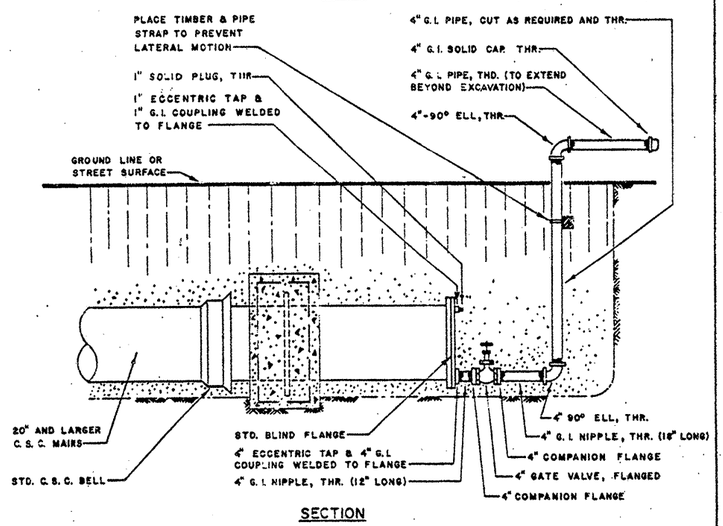
SECTION

APPROVED J.R. Anderson	4" PERMANENT BLOW-OFF ASSEMBLY 20" AND LARGER C.S.C. MAINS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-10-04 SHEET 3 OF 3
DATE 9 JUNE 1982		
REVISION JUNE 1988		

NOTES:
1. EMBED ALL EXTERIOR METAL SURFACES IN SILICA SAND.
2. ALL REINFORCING BARS IN THE CONCRETE REACTION BLOCK SHALL BE # 5.



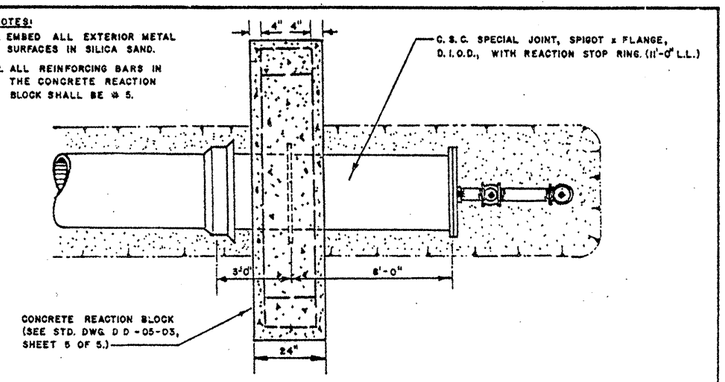
PLAN



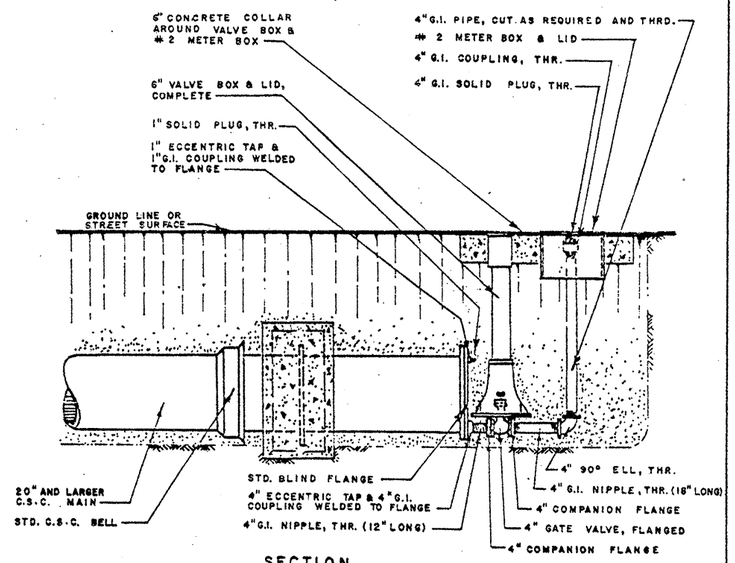
SECTION

APPROVED H. R. Anderson	4" TEMPORARY BLOW-OFF ASSEMBLY 20" AND LARGER C. S. C. MAINS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-10-03 SHEET 3 OF 3
DATE 9 JUNE 1982		
REVISION JUNE 1988		

NOTES:
1. EMBED ALL EXTERIOR METAL SURFACES IN SILICA SAND.
2. ALL REINFORCING BARS IN THE CONCRETE REACTION BLOCK SHALL BE # 5.



PLAN



SECTION

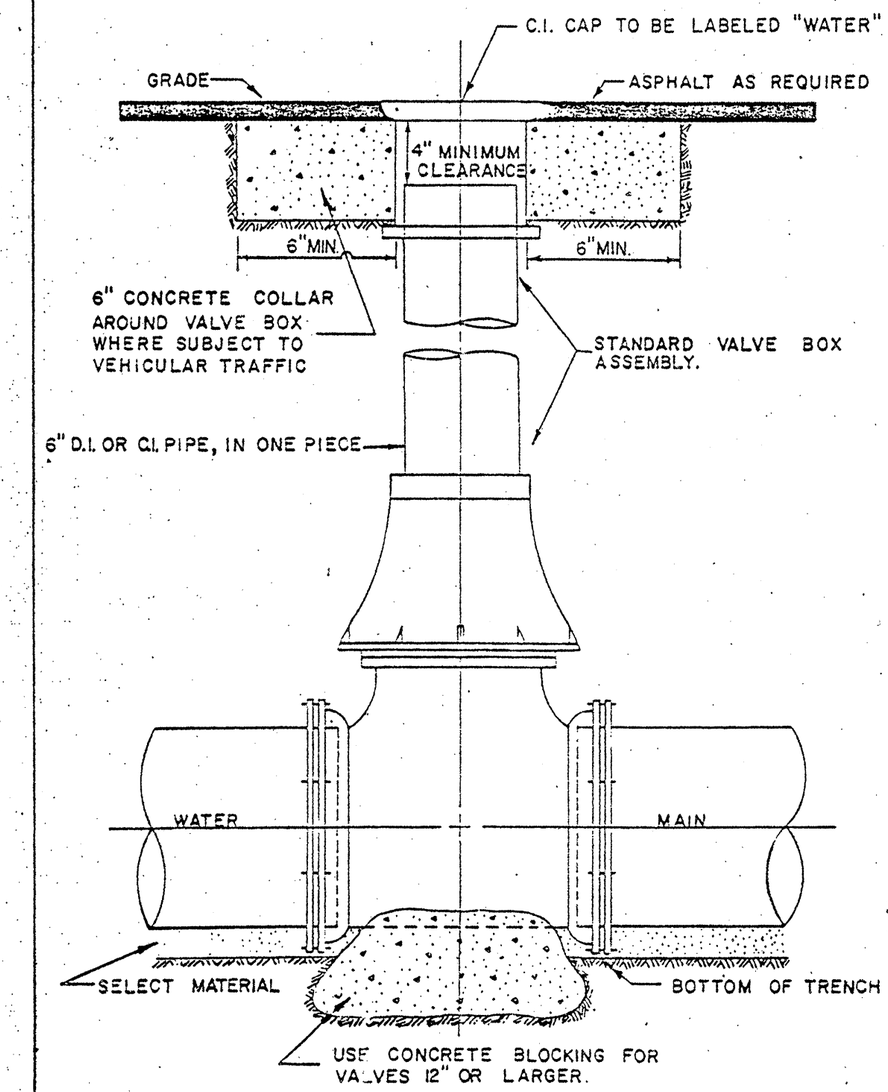
APPROVED H. R. Anderson	4" PERMANENT BLOW-OFF ASSEMBLY 20" AND LARGER C. S. C. MAINS	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-10-04 SHEET 3 OF 3
DATE 9 JUNE 1982		
REVISION JUNE 1988		

3-31-93

8-7-92

CWB JOB 90-5051
SHEET 23 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.	SHEET NO.
6	TEXAS		372
STATE DIST. NO.	COUNTY	CONT. / SECT. / JOB / HIGHWAY NO.	
15	BEXAR	2452 05 023 LP1604	



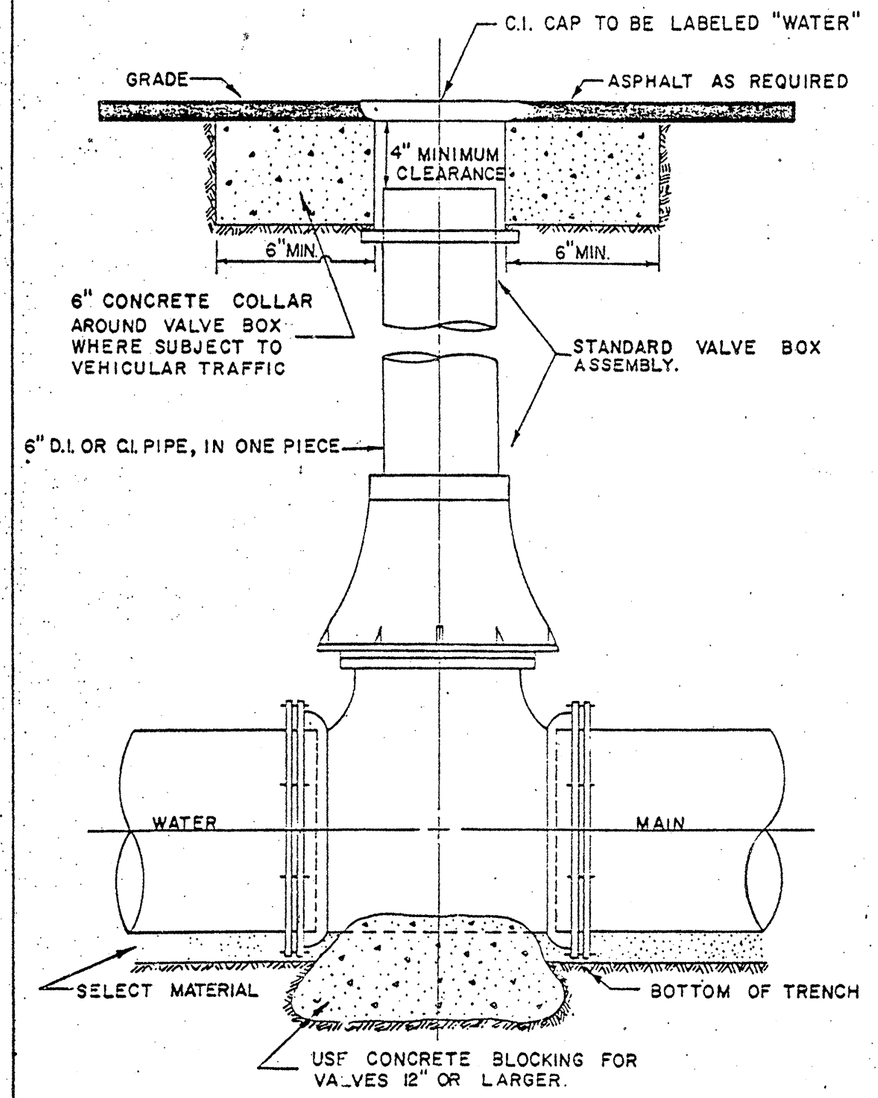
APPROVED [signature]	INSTALLATION OF NON-GEARED GATE VALVE WITH VALVE BOX AND EXTENSION	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-05-00 SHEET 1 OF 1
DATE 2-12-65		
REVISION JUNE 1988 DD		

3-31-93

2-7-92

SAWS JOB 90-5051
SHEET 24 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS					373
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.	
15	BEXAR	2452	02	023	LP 1604	



APPROVED [signature]	INSTALLATION OF NON-GEARED GATE VALVE WITH VALVE BOX AND EXTENSION	CITY WATER BOARD SAN ANTONIO, TEXAS STD. DWG. DD-05-00 SHEET 1 OF 1
DATE 2-12-65		
REVISION JUNE 1988 pp		

3-31-93

2-7-92

7/9/91

CWB JOB 90-5051
SHEET 24 OF 24

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS					373
STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR		2852	02	023	LP 1604

NOTE: THE ESTIMATED QUANTITIES SHOWN HEREON ARE FOR THE CONTRACTOR'S INFORMATION ONLY AND ACTUAL QUANTITIES SHALL BE VERIFIED IN THE FIELD

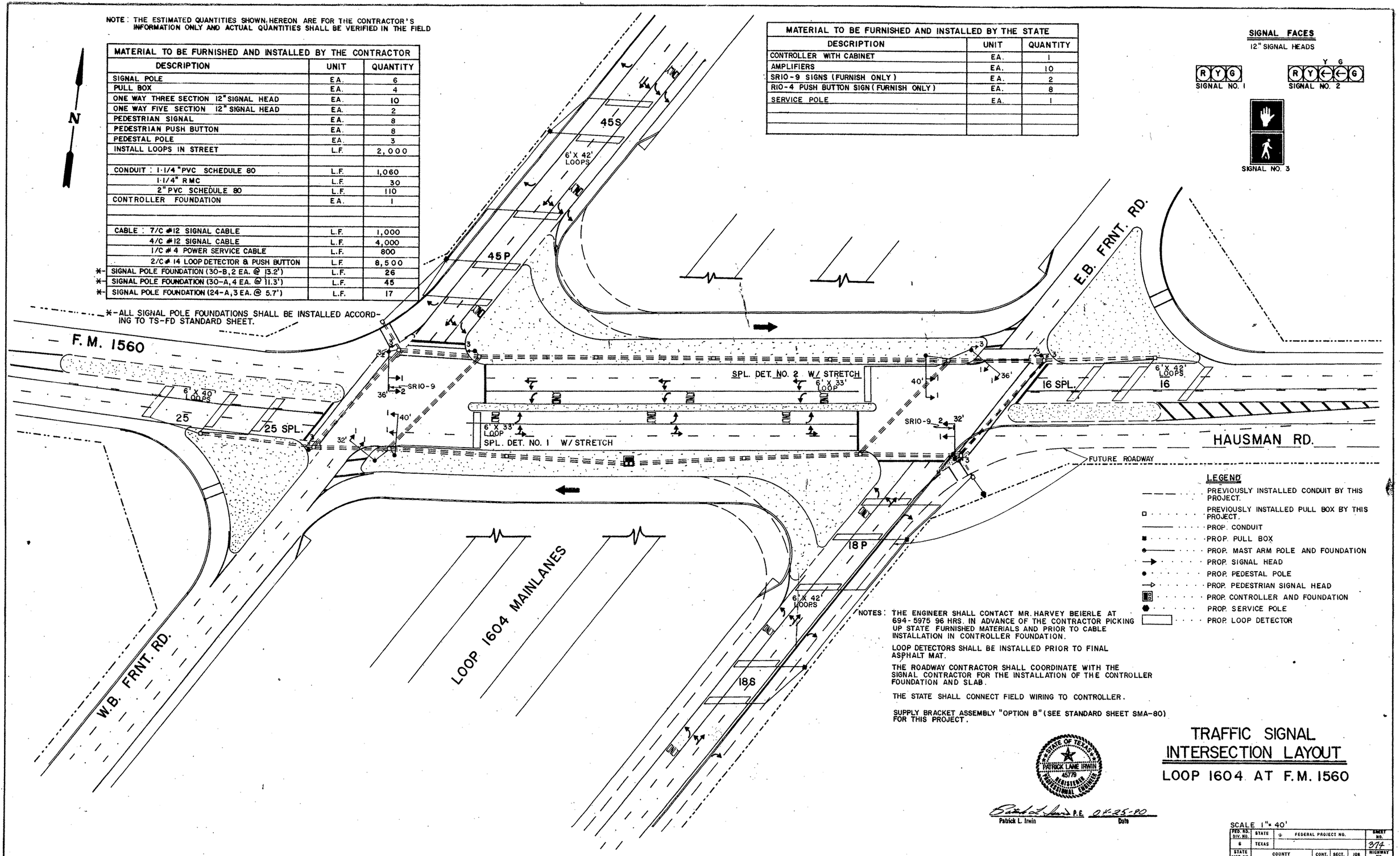
MATERIAL TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR		
DESCRIPTION	UNIT	QUANTITY
SIGNAL POLE	EA.	6
PULL BOX	EA.	4
ONE WAY THREE SECTION 12" SIGNAL HEAD	EA.	10
ONE WAY FIVE SECTION 12" SIGNAL HEAD	EA.	2
PEDESTRIAN SIGNAL	EA.	8
PEDESTRIAN PUSH BUTTON	EA.	8
PEDESTAL POLE	EA.	3
INSTALL LOOPS IN STREET	L.F.	2,000
CONDUIT : 1-1/4" PVC SCHEDULE 80	L.F.	1,060
1-1/4" RMC	L.F.	30
2" PVC SCHEDULE 80	L.F.	110
CONTROLLER FOUNDATION	EA.	1
CABLE : 7/C #12 SIGNAL CABLE	L.F.	1,000
4/C #12 SIGNAL CABLE	L.F.	4,000
1/C # 4 POWER SERVICE CABLE	L.F.	800
2/C # 14 LOOP DETECTOR & PUSH BUTTON	L.F.	8,500
*- SIGNAL POLE FOUNDATION (30-B, 2 EA. @ 13.2')	L.F.	26
*- SIGNAL POLE FOUNDATION (30-A, 4 EA. @ 11.3')	L.F.	45
*- SIGNAL POLE FOUNDATION (24-A, 3 EA. @ 5.7')	L.F.	17

*-ALL SIGNAL POLE FOUNDATIONS SHALL BE INSTALLED ACCORDING TO TS-FD STANDARD SHEET.

MATERIAL TO BE FURNISHED AND INSTALLED BY THE STATE		
DESCRIPTION	UNIT	QUANTITY
CONTROLLER WITH CABINET	EA.	1
AMPLIFIERS	EA.	10
SR10-9 SIGNS (FURNISH ONLY)	EA.	2
R10-4 PUSH BUTTON SIGN (FURNISH ONLY)	EA.	8
SERVICE POLE	EA.	1

SIGNAL FACES

12" SIGNAL HEADS



NOTES: THE ENGINEER SHALL CONTACT MR. HARVEY BEIERLE AT 694-5975 96 HRS. IN ADVANCE OF THE CONTRACTOR PICKING UP STATE FURNISHED MATERIALS AND PRIOR TO CABLE INSTALLATION IN CONTROLLER FOUNDATION.

LOOP DETECTORS SHALL BE INSTALLED PRIOR TO FINAL ASPHALT MAT.

THE ROADWAY CONTRACTOR SHALL COORDINATE WITH THE SIGNAL CONTRACTOR FOR THE INSTALLATION OF THE CONTROLLER FOUNDATION AND SLAB.

THE STATE SHALL CONNECT FIELD WIRING TO CONTROLLER.

SUPPLY BRACKET ASSEMBLY "OPTION B" (SEE STANDARD SHEET SMA-80) FOR THIS PROJECT.

LEGEND

- PREVIOUSLY INSTALLED CONDUIT BY THIS PROJECT.
- PREVIOUSLY INSTALLED PULL BOX BY THIS PROJECT.
- PROP. CONDUIT
- PROP. PULL BOX
- PROP. MAST ARM POLE AND FOUNDATION
- PROP. SIGNAL HEAD
- PROP. PEDESTAL POLE
- PROP. PEDESTRIAN SIGNAL HEAD
- PROP. CONTROLLER AND FOUNDATION
- PROP. SERVICE POLE
- PROP. LOOP DETECTOR

STATE OF TEXAS
PATRICK LANE IRWIN
45776
REGISTERED
PROFESSIONAL ENGINEER

Patrick L. Irwin P.E. 01-25-90
Patrick L. Irwin Date

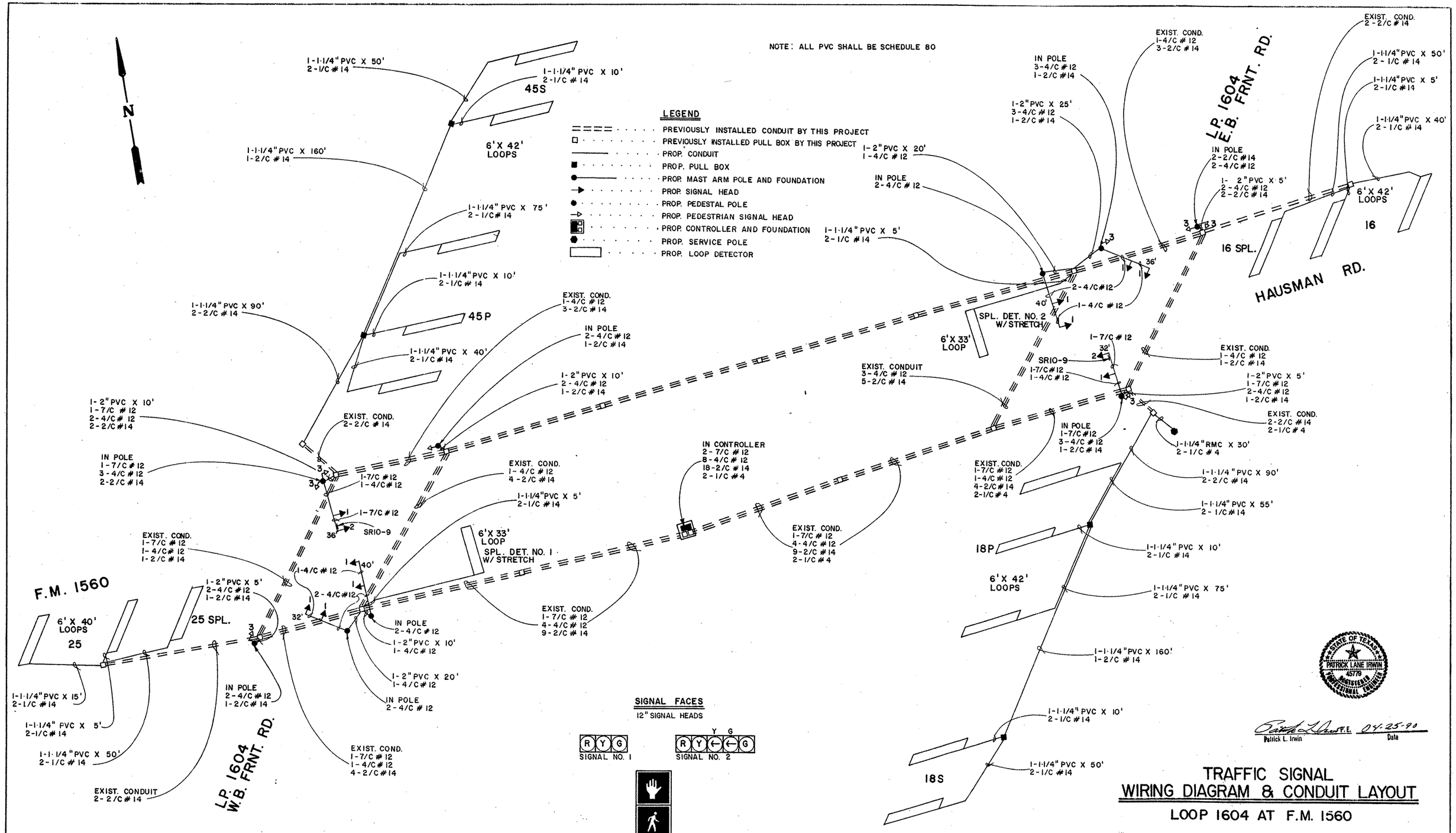
TRAFFIC SIGNAL INTERSECTION LAYOUT

LOOP 1604 AT F.M. 1560

SCALE 1" = 40'

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			SHEET NO.
6	TEXAS				374
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR	2452	02	023	L.P.1604

NOTE: ALL PVC SHALL BE SCHEDULE 80



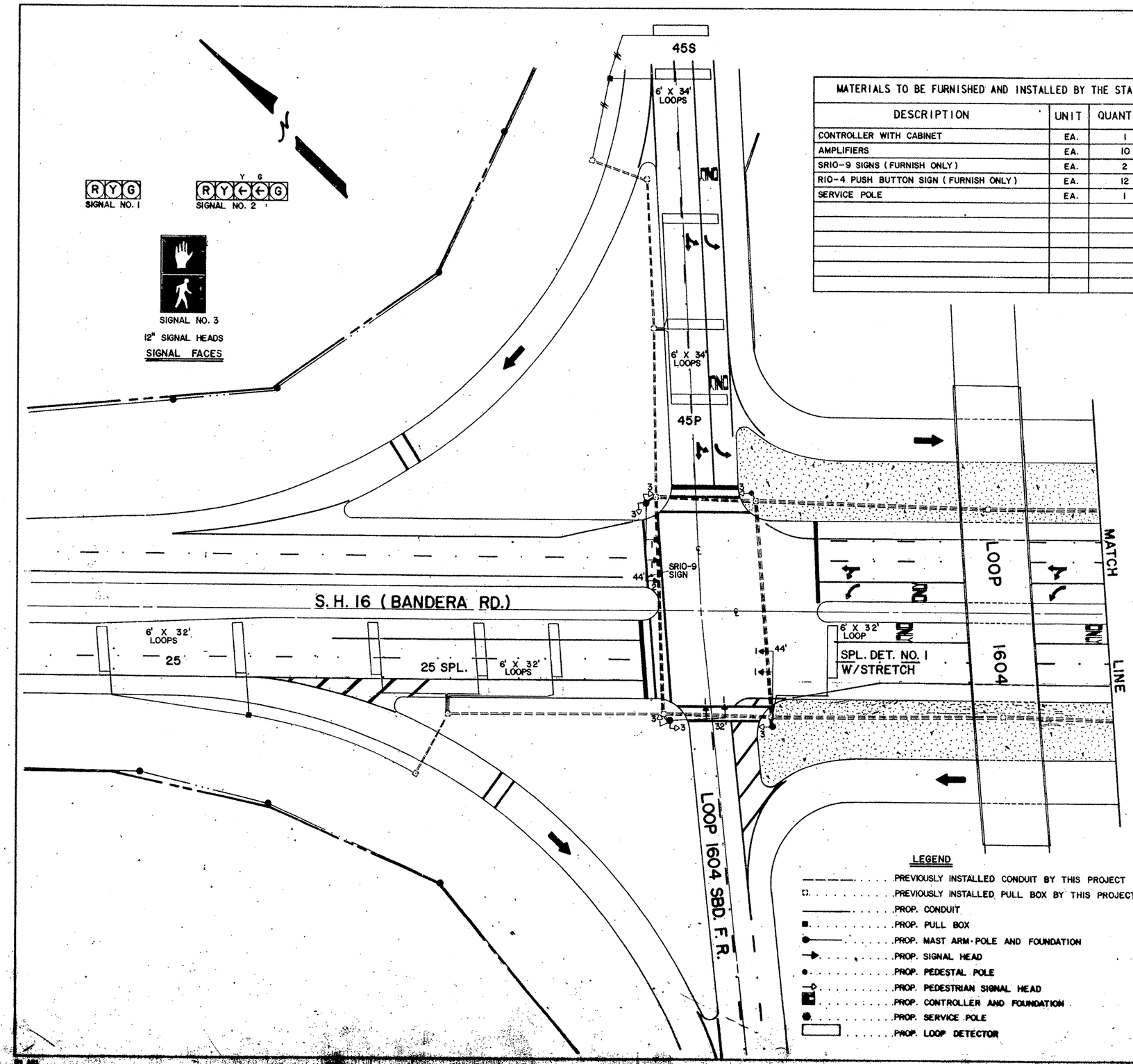
STATE OF TEXAS
PATRICK LANE IRWIN
45779
PROFESSIONAL ENGINEER

Patrick L. Irwin P.E. 04-25-90
Patrick L. Irwin Date

TRAFFIC SIGNAL WIRING DIAGRAM & CONDUIT LAYOUT

LOOP 1604 AT F.M. 1560

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS					375
STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR		2452	02	023	LP1604



NOTE: THE ESTIMATED QUANTITIES SHOWN HEREON ARE FOR CONTRACTOR'S INFORMATION ONLY AND ACTUAL QUANTITIES SHALL BE VERIFIED IN THE FIELD

MATERIALS TO BE FURNISHED AND INSTALLED BY THE STATE

DESCRIPTION	UNIT	QUANTITY
CONTROLLER WITH CABINET	EA.	1
AMPLIFIERS	EA.	10
SRIO-9 SIGNS (FURNISH ONLY)	EA.	2
RIO-4 PUSH BUTTON SIGN (FURNISH ONLY)	EA.	12
SERVICE POLE	EA.	1

MATERIALS TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR

DESCRIPTION	UNIT	QUANTITY
SIGNAL POLE	EA.	6
PULL BOX	EA.	4
ONE WAY THREE SECTION 12" SIGNAL HEAD	EA.	12
ONE WAY FIVE SECTION 12" SIGNAL HEAD	EA.	2
PEDESTRIAN SIGNAL	EA.	12
PEDESTRIAN PUSH BUTTON	EA.	12
PEDESTAL POLE	EA.	2
INSTALL LOOPS IN STREET	L.F.	2,475
CONTROLLER FOUNDATION	EA.	1
CONDUIT: 1-1/4" PVC SCHEDULE 80	L.F.	756
1-1/4" RMC	L.F.	70
2" PVC SCHEDULE 80	L.F.	104
CABLE: 7/C #12 SIGNAL CABLE	L.F.	950
4/C #12 SIGNAL CABLE	L.F.	4,500
2/C #14 LOOP DETECTOR & PUSH BUTTON	L.F.	8,950
1/C #4 POWER SERVICE CABLE	L.F.	1,100
*- SIGNAL POLE FOUNDATION (30-B, 5 EA. @ 13.2')	L.F.	66
*- SIGNAL POLE FOUNDATION (30-A, 1 EA. @ 11.3')	L.F.	11
*- SIGNAL POLE FOUNDATION (24-A, 2 EA. @ 5.7')	L.F.	6

*- ALL SIGNAL POLE FOUNDATIONS SHALL BE INSTALLED ACCORDING TO TS-FD STANDARD SHEET.

NOTES: THE ENGINEER SHALL CONTACT MR. HARVEY BEIERLE AT 694-5975 96 HOURS IN ADVANCE OF THE CONTRACTOR PICKING UP STATE FURNISHED MATERIALS AND PRIOR TO CABLE INSTALLATION IN CONTROLLER FOUNDATION.

LOOP DETECTORS SHALL BE INSTALLED PRIOR TO FINAL ASPHALT MAT.

THE ROADWAY CONTRACTOR SHALL COORDINATE WITH THE SIGNAL CONTRACTOR FOR THE INSTALLATION OF THE CONTROLLER FOUNDATION AND SLAB.

THE STATE SHALL CONNECT FIELD WIRING TO CONTROLLER.

SUPPLY BRACKET ASSEMBLY "OPTION B" (SEE STANDARD SHEET SMA-80) FOR THIS PROJECT.

STATE OF TEXAS
PATRICK LANE IRWIN
45779
REGISTERED
PROFESSIONAL ENGINEER

Patrick L. Irwin P.E. 10-09-90
Patrick L. Irwin Date

TRAFFIC SIGNAL INTERSECTION LAYOUT

LOOP 1604 AT S.H. 16 (BANDERA RD.)

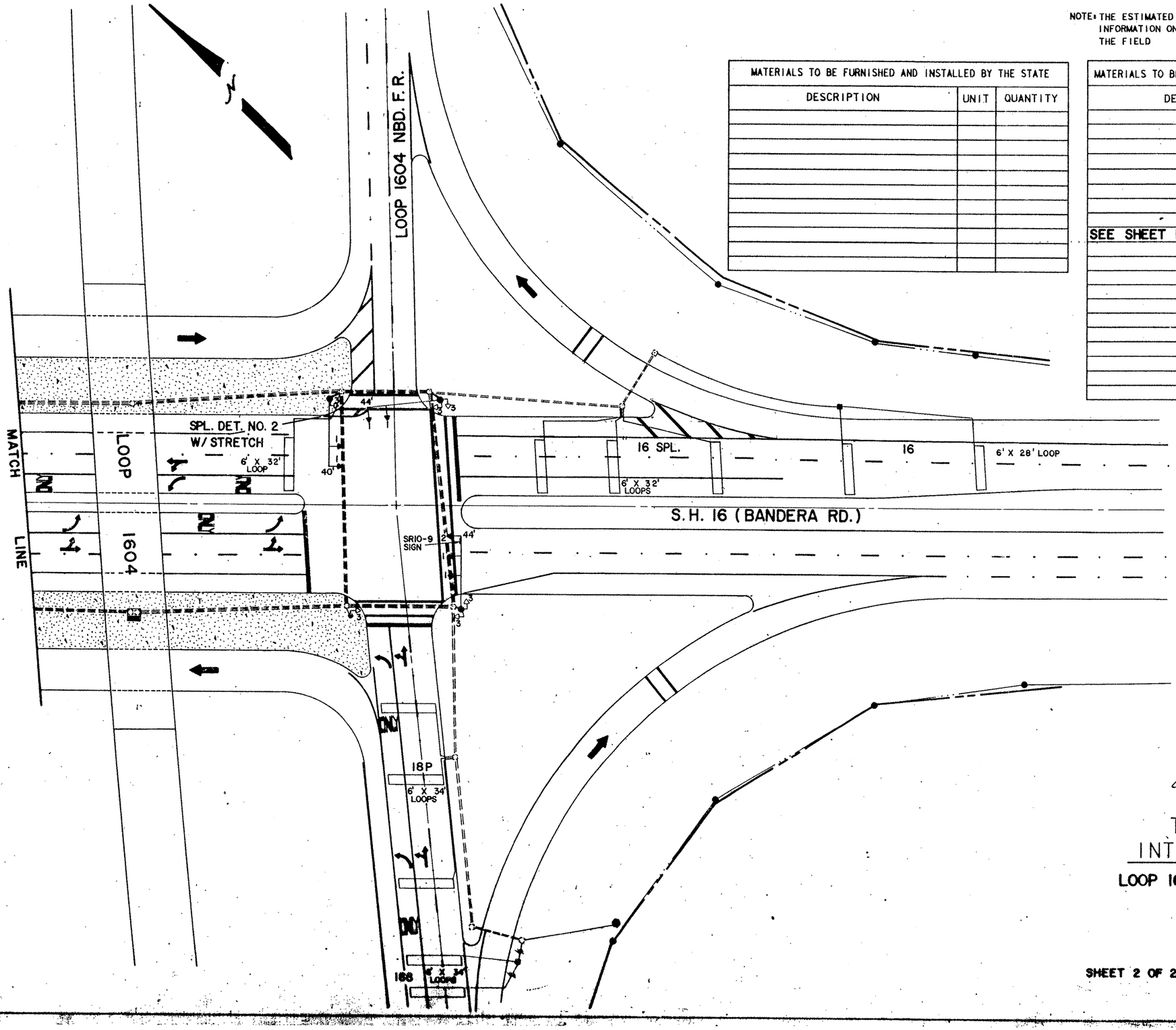
SHEET 1 OF 2

SCALE: 1" = 30'

NOTE: THE ESTIMATED QUANTITIES SHOWN HEREON ARE FOR CONTRACTOR'S INFORMATION ONLY AND ACTUAL QUANTITIES SHALL BE VERIFIED IN THE FIELD

MATERIALS TO BE FURNISHED AND INSTALLED BY THE STATE		
DESCRIPTION	UNIT	QUANTITY

MATERIALS TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR		
DESCRIPTION	UNIT	QUANTITY
SEE SHEET 1 OF 2 FOR QUANTITIES AND NOTES		



SIGNAL NO. 3
12" SIGNAL HEADS
SIGNAL FACES

STATE OF TEXAS
PATRICK LANE IRWIN
45779
PROFESSIONAL ENGINEER

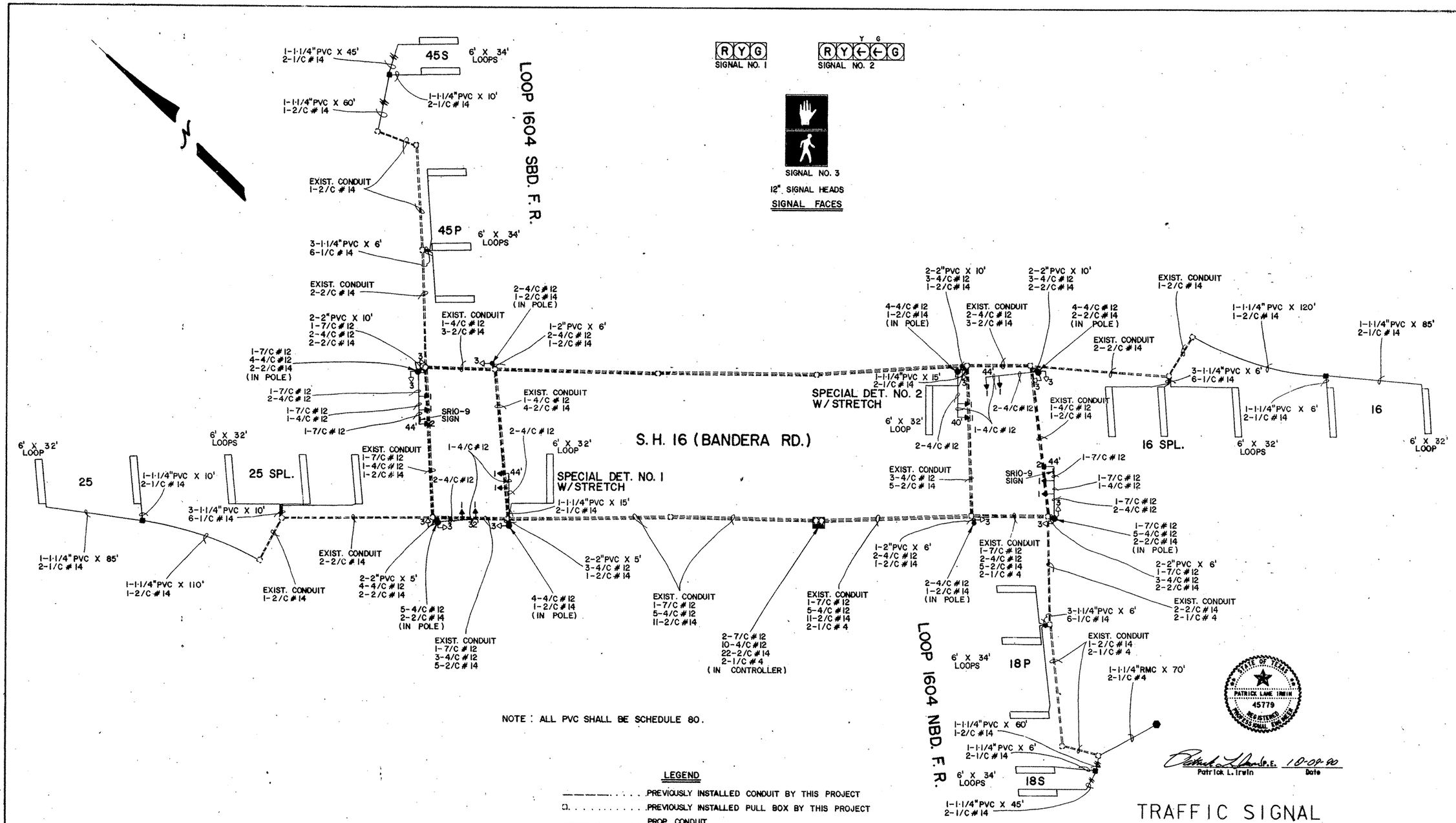
P.E. 10-09-90
Patrick L. Irwin — Date

TRAFFIC SIGNAL INTERSECTION LAYOUT

LOOP 1604 AT S.H. 16 (BANDERA RD.)

SCALE: 1" = 30'

SHEET 2 OF 2



SIGNAL NO. 1 (R Y G)

SIGNAL NO. 2 (R Y ← ← G)

SIGNAL NO. 3

12" SIGNAL HEADS

SIGNAL FACES

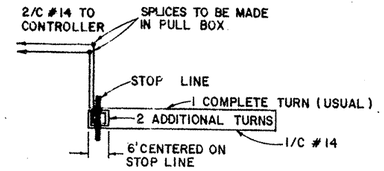
NOTE : ALL PVC SHALL BE SCHEDULE 80.

LEGEND

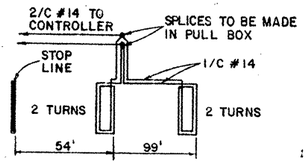
- PREVIOUSLY INSTALLED CONDUIT BY THIS PROJECT
- PREVIOUSLY INSTALLED PULL BOX BY THIS PROJECT
- PROP. CONDUIT
- PROP. PULL BOX
- PROP. MAST ARM POLE AND FOUNDATION
- PROP. SIGNAL HEAD
- PROP. PEDESTAL POLE
- PROP. PEDESTRIAN SIGNAL HEAD
- PROP. CONTROLLER AND FOUNDATION
- PROP. SERVICE POLE
- PROP. LOOP DETECTOR

TRAFFIC SIGNAL WIRING DIAGRAM & CONDUIT LAYOUT

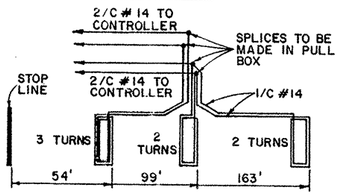
LOOP 1604 AT S.H. 16 (BANDERA RD.)



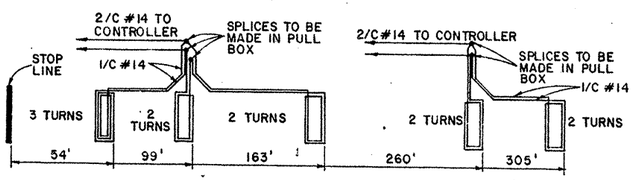
APPROACH WITH LONG LOOP



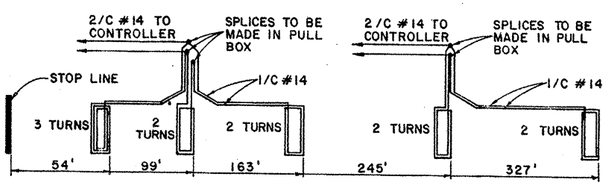
APPROACH WITH 2 LOOPS



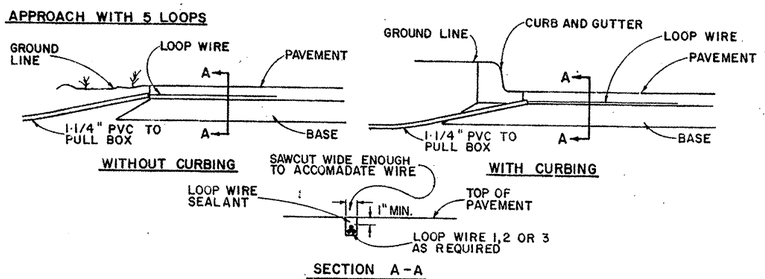
APPROACH WITH 3 LOOPS



APPROACH WITH 5 LOOPS (FRONTAGE ROAD APPROACH)



APPROACH WITH 5 LOOPS

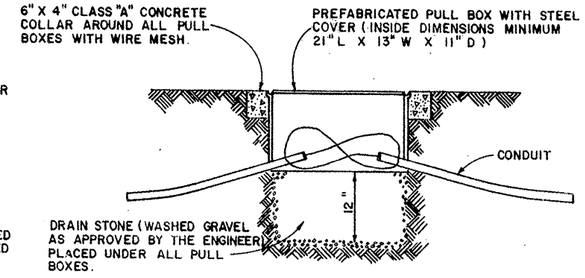


SECTION A-A

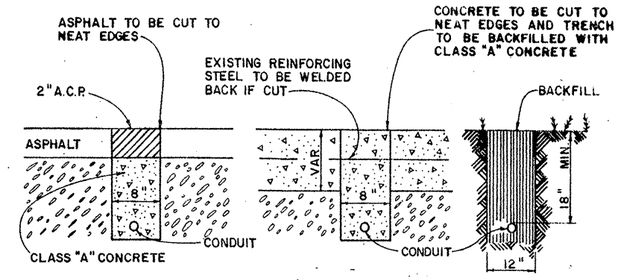
TYPICAL LOOP DETECTOR DETAILS

LOOP DETECTOR NOTES:

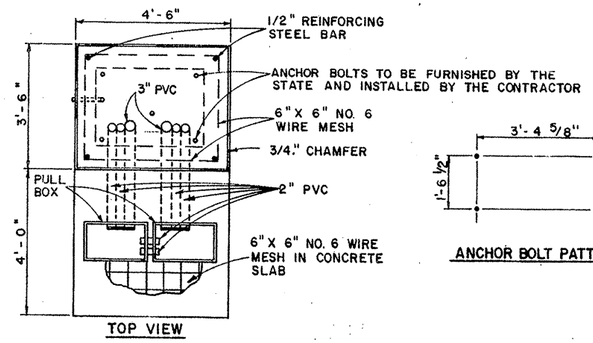
1. THE PAVEMENT CUT IS TO BE MADE WITH A CONCRETE SAW TO NEAT LINES AND LOOSE MATERIAL REMOVED. THE CUT SHALL BE CLEAN AND DRY WHEN THE WIRE AND LOOP SEALANT IS PLACED.
2. WHERE MORE THAN ONE LOOP IS PLACED ON AN INTERSECTION APPROACH, THE WIRE FROM LOOP TO PULL BOX SHALL NOT BE PLACED IN A SAW CUT WITH WIRE FROM OTHER LOOPS UNLESS OTHERWISE SHOWN IN THE PLANS.
3. THE LOOP WIRE SHALL BE TWISTED A MINIMUM OF FIVE TURNS PER FOOT FROM THE EDGE OF THE ROAD TO THE PULL BOX AND NO SPLICES SHALL BE PERMITTED IN THE LOOP OR IN THE RUN TO THE PULL BOX.
4. THE 1/C #14 LOOP WIRE SHALL BE SINGLE CONDUCTOR CROSSLINKED POLYETHYLENE (0.045) INSULATED WIRE, TYPE: USE, RHH, RHW, 14 AWG STRANDED COPPER RATED AT 600 VOLTS.
5. THE 2/C #14 LOOP CABLE SHALL BE TWO CONDUCTOR SHIELDED CABLE, 14 AWG, 19 X 27 STRANDED, 600 VOLT TINNED COPPER, POLYETHYLENE INSULATED, TWISTED PAIR, TWISTED A MINIMUM OF FIVE TWISTS PER FOOT, ALUMINUM - POLYESTER SHIELD, 16 AWG STRANDED TINNED COPPER DRAIN WIRE, CHROME VINYL JACKET, 100 % SHIELD COVERAGE. THE LOOP CABLE SHALL BE CONTINUOUS WITHOUT SPLICES.
6. THE LOOP WIRE SHALL BE SPLICED TO THE LOOP CABLE BY SOLDERING CONDUCTORS, SECURING WITH A WIRE NUT AND FULLY ENCAPSULATING INTO A WATER TIGHT COMMERCIAL SPLICING KIT.
7. ALL LOOP WIRE PLACED IN A SAWCUT SHALL BE SEALED BY FULLY ENCAPSULATING IT WITH LOOP WIRE SEALANT.
8. ALL LOOP WIRE AND LOOP CABLE SHALL BE TESTED. WIRE AND CABLE TESTING LESS THAN 50 MEGAOHMS INSULATION RESISTANCE AT 500 VOLTS SHALL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE. THIS TEST SHOULD BE MADE BEFORE, DURING AND AFTER EACH COMPLETE LOOP DETECTOR INSTALLATION.
9. UPON COMPLETION OF THE COMPLETE LOOP DETECTOR SYSTEM, THE FINAL TEST WILL BE MADE AT ITS TERMINATION AT THE CONTROLLER BY THE ENGINEER. ANY LOOP DETECTOR NOT MEETING THE REQUIREMENTS OF NOTE 8 SHALL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE.



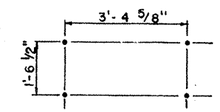
PULL BOX DETAILS



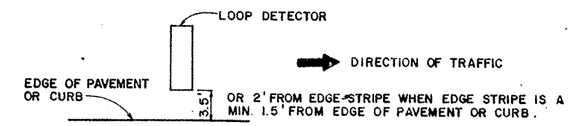
TRENCH DETAILS



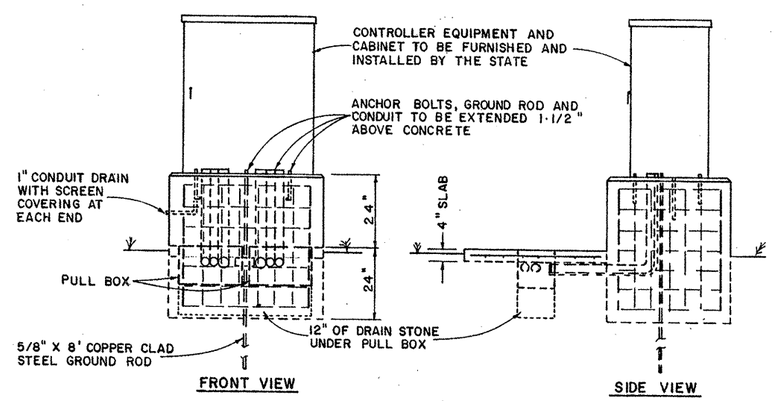
TOP VIEW



ANCHOR BOLT PATTERN



LOOP DETECTOR PLACEMENT



CONTROLLER MOUNT NOTES:

ALL WIRING TERMINATING IN THE CONTROLLER SHALL BE LABELLED IN A MANNER THAT CAN BE IDENTIFIED BY THE ENGINEER WHEN THE CONTROLLER IS INSTALLED.

CLASS "A" CONCRETE SHALL BE USED FOR CONTROLLER FOUNDATION AND SLAB.

CONCRETE SHALL BE TESTED AS MISCELLANEOUS CONCRETE.

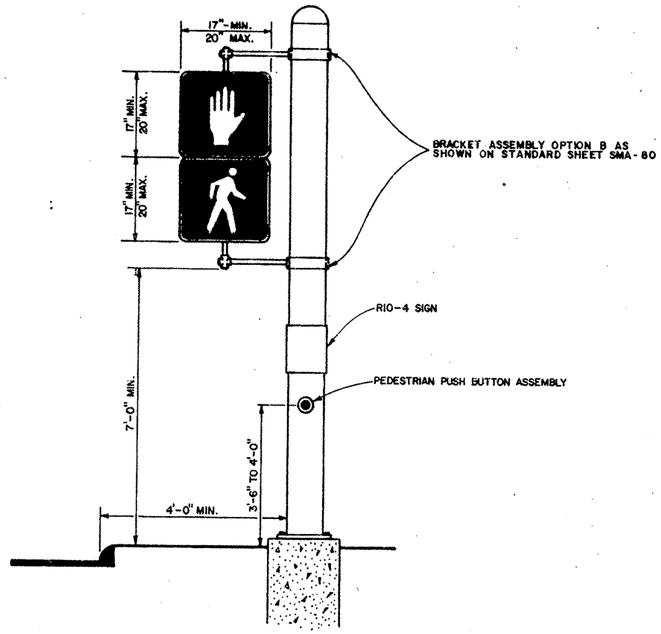
TYPICAL CONTROLLER MOUNT DETAILS

STATE OF TEXAS
PATRICK LANE IRWIN
45779
LICENSED
PROFESSIONAL ENGINEER

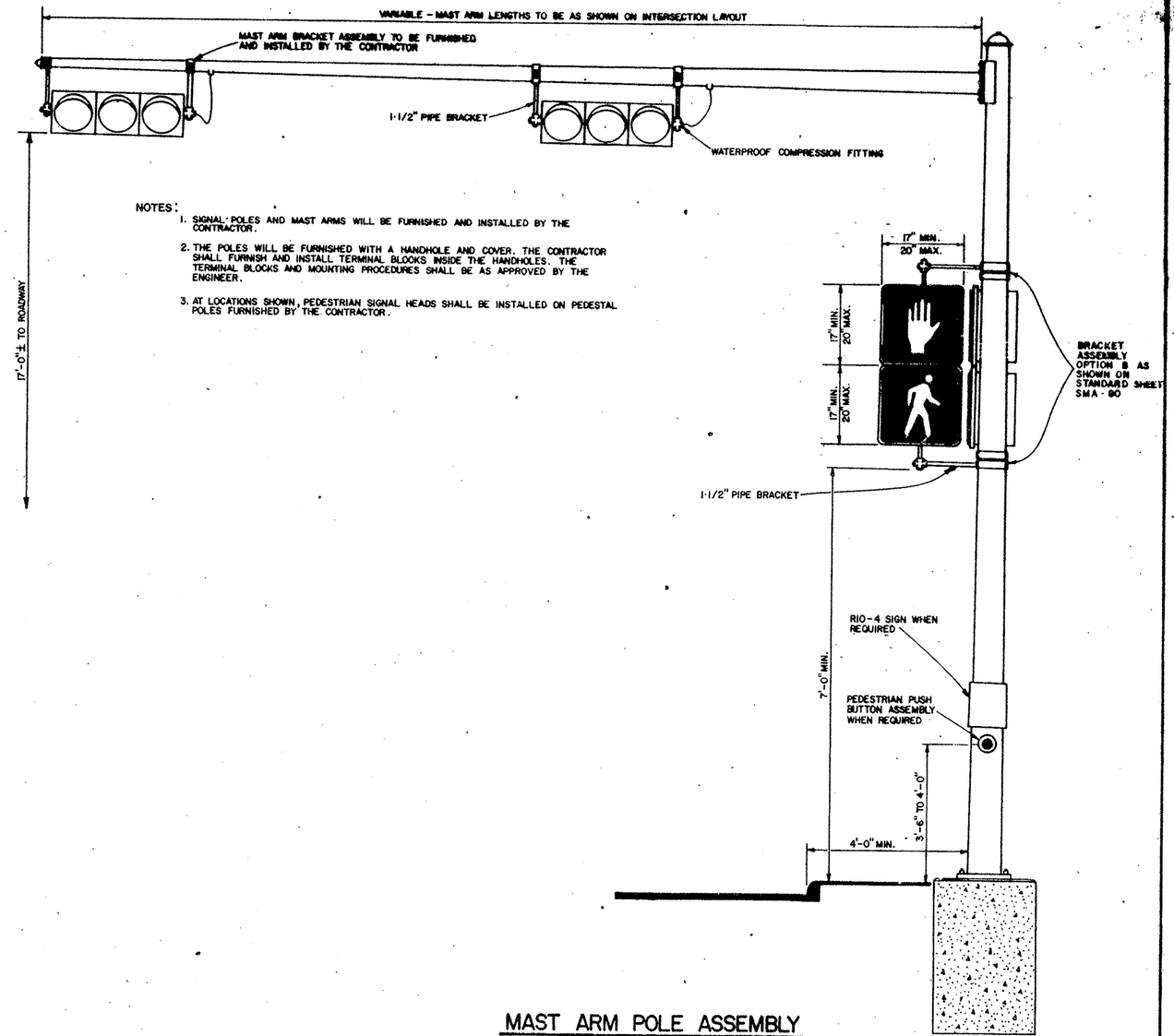
Patrick L. Irwin P.E. 04-25-90
Patrick L. Irwin — Date

CONSTRUCTION DETAILS

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS					379
STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR		2452	02	023	LP1604



PEDESTRIAN SIGNAL POLE ASSEMBLY



NOTES:

1. SIGNAL POLES AND MAST ARMS WILL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.
2. THE POLES WILL BE FURNISHED WITH A HANDHOLE AND COVER. THE CONTRACTOR SHALL FURNISH AND INSTALL TERMINAL BLOCKS INSIDE THE HANDHOLES. THE TERMINAL BLOCKS AND MOUNTING PROCEDURES SHALL BE AS APPROVED BY THE ENGINEER.
3. AT LOCATIONS SHOWN, PEDESTRIAN SIGNAL HEADS SHALL BE INSTALLED ON PEDESTAL POLES FURNISHED BY THE CONTRACTOR.

MAST ARM POLE ASSEMBLY

STATE OF TEXAS
PATRICK LANE IRWIN
45779
REGISTERED
PROFESSIONAL ENGINEER

Patrick L. Irwin P.E. 04-25-90
Patrick L. Irwin Date

CONSTRUCTION DETAILS

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.				SHEET NO.
6	TEXAS					300
STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
15	BEXAR		2452	02	023	LP1604

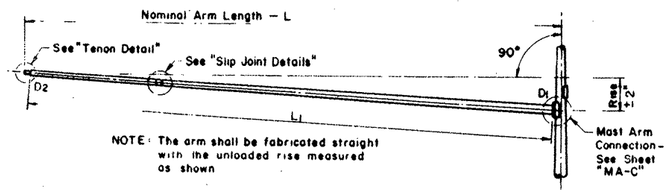
Arm Length	ROUND POLES				POLYGONAL POLES				Foundation Type
	D_B	D_{TP}	D_{30}	# thk.	D_B	D_{TP}	D_{30}	# thk.	
ft	in	in	in	in	in	in	in	in	
20	10.0	7.5	6.0	.179	11.0	8.0	6.3	.179	30-A
24	11.0	8.5	6.8	.179	12.0	9.0	7.3	.179	30-A
28	11.5	9.0	7.3	.179	12.5	9.5	7.8	.179	30-A
32	12.0	9.5	7.8	.179	13.0	10.0	8.3	.179	30-A
36	12.5	10.0	8.3	.179	12.5	9.5	7.8	.239	30-A
40	12.0	9.5	7.8	.239	13.5	10.5	8.8	.239	30-B
44	12.5	10.0	8.3	.239	14.0	11.0	9.3	.239	30-B
48	13.0	10.5	8.8	.239	15.0	12.0	10.3	.239	30-B

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	# thk.	Rise	L_1	D_1	D_2 △	# thk.	Rise
ft	ft	in	in	in		ft	in	in	in	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"
48	47.0	10.5	4.1	.239	3'-4"	47.0	11.0	3.5	.239	2'-9"

D_B = Pole Base O.D.
D_{TP} = Pole Top O.D. w/out Luminaire
D_{30} = Pole Top O.D with Luminaire
D_1 = Arm Base O.D
D_2 = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

Thicknesses shown are minimums, thicker materials may be used.

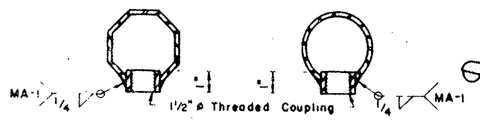
△ D_2 may be increased by up to 1.0" for polygonal arms



NOTE: The arm shall be fabricated straight with the unloaded rise measured as shown

TRAFFIC SIGNAL ARM

(Fixed Mount)



COUPLING DETAILS

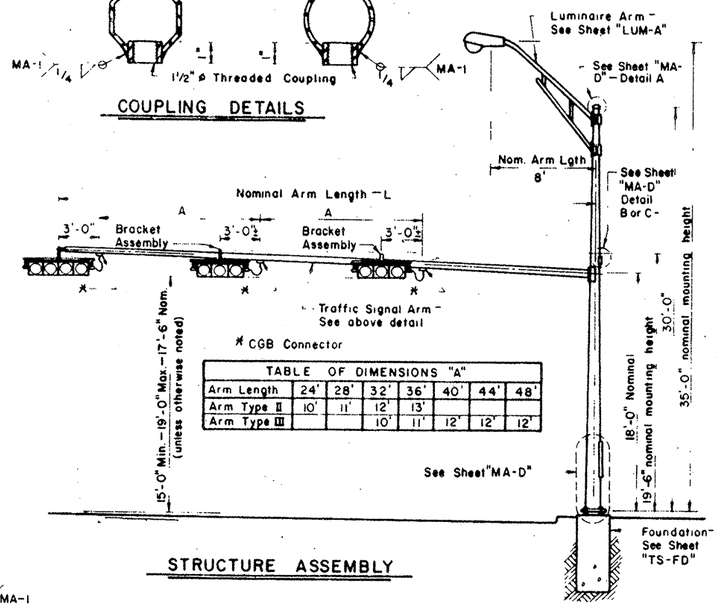
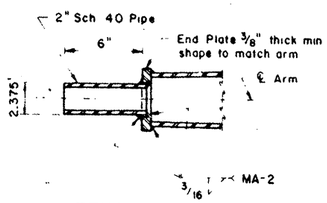
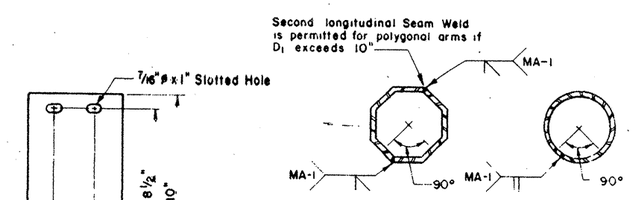


TABLE OF DIMENSIONS "A"							
Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type II	10'	11'	12'	13'			
Arm Type III			10'	11'	12'	12'	12'

STRUCTURE ASSEMBLY

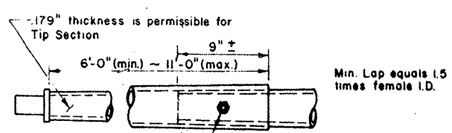


TENON DETAIL



Longitudinal Seam Weld must be oriented within the lower 90° of the Signal Arm.

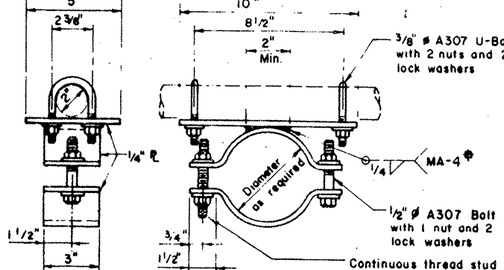
ARM WELD DETAIL



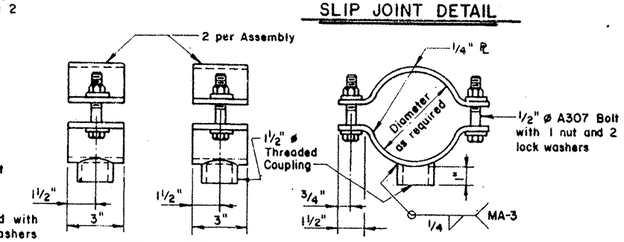
Note: A slip joint is permissible for arms 40' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped dissassembled.

4 – 3/4" ø holes and 1 – 3/8" ø galv. A307 bolt. Tack weld nut to thread projection after making joint. Repair damaged galvanizing in accordance with the Specifications.

SLIP JOINT DETAIL



BRACKET ASSEMBLY DETAILS OPTION A



BRACKET ASSEMBLY DETAILS OPTION B

Stainless steel bands and cast bracket as in "Astro-Brac" with 1 1/2" ø Threaded Coupling. ⊕

BRACKET ASSEMBLY OPTION C

VIBRATION WARNING:

Mast Arms of approximately 40 ft. or longer are subject to possible harmonic vertical vibrations in light wind conditions due to unusual combinations of signal numbers, weights or positions, arm-wind orientation, and arm-pole stiffness. Arms shall be visually inspected in 5 to 20 mph wind conditions after signal head installation and, if vertical movements with a total excursion (max positive to max negative) of more than approximately 8 in are observed at arm tip, damping devices or other means shall be fitted to the arm(s). The necessary damping device(s) or other remedial measures shall be as recommended by the fabricator. Excessive vibrations shall not be allowed to continue for more than two days.

GENERAL NOTES:

Design conforms to 1975 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor.

Poles are designed to support an 8-foot luminaire arm and 1 traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 75 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.5 sq. ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertcal dead load plus the horizontal wind load on an effective projected area of 3.2.4 sq. ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "LUM-A" for luminaire arm and connection details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Miscellaneous welds which do not call for preapproved weld procedures are nevertheless subject to rejection for poor workmanship. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and the Specifications.

Unless otherwise noted, all parts shall be galvanized in accordance with the Specifications.

Special designs require submission of shop drawings in accordance with the item "Steel Structures".

SHIPPING PARTS LIST

POLES

Nominal Arm Length	30' Poles with Luminaire: Ship each pole with the following hardware attached: enlarged hand hole, small hand hole, pole cap, clamp-on simplex, fixed-arm connection bolts and washers		19' Poles without Luminaire: Ship each pole with the following hardware attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers.	
ft	Designation	Quantity	Designation	Quantity
20	20L-80		20-80	
24	24L-80		24-80	
28	28L-80		28-80	
32	32L-80		32-80	3
36	36L-80		36-80	2
40	40L-80		40-80	3
44	44L-80		44-80	4
48	48L-80		48-80	

TRAFFIC SIGNAL ARMS 1 per pole

Nominal Arm Length	Type I Arm (1 signal): Ship each Type I Arm with the following hardware attached: 1 CGB Connector		Type II Arm (2 signals): Ship each Type II Arm with the following hardware attached: 2 Bracket Assemblies* and 2 CGB Connectors		Type III Arm (3 signals): Ship each Type III Arm with the following hardware attached: 3 Bracket Assemblies* and 3 CGB Connectors	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20 I-80					
24	24 I-80		24 II-80			
28	28 I-80		28 II-80			
32			32 II-80	3	32 III-80	
36			36 II-80	2	36 III-80	
40			40 II-80	3	40 III-80	
44			44 II-80	2	44 III-80	2
48					48 III-80	

LUMINAIRE ARMS 1 per 30' pole

Nominal Arm Length	Quantity
8' Arm	

ANCHOR BOLT ASSEMBLIES 1 per pole

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 1/2"	3'-4"	5
1 3/4"	3'-10"	7
3/4"	1'-6"	5

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, 4 lock washers and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

*Supply "Option A" unless otherwise noted.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

STANDARD ASSEMBLY DRAWINGS FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLIES

(80 MPH WIND ZONE)

SMA-80

ORIGINAL DRAWING DATE June 1985	REVISIONS	STATE	FEDERAL AID PROJECT
DR. - LEH	July, 1985	15	
CK. - JBY		COUNTY	
DW. - JRP		BEXAR	2452 02 023
CK. - LDB			

122

FOUNDATION DESIGN TABLE

FDN. TYPE	DRILLED SHAFT DIA.	REINFORCING STEEL: VERT BARS	REINFORCING STEEL: SPIRAL & PITCH	DRILLED SHAFT LENGTH – feet (4),(5),(6): TEXAS CONE PENTROMETER, N blows/ft: 10	15	40	ANCHOR BOLT DESIGN (1): ANCHOR BOLT DIA.	Fy (ksi)	BOLT CIRCLE DIA.	ANCHOR TYPE	FOUNDATION DESIGN LOAD (2): MOMENT K-ft.	SHEAR Kips	TYPICAL APPLICATION
24-A	24"	4-#5	#2 at 12"	5.7	5.3	4.5	3/4"	36	12 3/4"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8-#7	#3 at 9"	11.3	10.3	8.0	1 1/2"	55	17"	2	87	3	Mast arm assembly (see Selection Table)
30-B	30"	8-#9	#3 at 9"	13.2	11.9	9.0	1 3/4"	55	19"	2	131	5	Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire.
36-A	36"	12-#9	#3 at 9"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm

NOTES:

(1) Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

(2) Foundation Design Loads are the allowable moments and shears at the base of the structure.

(3) Foundations may be listed seperately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

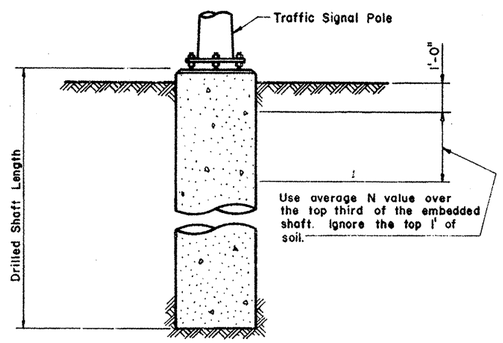
(4) Field Pentrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

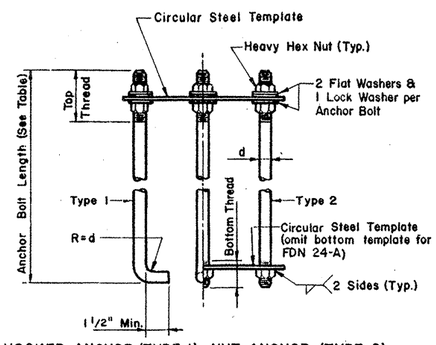
(5) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

(6) Decimal lengths in Design Table are to allow interpolation for other pentrometer values. Round to nearest foot for entry into Summary Table.

FOUNDATION SUMMARY TABLE (3)

LOCATION / IDENTIFICATION	AVG. N blows/ft	FDN. TYPE	NO. (ea.)	-	DRILLED SHAFT LENGTH (6) (FEET): 24-A	30-A	30-B	36-A			
TOTAL DRILLED SHAFT LENGTHS											



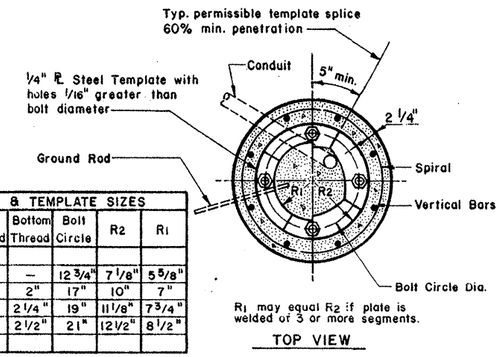


HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

ANCHOR BOLT ASSEMBLY

ANCHOR BOLT & TEMPLATE SIZES						
Bolt Diameter	* Bolt Length	Top Thread	Bottom Thread	Bolt Circle	R2	R1
3/4"	1'-6"	3"	—	12 3/4"	7 1/8"	5 5/8"
1 1/2"	3'-4"	6"	2"	17"	10"	7"
1 3/4"	3'-10"	7"	2 1/4"	19"	11 1/8"	7 3/4"
2"	4'-3"	8"	2 1/2"	21"	12 1/2"	8 1/2"

* Minimum dimensions given, longer bolts are acceptable.

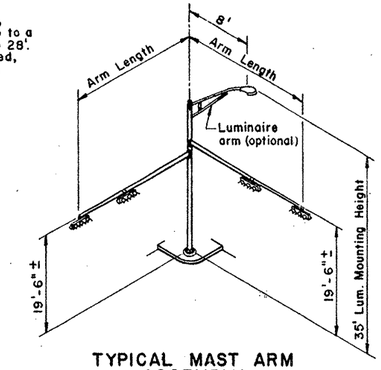


TOP VIEW

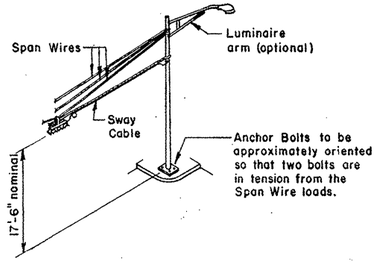
FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM ASSEMBLIES

		FDN 30-A	FDN 30-B	FDN 36-A
80 MPH DESIGN WIND SPEED	MAXIMUM SINGLE ARM LENGTH	36'	48'	
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' x 24'		
		28' x 28'		
		32' x 28'	32' x 32'	
			36' x 36'	
			40' x 36'	
			44' x 28'	44' x 36'
100 MPH DESIGN WIND SPEED	MAXIMUM SINGLE ARM LENGTH	24'	36'	44'
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS		24' x 24'	
			28' x 28'	
			32' x 24'	32' x 32'
				36' x 36'
				40' x 36'
				44' x 36'

EXAMPLES:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'.
2. For 100mph design wind speed, foundation 30-B can support a single 36' mast arm.



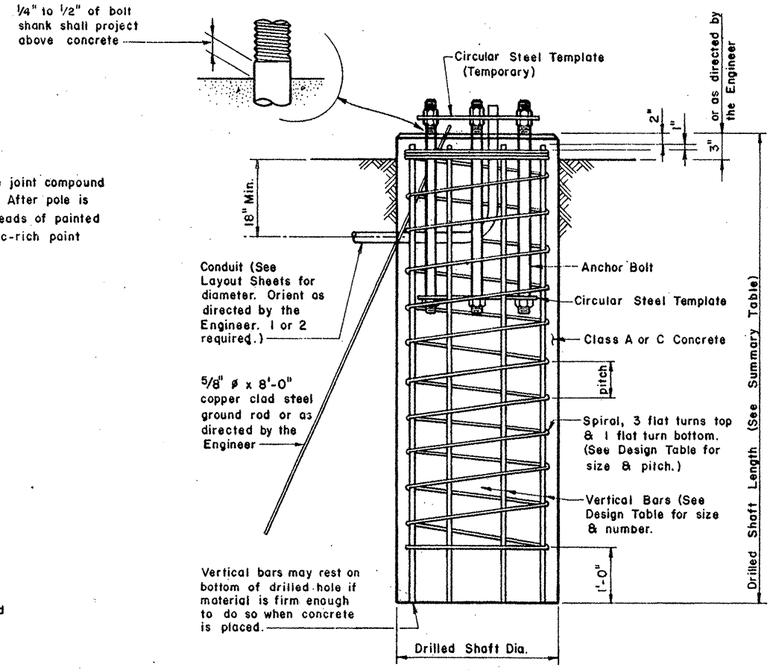
TYPICAL MAST ARM ASSEMBLY



TYPICAL STRAIN POLE ASSEMBLY

INSTALLATION PROCEDURE:

Threads of anchor bolts shall be coated with pipe joint compound prior to installation of upper nuts when erecting pole. After pole is plumbed and in permanent alignment, the exposed threads of painted bolts shall be cleaned and an additional coating of zinc-rich paint applied to seal the bolt thread-nut joint.



ELEVATION

FOUNDATION DETAILS

GENERAL NOTES:

Design conforms to 1975 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

Reinforcing steel shall conform to Item 440.

Concrete shall be Class A or C.

Threads for anchor bolts and nuts shall be rolled or cut threads of unified national coarse thread series except for A193B7 bolts which shall have 8 pitch thread series. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Anchor bolts larger than 1" in diameter shall conform to Special Specification A36M55 or ASTM A193B7 or A687. Galvanize or coat with zinc-rich paint a minimum of the upper 14 inches of all anchor bolts unless otherwise noted. Nuts for anchor bolts shall conform to ASTM A563 Gr A or better heavy hex. Exposed nuts shall be galvanized or coated with zinc-rich paint. Washers shall be galvanized. Templates and embeded nuts need not be galvanized.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

TRAFFIC SIGNAL POLE FOUNDATIONS

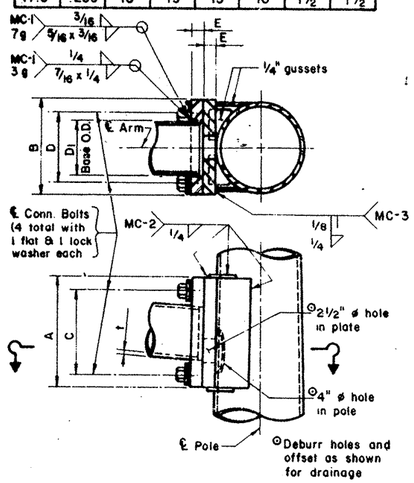
TS-FD

ORIGINAL DRAWING DATE: June, 1985	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.:-LEH	15	6		302
CK.:-JSY	COUNTY		CONTROL / SECTION / JOB	HIGHWAY
DW.:-JRP	BEXAR		2452 02 023	LP1604
CK.:-LEH				128

REVISIONS

BRUNING 44-142-57049

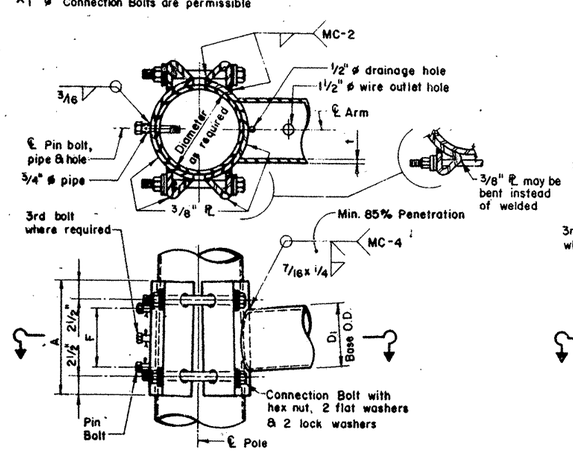
ARM SIZE Di	ARM SIZE t	A	B	C	D	E	CONN. BOLT DIAM.
in.	in.	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1	1
7.5	.179	13	9	10	6	1	1
8.0	.179	14	10	11	7	1 1/4	1 1/4
9.0	.179	16	11	13	8	1 1/4	1 1/4
9.5	.179	17	12	14	9	1 1/4	1 1/4
9.5	.239	18	12	15	9	1 1/4	1 1/4
10.0	.239	18	12	15	9	1 1/4	1 1/4
10.5	.239	18	13	15	10	1 1/2	1 1/2
11.0	.239	18	13	15	10	1 1/2	1 1/2



FIXED MOUNT DETAIL 1

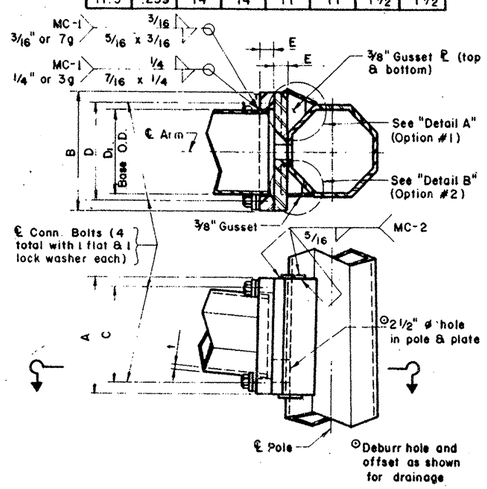
ARM SIZE Di	ARM SIZE t	A	F	CONN. BOLTS No.	CONN. BOLTS Dia.	PIN BOLTS No.	PIN BOLTS Dia.
in.	in.	in.	in	ea	in	ea.	in
6.5	.179	12	8	4	* 7/8	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	4	1 1/4	3	5/8
9.5	.239	18	12	4	1 1/4	3	5/8
10.0	.239	18	12	4	1 1/4	3	5/8

*1" ø Connection Bolts are permissible



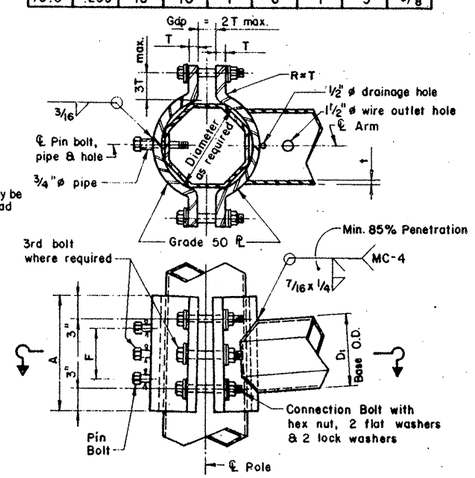
CLAMP-ON DETAIL 1

ARM SIZE Di	ARM SIZE t	A	B	C	D	E	CONN. BOLT DIAM.
in	in	in.	in	in.	in.	in.	in.
7.0	.179	11	11	8	8	1 1/4	1 1/4
7.5	.179	11	11	8	8	1 1/4	1 1/4
8.0	.179	11	11	8	8	1 1/4	1 1/4
9.0	.179	13	13	10	10	1 1/4	1 1/4
10.0	.179	13	13	10	10	1 1/4	1 1/4
9.5	.239	13	13	10	10	1 1/4	1 1/4
10.0	.239	14	14	11	11	1 1/2	1 1/2
11.0	.239	14	14	11	11	1 1/2	1 1/2
11.5	.239	14	14	11	11	1 1/2	1 1/2

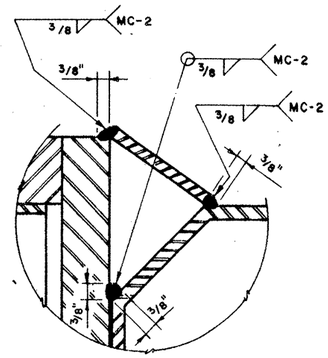


FIXED MOUNT DETAIL 2

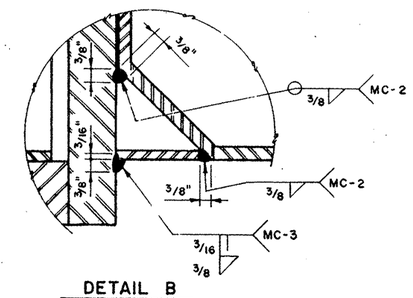
ARM SIZE Di	ARM SIZE t	A	F	T	CONN. BOLTS No.	CONN. BOLTS Dia.	PIN BOLTS No.	PIN BOLTS Dia.
in	in.	in	in.	in	ea.	in.	ea.	in
7.0	.179	12	8	3/4	4	3/4	2	5/8
7.5	.179	14	8	3/4	4	3/4	2	5/8
8.0	.179	14	8	3/4	4	3/4	2	5/8
9.0	.179	16	10	7/8	4	1	2	5/8
10.0	.179	18	10	7/8	4	1	2	5/8
9.5	.239	18	10	1	6	1	3	5/8
10.0	.239	18	10	1	6	1	3	5/8



CLAMP-ON DETAIL 2

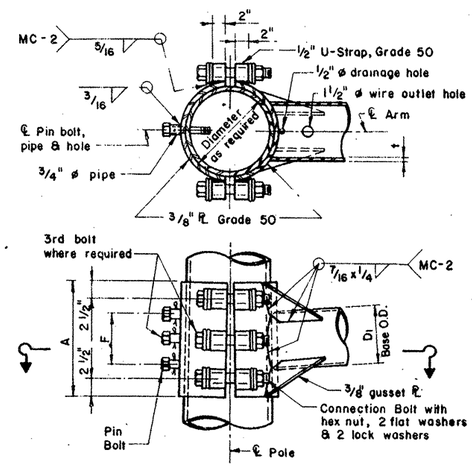


DETAIL A



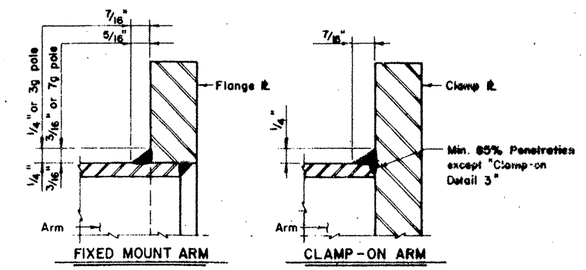
DETAIL B

ARM SIZE Di	ARM SIZE t	A	F	CONN. BOLTS No.	CONN. BOLTS Dia.	PIN BOLTS No.	PIN BOLTS Dia.
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	8	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	6	1	3	5/8
9.5	.239	18	12	6	1	3	5/8
10.0	.239	18	12	6	1	3	5/8



CLAMP-ON DETAIL 3

NOTE: Pin bolts shall be A325 with threads exluded from the shear plane. Pin bolt and 3/4" ø pipe shall have 3/16" ø holes for a 1/8"ø galv. cotter pin. Back clamp plate shall be furnished with a 3/4" ø hole for each pin bolt. An 11/16" ø hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.



ARM BASE WELD DETAILS

MATERIALS	
Round Shafts or Polygonal Shafts	ASTM A595 GR A, ASTM A570 GR50, ASTM A607 GR50, ASTM A572 GR50 or A36M50
Plates (1)	ASTM A36 or A572 GR50 or A595 (2) or A36M50
Connection Bolts	ASTM A325 except where noted
Pin Bolts	ASTM A325
Pipe	ASTM A53 GR A or B, or A501
Misc. Hardware	Galvanized steel or stainless steel or as noted

(1) Any of the materials listed for plates may be used where the drawings do not specify a particular Grade designation.

(2) If A595 material is used, it need not be cold worked to A595 requirements, but materials must have 40 ksi minimum yield prior to fabrication.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A maximum 1 1/2" wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1".

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

STANDARD ASSEMBLY DRAWINGS FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

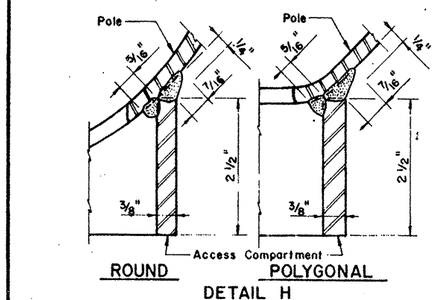
MAST-ARM CONNECTIONS

MA-C

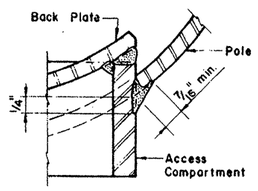
ORIGINAL DRAWING DATE June, 1985	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
DR.:- LEH	REVISIONS	15	6		303
CK.:- JSY	July, 1985	COUNTY			
DW.:- JRP		BEXAR	2452	02	023
CK.:- LEH					

FEDERAL AID PROJECT: EP160

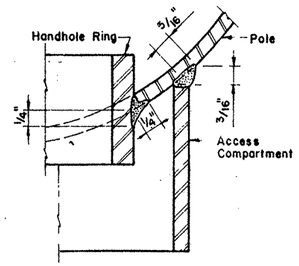
126



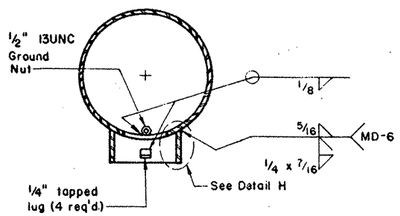
DETAIL H



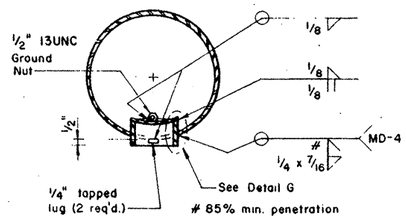
DETAIL G



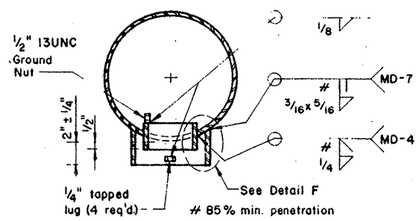
DETAIL F



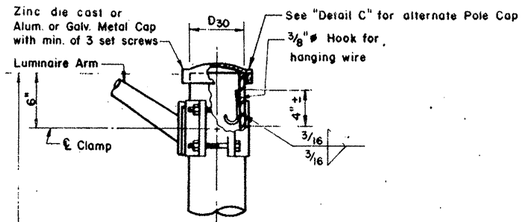
SECTION D-D



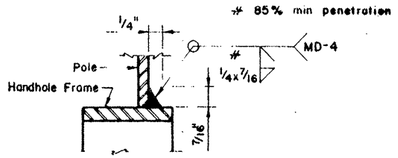
SECTION C-C



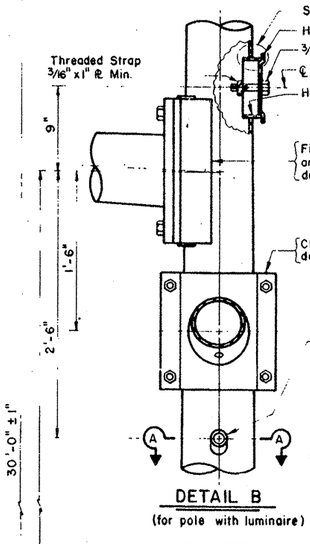
SECTION B-B



DETAIL A
(for pole with luminaire)

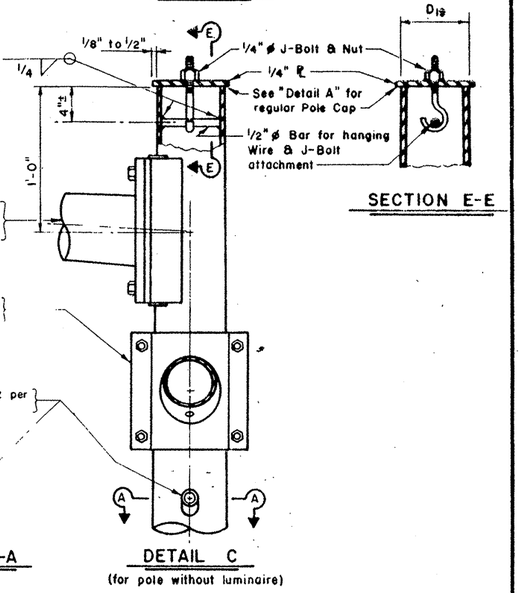


DETAIL E



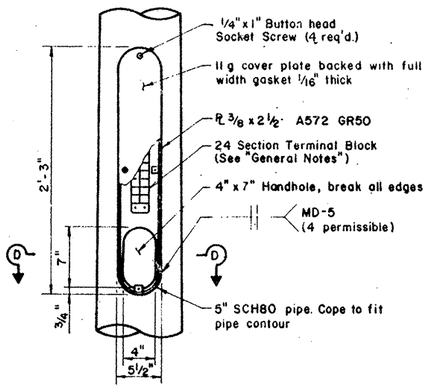
DETAIL B
(for pole with luminaire)

SECTION A-A

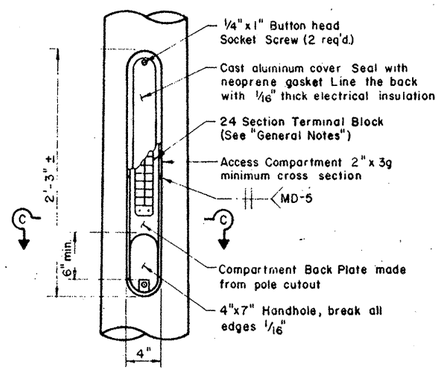


SECTION E-E

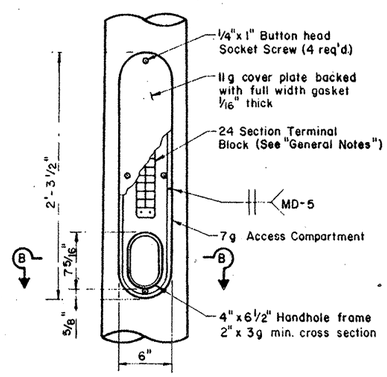
DETAIL C
(for pole without luminaire)



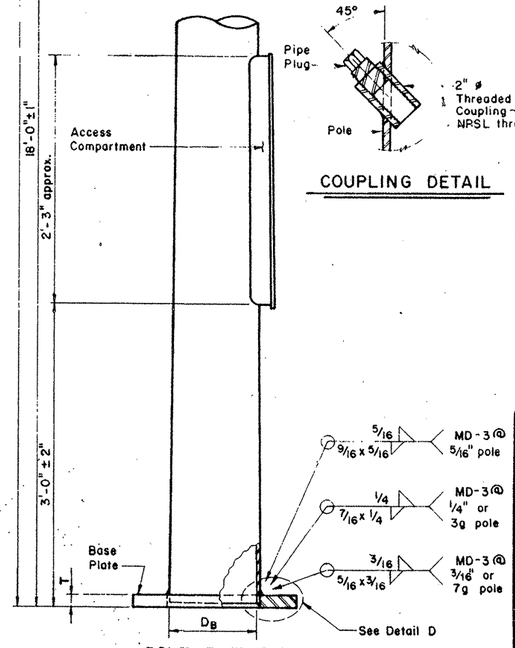
ACCESS COMPARTMENT DETAIL 1



ACCESS COMPARTMENT DETAIL 2



ACCESS COMPARTMENT DETAIL 3



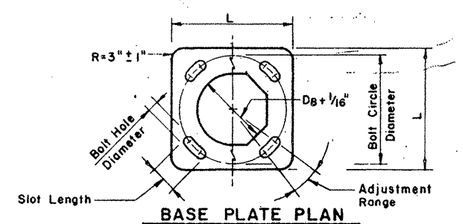
COUPLING DETAIL

POLE ELEVATION

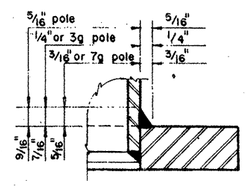
GENERAL NOTES:

The Fabricator shall furnish each pole with a twelve position, double posted, molded phenolic Terminal Block with insulating strip as necessary. The Terminal Block shall be provided with size 8-32 nickel plated screws and shall be T.R.W. Cinch No. 12-142 or equal.

Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base ℞ Dimensions L x T	Adjustment Range
1 1/2"	1 3/4"	3 1/2"	17"	18" x 1 1/2"	13.4°
1 3/4"	2"	4"	19"	20" x 1 3/4"	13.5°
2"	2 1/4"	4 1/2"	21"	22" x 2"	13.6°



BASE PLATE PLAN



DETAIL D

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

STANDARD ASSEMBLY DRAWINGS FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

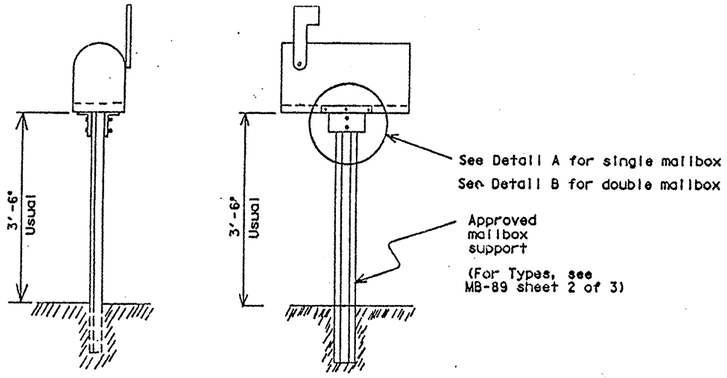
MAST-ARM POLE DETAILS

MA-D

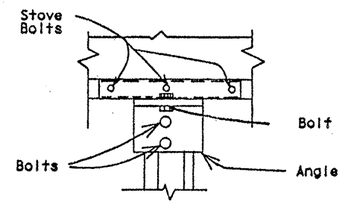
ORIGINAL DRAWING DATE June, 1985	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #	SHEET
DN.:-LEH REVISIONS	15	6		307
CK.:-JSY	COUNTY		CONTROL SECTION JOB	HIGHWAY
DW.:-JRP	BEXAR		2452 02 023	P1604
CK.:-LEH				

127

BRUNING 44-1425 7049

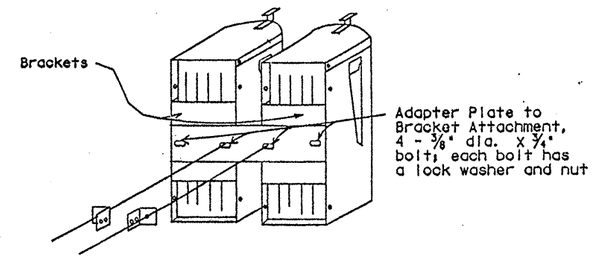


SINGLE AND DOUBLE MAILBOX MOUNT

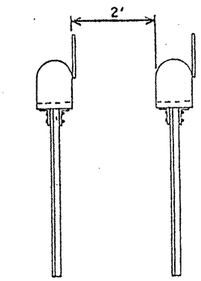


For bolt sizes see notes for Standard Mailbox Attachment Details

DETAIL A
SINGLE MAILBOX MOUNT

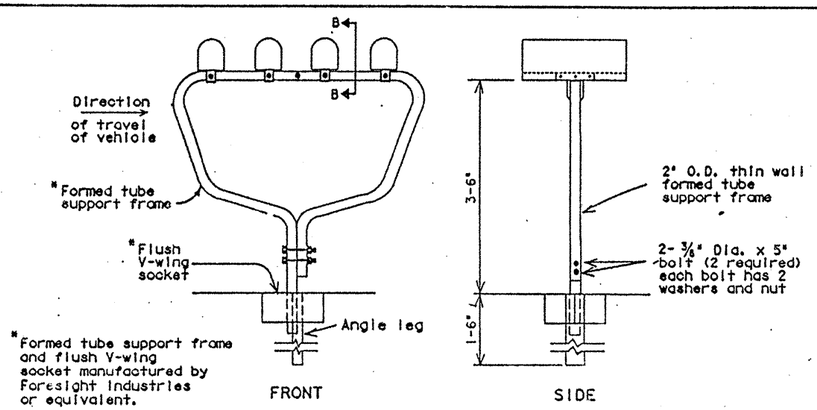


DETAIL B
DOUBLE MAILBOX MOUNT
(Not permitted for No. 2 Mailboxes)

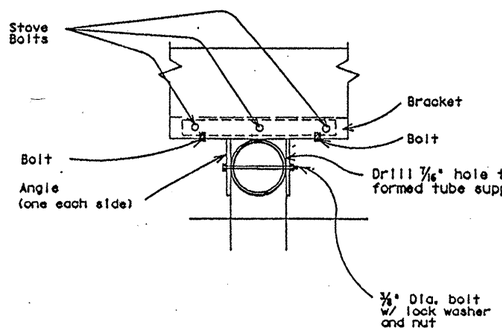


TWO SINGLE MAILBOX INSTALLATIONS

2' Clear Distance between Installations

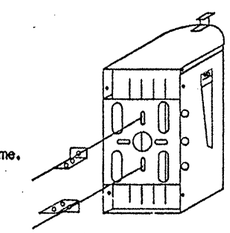


MULTIPLE MAILBOX MOUNT

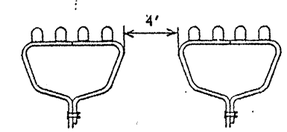


SECTION B-B

For bolt sizes see notes for Standard Mailbox Attachments Details

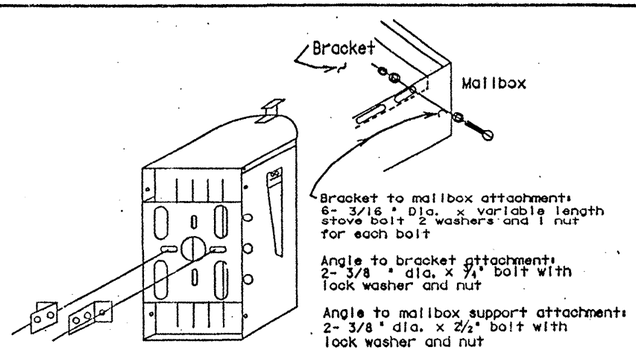


ANGLE TO BRACKET ATTACHMENT FOR MULTIPLE MAILBOX MOUNT

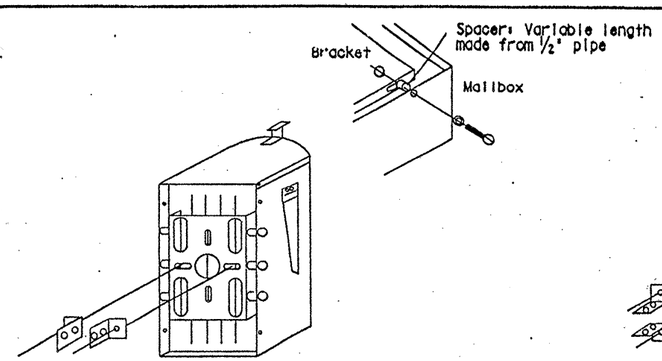


TWO OR MORE MULTIPLE MAILBOX INSTALLATIONS

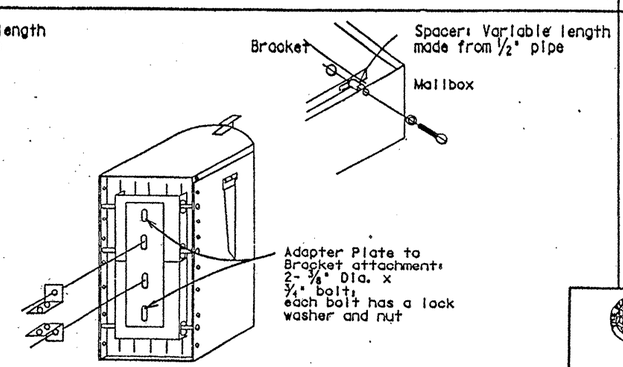
4' Clear Distance between Installations.



SIZE NO. 1 MAILBOX



SIZE NO. 1 1/2 MAILBOX
See notes for Size No. 1 Mailbox



SIZE NO. 2 MAILBOX
See notes for Size No. 1 Mailbox

STANDARD MAILBOX ATTACHMENT DETAILS

For General Notes See sheet 2 of 3.

See MB-89 sheet 3 of 3 for Adapter Plate, Angle, and Bracket Hardware Details.

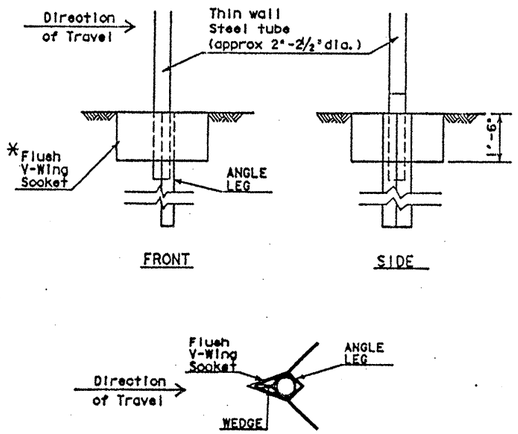
Bracket may be installed with edges down.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

MAILBOX MOUNTING DETAILS
MB-89
Sheet 1 of 3

FED. RD. DIST. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
6	TEXAS	NH 90(191)M, Etc.	385

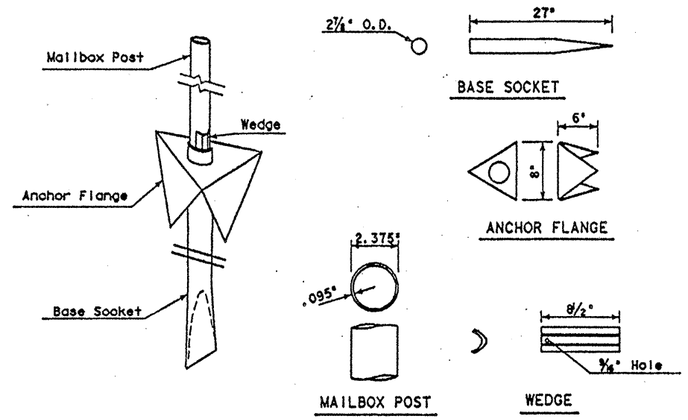
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	Bexar	2458	2	23	Loop 410 Etc.



*See General Note 6.

TYPE 1 SUPPORT/FOUNDATION

THIN WALL STEEL TUBE w/ V-LOC ANCHORAGE



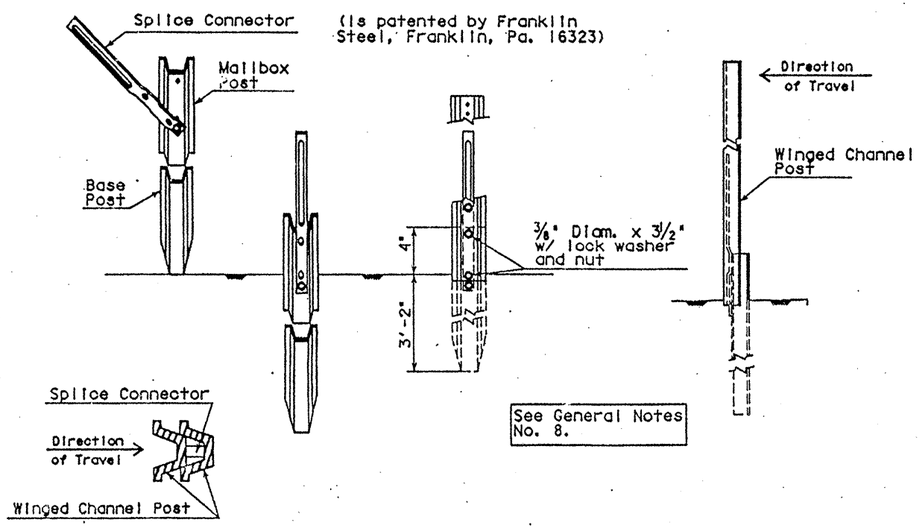
All dimensions may be varied to fit 2" thin wall steel tube post if approved by Engineer

TYPE 2 SUPPORT/FOUNDATION

THIN WALL STEEL TUBE w/ANCHOR FLANGE

NOTES FOR TYPE 2 SUPPORT/FOUNDATION

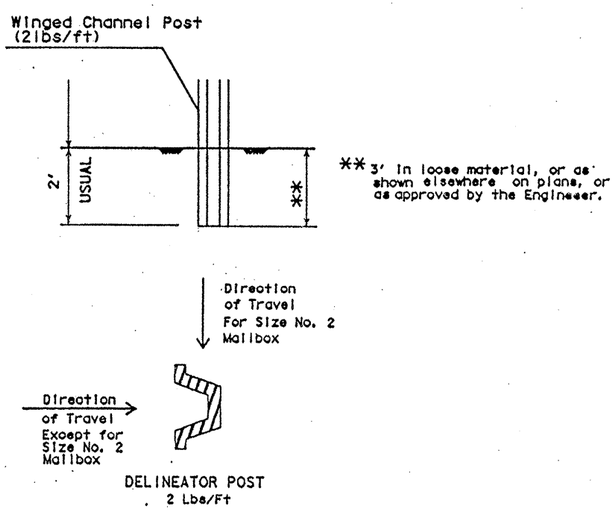
1. The Base Socket is formed from 2-7/8" O.D. x 12 gauge galvanized pipe.
2. The Anchor Flange is formed from 12 Ga. galvanized steel made to ASTM A-525. Only needed for soft soils as determined by the Engineer.
3. The Wedge is formed from 11 Ga. galvanized steel made to ASTM A-525.
4. The Mailbox Post is 2.375" O.D. x 0.095" thin wall steel tubing.
5. Steel Support Foundation unit shall be made from new material and shall be corrosion resistant. The unit shall be galvanized in accordance with ASTM designation A-123, A-525, G-90 or better. In addition, steel members of the support that are in direct contact with earth must be galvanized to ASTM Designation G-90 and coated with one mil of clear approved coating, or galvanized in accordance with ASTM Designation A-123.



See General Notes No. 8.

TYPE 3 SUPPORT/FOUNDATION

DELINEATOR POST w/ SPLICE CONNECTOR



TYPE 4 SUPPORT/FOUNDATION

DELINEATOR POST

GENERAL NOTES

1. Bolts, nuts, screws, washers and other miscellaneous hardware shall be galvanized in accordance to ASTM Designation: A-153, Class C or D, or B-454, Class 40.
2. Foundation and post must be driven plumb. Recommended procedure is to drive post or foundation about 10-12 inches, stop and check for straightness, front to back, side to side. Make adjustments, continue to drive an additional 10-12 inches, repeat check, make final adjustments, complete installation.
3. The 2 lbs./ft. winged channel posts for the Type 4 support shall conform to the requirements of departmental materials specification D-9-7130.
4. Hardware for mounting mailboxes to support/foundation furnished by Foresight Industries or equivalent may be used when approved by the Engineer.
5. Where more than two mailboxes are to be mounted at one location a multiple mailbox mount shall be used.
6. The formed tube support frame for the multiple mailbox mount and the Type 1 mailbox support system are patented and manufactured by Foresight Products Inc.
7. Any support or foundation on these standards may be used for mounting single or double mailboxes, except for the restriction shown in note No. 8.
8. The Type 3 support foundation cannot be used with No. 2 size mailbox unless a tested mounting hardware is approved by the Engineer.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

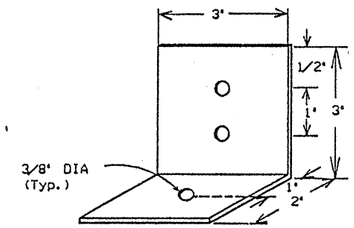
MAILBOX SUPPORT/ FOUNDATION DETAILS

MB-89

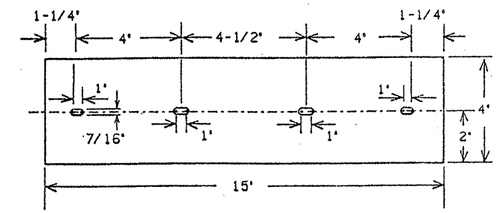
Sheet 2 of 3

FED. RD. DIST. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS	NH 90(191) M, Etc			386
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	Bexar	1452	2	23	Loop 410

Etc.

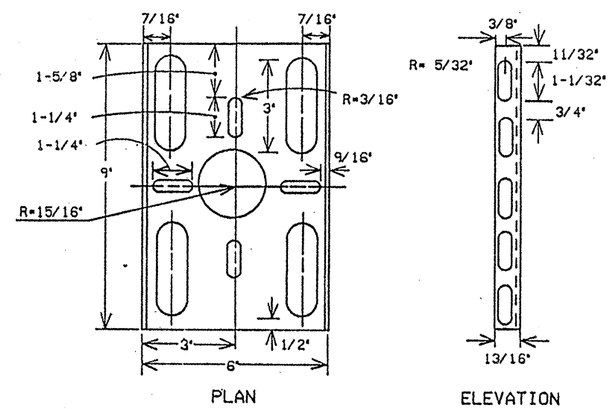


ANGLE



HOLES SHALL HAVE A DIAMETER OF 7/16"

ADAPTER PLATE



PLAN

ELEVATION

BRACKET

Hardware for mounting mailboxes to support/foundation furnished by Foresight Industries or equivalent may be used when aproved by the Engineer.

The bracket is to be constructed of 14 gage galvanized steel sheet. The angle is to be constructed of 14 gage galvanized steel sheet. The adapter plate is to be constructed of 12 gage steel sheet. The angle and the adapter plate may be galvanized before or after fabrication in accordance with ASTM A153. The angle must be formed into the 90 degree bend without damage to the galvanizing coating. The base metal of the angle and the adapter plate must have sufficient ductility to be bent flat upon itself without breaking. Items with wet storage stains (white rust) will not be accepted.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

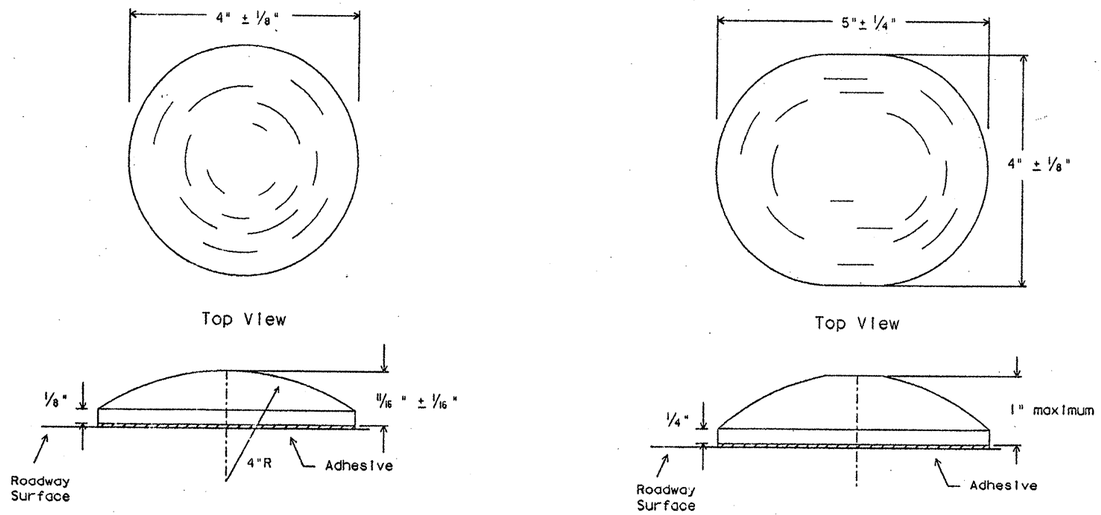
STANDARD MAILBOX HARDWARE

MB-89

Sheet 3 of 3

FED. RD. DIST. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS	NH 90(191)M, Etc			387
STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
15	Bexar	2452	2	23, etc	

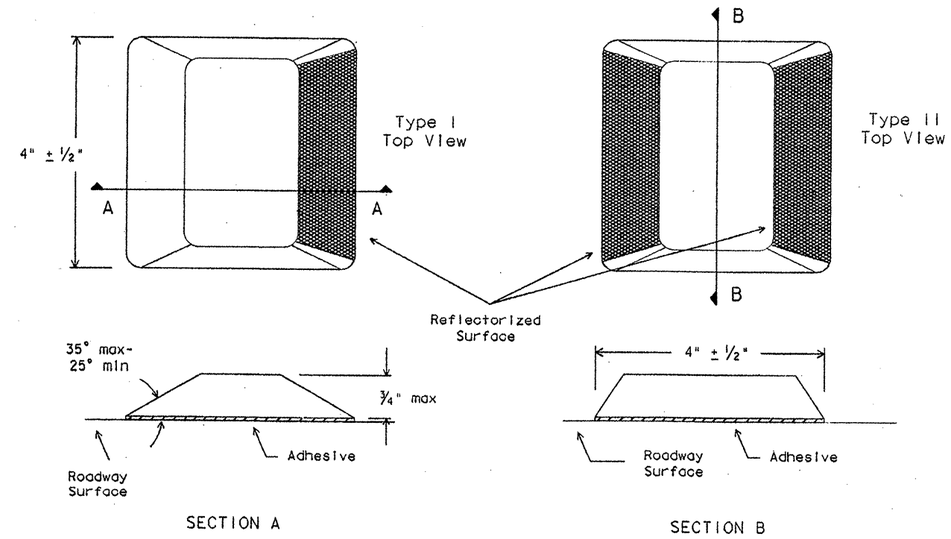
Etc.



TRAFFIC BUTTONS

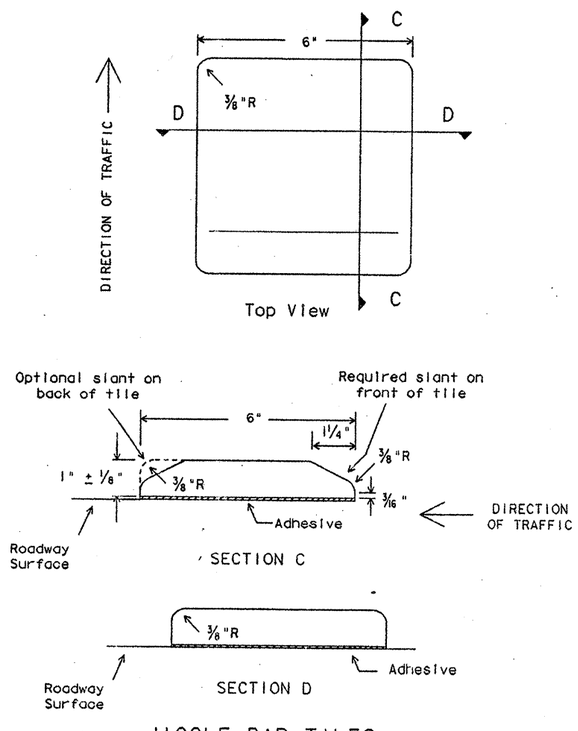
(NON-REFLECTORIZED)

NOTE: Minimum area of markers shall be not less than 12.5 square inches.
Either shape may be used but the same shape shall be used through out the project.



RAISED PAVEMENT MARKERS

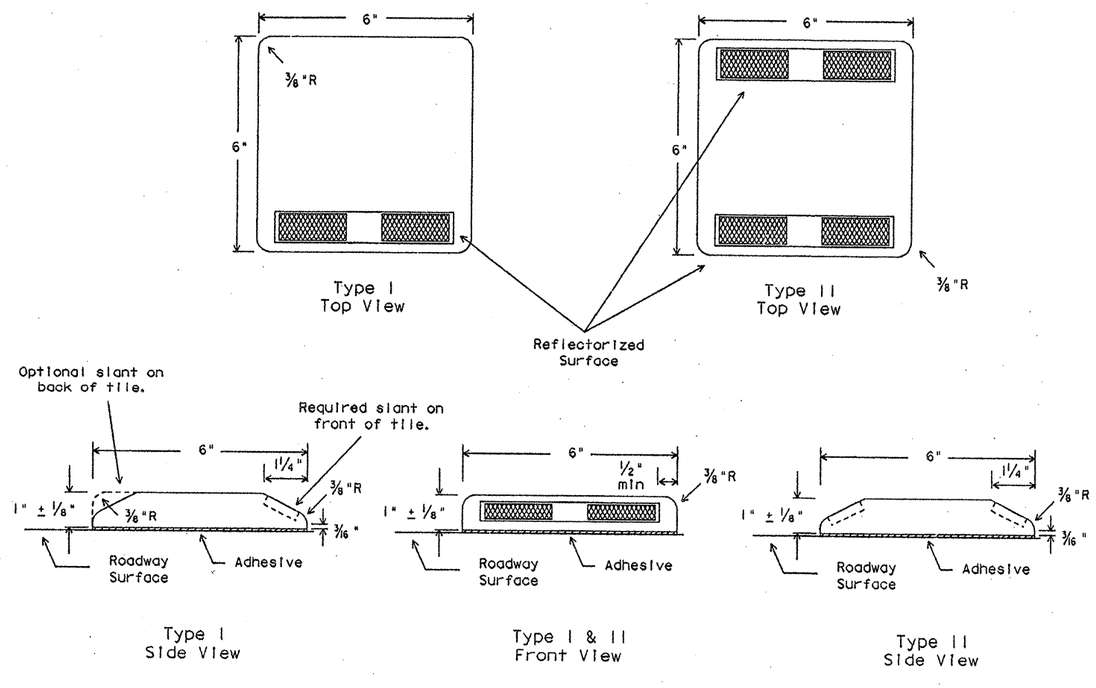
(REFLECTORIZED)



JIGGLE BAR TILES

(NON-REFLECTORIZED)

"Jiggle Bars" consist of a number of Jiggle Bar Tiles placed in a linear configuration.



JIGGLE BAR TILES

(REFLECTORIZED)

SPECIFICATION REFERENCE TABLE	
MATERIALS AND TEST SPECIFICATIONS (D-9)	
JIGGLE BAR TILE	D-9-4100
PAVEMENT MARKERS (REFLECTORIZED)	D-9-4200
TRAFFIC BUTTONS	D-9-4300
BITUMINOUS ADHESIVE	D-9-6130

GENERAL NOTES:

RAISED PAVEMENT MARKERS (RPMs) MAY CONSIST OF TRAFFIC BUTTONS, PAVEMENT MARKERS AND/OR JIGGLE BAR TILES. PAVEMENT SURFACE SHALL BE PREPARED AND CLEANED SUBJECT TO APPROVAL OF THE ENGINEER BEFORE ADHESIVE AND RPMs ARE PLACED.

JIGGLE BARS SHALL BE ORIENTED PERPENDICULAR TO ROADWAY. JIGGLE BARS SHALL ALSO BE PLACED AT SUCH OTHER LOCATIONS AS SHOWN IN PLANS OR AS DIRECTED BY THE ENGINEER.

MARKERS, BUTTONS AND JIGGLE BAR TILES SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY AND NOT INTENDED TO SPECIFY ANY PARTICULAR PRODUCT. ALL PAVEMENT MARKERS PROVIDED SHALL BE OF THE SAME MANUFACTURER.

ALL DIMENSIONS ARE ± 1/8 " UNLESS OTHERWISE NOTED.

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

RAISED PAVEMENT MARKERS REFLECTIVE PAVEMENT MARKERS, TRAFFIC BUTTONS & JIGGLE BAR TILE

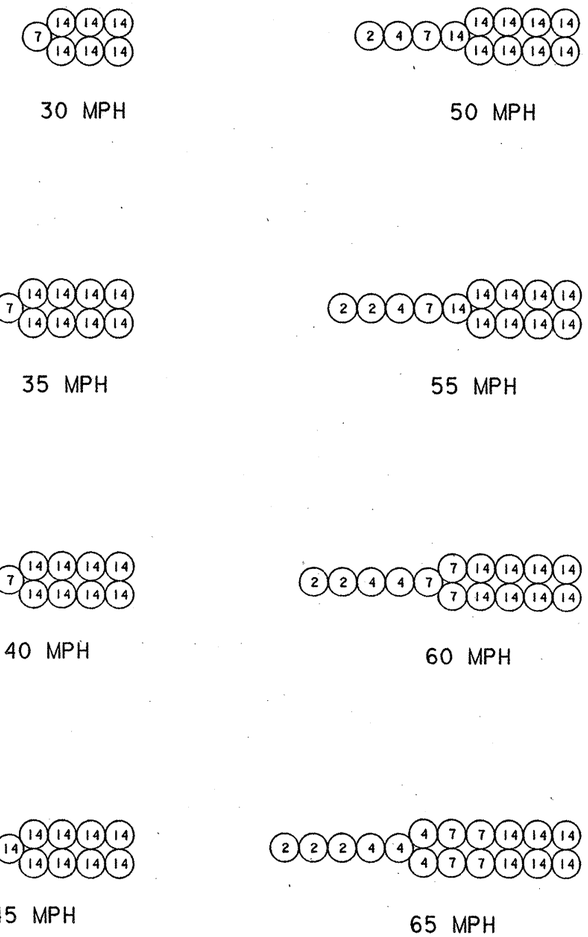
RPM(1)-92

ORIGINAL DRAWING DATE: 1-81		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.: LR	REVISIONS 2-82 7-86 4-92	15	6		389
CK.:	7-85 10-86	COUNTY		CONTROL / SECTION / JOB	HIGHWAY
DN.: DN	11-85 12-90	BEXAR		2452 / 02 / 023	LP 1604
CK.:					

SITE CONDITIONS AND PLACEMENT GUIDELINES

CONDITION	RECOMMENDATIONS	ILLUSTRATION
1. ANGLE OF ARRAY IN RELATION TO CENTER LINE OF OBSTACLE	NOT RECOMMENDED FOR MORE THAN 10°	EDGE OF PAVEMENT; 10° MAX.
2. BIDIRECTIONAL TRAFFIC	OFFSET ARRAY TO AVOID IMPACT TO THE REAR MODULE FROM WRONG-WAY VEHICLES	EDGE OF PAVEMENT; EDGE OF PAVEMENT
3. MODULE SPACING: MODULE TO MODULE MODULE TO HAZARD	6" USUAL 1'-2'	MODULE TO HAZARD; MODULE TO MODULE
4. "COFFIN" CORNER	SHIELD 2.5' OUTSIDE OF HAZARD	
5. SLOPING SITES (LATERAL AND LONGITUDINAL)	10:1 MAXIMUM	SLOPE
6. CURBS AND RAISED ISLANDS	NO MORE THAN 4" HIGH (REMOVE IF POSSIBLE)	CURB OR RAISED ISLAND
7. FOUNDATION PADS	FLAT SURFACE, CONCRETE OR ASPHALT	PAD
8. MAINTENANCE	KEEP SITE CLEAR OF DEBRIS AND SNOW	REMOVE
9. SAND DENSITIES	100 LBS/CF	SCALE
10. VANDALISM	CHECK PERIODICALLY FOR DAMAGES	DAMAGED MODULE

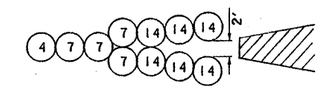
TYPICAL MODULE ARRAYS WITH CORRESPONDING DESIGN SPEED AND SAND WEIGHT (X 100 LB)



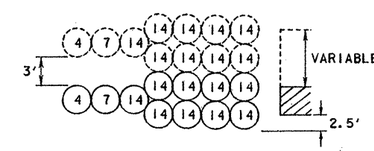
FOR THIS PROJECT, THE BARREL ARRANGEMENT SHALL BE BASED ON A DESIGN SPEED OF 60 MPH OR AS DIRECTED BY THE ENGINEER.

GENERAL NOTES

1. REAR MODULES SHOULD OVERLAP (IN WIDTH) THE FIXED OBJECT ON EACH SIDE BY A MINUMUM OF 2.5 FEET.
2. MODIFICATION OF ARRAY: WHEN PROXIMITY OF TRAFFIC LANES EXCLUDE THE USE OF A WIDER BARRIER. THE FRONT OF THE BARRIER MAY RETAIN THE STANDARD WIDTH, BUT THE REAR CAN BE WIDENED BY SPACING AS SHOWN IN THIS DIAGRAM.



3. BARRIER CAN BE PLACED AT ANY DISTANCE FROM THE SHOULDER BOTH AT ROADSIDE AND IN MEDIAN SITES FROM 0 TO 30 FEET DEPENDING ON THE LOCATION OF THE HAZARDOUS FIXED OBJECT. ANGLING OF THE BARRIER TOWARD ON-COMING TRAFFIC IS SUGGESTED FROM 3 TO 10 DEGREES DEPENDING ON SPACE AVAILABLE.
4. WHENEVER POSSIBLE, CURBS 4 INCHES AND HIGHER SHOULD BE REMOVED FROM HAZARDOUS SITES. HOWEVER, WHEN REMOVAL IS NOT POSSIBLE, MODULES CAN BE SEPARATED ALONG THE BARRIER AXIS TO FIT THE SITUATION.
5. LONGITUDINAL SPACING OF MODULES MAY BE INCREASED WHERE SPACE PERMITS. FOR EXAMPLE, 2 FOOT OR EVEN 3 FOOT SPACING OF SOME OF THE MODULES MAY PERMIT THE DESIGN ENGINEER TO EXPLOIT ALL THE SPACE ALLOCATED FOR AN ENERGY-ABSORBING BARRIER.
6. THE ENTIRE AREA OF THE CRASH CUSHION INSTALLATION AND APPROACHES SHALL BE GRADED SO THAT THE MAXIMUM SLOPE DOES NOT EXCEED 10:1 IN ANY DIRECTION.
7. WHERE REQUIRED, SUPPORT PADS WILL BE MEASURED AND PAID FOR IN ACCORDANCE WITH PERTIMENT BID ITEMS.



BARRIER ARRAYS FOR FIXED OBJECT OF VARIABLE WIDTH (45 MPH) (EXAMPLE)

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Gregory A. Biediger, P.E. 61429, on Mar 26, 1993

Gregory A. Biediger

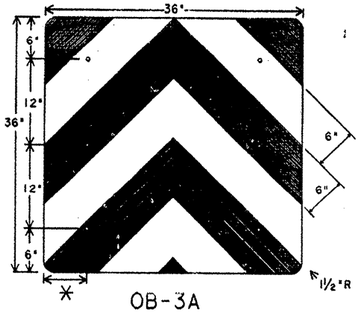
DESIGN GUIDELINES AND TYPICAL MODULE ARRAYS

VEHICLE IMPACT ATTENUATOR (SAND FILLED PLASTIC MODULES)

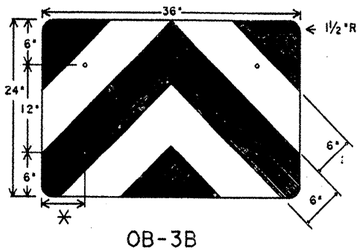
VIA (SFPM) (MOD)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			390
STATE	STATE DIST. NO.	COUNTY	
TEXAS	15	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
2452	02	023	LP 1604

15lp2avia.dgn



OB-3A



OB-3B

* adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer.

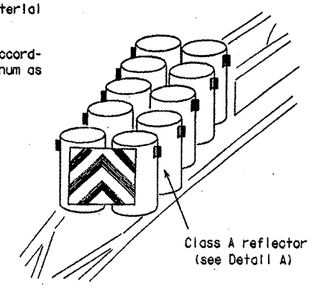
Object Marker reflective sheeting will conform to Material Specification D-9-8300, Type C.

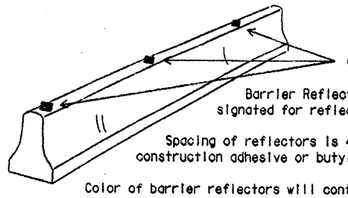
Object Marker blank to be 5/8" Plywood (Type A) in accordance with item "PLYWOOD SIGNS (TYPE A)" or .08 Aluminum as per Specification D-9-7110.

Background - yellow reflective, chevron - black. Mounting should be flush with top of VIA. Minimum size 36" x 24".

Nuts and bolts may be used to fasten Object Markers to attenuator.

Class A or B reflectors may also be used to delineate side of attenuator.

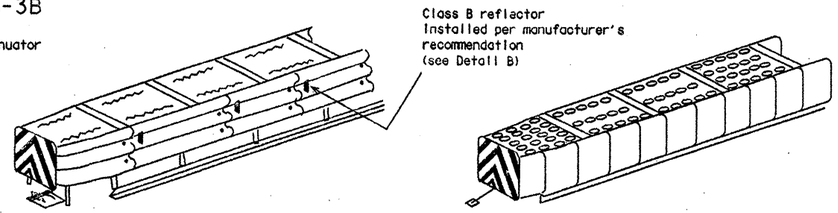


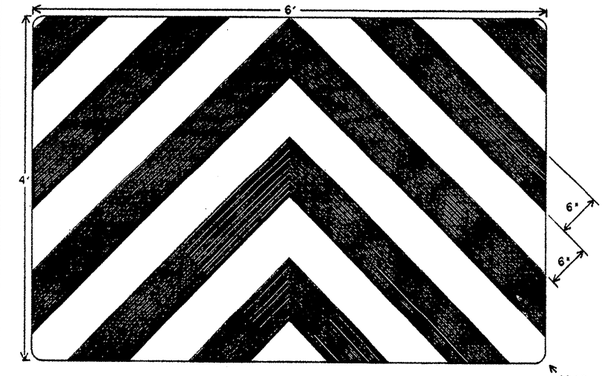


Barrier Reflectors will be installed only on barriers designated for reflectorization as required elsewhere in the plans.

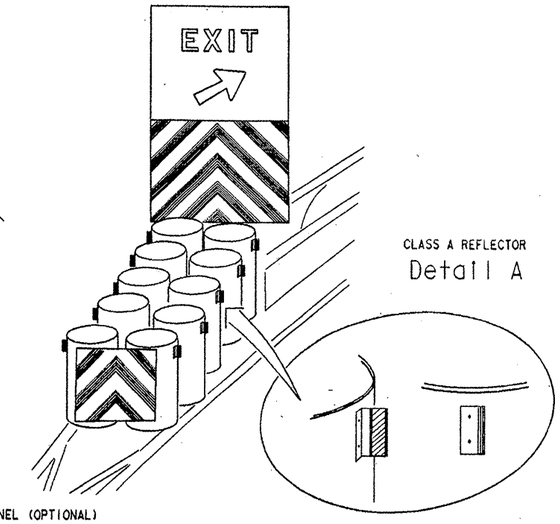
Spacing of reflectors is 40 feet. Mount reflectors to barrier by construction adhesive or butyl rubber adhesive.

Color of barrier reflectors will conform to the Texas "Manual on Uniform Traffic Control Devices", (TMUTCD).





OB-3E



CLASS A REFLECTOR

Reflectors for Concrete Traffic Barrier and Drum Type Attenuator may be:

1. Davidson Plastics Co. - PCBM-12
2. Cal. Tex. Ind., Inc. - Microprism Delineator
3. Cal. Tex. Ind., Inc. - Cube Corner Delineator
4. Stimsonite - Barrier and Guardrail Delineator, Model 965
5. Stimsonite - Barrier Delineator, Model 967
6. Astro Optics - JD-1 or No. 181
7. Reflexite Corp. - Model 661, Model 662
8. Duraflex Corp. - Flexx 2020

CLASS B REFLECTOR

Reflectors for other Type Attenuator and Metal Beam Guard Fence

1. Stimsonite - Barrier and Guardrail Delineator, Model 965
2. Astro Optics - Guardrail Delineator, Model 567

Class A or B reflectors may be installed using pop rivets, nuts and bolts, construction adhesive or butyl rubber adhesive.

Class A or B reflectors shall coform to the color and reflectivity requirements of Specification D-9-8600.

Color of Class A or B reflector will be the same color as the nearest edge line, gore pavement markings or as directed by the Engineer.

BACK PANEL (OPTIONAL)

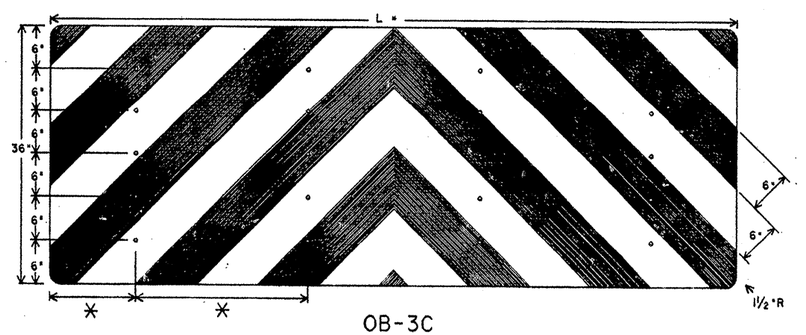
Back Panel (OB-3E) shall be made of 5/8" plywood (Type A) panels unless otherwise noted in the plans. Type C sheeting per Material Specification D-9-8300.
Background - yellow reflective, chevron - black.
Back panel will be mounted independent of the attenuator. The minimum mounting height is flush with the top of the attenuator.
Alternating flashing yellow lights may be added. Lights should be mounted minimum 72" above pavement.
Attenuator may have additional yellow reflective and black striping, and/or reflectors placed on sides. CHEVRONS (W1-8) may be erected to delineate roadway curvature beyond the attenuator. These additional devices will be installed if required elsewhere in the plans.
Mount Back Panel per details on SMD Standards, or as detailed elsewhere in the plans.

GENERAL NOTES:

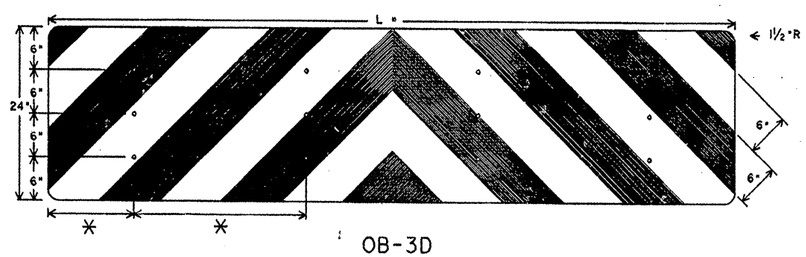
1. Holes, slots or other openings may be cut or drilled through OB-3 Object Markers to allow cable or other attachments.
2. Minimum size may be reduced to fit smaller attenuator.
3. When traffic passes only on one side of attenuator, only the OM-3 marker should be installed. OM-3 should be installed per the requirements of D & OM Standards with a mounting height of 18 inches.
4. OM-3 marker will meet the color and reflective requirements of the Material Specification D-9-8300.
5. All traffic control devices shall conform to the TMUTCD.

TRAFFIC FLOW	BOTH SIDES						ONE SIDE
ATTENUATOR TYPE	OB-3A	OB-3B	OB-3C	OB-3D	L	OM-1	
GREAT	NR	✓	NR	✓	96"	✓	
Steel Drum	✓	✓	✓	✓	114"	✓	
Hydraulic	✓	✓	NR	NR	NR	✓	OM-3
Hex Foam	✓	✓	NR	NR	NR	✓	
Low Maintenance	NR	✓	NR	✓	96"	✓	
Sand Filled Plastic Modules	NR	NR	NR	NR	NR	✓	
Sand Tire	NR	NR	NR	NR	NR	✓	

NR - Not Recommended



OB-3C



OB-3D

* spacing adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

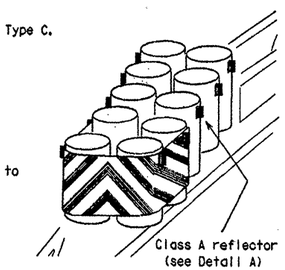
Object Marker sheeting will conform to Specification D-9-8300, Type C.

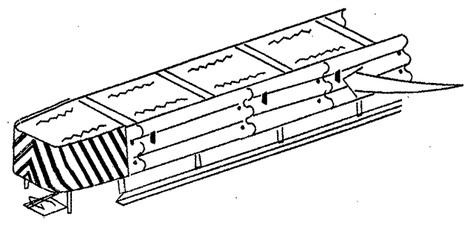
Background - yellow reflective, chevron - black. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

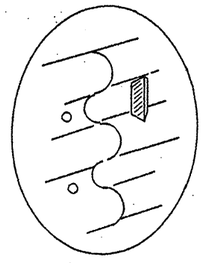
Pop rivets or nuts and bolts may be used to attach object markers and reflectors to attenuators.

Reflective sheeting applied to galvanized sheet metal gauge 24 to 28 per ASTM A366.025 nominal: Aluminum sheet of 6061-T6 or 5052-H38 alloys approximately .065 inch thickness, Low Density Polyethylene approximately .080 inch thickness or Medium Density Polyethylene approximately .080 inch thickness. Other materials may be specified in the plans or approved by the Engineer.

Class A or B reflectors may also be used to delineate side of attenuator.







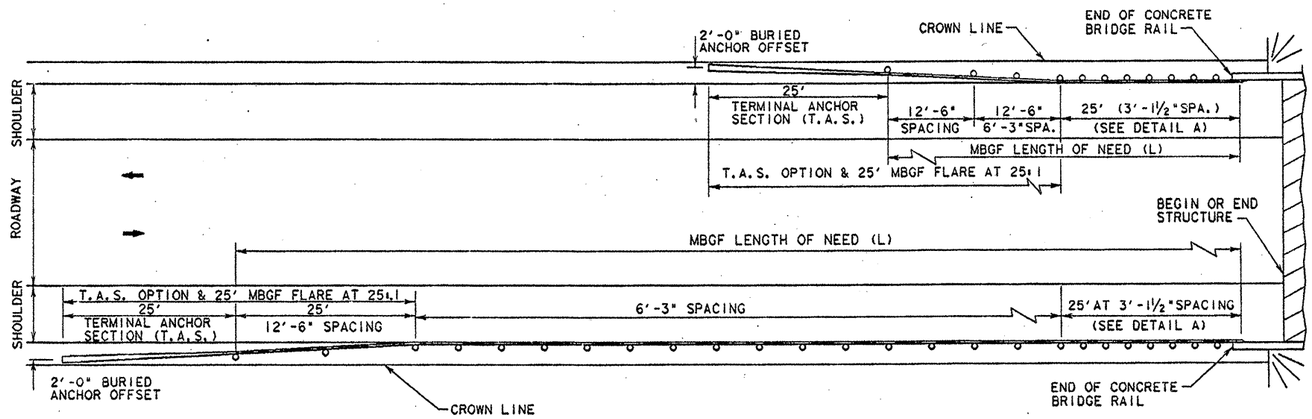
CLASS B REFLECTOR
Detail B

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

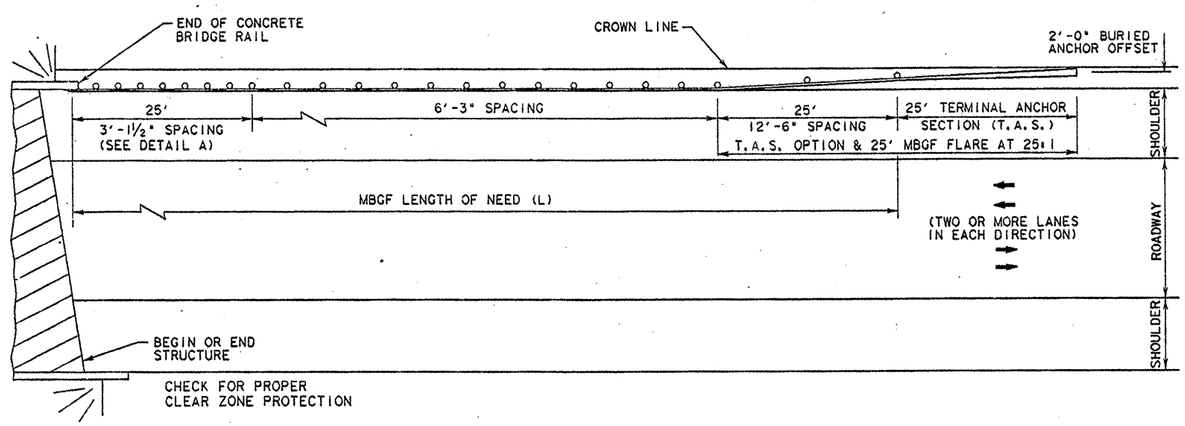
DELINEATORS & OBJECT MARKERS FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-92

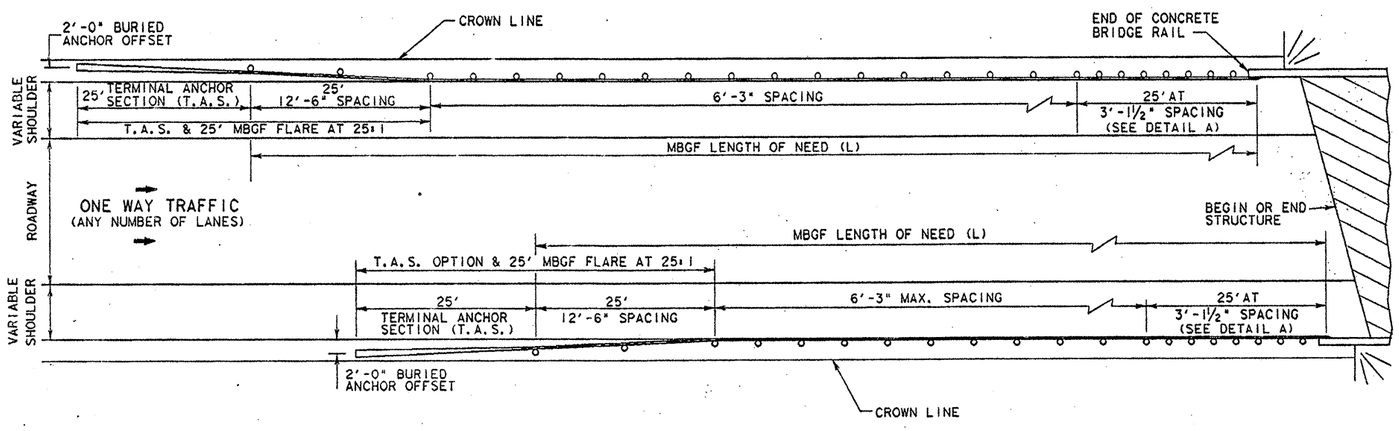
ORIGINAL DRAWING DATE: 12-89		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.: MT/LR	REVISIONS	15	6		392
CK.:	4-90	COUNTY		CONTROL / SECTION / JOB	HIGHWAY
DN.: DN	4-92	BEXAR		2452 / 2 / 23	LP1604
CK.:					



TWO LANE (RURAL) HIGHWAYS



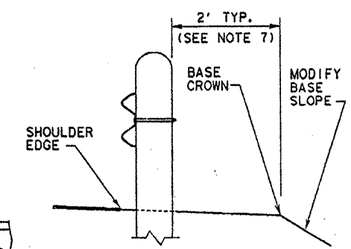
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



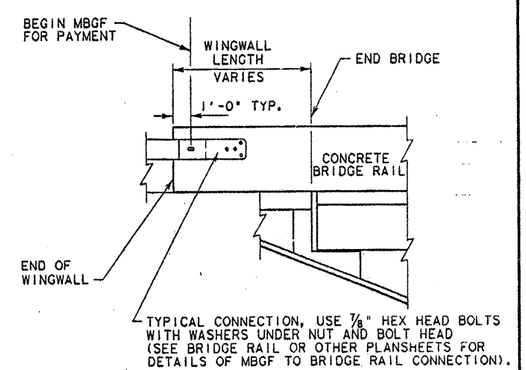
ONE WAY TRAFFIC

GENERAL NOTES

1. FOR METAL BEAM GUARD FENCE DETAILS, SEE MBGF PLAN SHEET.
2. QUANTITIES OF METAL BEAM GUARD FENCE (MBGF) AT INDIVIDUAL BRIDGE ENDS ARE SHOWN ELSEWHERE IN PLANS.
3. USE AVERAGE DAILY TRAFFIC (ADT) FOR THE CURRENT YEAR TO DETERMINE MBGF LENGTH OF NEED IN ACCORDANCE WITH THE DESIGN MANUAL UNLESS OTHERWISE SPECIFED. WHERE SIGNIFICANT TRAFFIC VOLUME GROWTH IS ANTICIPATED ON LOW VOLUME (0-750 ADT) HIGHWAYS USE LENGTH DETERMINATIONS FOR THE HIGHER VOLUME CATEGORY.
4. WHERE LENGTH (L) OF MBGF USED IS 50 FEET, POST SPACING SHALL BE AS DETAILED HEREON (SEE PLAN LAYOUT FOR TWO LANE (RURAL) HIGHWAYS, LEFT SIDE OF TRAFFIC APPROACHING BRIDGE). WHERE LENGTH (L) OF MBGF IS 75' OR MORE, POST SPACING SHALL BE 3'-1 ½" FOR THE 25' SECTION ADJACENT TO THE BRIDGE, 12'-6" FOR THE 25' SECTION AJACENT TO THE T.A.S., AND 6'-3" FOR REMAINING INTERVENING LENGTH. WHEN T6 BRIDGE RAIL IS USED, THE MIN. MBGF POST SPACING SHALL BE 6'- 3".
5. MBGF MAY NOT BE REQUIRED TO SHIELD DEPARTURE END OF BRIDGE UNLESS OTHER HAZARDS WITHIN THE CLEAR ZONE WARRANT MBGF. WHERE INSTALLED ON THE DEPARTURE END, 6'- 3" POST SPACING IS ACCEPTABLE THOUGHOUT THE PLACEMENT LENGTH INCLUDING ADJACENT TO BRIDGE END.
6. WHEN SPECIFIED, THE T.A.S. AND TYPICALLY ADJACENT 25' MBGF SHOULD BE FLARED FROM THE SHOULDER EDGE AT 25:1 TO PROVIDE A 2' USUAL OFFSET TO BURIED ANCHOR. THE 6'-3" POST SPACING SHALL BE MAINTAINED TO THE LENGTH OF NEED WHEN END TREATMENTS OTHER THAN T.A.S. ARE USED.
7. THE CROWN WILL BE WIDENED TO ACCOMMODATE MBGF. TYPICALLY THE CROWN LINE SHOULD BE 2 FEET FROM THE BACK OF THE MBGF POST. THIS APPLIES TO NEW CONSTRUCTION ON NEW ALIGNMENT OR WHERE EXISTING ROADWAY CROSS SECTION IS TO BE WIDENED TO INCREASE ROADWAY WIDTH. THIS DOES NOT APPLY TO REHABILITATION WORK WHERE EXISTING ROADWAY CROWN WIDTH IS TO BE RETAINED (SEE TYPICAL CROSS SECTION).
8. FOR RESTRICTIVE WIDTH BRIDGES, A 25-FOOT TANGENT SECTION OF MBGF SHOULD CONNECT TO THE WINGWALL. THE ADJOINING MBGF THAT LIES WITHIN THE ROADWAY (LANES & SHOULDER AREA) CROWN SHOULD BE FLARED AT THE RATE OF 25:1 (LONGITUDINAL: LATERAL). LENGTH ON THESE BRIDGES SHOULD BE DETERMINED AS STATED ABOVE OR THE LENGTH NECESSARY TO LOCATE THE BURIED ANCHOR AT A 2-FOOT OFFSET FROM SHOULDER EDGE, WHICHEVER IS GREATER.
9. VARIATIONS IN POST SPACINGS AND/OR THE USE OF SPACER BLOCKS OR SHIMS MAY BE REQUIRED BY THE ENGINEER IN ORDER TO ACCOMMODATE THE REQUIRED RAIL CONNECTION TO EXISTING STRUCTURES.



TYPICAL CROSS SECTION



DETAIL A

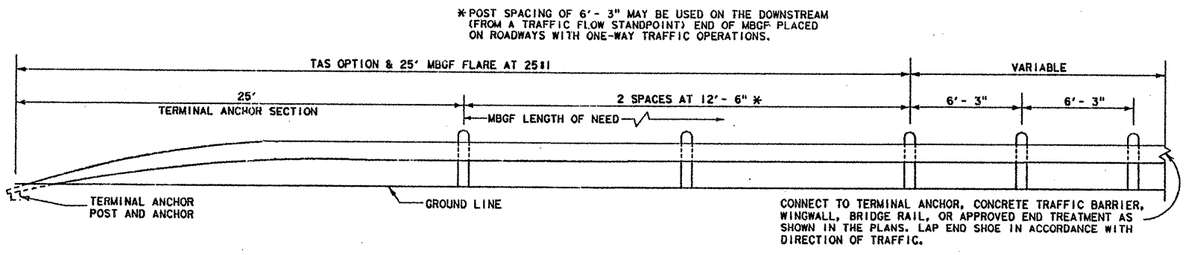
TEXAS DEPARTMENT OF TRANSPORTATION

BRIDGE END DETAILS

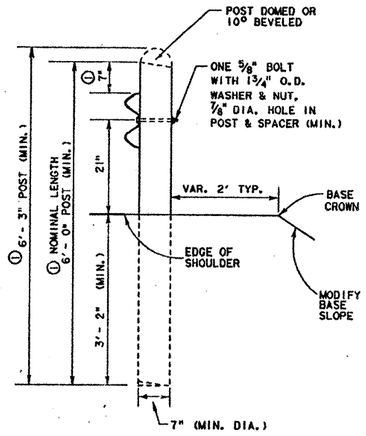
BED-91

REVISIONS	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
	6	TEXAS	NH 90(191) M, Etc.				393
	STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
	15	Bexar		2452	2	23, Etc.	4,1604

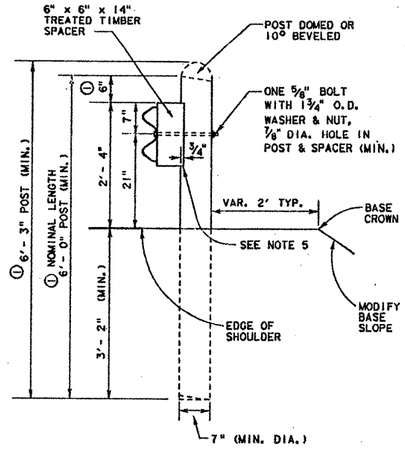
DIVISION OF HIGHWAY DESIGN



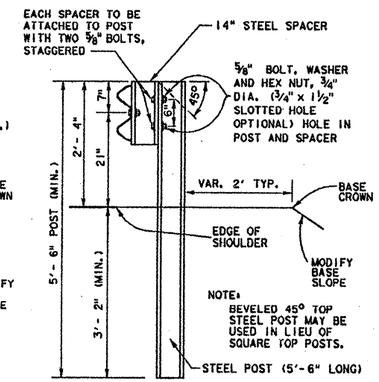
ELEVATION



WOOD POST



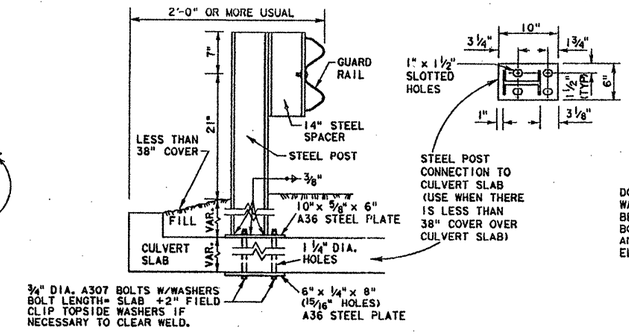
WOOD POST
(BLOCKOUT)



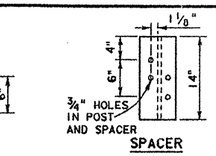
STEEL POST
(BLOCKOUT)

NOTE. ① : WHERE A NOMINAL LENGTH OF 5'- 6" IS SPECIFIED AS ACCEPTABLE ELSEWHERE IN THE PLANS, THESE DIMENSIONS SHALL BE REDUCED BY 0'- 6".

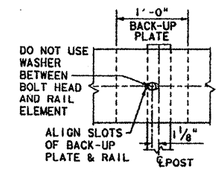
THE DESIGNER SHOULD SPECIFY THE REDUCED LENGTH ONLY ON HIGHWAYS WHERE FUTURE ACP OVERLAYS ARE UNLIKELY.



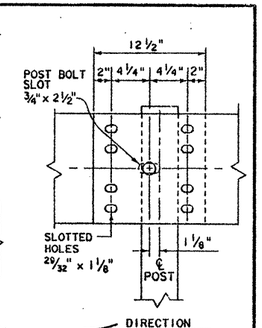
LOW FILL CULVERT POST MOUNTING OPTION



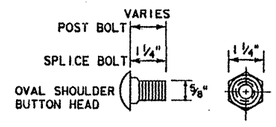
SPACER



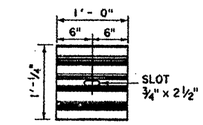
POST CONNECTION
STEEL POST
NON-SPLICE STEEL POST ONLY



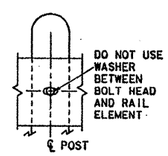
RAIL SPLICE



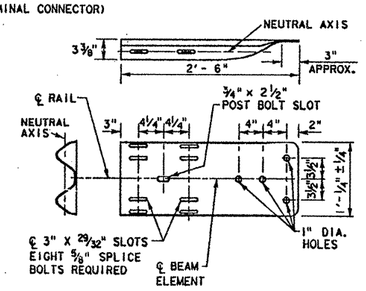
CONNECTOR DETAIL
(7/8" HEX BOLTS REQUIRED FOR TERMINAL CONNECTOR)



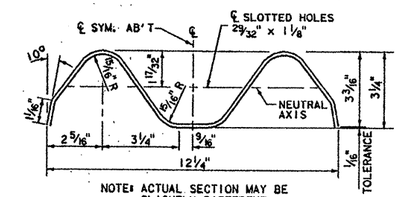
BACK-UP PLATE



POST CONNECTION
WOOD POST



TERMINAL CONNECTOR
(10 GAGE MINIMUM)

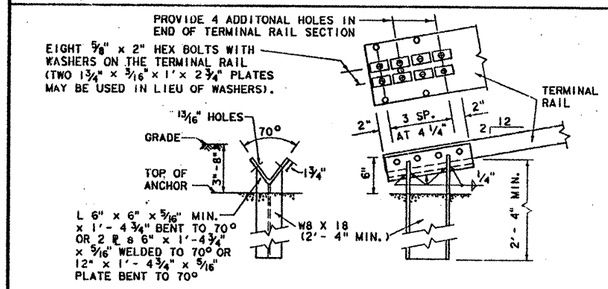


NOTE: ACTUAL SECTION MAY BE SLIGHTLY DIFFERENT DEPENDING UPON THE MANUFACTURER.

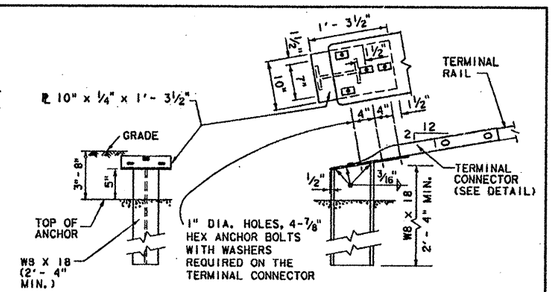
SECTION THRU GUARD RAIL
AND BACK-UP PLATE

GENERAL NOTES

1. THE EXACT POSITION OF GUARD FENCE SHALL BE AS SHOWN ELSEWHERE ON THE PLANS OR AS DIRECTED BY THE ENGINEER. GUARD FENCE SHALL BE TRANSITIONED TO A SMOOTH CONNECTION WITH OTHER GUARD FENCE OR STRUCTURE RAILING AS SHOWN ELSEWHERE ON PLANS.
2. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE BLOCKED OUT SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 21-INCHES ABOVE THE GUTTER PAN OR ROADWAY SURFACE.
3. UNLESS OTHERWISE SHOWN IN THE PLANS, MBGF SHALL BE PLACED WITH THE FACE OF RAIL DIRECTLY ABOVE THE SHOULDER EDGE (OR CURBFACE) EXCEPT THE 25' TERMINAL ANCHOR SECTION AND ADJACENT 25' OR MBGF SHALL BE FLARED AT 25:1 (LONGITUDINAL:LATERAL) TO PROVIDE A 2' OFFSET BETWEEN BURIED ANCHOR AND SHOULDER EDGE (OR CURBFACE). FLARING THE 25' TERMINAL ANCHOR AND ADJACENT 25' MBGF IS OPTIONAL FOR ONE-WAY TRAFFIC CONDITIONS ON THE DOWNSTREAM END OF GUARD FENCE.
4. AT THE OPTION OF THE CONTRACTOR THE RAIL ELEMENTS FOR THE GUARD FENCE MAY BE BE FURNISHED IN EITHER 12 1/2 OR 25 FOOT NOMINAL LENGTHS WITH POST BOLT SLOTS FOR CONNECTION TO POSTS.
5. TIMBER POSTS MAY BE BEVELED AT APPROXIMATELY 10 DEGREES ON THE TOP OF BOTH ENDS WITH HIGH SIDE OF TOP OF POST PLACED TOWARD THE ROADWAY OR THEY MAY BE DOMED. WHEN BLOCKOUT GUARD FENCE IS SPECIFIED ELSEWHERE IN THE PLANS, A 6" x 6" x 14" TREATED TIMBER SPACER OF YELLOW PINE SHALL BE USED WITH WOOD POSTS. WHEN "BLOCKED OUT", THE UPPER PORTION OF THE POST SHALL BE NOTCHED 3/4" TO PROVIDE FLAT SURFACE FOR TIMBER SPACER. A TOLERANCE OF ± 1/4" WILL BE PERMITTED ON THE NOTCHED PORTION OF THE POST. ROUTING THE TIMBER SPACER MAY BE USED IN LIEU OF NOTCHING THE POST. THE DEPTH OF ROUTING SHALL BE 3/4" AT THE CENTER OF RADIUS ± 1/4".
6. STEEL POSTS SHALL BE BLOCKED OUT. STEEL POSTS AND SPACERS SHALL MEET THE REQUIREMENTS OF ASTM A-36 (W6 x 9.0 OR W6 x 8.5). BOLT HOLES SHALL BE APPROXIMATELY CENTERED BETWEEN WEB AND EDGE OF FLANGE OF SPACERS AND POSTS.
7. POST SPACING WILL BE 6'-3" EXCEPT THAT THE FIRST POST WILL BE 25' FROM THE TERMINAL ANCHOR POST AND THE NEXT TWO POSTS SPACED AT 12'-6" WITH A MINIMUM OF 8 POSTS ADJACENT TO STRUCTURES SPACED AT 3'-1 1/2".
8. THE UPPER 10" (MINIMUM) OF THE TERMINAL ANCHOR POST AND ALL STEEL FITTINGS THEREON SHALL BE GALVANIZED.
9. THE TERMINAL ANCHOR POST SHALL BE SET IN CLASS "A", "B" OR "C" CONCRETE IN ACCORDANCE WITH ITEM, "CONCRETE FOR STRUCTURES", OR SET IN CONCRETE IN ACCORDANCE WITH ITEM, "CONCRETE PAVEMENT". CONCRETE SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TERMINAL RAIL SECTION AND ANCHORAGE SYSTEM.
10. AN ANCHOR OTHER THAN TO A TERMINAL ANCHOR POST SHALL CONSIST OF A CONNECTION SIMILAR TO THE RAIL SPLICE OR SIMILAR TO THE TERMINAL CONNECTOR.
11. BACK-UP PLATES SHALL BE PROVIDED AT INTERMEDIATE (NON-SPLICE) STEEL POSTS. BACK-UP PLATES SHALL CONFORM TO THE MATERIALS AND GALVANIZING REQUIREMENTS SPECIFIED FOR THE RAIL ELEMENT, AND SHALL BE OF THE SAME NOMINAL THICKNESS AS THE RAIL ELEMENT USED.
12. WASHERS USED WITH THE EIGHT 5/8" SPLICE BOLTS AND NUTS THAT ARE PROVIDED FOR TERMINAL CONNECTORS AND/OR TERMINAL ANCHOR POSTS SHALL BE 1 3/4" x 3" x 3/16", OR 1" I.D. AND 2" O.D. x 0.134" (ANSI B27.2) NARROW TYPE A PLAIN WASHERS.
13. THE 10 GAGE TERMINAL CONNECTORS MUST BE USED WITH THE OPTIONAL TERMINAL ANCHOR POST. EITHER ANCHOR POST MAY BE USED WITH EITHER CONCRETE ANCHOR.
14. WELDED STEEL POSTS AND SPACERS SHALL MEET THE REQUIREMENTS OF ASTM A-769. THE FLANGE WIDTH AND THICKNESS, WEB THICKNESS, AND DEPTH OF WELDED POSTS AND SPACERS SHALL EQUAL OR EXCEED THE DIMENSIONS OF A STANDARD ROLLED W6 x 8.5 OR W6 x 9.0.
15. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATIONS HAVING A CURVATURE OF LESS THAN 150' RADIUS.
16. BOLTS SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND NO MORE THAN 3/4" BEYOND IT. (BUTTON HEAD BOLTS MAY BE USED INSTEAD OF HEX BOLTS WHEN SPECIFIED BY THE ENGINEER)
17. CROWN WILL BE WIDENED TO ACCOMMODATE GUARD FENCE.
18. WHERE SOLID ROCK IS ENCOUNTERED OR WHERE SHOWN ON THE PLANS, THE DIAMETER OF THE HOLES SHALL BE APPROXIMATELY 12 INCHES. THE BACKFILLING SHALL BE WITH A COHESIONLESS MATERIAL, AND EMBEDMENT DEPTH SHALL BE 1'-6" OR MORE AS DIRECTED BY THE ENGINEER. TIMBER POSTS SHALL NOT BE SET IN CONCRETE.

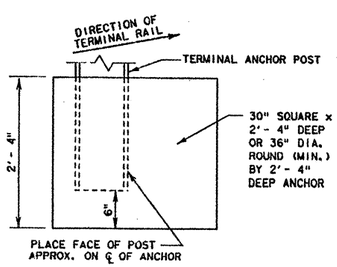


NOTE: THIS POST REQUIRES 4 ADDITIONAL HOLES (SHOP OR FIELD) IN THE TERMINAL RAIL MEMBER WITH EIGHT 5/8" BOLTS AND WASHER PLATES AS SHOWN FOR ATTACHMENT.



NOTE: THIS OPTIONAL POST REQUIRES THE USE OF THE 10 GA. TERMINAL CONNECTOR WITH FOUR 7/8" HEX BOLTS FOR ATTACHMENT TO THE ANCHOR POST.

TERMINAL ANCHOR POST OPTIONS

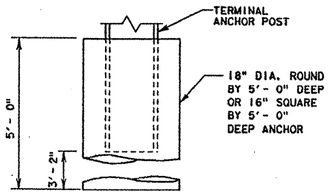


NOTES: EITHER POST MAY BE USED WITH EITHER ANCHOR.

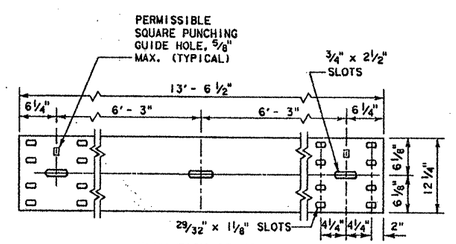
NO CONSTRUCTION JOINT IS ALLOWED IN THE CONCRETE ANCHOR.

TERMINAL RAIL MAY BE BOLTED TO POST AND IN TWIST POSITION PRIOR TO PLACING CONCRETE ANCHOR.

IF CONCRETE ANCHOR IS PRECAST, THE AREA SHOULD BE COMPACTED AS DIRECTED BY THE ENGINEER, WHEN PLACED IN THE FIELD.



TERMINAL CONCRETE ANCHOR OPTIONS



ELEVATION OF NOMINAL
12 1/2 FOOT GUARD RAIL
(25 FOOT SECTIONS MAY ALSO BE SUPPLIED)

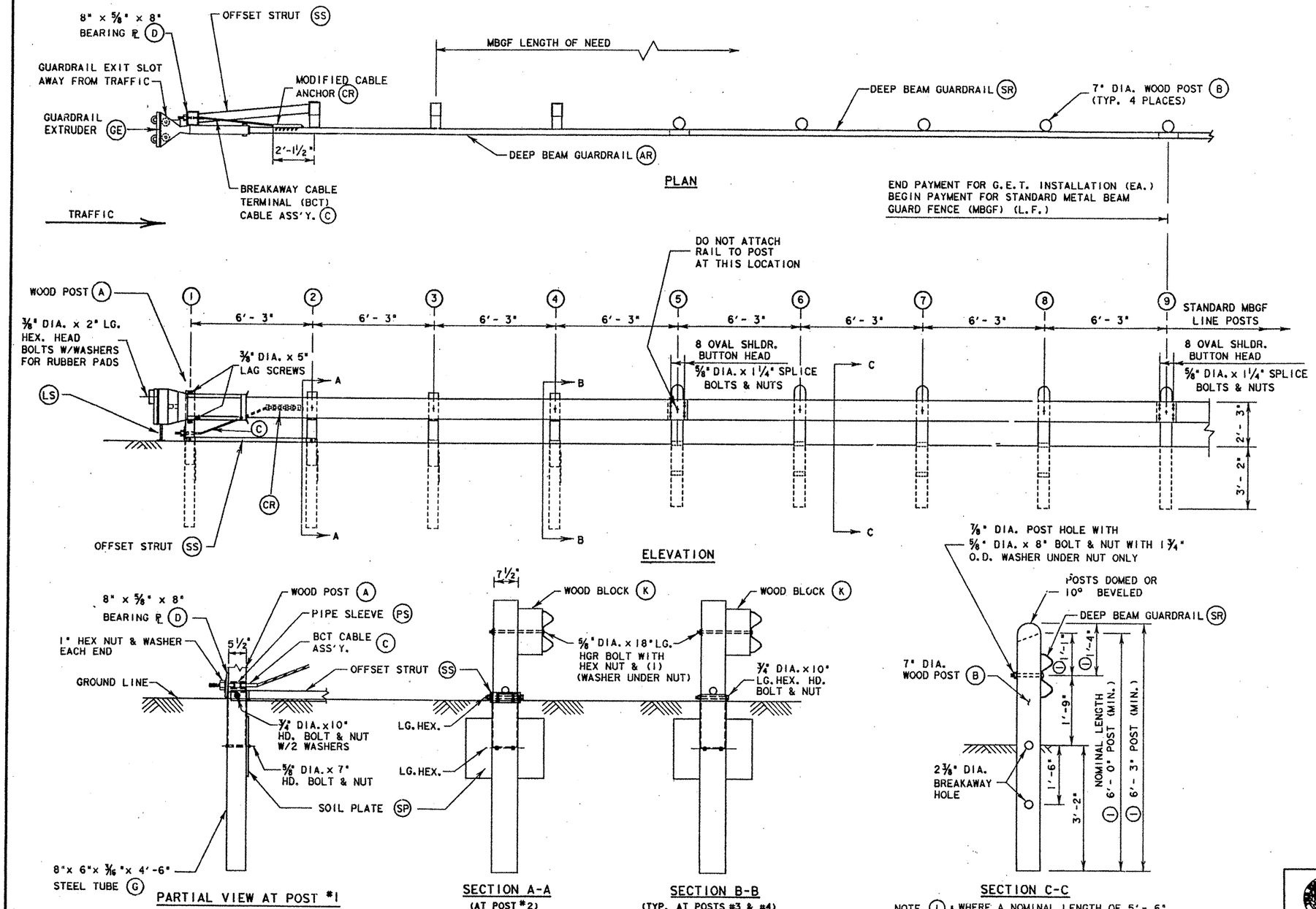
TEXAS DEPARTMENT OF TRANSPORTATION

METAL BEAM GUARD FENCE

MBGF-92

MODIFICATIONS	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
	6	TEXAS	NH 90(191)M, Etc.			394
	STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
	15	Bexar		2457	2	23	16 1464

DIVISION OF HIGHWAY DESIGN (D-8)



GENERAL NOTES

1. THE POSTS REQUIRED WITH THE GUARDRAIL EXTRUDER TERMINAL SHALL BE TIMBER POSTS.
2. ALL BOLTS, NUTS, CABLE ASSEMBLIES, CABLE ANCHORS AND BEARING PLATES, SHALL BE GALVANIZED.
3. WHEN THE GUARDRAIL EXTRUDER TERMINAL IS SPECIFIED AS THE END TREATMENT FOR A MBGF INSTALLATION, THE MBGF WILL NOT BE FLARED, UNLESS IT IS PLACED OVER A CURB. IN SUCH CASE, A 25:1 FLARE RATE BEGINNING AT POST (5) AND ENDING AT THE EXTRUDER WILL BE REQUIRED. THE 7" DIA. WOOD POSTS WILL ALSO REQUIRE TIMBER SPACERS IN ACCORDANCE WITH THE MBGF STANDARD DETAIL SHEET. THESE SPACERS SHALL BE CONSIDERED SUBSIDIARY ITEMS (SEE DETAIL A).
4. A TYPE 2 OBJECT MARKER, IN CONFORMANCE WITH THE TEXAS MUTCD, SHALL BE MOUNTED SEPARATELY WITHIN 6 FEET OF THE FRONT OF THE EXTRUDER SUBJECT TO THE APPROVAL OF THE ENGINEER.

BILL OF MATERIAL

ITEM	QTY.	DESCRIPTION
(A)	4	5 1/2" x 7 1/2" WOOD POST
(AR)	1	DEEP BEAM GUARDRAIL 12 GA. x 25'-0" CONTINUOUS SECTION
(B)	4	7" DIA. WOOD POST
(C)	1	BCT CABLE ASSEMBLY
(CR)	1	MODIFIED CABLE ANCHOR
(D)	1	8" x 5/8" x 8" BEARING PL
(G)	4	S.T. 8" x 6" x 3/16" x 4'-6" LG.
(GE)	1	GUARDRAIL EXTRUDER
(K)	3	WOOD BLOCK 5 1/2" x 7 1/2" x 14"
(LS)	2	LEG SUPPORT
(PS)	1	PIPE SLEEVE
(SP)	4	SOIL PLATE 18" x 24"
(SR)	1	DEEP BEAM GUARDRAIL 12 GA. x 25'-0" CONTINUOUS SECTION
(SS)	1	OFFSET STRUT

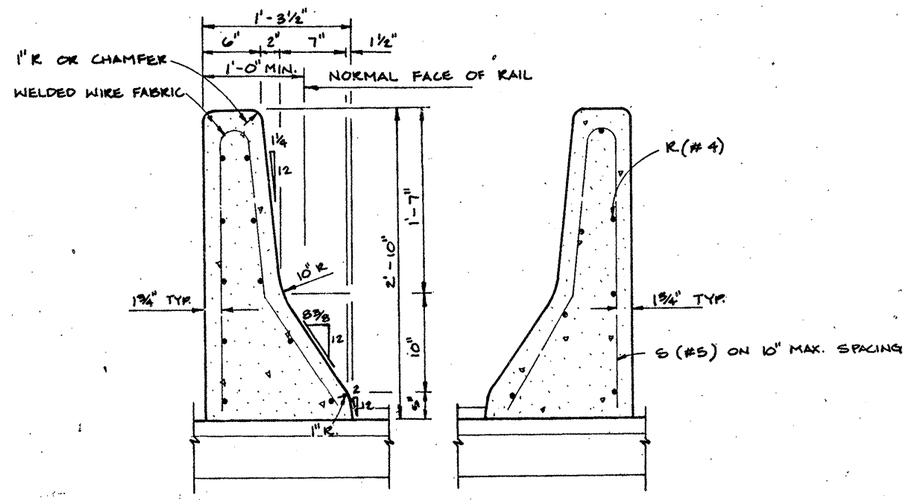
TEXAS DEPARTMENT OF TRANSPORTATION

GUARDRAIL EXTRUDER TERMINAL DETAILS

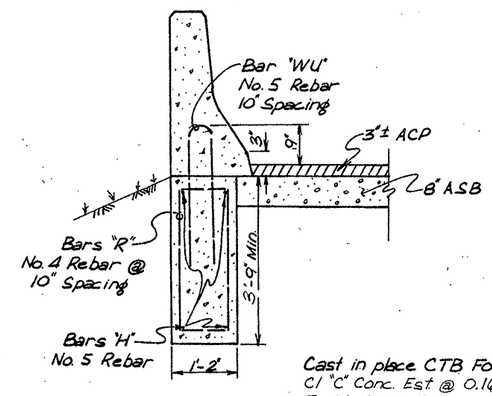
GET-92

MODIFICATIONS	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
	6	TEXAS	NH 90(191)M, Etc.			394A
	STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
	15	Bexar		2452	2	23, 1, 1604

DIVISION OF HIGHWAY DESIGN



TYPICAL SECTIONS
(SHOWING WWF & CONVENTIONAL REINF.)



Notes:
1). All Concrete Shall Be Class "C" or Better and All Reinforcing Steel Shall Be Gr. 60.

2). No Direct Payment Shall Be Made for CTB Foundation, All Materials, Excavation and Labor Shall Be Considered Subsidiary to Item Concrete Traffic Barrier.

Cast in place CTB Foundation
Cl "C" Conc. Est @ 0.16 C.Y./Linear Foot & 11.59 lbs. per Lf of Reinforcing Steel.
(Supplied for Contractor's Info. Only)

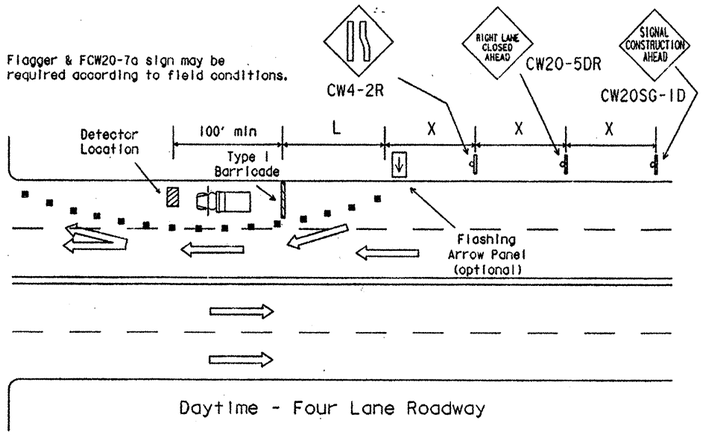
Ty 5 CTB Foundation Detail In Asph Stab Base

STATE OF TEXAS
GREGORY A. BIEDIGER
61429
REGISTERED
PROFESSIONAL ENGINEER

Gregory A. Biediger P.E.
Apr. 1, 1993

CTB(Ty 5) w/ TRF

FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			
6	TEXAS				395
STATE DIST. NO.	COUNTY				
15	BEXAR	2452	02	023	LP1604



Daytime - Four Lane Roadway

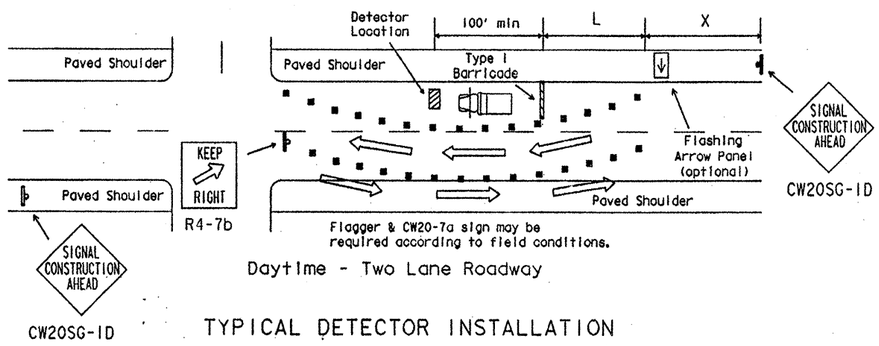
TYPICAL TRANSITION LENGTHS AND SUGGESTED MAXIMUM SPACING OF DEVICES

Posted Speed ✱	Formula	Minimum Desirable Taper Lengths ✱✱ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'
35		205'	225'	245'	35'	70'-90'
40		265'	295'	320'	40'	80'-100'
45	L=WS	450'	495'	540'	45'	90'-110'
50		500'	550'	600'	50'	100'-125'
55		550'	605'	660'	55'	110'-140'
60		600'	660'	720'	60'	120'-150'
65		650'	715'	780'	65'	130'-175'

✱ 85th Percentile Speed may be used on roads where traffic speeds normally exceed the posted speed limit.
✱✱ Taper lenghts have been rounded off.
L=Length of Taper (FT.)
W=Width of Offset (FT.)
S=Posted Speed (MPH)

X DISTANCE

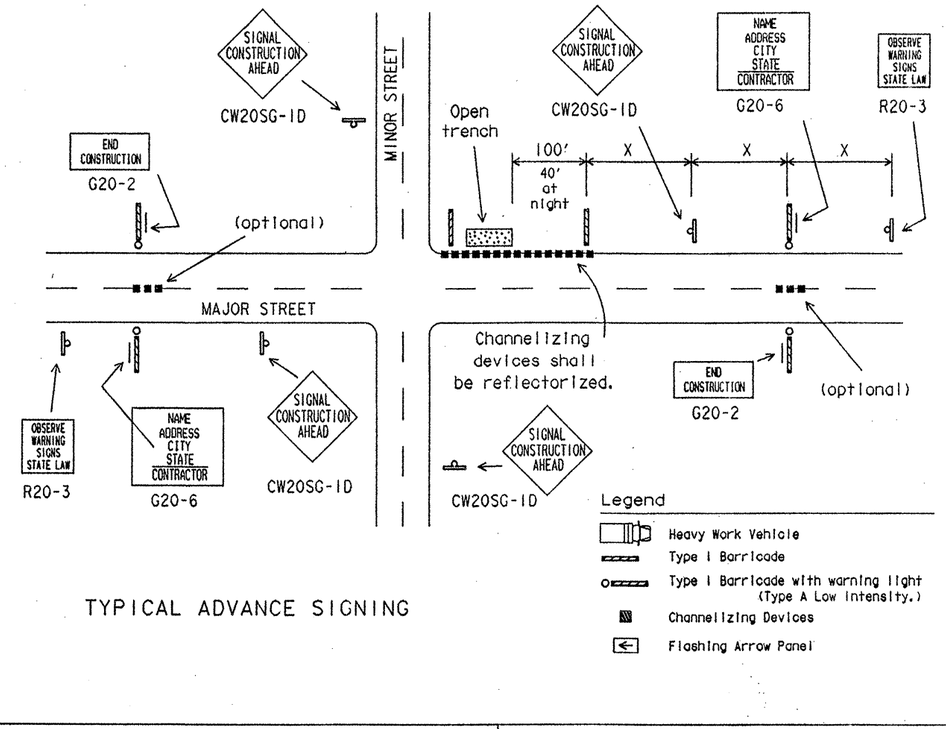
Posted Speed or 85% Speed (MPH)	X Min. Distance (feet)
30 or less	80
35	120
40	160
45	240
50	320
55	500



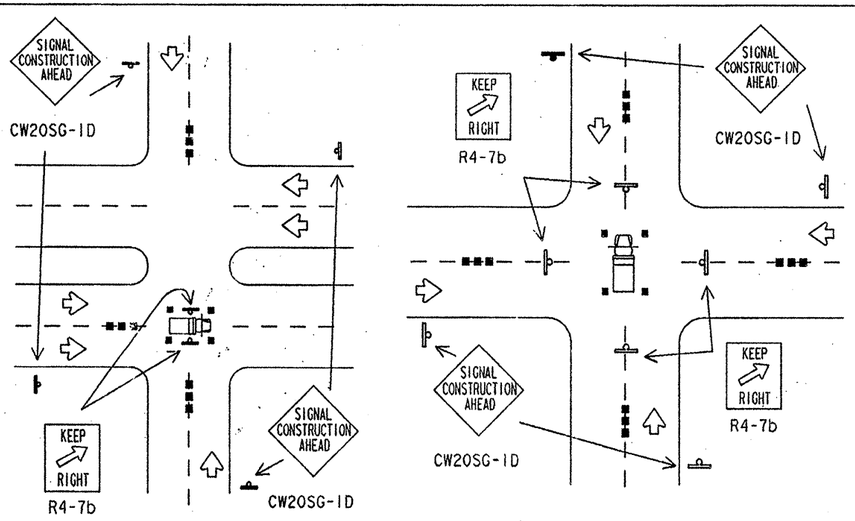
Daytime - Two Lane Roadway

TYPICAL DETECTOR INSTALLATION

Nighttime - 1. Channelizing Devices shall be reflectorized.
2. Barricades shall have Flashing Warning Lights.

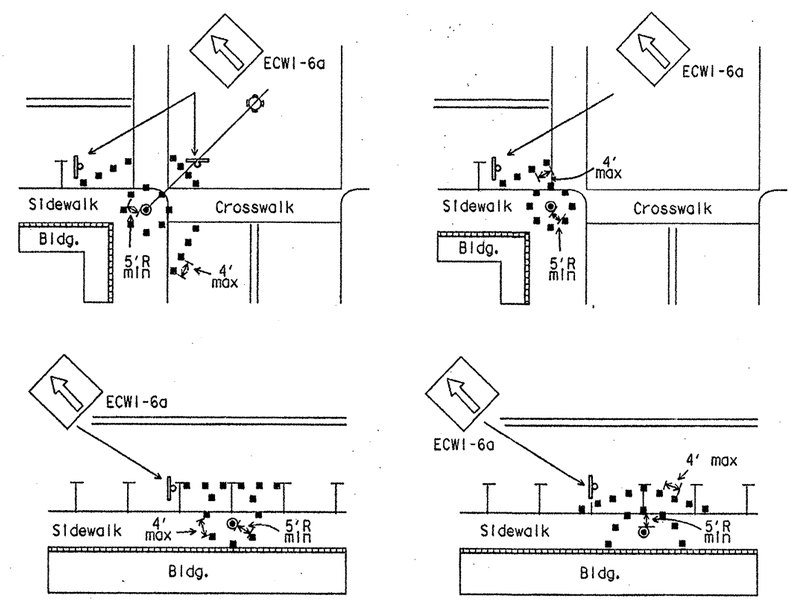


TYPICAL ADVANCE SIGNING



TYPICAL HANGING SIGNAL INSTALLATIONS

Advance warning channelizing devices are optional.



Channelizing devices should not be placed closer than 5 foot radius (minimum) to signal poles.
Parking may be eliminated by placing channelising devices in spaces.
If pedestrian walkways are blocked, refer to TMUTCD, Figure 6B-4.1.

TYPICAL RESTRICTED PEDESTRIAN MOVEMENTS

Typical channelizing device is the 28" cone. Plastic drums may be used if approved by the Engineer. Metal drums shall NOT be used as a channelizing device or sign support.

For several closely adjoining projects, advance signing may not be required in advance of each intersection, but only in advance of the intersections at the project limits. See details elsewhere in the plans for advance signing requirements.

Advance signs and barricades shall be in place when signal construction operations are in progress. The contractor may remove advance signs and barricades when no construction operations are underway if permitted elsewhere in the plans. Obstructions or hazards at the work area shall be clearly marked and delineated at all times.

All holes, trenches or other hazardous areas shall be adequately protected by barricades, lights or other protective devices. Trenches shall be covered or surrounded with orange plastic construction fence as directed by the Engineer.

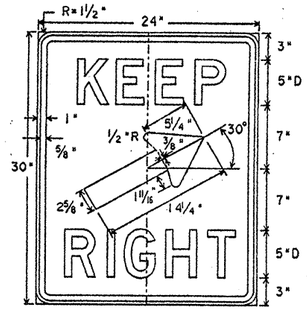
Flagger and FCW20-7a sign may be required according to field conditions. Vehicles parked in roadway shall be equipped with two strobes. High level flags at corners of vehicle may also be used. Work operations that require work vehicle in traveled way 20 minutes or less may use cones, high level flags and strobes as advance warning devices. Cones should only be placed around vehicle. Flaggers may be used on high speed rural intersections.

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

TRAFFIC SIGNAL INSTALLATION TYPICAL DETAILS

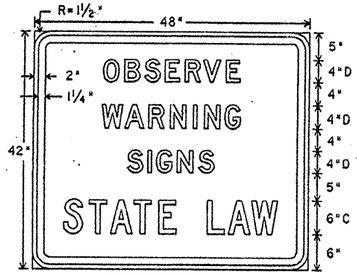
(1 of 2) WZ(BTS-1)-92

ORIGINAL DRAWING DATE: 4-92		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT				SHEET
DN.: LR/MT	REVISIONS	15	6					405
CK.:		COUNTY			CONTROL	SECTION	JOB	HIGHWAY
DN.: DN		BEXAR			2452	02	023	1604
CK.:								



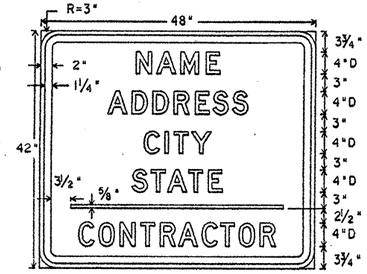
R4-7b
24" X 30"

Letters - Black
Symbol - Black
Border - Black
Background - White Refl.



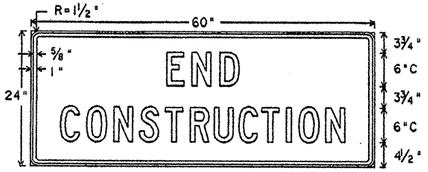
R20-3
48" X 42"

Letters - Black
Border - Black
Background - White Refl.



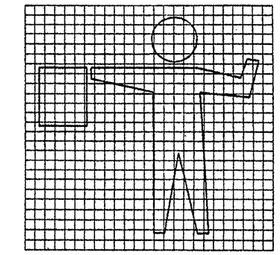
G20-6
Var. X 42"
(48" min.)

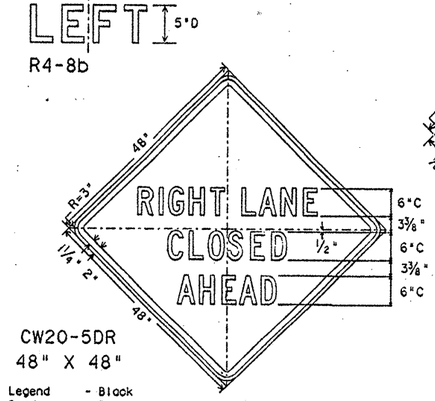
Letters - Black
Border - Black
Background - White Refl.



G20-2
60" X 24"

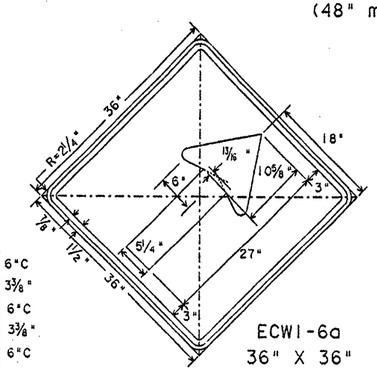
Letters - Black
Border - Black
Background - Orange Refl.





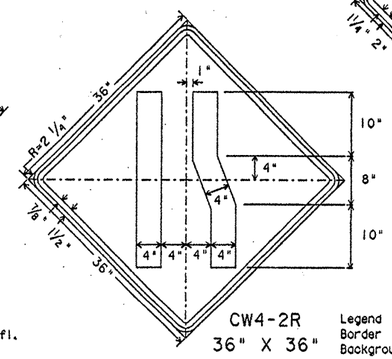
CW20-5DR
48" X 48"

Legend - Black
Border - Black
Background - Orange Refl.



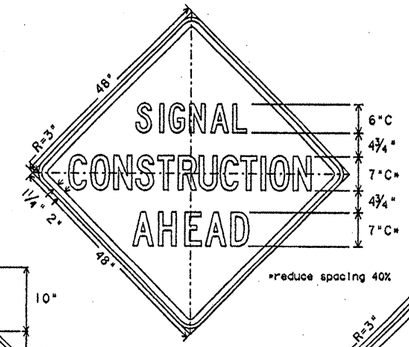
ECW1-6a
36" X 36"

Legend - Black
Border - Black
Background - Orange Refl.



CW4-2R
36" X 36"

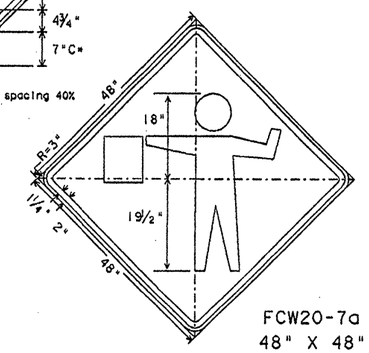
Legend - Black
Border - Black
Background - Orange Refl.



*reduce spacing 40%

CW20SG-1D
48" X 48"

Letters - Black
Border - Black
Background - Orange Refl.

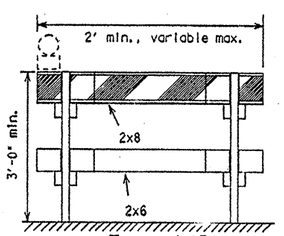


FCW20-7a
48" X 48"

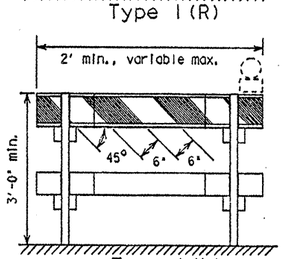
Legend - Black
Border - Black
Background - Orange Refl.

TYPICAL SIGNS USED IN TRAFFIC SIGNAL CONSTRUCTION AREAS

TYPE I BARRICADES



Type I (R)

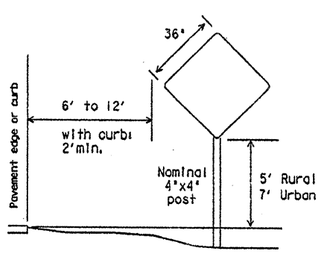


Type I (L)

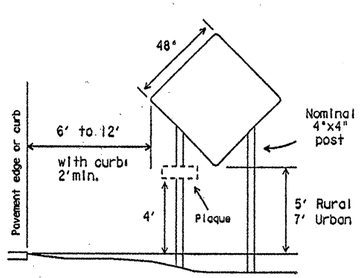
For Type I and II Barricades, both sides of the rails shall have reflective orange and reflective white striping.

TYPICAL SIGN SUPPORTS

FIXED SUPPORTS



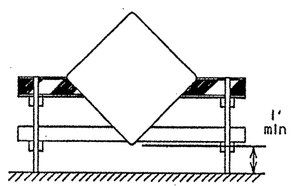
WOOD POST SIGN SUPPORT: for 36" x 36" and smaller warning signs, and other signs having an area not exceeding 10 sq. ft.



WOOD POST SIGN SUPPORT: for 48" x 48" warning sign.

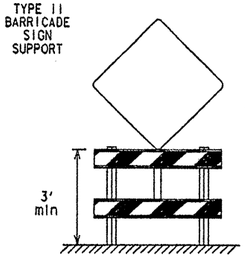
PORTABLE SUPPORTS

TYPE I BARRICADE SIGN SUPPORT
Barricade Types I, II or III may be used.



TEMPORARY SUPPORTS

TYPE II BARRICADE SIGN SUPPORT



Where a sign is to be mounted on a barricade, the barricade length should not be less than the horizontal dimension of the sign. Other types of portable or temporary sign supports may be used with approval of the Engineer.

Signs erected on fixed supports should be at a minimum height of 5 feet in rural areas and 7 feet in urban areas and other rural locations where sight distance obstructions are present.

Embedment depth for wood sign supports and post type barricades should be 3 feet minimum, unless specified elsewhere in the plans.

Driveable sign supports may be used and shall be installed in accordance with the manufacturers recommendations.

Approved driveable supports:
1.) Franklin Steel Company - E-Z-Erect
2.) Southwestern Pipe, Inc. - Poz-Loc

SPECIFICATION REFERENCE TABLE

MATERIALS AND TEST SPECIFICATIONS (D-9)	
PLYWOOD SIGN BLANKS	D-9-7100
ALUMINUM SIGN BLANKS	D-9-7110
FLAT SURFACE REFLECTIVE SHEETING, TYPE A (ENGINEER GRADE)	D-9-8300
FLAT SURFACE REFLECTIVE SHEETING, TYPE B (SUPER ENGINEER GRADE)	D-9-8300
FLAT SURFACE REFLECTIVE SHEETING, TYPE C (HIGH SPECIFIC INTENSITY)	D-9-8300

GENERAL

All traffic control devices shall conform with the Texas "Manual on Uniform Traffic Control Devices for Streets and Highways" (TMUTCD), and shall be maintained as directed by the Engineer. Additional guidelines for traffic control devices may be found in the TMUTCD.

WARNING LIGHTS

When required by the Engineer the Contractor shall furnish a copy of the warning lights certification. The certification will be by the manufacturer, stating the lights meet the requirements of the latest ITE Purchase Specification for Flashing and Steady-Burn Warning Lights.

REFLECTIVE SHEETING

Reflectorized signs shall be constructed of retroreflective sheeting meeting the color and reflectivity requirements of Material Specification, D-9-8300. Day only is defined as a device that is used only during daylight hours.

Type A, B or C sheeting may be used for all, day only, applications. Type A sheeting should be used for all, white background, regulatory signs. Type C sheeting shall be used for all other applications.

The above applications of sheeting grades to different type signs will apply unless otherwise specified in the plans.

TYPE A = Engineer Grade
TYPE B = Super Engineer Grade
TYPE C = High Specific Intensity

SUPPORTS AND MOUNTING HEIGHT

Regardless of the type of support used, regulatory signs should not be erected at heights less than 5 feet in rural areas or 7 feet in urban areas above the pavement surface. Sign heights may be lowered if approved by the Engineer in writing.

Wood sign post supports shall be painted white.

Reflective sheeting is not required on back of barricades used as sign supports at locations other than project limits.

Signs may be erected on portable, temporary, or fixed supports, for use on construction projects to warn or guide traffic through and/or around the actual construction area.

PORTABLE - Signs erected on portable supports for use on construction projects normally mean signs which are used during the daytime to warn or guide traffic through and/or around the actual construction area, but at the end of the workday such signs are removed.

Portable supports shall be as shown on this sheet or as approved by the Engineer. The bottom of the sign shall be a minimum of one (1) foot above the pavement surface. Signs required for nighttime usage should not normally be mounted on portable supports, except when approved by the Engineer.

TEMPORARY - Where a sign may be required for a few days duration and then is no longer needed, where a sign is moved from location to location every few days, where it is not practical or desirable to provide a fixed mounting, such signs may be erected on a temporary type of support. Temporary supports shall be as shown on this sheet or as approved by the Engineer. Signs erected on temporary supports should be mounted at a minimum height of three (3) feet measured to the pavement surface.

FIXED - Signs erected on fixed supports for use on construction projects normally mean signs that are to remain in place for both daytime and nighttime usage to regulate, warn and guide traffic in advance of and within the limits of the project including the crossroad approaches. Signs erected on fixed supports should be at a minimum height of five (5) feet in rural areas and seven (7) feet in urban areas and other rural locations where sight distance obstructions are present.

SIGN SUPPORT WEIGHTS

Where portable or temporary supports require the use of weights to keep a sign or barricade from turning over, the use of some type of sandbag is recommended. The use of pieces of concrete, rock, iron, steel or other solid objects will not be permitted.

REMOVING OR COVERING

When sign messages may be confusing or no longer apply, the signs shall be removed or completely covered. When signs are covered the material used shall be opaque, such as heavy mil black plastic. Burlap shall not be used to cover signs. Signs shall be removed upon completion of the work.

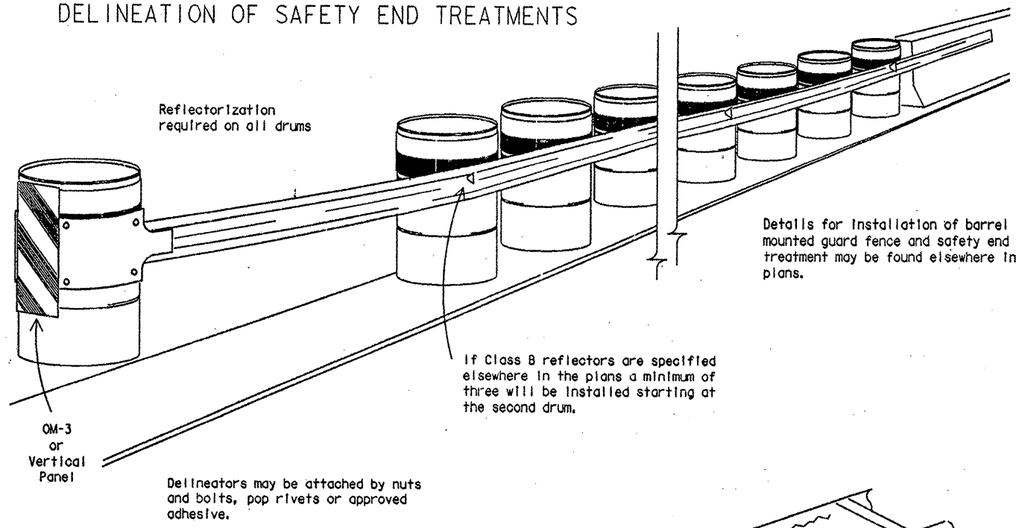
STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

TRAFFIC SIGNAL INSTALLATION BARRICADES AND SIGNS

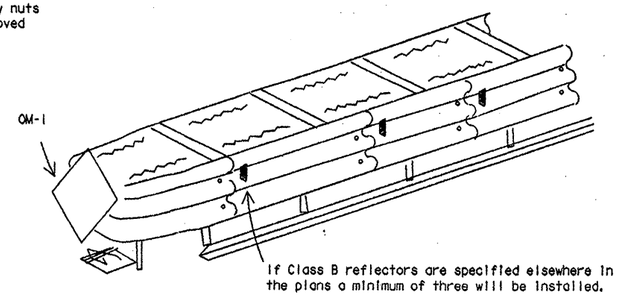
(2 of 2) WZ(BTS-2)-92

ORIGINAL DRAWING DATE: 4-92	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
DN.: LR/MT REVISIONS	15	6				406
CK.:	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DN.: DN	BEXAR		2452	2	23	LP1604
CK.:						

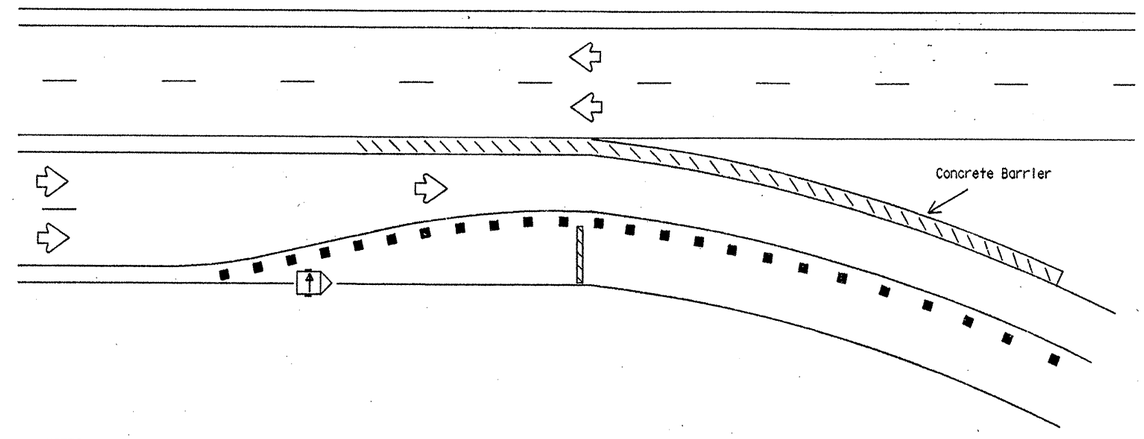
DELINEATION OF SAFETY END TREATMENTS



	APPROACHING TRAFFIC	
	BOTH SIDES	ONE SIDE
DELINEATION	OM-1	OM-3 or Vertical Panel



BARRIER DELINEATION WITH SAFETY GLARE FENCE



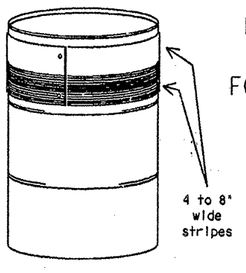
NOTES:

1. Length of Safety Glare Fence will be specified elsewhere in the plans.
2. The cumulative nominal length of the modular units shall equal the length of the individual sections of temporary concrete traffic barrier on which they are installed so the joint between barrier sections will not be spanned by any one unit.
3. Panel/blades will be designed such that reflective sheeting conforming with Departmental Specification D-9-8300, Type C, minimum size of 2 inches by 12 inches can be attached to the edge of the panel/blade. The sheeting shall be attached to one panel/blade per section of concrete barrier not to exceed a spacing of 30 feet. Barrier reflectors are not necessary when panel/blades are installed.

LEGEND

- Barricade
- Channelizing devices
- Trailer mounted flashing arrow panel
- Safety glare fence

REFLECTORIZATION OF METAL DRUMS FOR BARREL MOUNTED GUARD FENCE



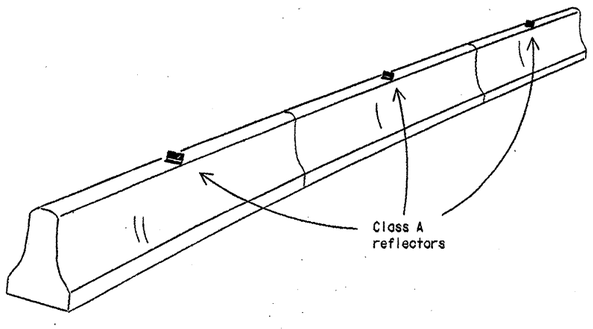
The following specification is intended to detail the reflectorization of metal drums used to support barrel mounted guard fence. Metal drums shall not be used as a standalone channelizing device or sign support.

Markings on drums shall be horizontal, circumferential, reflectorized orange and reflectorized white stripes, 4 to 8 inches wide. The first reflectorized stripe should start within four inches of the top of the drum. There shall be at least one orange and one white stripe on each drum. If there is a non-reflectorized space between the horizontal orange and white stripes, it shall be no more than 2 inches wide. Reflectorized material shall conform with Specification D-9-8300 Type C (High Specific Intensity).

All drums on project will be of the same color.

> Orange color metal drums shall be used in all barrel mounted guard fence installations on all contracts awarded after January 1, 1994.

CONCRETE TRAFFIC BARRIER (CTB)



Barrier reflectors will be installed only on barriers designated for reflectorization as required elsewhere in the plans.

Reflectors should be mounted one reflector per section of barrier, preferably in the center.

Maximum spacing of reflectors is 40 feet. Mount reflectors to barrier with construction adhesive or butyl rubber adhesive.

Color of barrier reflectors will conform to the Texas "Manual on Uniform Traffic Control Devices", (TMUTCD).

REFLECTORS

CLASS A

Reflectors for Concrete Traffic Barrier and Drum Type Attenuator:

1. Davidson Plastics Co. - PCBM-12
2. Cal. Tex. Ind., Inc. - Microprism Delineator
3. Cal. Tex. Ind., Inc. - Cube Corner Delineator
4. Stimsonite - Barrier and Guardrail Delineator, Model 965
5. Stimsonite - Barrier Delineator, Model 967
6. Astro Optics - JD-1 or No. 181
7. Reflexite Corp. - Model 661, Model 662
8. Duraflex Corp. - Flexx 2020

CLASS B

Reflectors for Barrel Mounted Guard Fence and other type Attenuators:

1. Stimsonite - Barrier and Guardrail Delineator, Model 965
2. Astro Optics - Guardrail Delineator, Model 567

Class A or B reflectors may be installed using pop rivets, nuts and bolts, construction adhesive or butyl rubber adhesive.

Class A or B reflectors shall be prequalified and shall conform to the color and reflectivity requirements of Specification D-9-8600.

Color of Class A or B reflector will be the same as the nearest edge line, gore pavement marking or as directed by the Engineer.

> Unless stated elsewhere in the plans, reflectorization of metal drums, delineation and reflectors shown on this standard shall be considered subsidiary to the various bid items.

> PREQUALIFICATION PROCEDURES MAY BE OBTAINED BY WRITING:
>
> DIVISION OF MAINTENANCE AND OPERATION
> TEXAS DEPARTMENT OF TRANSPORTATION (TxDOT)
> 125 EAST 11th STREET
> AUSTIN, TX 78701-2483

SPECIFICATION REFERENCE TABLE

MATERIALS AND TEST SPECIFICATIONS (D-9)	
EPOXY	D-9-6100
BITUMINOUS ADHESIVE	D-9-6130
ALUMINUM SIGN BLANKS	D-9-7110
FLAT SURFACE REFLECTIVE SHEETING, TYPE C (HIGH SPECIFIC INTENSITY)	D-9-8300
DELINEATOR AND OBJECT MARKER	D-9-8600

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

WORK ZONE BARRIER DELINEATION

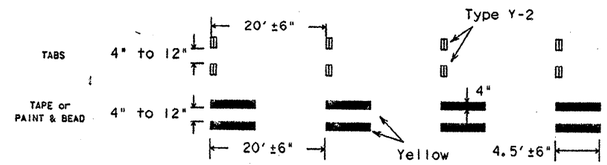
WZ(BD)-92

ORIGINAL DRAWING DATE: 4-92	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
DN.: LR/MT REVISIONS	15	6				4/07
CK.:	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DW.: DN	BEXAR		2452	02	023	LP169
CK.:						

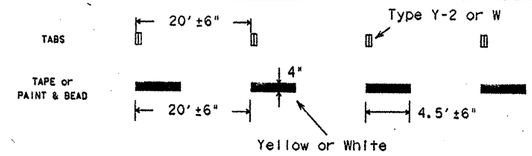
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

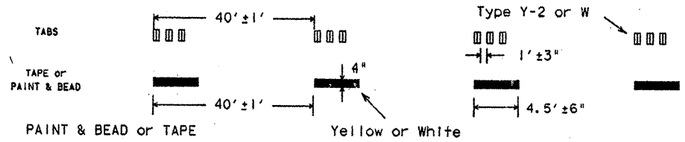


SINGLE NO-PASSING LINE or CHANNELIZATION LINE

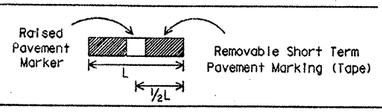


BROKEN LINE

(FOR CENTER LINE OR LANE LINE.)



If raised pavement markers are used to supplement REMOVABLE short term markings, the markers shall be applied to the top of the tape at the approximate mid length of the tape. This allows an easier removal of raised markers and tape.



SPECIFICATION REFERENCE TABLE	
MATERIALS AND TESTS SPECIFICATIONS (D-9)	
PREFABRICATED PAVEMENT MARKINGS-REMOVABLE	D-9-8241
TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS	D-9-8242
PAVEMENT MARKERS (REFLECTORIZED)	D-9-4200

NOTES:

1. Short term pavement markings may be paint and beads, prefabricated markings (stick down tape) or temporary flexible-reflective roadway marker tabs unless otherwise specified elsewhere in plans. Paint and beads shall not be used as removable short term pavement markings.
2. Short term pavement markings shall NOT be used to simulate edge lines.
3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
4. Temporary flexible-reflective roadway marker tabs will require normal maintenance replacement when used on roadways with an ADT per lane of up to 7500 vehicles with no more than 10% truck mix. When roadways exceed these values, additional maintenance replacement of devices should be planned.
5. No segment of roadway open to traffic shall remain without standard pavement markings for a period greater than 14 calendar days. The Contractor will be responsible for maintaining short term pavement markings until standard pavement markings are in place. When the Contractor is responsible for placement of standard pavement markings, no segment of roadway shall remain without standard pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Standard pavement markings shall be placed as soon as weather permits.
6. For two lane, two-way roadways, DO NOT PASS signs shall be erected to mark the beginning of sections where passing is prohibited and PASS WITH CARE signs shall be erected to mark the beginning of sections where passing is permitted. Signs shall be in accordance with the TMUTCD and may be used to indicate the limits of no-passing zones for up to 14 calendar days. Standard pavement markings should then be placed.
7. For low volume two lane, two-way roadways of 4000 ADT or less, no-passing lines may be omitted when approved by the Engineer. DO NOT PASS and PASS WITH CARE signs shall be erected (see note 6).

TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS (TABS)

1. Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one silver reflective surface with white body). Additional details may be found on BC(8).
2. Tabs shall meet requirements of Department Material Specification D-9-8242.
3. The body of Tabs shall consist of a base and vertical wall made of polyurethane, polyester elastomer or other material approved by the Division of Materials and Tests.
4. The reflective material shall be protected with an easily removable heat resistant transparent cover capable of withstanding and protecting reflective material from application of 400 degree F asphalt. Stapling or clipping devices used to retain the protective cover shall not protrude throught reflective material.
5. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A) Select five (5) or more tabs at random from each lot or shipment and submit to the Division of Materials and Tests to determine specification compliance.
   B) Select five (5) tabs and submit to the following test. Affix five (5) tabs at two (2) foot intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with front and rear wheels at a speed of 35 to 40 miles per hour, four times in each direction. No more than one (1) out of five reflective surfaces shall be lost or displaced as a result of this test.
6. When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low-beam head light at night, unless sight distance is restricted by roadway geometrics.
7. No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of note 6.

REMOVABLE - PREFABRICATED PAVEMENT MARKINGS

1. Prefabricated Pavement Markings shall be a material of manufacture and product code or designation shown on list of approved materials covered by Department Materials Specification: D-9-8241.

NON REMOVABLE - PREFABRICATED PAVEMENT MARKINGS (FOIL BACK)

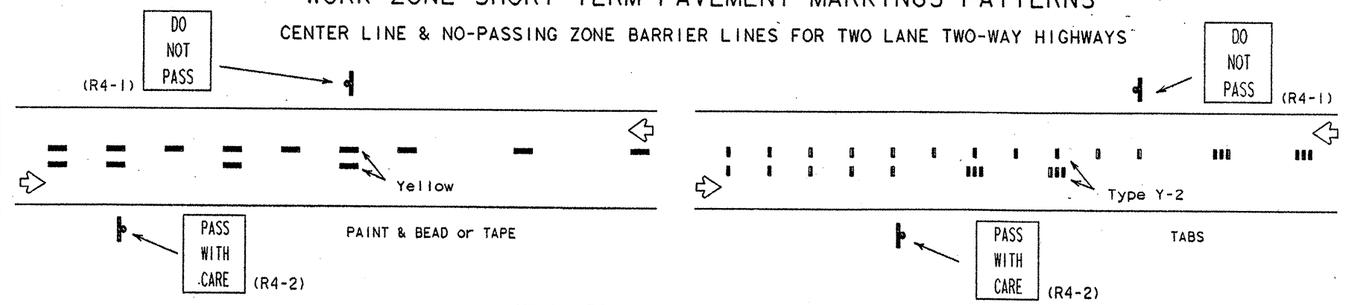
1. Prefabricated Pavement Markings shall be a material of manufacture and product code or designation shown on list of approved material covered by Specification TxDOT- 550-74-01.

RAISED PAVEMENT MARKERS

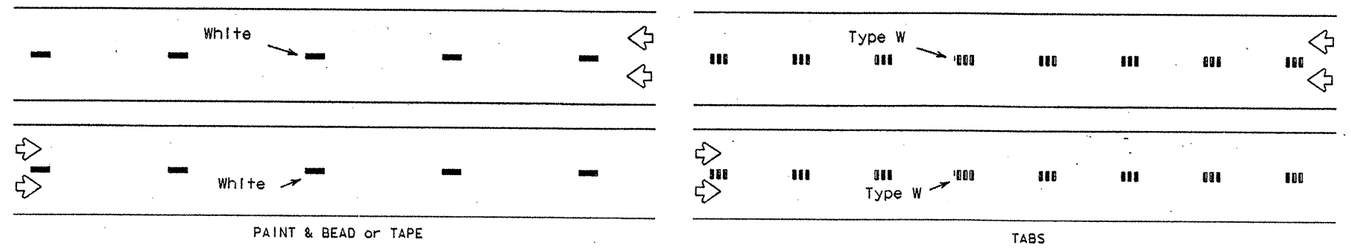
1. Raised pavement markers used to supplement short term removable pavement markings shall meet the requirements of item "RAISED PAVEMENT MARKERS".

WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS

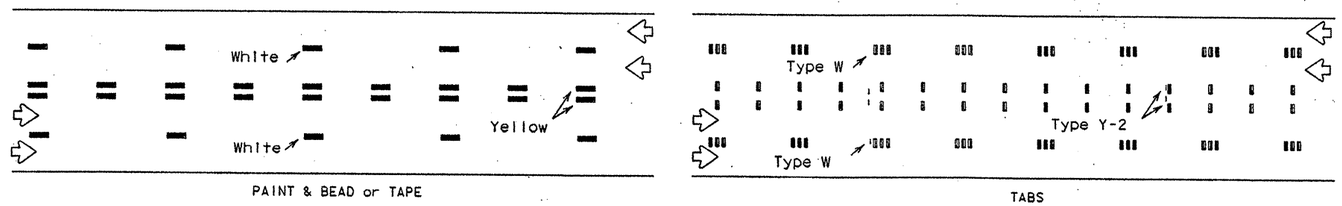
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



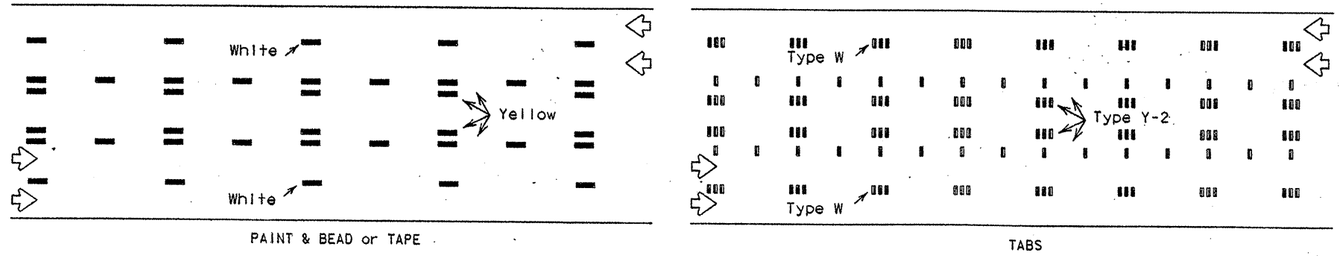
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

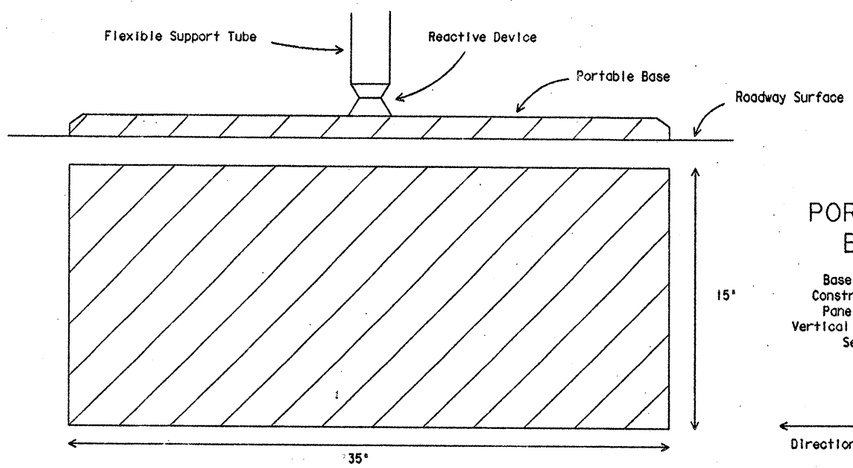
WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-92

ORIGINAL DRAWING DATE: 4-92	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.: LR	15	6		408
CK.:	COUNTY		CONTROL / SECTION / JOB	HIGHWAY
DN.: DN	BEXAR		7457 / 2 / 23	LP,IH
CK.:				112

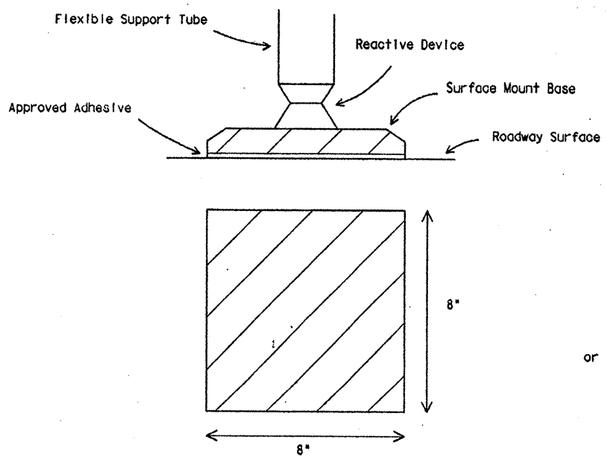
REVISIONS

Division of Maintenance and Operations



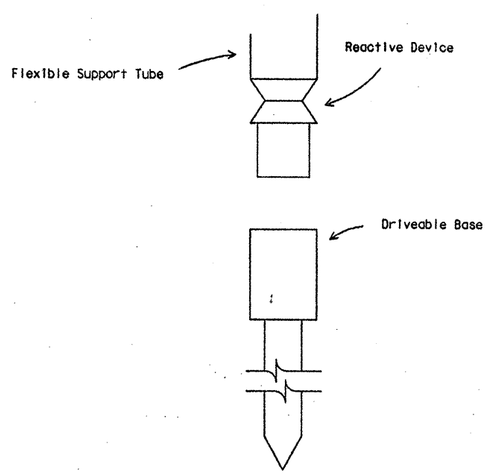
PORTABLE BASE

Base Support for Construction Object Panel (COP-F) or Vertical Panel (VP(F)-1). See Note 5.



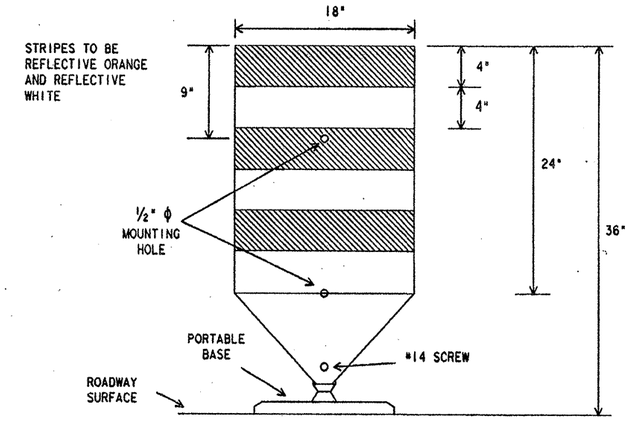
SURFACE MOUNT BASE

Fixed Base Support for Chevron CWI-8(F), Vertical Panels VP(F)-1 or Construction Object Panel (COP-F).

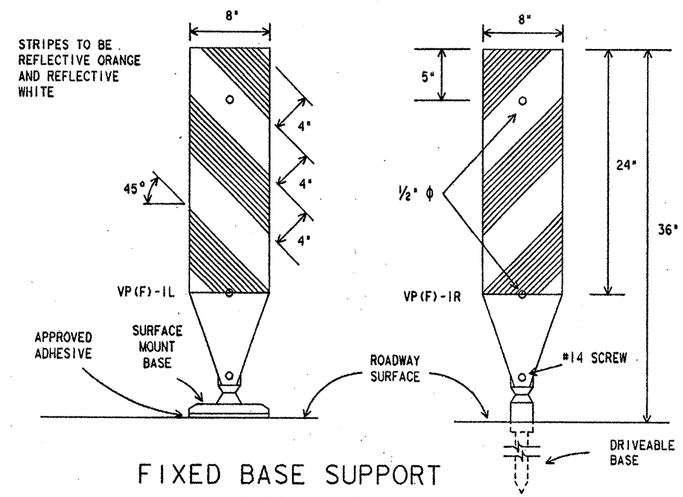


DRIVEABLE BASE

Fixed Base Support for vertical Panel VP(F)-1 or Chevron CWI-8(F).

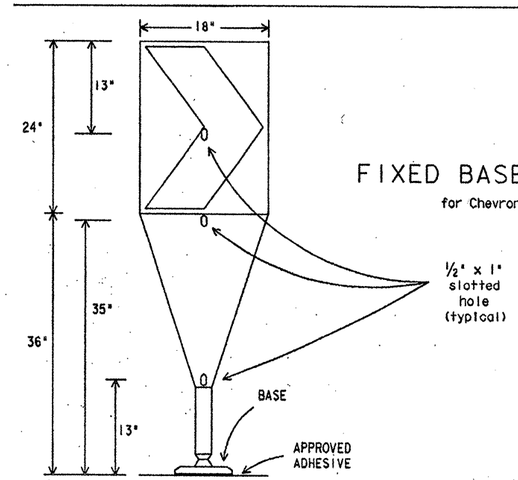


CONSTRUCTION OBJECT PANEL (COP-F)



FIXED BASE SUPPORT

for Vertical Panels VP(F)-1



FIXED BASE SUPPORT

for Chevrons CWI-8(F)

GENERAL NOTES:

1. Channelizing devices on flexible supports shall be used at locations detailed elsewhere in the plans. These devices shall conform to the Texas MUTCD.
2. Channelizing devices on flexible supports may be used in work zone areas where channelizing devices are frequently impacted by errant vehicles. Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. Devices should not be placed within one foot of the traveled way. Spacing and placement shall be uniform and in accordance with the Texas MUTCD.
3. The contractor shall maintain devices in a clean condition and replace damaged, non-reflective, faded, or broken devices and bases as necessary.
4. Devices shall be fabricated to withstand repeated impacts with minimal maintenance to devices and damage to vehicles. When devices are impacted, they should not adversely affect worker or vehicle safety.
5. Devices shall be erected on a fixed, portable, or driveable base as approved by the Engineer.
6. Portable bases shall be fabricated from a flexible material such as virgin and/or recycled rubber. Approximate weight of portable bases should be 35 pounds.
7. Fixed bases may be surface mount or driveable type.
8. Pavement surfaces shall be prepared in a manner that will insure proper bonding of adhesives and surface mount bases to the pavement surfaces. Adhesives shall be prepared and applied as per manufacturers recommendations.
9. Application and removal of devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface intregity. Driveable bases shall not be permitted on final pavement surfaces. All application and removal procedures of fixed bases shall be approved by the Engineer.
10. These devices shall not be paid for directly but shall be considered subsidiary to the item "Barricades, Signs, and Traffic Handling."

PREQUALIFICATION PROCEDURES MAY BE OBTAINED BY WRITING:

DIVISION OF MAINTENANCE AND OPERATIONS
TEXAS DEPARTMENT OF TRANSPORTATION (TxDOT)
125 EAST 11th STREET
AUSTIN, TX 78701-2483

SPECIFICATION REFERENCE TABLE
MATERIALS AND TEST SPECIFICATIONS (D-9)

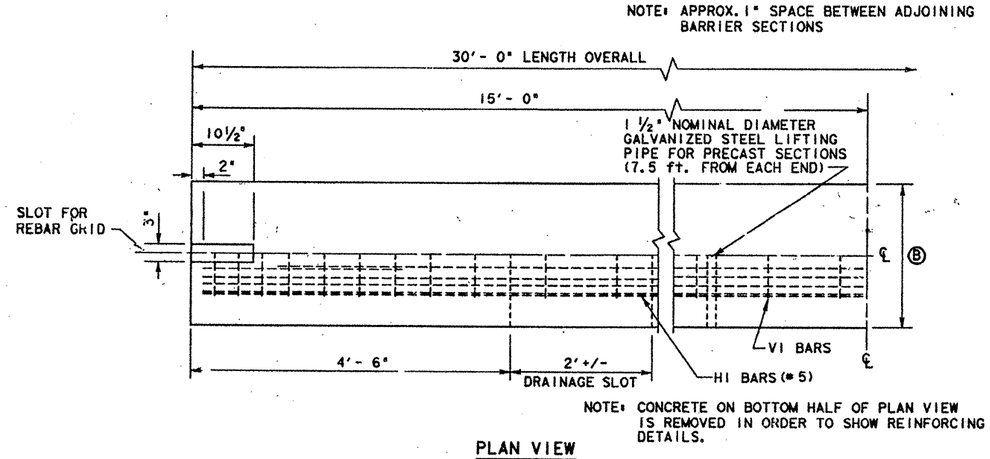
FLAT SURFACE REFLECTIVE SHEETING, TYPE C (HIGH SPECIFIC INTENSITY) D-9-8300

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

WORK ZONE CHANNELIZING DEVICES ON FLEXIBLE SUPPORTS

WZ(CD)-92

ORIGINAL DRAWING DATE: 1-92		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
DN.: LR/CW	REVISIONS	15	6				409
CK.:		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DN.: DN		BEXAR		2452	2	23	LP1604
CK.:							

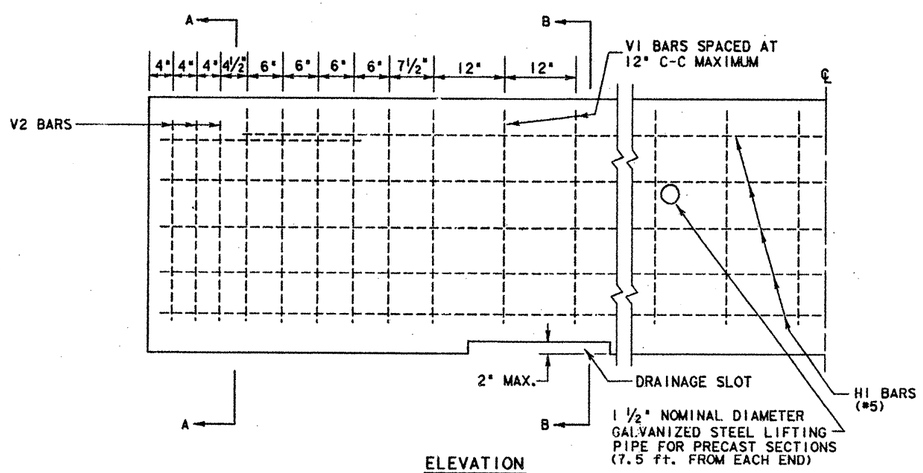


PLAN VIEW

(SYMMETRICAL ABOUT CENTER LINES)

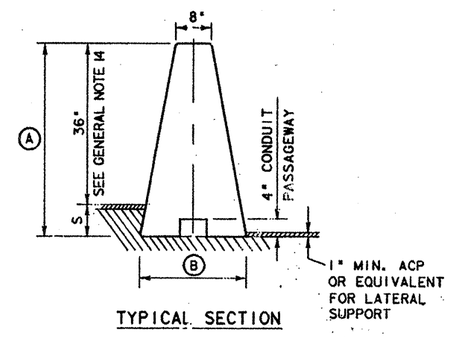
GENERAL NOTES

1. BARRIER LENGTH SHALL BE 30 FEET (+/- 1 INCH) UNLESS OTHERWISE SPECIFIED IN THE PLANS.
2. THE USUAL TEMPORARY INSTALLATION WILL REQUIRE THE PLACEMENT OF THE REBAR GRID IN THE UNGROUTED SLOT. THE USUAL PERMANENT INSTALLATION USING PRECAST BARRIER WILL CONNECT THE BARRIER SEGMENTS WITH THE REBAR GRID PLACED IN THE SLOT AND GROUTED IN PLACE.
3. WHEN INSTALLED IN A PERMANENT ROADWAY LOCATION, THE END CONNECTIONS OF THE PRECAST BARRIER SHALL BE GROUTED WITH A MIXTURE OF TWO PARTS SAND AND ONE PART CEMENT WITH ENOUGH WATER TO MAKE THE MIXTURE PLASTIC. GROUTING SHALL BE DONE IN A MANNER THAT WILL ASSURE A SMOOTH SURFACE AT THE JOINT.
4. ALL CONCRETE SHALL BE CLASS A, C, OR H, UNLESS OTHERWISE SPECIFIED.
5. ALL REINFORCING STEEL SHALL BE GRADE 60, UNLESS OTHERWISE SPECIFIED.
6. EACH PRECAST BARRIER TO BE INSTALLED IN A TEMPORARY LOCATION SHALL BE DELIVERED WITH A REBAR GRID.
7. CHAMFER TOP AND END EDGES ¾ INCH.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, THE CONTRACTOR HAS THE OPTION OF PLACING EITHER PRECAST OR CAST-IN-PLACE PERMANENT CONCRETE BARRIER. CAST-IN-PLACE BARRIER MAY BE SLIP FORMED. ADDITIONAL REINFORCEMENT MAY BE TACK WELDED TO THE UPPER TWO-THIRDS OF THE REINFORCING CAGE TO PROVIDE BRACING. VERTICAL BARS SHALL BE PROVIDED ONLY TO THE EXTENT NECESSARY TO POSITION LONGITUDINAL STEEL WITHIN TOLERANCES. LIFTING PIPE, REBAR GRID AND SLOT SHALL BE OMITTED FOR CAST-IN PLACE CONSTRUCTION.
9. BAR SPLICES FOR ROADWAY BARRIER SHALL BE A MINIMUM OF 24 TIMES THE NOMINAL DIAMETER OF THE BAR.
10. ANY METHOD DEVISED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER THAT WILL ASSURE THE LONGITUDINAL ROADWAY STEEL WILL BE POSITIONED +/- ½ INCH AS DIMENSIONED WILL BE SATISFACTORY.
11. WELDED WIRE FABRIC MAY BE USED AS AN OPTION TO CONVENTIONAL REINFORCEMENT FOR PRECAST OR CAST-IN-PLACE BARRIER. WELDED WIRE FABRIC SHALL BE MADE IN ACCORDANCE WITH ASTM A497.
12. CONDUIT TO BE PROVIDED ONLY WHEN CALLED FOR ELSEWHERE IN THE PLANS. POSITION OF THE CONDUIT OR CONDUIT PASSAGEWAY MAY BE ADJUSTED TO FACILITATE CONSTRUCTION, SUBJECT TO APPROVAL OF THE ENGINEER.
13. TRANSITIONS TO BARRIER HEIGHT, AS NEEDED, SHALL BE DETERMINED BY THE ENGINEER. CHANGES IN BARRIER HEIGHT SHOULD NOT NORMALLY EXCEED 2 INCHES PER 30 FOOT. VERTICAL STEEL SHALL BE UNIFORMLY TRANSITIONED THROUGHOUT THE VARIATION IN BARRIER HEIGHT AS DIRECTED BY THE ENGINEER.
14. A 36 INCH MINIMUM HEIGHT DIFFERENTIAL BETWEEN TOP OF BARRIER AND TOP OF ACP SHALL BE REQUIRED AT PLACEMENT IN ORDER TO ALLOW FOR UP TO 6 INCHES OF FUTURE OVERLAYS WHILE MAINTAINING A 30 INCH MINIMUM FUTURE EFFECTIVE HEIGHT OF BARRIER. TOTAL MINIMUM BARRIER HEIGHT FOR DESIGN IS THEREFORE DICTATED BY ALLOWANCE FOR FUTURE OVERLAYS PLUS EXISTING STAIRSTEP DIMENSION "S". MINIMUS TYPICALLY ROUNDED TO 42", 48", OR 54" TO FACILITATE PRECASTING.

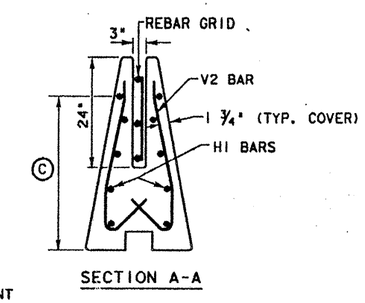


ELEVATION

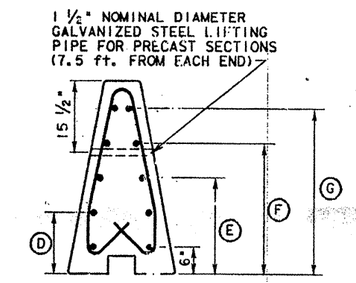
(SYMMETRICAL ABOUT CENTER LINES)



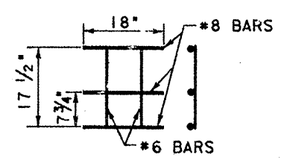
TYPICAL SECTION



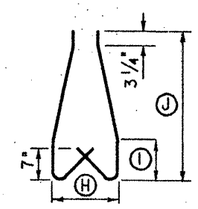
SECTION A-A



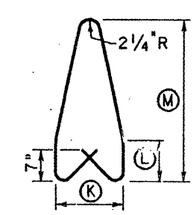
SECTION B-B



REBAR GRID

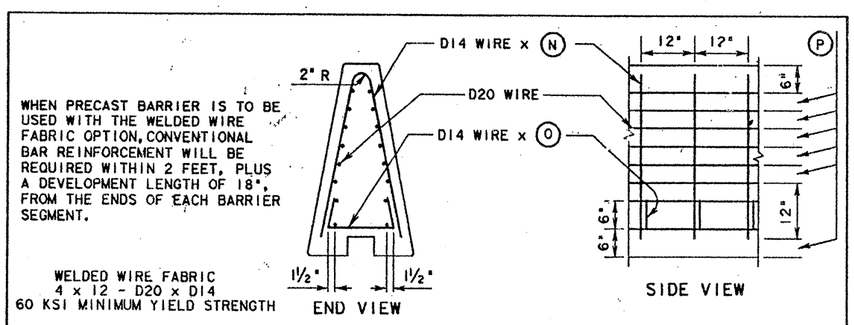


V2 BAR (#4)



V1 BAR (#4)

REINFORCING DETAILS



WELDED WIRE FABRIC OPTIONAL REINFORCING

BARRIER HEIGHT (IN.)	DIMENSIONS (IN.)															
	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	Ⓕ	Ⓖ	Ⓗ	Ⓘ	Ⓙ	Ⓚ	Ⓛ	Ⓜ	Ⓝ	Ⓞ	Ⓟ
42	42	24	33 ½	13 ½	21	28 ½	36	15	9 ¼	33 ¼	15	9 ¼	36	72	28	4
48	48	26 9/32	39 ½	15	24	33	42	17 ¼	10 ¾	39 ¼	17 ¼	10 ¾	42	84	31 ½	5
54	54	28 9/16	45 ½	16 ½	27	37 ½	48	19 ½	12 ¼	45 ¼	19 ½	12 ¼	48	96	34 ¾	6

TEXAS DEPARTMENT OF TRANSPORTATION

SINGLE SLOPE CONCRETE BARRIER

TYPE 2

SSCB(2)-92

MODIFICATIONS	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				SHEET NO.
	6	TEXAS	NH 90(191)M, Etc.				410
	STATE DIST. NO.	COUNTY		CONT.	SECT.	JOB	HIGHWAY NO.
	15	Bexar		2452	2	23	Loop 410

DIVISION OF HIGHWAY DESIGN (RD 8)

F3081 '/93

LETTER OF TRANSMITTAL

2 PARTS

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS

(210) 735-9202
FAX (210) 735-2074

3838 N.W. LOOP 410
SUITE 200
SAN ANTONIO, TX 78229

DATE 1/11/94 JOB. NO. 94-018H

ATTENTION Mr. Greg Kindle

RE: Bexar County LP. 1604
Project No. NH 90(191) M, etc.
Control No. 2452-02-023, etc.

(Beams)

TO Texas Dept. of Transportation
125 E. 11th St.
Austin Texas 78701

GENTLEMEN:

WE ARE SENDING YOU ☑ Attached ☐ Under separate cover via _____ the following items:

☑ Shop drawings ☑ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☑ Optional Designs

COPIES	DATE	NO.	DESCRIPTION
7			E-1 Thru E-6
6			I-1, NP-1, 54-1 Thru 54-5, IV-1 Thru IV-12,
			C-1 Thru C-21, S-"54", S-"IV" & S-"C"
1			O.D. #1 Thru O.D. #5

RECEIVED
JAN 12 1994
BRIDGE DIVISION

5P1

THESE ARE TRANSMITTED as checked below:

☑ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval

☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution

☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints

☐ For review and comment ☐ _____

☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS Please return ~~one complete set after~~ reviewing.

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

Thank You

COPY TO _____

SIGNED: Michael J. Ripley
Michael J. Ripley

Texas Department of Transportation

DEWITT C. GREER STATE HIGHWAY BLDG. • 125 E. 11TH STREET • AUSTIN, TEXAS 78701-2483 • (512) 463-8585

February 16, 1994

Shop Plan File No. P-~~3081~~ 7209
Your Order: 94-018H

County: Bexar
Control: 2452-02-023
Project: NH 90(191)M
Highway: LP 1604

Structural Engineering Associates
3838 N. W. Loop 410, Suite 200
San Antonio, TX 78229

Attention: Mr. Michael J. Rigsby

Gentlemen:

We have reviewed your shop drawings, O.D. Nos. 1 thru 5, sheets E-1 thru E-6, I-1, NP-1, 54-1 thru 54-5, IV-1 thru IV-12, C-1 thru C-21, S-"54", S-"IV", & S-"C", covering C beams, 54" beams, Type IV beams, and neoprene pads on the above project. The drawings are approved for fabrication and are enclosed.

Any corrections noted in red must be incorporated into the work. Revised prints for these corrections will not be necessary.

One set of any erection drawings, included herein, has been sent to the Contractor.

Sincerely,
Original Signed for
Robert L. Wilson, P.E.

Robert L. Wilson, P.E.
Director, Design Division

MAB:ew
Encl.

cc: San Antonio District
Materials & Tests Division
Gilbert Texas Const. Corp.

SP-1

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

PRESTRESSED CONCRETE OPTIONAL DESIGN
STANDARD I BEAM SECTION
(DRAPED OR STRAIGHT STRAND PATTERN)

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DIVISION OF BRIDGES AND STRUCTURES

FEB 17 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL.

RESERVE THIS SPACE FOR APPROVAL STAMP

Reason for Rejection:

Optional Design No. OD- 1
Project No. : NH 90(191)M, ETC.
Contractor : GILBERT TEXAS
Fabricator : MANUF. CONCRETE PRODUCTS CO.
Plan Sheet No. : 200

SHOP PLAN FILE NO.	COUNTY	HIGHWAY NO.	CONTROL-SECTION-JOB
	BEXAR	LOOP 1604	2452-02-023

LOOP 1604 O'PASS @ KYLE SEALE PKWY
PROB 1 SPAN 1 BEAMS 1-4 (W.B.)

Card	Fields	Values
Beam Card: BEAMF	BEAM TYPE / SPAN LENGTH C-C BRG. (ft.) / BEAM SPAC. (ft.) / SLAB THICKNESS (in.) / RELATIVE HUMIDITY	54 / 73.75 / 6.80 / 7.50 / 70
Analysis Card: ANLY	C.L. DESIGN STRESS (PSI) TOP (fct) / BOTTOM (fcb) / REQUIRED ULTIMATE MOMENT (kip-ft.) / FABRICATOR'S CONCRETE STRENGTH (PSI) RELEASE / 28-DAY	2029. / - 2676. / 3039. / 4400. / 5000.
Strand Card: STRD	STRAND SIZE (in.) / L R (Low-Relaxation) S R (Stress-Relieved) / STRAND ULTIMATE STRENGTH (ksi)	1/2 / LR / 270
Materials Card: MAT1	MOD. OF ELASTICITY OF BEAM (ksi) / MOD. OF ELASTICITY OF SLAB (ksi) / SLAB 28-DAY CONC. STRENGTH (PSI)	5000. / 5000. / 3600
Specifications Card: SPEC	LIVE LOAD TYPE	HS20
Centerline Strand Pattern Card: STPR LOCR	CL (Dist. from bottom in.) / STRANDS PER ROW	6 6 6 4 / 2 4 6 8
End Strand Pattern Card: STPR LOCR	ED (Dist. from bottom in.) / STRANDS PER ROW	4 4 4 2 2 2 2 2 / 2 4 6 8 32 34 36 38
Transformed Steel Card: TRNF	BARS U AREA (sq. in.) DIST. FROM BOTTOM (in.)	C1
Original Beam Camber Card: ACAM	NO. OF STRANDS / END ECCENTRICITY (in.) / C.L. ECCENTRICITY (in.) / STRAND SIZE (in.) / L R (Low-Relaxation) S R (Stress-Relieved) / STRAND ULTIMATE STRENGTH (ksi)	18 / 16.86 / 21.53 / 1/2 / LR / 270

STATE OF TEXAS
M. NATARAJAN
30603
1-11-94
REGISTERED
PROFESSIONAL ENGINEER

RECEIVED
JAN 12 1994
BRIDGE DIVISION

Form 1110-A March 1983

For S.E.A. Use Only (FAST HWY 5-20-92 CPQ:) TXDOT DESIGN

Depress Strand Pattern; C.L. 2 in. Grid
22 LOLAX Strand Total

Ult Moment Provided = 4050 K-Ft.
8 Strands To A- 38 @ End
8 Strands To A- 8 @ Midspan

e @ mid span= 20.8 in e @ end= 9.889999 in No. Of lanes=2 Or More
Camber @ Erection = 2.06 in. Original Design Camber = 1.95 in.
Original Release Strength = 4000 psi. Hold-Down Distance = 10.5 ft.

SP-2

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

PRESTRESSED CONCRETE OPTIONAL DESIGN
STANDARD I BEAM SECTION
(DRAPED OR STRAIGHT STRAND PATTERN)

Optional Design No. OD- 3
Project No. :NH 90(191)M,ETC.
Contractor : GILBERT TEXAS
Fabricator : MANUF. CONCRETE PRODUCTS CO.
Plan Sheet No. : 200

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DIVISION OF BRIDGES AND STRUCTURES

FEB 17 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL.

RESERVE THIS SPACE FOR APPROVAL STAMP

Reason for Rejection:

SHOP PLAN FILE NO. | COUNTY: BEXAR | HIGHWAY NO.: LOOP 1604 | CONTROL-SECTION-JOB: 2452-02-023

STRUCTURE NAME: LOOP 1604 @ HUESTA CREEK

PROB: OD 3 SPAN 2 BEAMS 2-4 (E.B.)

Beam Card: BEAM F | BEAM TYPE: C | SPAN LENGTH C-C BRG (ft.): 58.75 | BEAM SPAC. (ft.): 8.50 | SLAB THICKNESS (in.): 8.00 | RELATIVE HUMIDITY: 70

Analysis Card: ANLY | C.L. DESIGN STRESS (PSI) TOP (fct): 2290. | BOTTOM (fcb): - 2697. | REQUIRED ULTIMATE MOMENT (kip-ft.): 2616. | FABRICATOR'S CONCRETE STRENGTH (PSI) RELEASE: 5640. | 28-DAY: 5640.

Strand Card: STRD | STRAND SIZE (in.): 1/2 | L R (Low-Relaxation) S R (Stress-Relieved): LR | STRAND ULTIMATE STRENGTH (ksi): 270

Materials Card: MAT1 | MOD. OF ELASTICITY OF BEAM (ksi): 5000. | MOD. OF ELASTICITY OF SLAB (ksi): 5000. | SLAB 28-DAY CONC. STRENGTH (PSI): 3600

Specifications Card: SPEC | LIVE LOAD TYPE: HS20

Centerline Strand Pattern Card: STPR LOCR (Dist. from bottom in.) CL — STRANDS PER ROW: 8 10 10 2 / 2 4 6 8

End Strand Pattern Card: STPR LOCR (Dist. from bottom in.) ED — STRANDS PER ROW: 8 8 8 2 2 2 / 2 4 6 30 32 34

Transformed Steel Card: TRNF | BARS U AREA (sq. in.) DIST. FROM BOTTOM (in.): C1

Original Beam Camber Card: ACAM | NO. OF STRANDS: 20 | END ECCENTRICITY (in.): 10.09 | C.L. ECCENTRICITY (in.): 14.09 | STRAND SIZE (in.): 1/2 | L R (Low-Relaxation) S R (Stress-Relieved): LR | STRAND ULTIMATE STRENGTH (ksi): 270

STATE OF TEXAS — M. NATARAJAN — 30603 — 1-11-94 — REGISTERED PROFESSIONAL ENGINEER

RECEIVED JAN 12 1994 BRIDGE DIVISION

Form 1110-A March 1990

For S.E.A. Use Only (FAST HWY 5-20-92 CPQ:) TXDOT DESIGN

Depress Strand Pattern; C.L. 2 in. Grid — Ult Moment Provided = 4135 K-Ft.
30 LOLAX Strand Total — 6 Strands To A- 34 @ End
6 Strands To A- 8 @ Midspan
e @ mid span= 12.69 in — e @ end= 7.49 in — No. Of lanes=2 Or More
Camber @ Erection = 2.21 in. — Original Design Camber = 1.85 in.
Original Release Strength = 4000 psi. — Hold-Down Distance = 10.5 ft.

SP-3

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

PRESTRESSED CONCRETE OPTIONAL DESIGN
STANDARD I BEAM SECTION
(DRAPED OR STRAIGHT STRAND PATTERN)

Optional Design No. OD- 2
Project No. :NH 90(191)M,ETC.
Contractor : GILBERT TEXAS
Fabricator : MANUF. CONCRETE PRODUCTS CO.
Plan Sheet No. : 200

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DIVISION OF BRIDGES AND STRUCTURES

FEB 17 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL.

RESERVE THIS SPACE FOR APPROVAL STAMP

Reason for Rejection:

SHOP PLAN FILE NO. | COUNTY: BEXAR | HIGHWAY NO.: LOOP 1604 | CONTROL-SECTION-JOB: 2452-02-023

STRUCTURE NAME: LOOP 1604 O'PASS @ HAUSMAN RD

PROB: OD 2 SPANS 1 & 3 BEAMS 1-6 (E.B. & W.B.)

Beam Card: BEAM F | BEAM TYPE: IV | SPAN LENGTH C-C BRG. (ft.): 98.57 | BEAM SPAC. (ft.): 6.80 | SLAB THICKNESS (in.): 7.50 | RELATIVE HUMIDITY: 70

Analysis Card: ANLY | C.L. DESIGN STRESS (PSI) TOP (fct): 2913. | BOTTOM (fcb): - 3150. | REQUIRED ULTIMATE MOMENT (kip-ft.): 5202. | FABRICATOR'S CONCRETE STRENGTH (PSI) RELEASE: 6020. | 28-DAY: 7040.

Strand Card: STRD | STRAND SIZE (in.): 1/2 | L R (Low-Relaxation) S R (Stress-Relieved): LR | STRAND ULTIMATE STRENGTH (ksi): 270

Materials Card: MAT1 | MOD. OF ELASTICITY OF BEAM (ksi): 5000. | MOD. OF ELASTICITY OF SLAB (ksi): 5000. | SLAB 28-DAY CONC. STRENGTH (PSI): 3600

Specifications Card: SPEC | LIVE LOAD TYPE: HS20

Centerline Strand Pattern Card: STPR LOCR (Dist. from bottom in.) CL — STRANDS PER ROW: 10 10 10 8 4 2 2 2 2 2 / 2 4 6 8 10 40 42 44 46 48

End Strand Pattern Card: STPR LOCR (Dist. from bottom in.) ED — STRANDS PER ROW: 10 10 10 8 4 2 2 2 2 2 / 2 4 6 8 10 40 42 44 46 48

Transformed Steel Card: TRNF | BARS U AREA (sq. in.) DIST. FROM BOTTOM (in.): C1

Original Beam Camber Card: ACAM | NO. OF STRANDS: 34 | END ECCENTRICITY (in.): 12.75 | C.L. ECCENTRICITY (in.): 20.87 | STRAND SIZE (in.): 1/2 | L R (Low-Relaxation) S R (Stress-Relieved): LR | STRAND ULTIMATE STRENGTH (ksi): 270

STATE OF TEXAS — M. NATARAJAN — 30603 — 1-11-94 — REGISTERED PROFESSIONAL ENGINEER

RECEIVED JAN 12 1994 BRIDGE DIVISION

Form 1110-A March 1990

For S.E.A. Use Only (FAST HWY 5-20-92 CPQ:) TXDOT DESIGN

Depress Strand Pattern; C.L. 2 in. Grid — Ult Moment Provided = 7399 K-Ft.
52 LOLAX Strand Total — 10 Strands To A- 48 @ End
10 Strands To A- 48 @ Midspan
e @ mid span= 11.98 in — e @ end= 11.98 in — No. Of lanes=2 Or More
Camber @ Erection = 2 in. — Original Design Camber = 2.5 in.
Uplift= 0 K — Max. X For Cant. @ Pickup Pt.= 20.5 Ft @ MidSpan= 27 Ft
Original Release Strength = 4029 psi. — Hold-Down Distance = 10.5 ft.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

PRESTRESSED CONCRETE OPTIONAL DESIGN
STANDARD I BEAM SECTION
(DRAPED OR STRAIGHT STRAND PATTERN)

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DIVISION OF BRIDGES AND STRUCTURES

FEB 17 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL.

RESERVE THIS SPACE FOR APPROVAL STAMP

Optional Design No. OD- 5
Project No. : NH 90(191)M, ETC.
Contractor : GILBERT TEXAS
Fabricator : MANUF. CONCRETE PRODUCTS CO.
Plan Sheet No. : 200

Reason for Rejection: .....

SHOP PLAN FILE NO.	COUNTY	HIGHWAY NO.	CONTROL-SECTION-JOB
	BEXAR	LOOP 1604	2452-02-023

STRUCTURE NAME: LOOP 1604 @ HUESTA CREEK

PROB: OD 5 SPAN 3 BEAM 1 (E.B.)

Beam Card: BEAMF

BEAM TYPE	SPAN LENGTH C-C BRG. (ft.)	BEAM SPAC. (ft.)	SLAB THICKNESS (in.)	RELATIVE HUMIDITY
C	43.75	8.50	8.00	70

Analysis Card: ANLY

C.L. DESIGN STRESS (PSI) TOP (fct)	BOTTOM (fcb)	REQUIRED ULTIMATE MOMENT (kip-ft.)	FABRICATOR'S CONCRETE STRENGTH (PSI) RELEASE	28-DAY
1310.	- 1625.	1650.	4000.	5000.

Strand Card: STRD — STRAND SIZE (in.): 1/2 — L R (Low-Relaxation) S R (Stress-Relieved): LR — STRAND ULTIMATE STRENGTH (ksi): 270

Materials Card: MAT1 — MOD. OF ELASTICITY OF BEAM (ksi): 5000. — MOD. OF ELASTICITY OF SLAB (ksi): 5000. — SLAB 28-DAY CONC. STRENGTH (PSI): 3600

Specifications Card: SPEC — LIVE LOAD TYPE: HS20

Centerline Strand Pattern Card: STPR LOCR (Dist. from bottom in.) — CL — STRANDS PER ROW: 10, 4 / 2, 4

End Strand Pattern Card: STPR LOCR (Dist. from bottom in.) — ED — STRANDS PER ROW: 8, 2, 2, 2 / 2, 4, 14, 16

Transformed Steel Card: TRNF — BARS U AREA (sq. in.) DIST. FROM BOTTOM (in.): C1

Original Beam Camber Card: ACAM — NO. OF STRANDS: 12 — END ECCENTRICITY (in.): 12.09 — C.L. ECCENTRICITY (in.): 14.76 — STRAND SIZE (in.): 1/2 — L R (Low-Relaxation) S R (Stress-Relieved): LR — STRAND ULTIMATE STRENGTH (ksi): 270

STATE OF TEXAS — M. NATARAJAN — 30603 — 1-11-94 — REGISTERED PROFESSIONAL ENGINEER

RECEIVED JAN 12 1994 BRIDGE DIVISION

Form 1110-A March 1990

For S.E.A. Use Only (FAST HWY 5-20-92 CPQ:) TXDOT DESIGN

Depress Strand Pattern; C.L. 2 in. Grid — Ult Moment Provided = 2108 K-Ft.
14 LOLAX Strand Total — 4 Strands To A- 16 @ End
4 Strands To A- 4 @ Midspan
e @ mid span= 14.52 in — e @ end= 11.09 in — No. Of lanes=2 Or More
Camber @ Erection = .86 in. — Original Design Camber = .73 in.
Original Release Strength = 4000 psi. — Hold-Down Distance = 10.5 ft.

SP-4

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

PRESTRESSED CONCRETE OPTIONAL DESIGN
STANDARD I BEAM SECTION
(DRAPED OR STRAIGHT STRAND PATTERN)

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DIVISION OF BRIDGES AND STRUCTURES

FEB 17 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL.

RESERVE THIS SPACE FOR APPROVAL STAMP

Optional Design No. OD- 4
Project No. : NH 90(191)M, ETC.
Contractor : GILBERT TEXAS
Fabricator : MANUF. CONCRETE PRODUCTS CO.
Plan Sheet No. : 200

Reason for Rejection: .....

SHOP PLAN FILE NO.	COUNTY	HIGHWAY NO.	CONTROL-SECTION-JOB
	BEXAR	LOOP 1604	2452-02-023

STRUCTURE NAME: LOOP 1604 @ HUESTA CREEK

PROB: OD 4 SPAN 1 BEAM 1 (E.B.)

Beam Card: BEAMF

BEAM TYPE	SPAN LENGTH C-C BRG. (ft.)	BEAM SPAC. (ft.)	SLAB THICKNESS (in.)	RELATIVE HUMIDITY
C	48.75	8.50	8.00	70

Analysis Card: ANLY

C.L. DESIGN STRESS (PSI) TOP (fct)	BOTTOM (fcb)	REQUIRED ULTIMATE MOMENT (kip-ft.)	FABRICATOR'S CONCRETE STRENGTH (PSI) RELEASE	28-DAY
1608.	- 1960.	1960.	4000.	5000.

Strand Card: STRD — STRAND SIZE (in.): 1/2 — L R (Low-Relaxation) S R (Stress-Relieved): LR — STRAND ULTIMATE STRENGTH (ksi): 270

Materials Card: MAT1 — MOD. OF ELASTICITY OF BEAM (ksi): 5000. — MOD. OF ELASTICITY OF SLAB (ksi): 5000. — SLAB 28-DAY CONC. STRENGTH (PSI): 3600

Specifications Card: SPEC — LIVE LOAD TYPE: HS20

Centerline Strand Pattern Card: STPR LOCR (Dist. from bottom in.) — CL — STRANDS PER ROW: 10, 6 / 2, 4

End Strand Pattern Card: STPR LOCR (Dist. from bottom in.) — ED — STRANDS PER ROW: 8, 4, 2, 2 / 2, 4, 16, 18

Transformed Steel Card: TRNF — BARS U AREA (sq. in.) DIST. FROM BOTTOM (in.): C1

Original Beam Camber Card: ACAM — NO. OF STRANDS: 14 — END ECCENTRICITY (in.): 11.09 — C.L. ECCENTRICITY (in.): 14.52 — STRAND SIZE (in.): 1/2 — L R (Low-Relaxation) S R (Stress-Relieved): LR — STRAND ULTIMATE STRENGTH (ksi): 270

STATE OF TEXAS — M. NATARAJAN — 30603 — 1-11-94 — REGISTERED PROFESSIONAL ENGINEER

RECEIVED JAN 12 1994 BRIDGE DIVISION

Form 1110-A March 1990

For S.E.A. Use Only (FAST HWY 5-20-92 CPQ:) TXDOT DESIGN

Depress Strand Pattern; C.L. 2 in. Grid — Ult Moment Provided = 2386 K-Ft.
16 LOLAX Strand Total — 4 Strands To A- 18 @ End
4 Strands To A- 4 @ Midspan
e @ mid span= 14.34 in — e @ end= 10.84 in — No. Of lanes=2 Or More
Camber @ Erection = 1.14 in. — Original Design Camber = .98 in.
Original Release Strength = 4000 psi. — Hold-Down Distance = 10.5 ft.

I N D E X

STRUCTURE		BEAM		LENGTH			1/2"ø-270k LO-LAX STRANDS					CONCRETE		ENDS				
										DEPRESSED								
DESIG-NATION	SPAN NO.	TYPE & MARK NO.	QUANTITY	I.D.T.S. ADDED	DESIGN (A)	CAST (B)	TOTAL QUANTITY	"e" AT ℄	"e" AT END	QUAN.	AT	MINIMUM RELEASE	MIN. COMP. 28 DAY STRENGTH	SKEW (INCHES)	BATTER (INCHES)	BEAM DETAIL SHEET NO.	DESIGN REFERENCE NO.	REMARKS
LOOP 1604 OVERPASS AT KYLE SEALE PKWY. EASTBOUND AND WESTBOUND MAINLANES	1,3	54-1	3	None	74.67'	74.74'	18	21.53"	16.86"	6	A-20	4000	5000	None	None	54-1	Gp-NS-LR	NONE
	1,3	54-2	13	None	74.67'	74.74'	18	21.53"	16.86"	6	A-20	4000	5000	None	None	54-2	Gp-NS-LR	NONE
	1,3	54-3	4	None	74.67'	74.74'	18	21.53"	16.86"	6	A-20	4000	5000	None	None	54-3	Gp-NS-LR	NONE
	1	54-4	1	None	74.67'	74.74'	22	20.80"	9.89"	8	A-38	4400	5000	None	None	54-4	O.D. # 1	NONE
	1	54-5	3	None	74.67'	74.74'	22	20.80"	9.89"	8	A-38	4400	5000	None	None	54-5	O.D. # 1	NONE
	2	IV-1	2	None	107.67'	107.72'	42	20.18"	11.80"	8	A-52	4762	6004	None	None	IV-1	Gp-NS-LR	NONE
	2	IV-2	8	None	107.67'	107.72'	42	20.18"	11.80"	8	A-52	4762	6004	None	None	IV-2	Gp-NS-LR	NONE
	2	IV-3	2	None	107.67'	107.72'	42	20.18"	11.80"	8	A-52	4762	6004	None	None	IV-3	Gp-NS-LR	NONE
LOOP 1604 EASTBOUND AND WESTBOUND MAINLANES BRIDGE AT HUESTA CREEK ROADWAY "A"	1	C-1	1	None	49.68'	49.73'	16	14.34"	10.84"	4	A-18	4000	5000	None	1"	C-1	O.D # 4	NONE
	1	C-2	6	None	49.68'	49.73'	14	14.52"	11.09"	4	A-16	4000	5000	None	1"	C-2	Gp-NS-LR	NONE
	1	C-3	2	None	49.68'	49.73'	14	14.52"	11.09"	4	A-16	4000	5000	None	1"	C-3	Gp-NS-LR	NONE
	1	C-4	1	None	49.68'	49.73'	14	14.52"	11.09"	4	A-16	4000	5000	None	1"	C-4	Gp-NS-LR	NONE
	2	C-5	2	None	59.69'	59.75'	20	14.09"	10.09"	4	A-24	4000	5000	None	None	C-5	Gp-NS-LR	NONE
	2	C-6	3	None	59.69'	59.75'	30	12.69"	7.49"	6	A-34	5640	5640	None	None	C-6	O.D. # 3	NONE
	2	C-7	2	None	59.69'	59.75'	20	14.09"	10.09"	4	A-24	4000	5000	None	None	C-7	Gp-NS-LR	NONE
	2	C-8	3	None	59.69'	59.75'	20	14.09"	10.09"	4	A-24	4000	5000	None	None	C-8	Gp-NS-LR	NONE
	3	C-10	1	None	44.68'	44.72'	14	14.52"	11.09"	4	A-16	4000	5000	None	1"	C-10	O.D. # 5	NONE
	3	C-11	6	None	44.68'	44.72'	12	14.76"	12.09"	4	A-12	4000	5000	None	1"	C-11	Gp-NS-LR	NONE
	3	C-9	1	None	44.68'	44.72'	12	14.76"	12.09"	4	A-12	4000	5000	None	1"	C-9	Gp-NS-LR	NONE
	3	C-12	2	None	44.68'	44.72'	12	14.76"	12.09"	4	A-12	4000	5000	None	1"	C-12	Gp-NS-LR	NONE
LOOP 1604 OVERPASS AT HAUSMAN RD. EASTBOUND AND WESTBOUND MAINLANES	1,3	IV-5	4	None	99.67'	99.72'	52	11.98"	11.98"	STRAIGHT		6020	7040	10 7/8"	None	IV-5	O.D. # 2	NONE
	1,3	IV-6	4	None	99.67'	99.72'	52	11.98"	11.98"	STRAIGHT		6020	7040	10 7/8"	None	IV-6	O.D. # 2	NONE
	1,3	IV-7	12	None	99.67'	99.72'	52	11.98"	11.98"	STRAIGHT		6020	7040	10 7/8"	None	IV-7	O.D. # 2	NONE
	1,3	IV-8	4	None	99.67'	99.72'	52	11.98"	11.98"	STRAIGHT		6020	7040	10 7/8"	None	IV-8	O.D. # 2	NONE
	2	IV-11	2	None	124.67'	124.73'	52	19.29"	11.21"	10	A-52	5749	7948	None	None	IV-11	Gp-NS-LR	NONE
	2	IV-9	2	None	124.67'	124.73'	52	19.29"	11.21"	10	A-52	5749	7948	10 7/8"	None	IV-9	Gp-NS-LR	NONE
	2	IV-4	6	None	124.67'	124.73'	52	19.29"	11.21"	10	A-52	5749	7948	None	None	IV-4	Gp-NS-LR	NONE
	2	IV-10	2	None	124.67'	124.73'	52	19.29"	11.21"	10	A-52	5749	7948	10 7/8"	None	IV-10	Gp-NS-LR	NONE
	2	IV-12	2	None	124.67'	124.73'	52	19.29"	11.21"	10	A-52	5749	7948	None	None	IV-12	Gp-NS-LR	NONE
LOOP 1604 OVERPASS AT S.H. 16 (BANDERA RD.) WESTBOUND MAINLANES	1	C-14	1	None	54.67'	54.72'	14	14.52"	11.09"	4	A-16	4000	5000	1/2"	None	C-14	Gp-NS-LR	NONE
	1	C-15	4	None	54.67'	54.72'	14	14.52"	11.09"	4	A-16	4000	5000	1/2"	None	C-15	Gp-NS-LR	NONE
	1	C-16	1	None	54.67'	54.72'	14	14.52"	11.09"	4	A-16	4000	5000	1/2"	None	C-16	Gp-NS-LR	NONE
	2,3	C-17	2	None	79.67'	79.75'	30	13.09"	7.49"	6	A-34	5031	6027	None	None	C-17	Gp-NS-LR	NONE
	2,3	C-18	8	None	79.67'	79.75'	30	13.09"	7.49"	6	A-34	5031	6027	None	None	C-18	Gp-NS-LR	NONE
	2,3	C-19	2	None	79.67'	79.75'	30	13.09"	7.49"	6	A-34	5031	6027	None	None	C-19	Gp-NS-LR	NONE
	4	C-20	1	None	59.67'	59.73'	16	14.34"	10.84"	4	A-18	4000	5000	1"	None	C-20	Gp-NS-LR	NONE
	4	C-21	4	None	59.67'	59.73'	16	14.34"	10.84"	4	A-18	4000	5000	1"	None	C-21	Gp-NS-LR	NONE
	4	C-13	1	None	59.67'	59.73'	16	14.34"	10.84"	4	A-18	4000	5000	1"	None	C-13	Gp-NS-LR	NONE

SP-5

RECEIVED
JAN 12 1994
BRIDGE DIVISION

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION
FEB 16 1994
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

FOR APPROVAL
JAN 11 1994

TOTAL OVERHANG INSERTS THIS PROJECT : 918
TOTAL LINEAR FEET OF THIS PROJECT : 10404.16'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR : GILBEIRT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.			HWY. NO.
6	TEXAS	NH 90(191)M, etc.			LP 1604
STATE DIST.NO.	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR		2452	02	023etc

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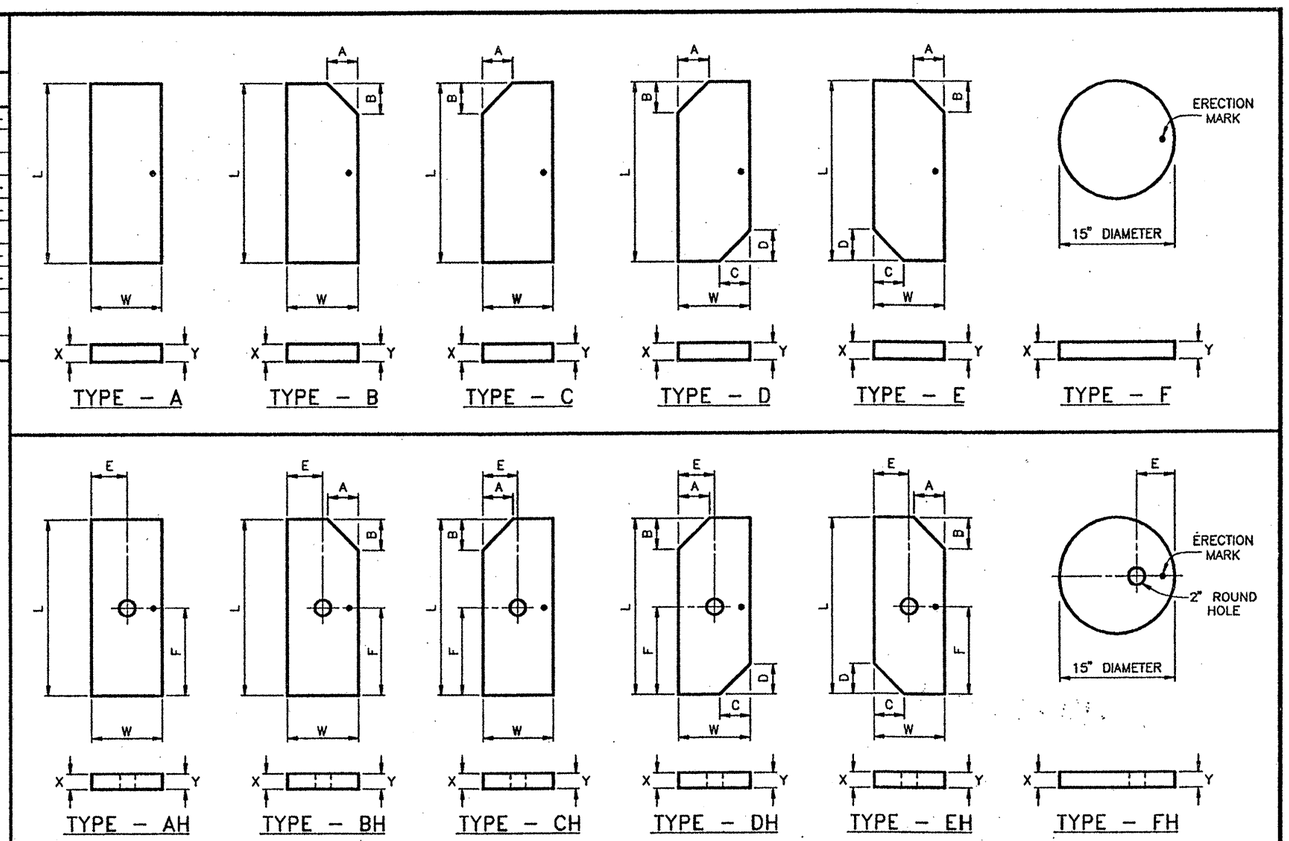
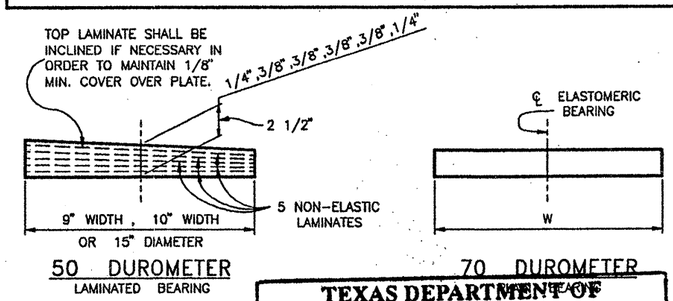
JOB NO.	DRAWN	CHECKED	DATE	SHEET NO.
93-063	C.J.B.	M.J.R.	1-11-94	I-1
SEA JOB NO. 93-160H	INDEX SHEET			
94-018H				

ELASTOMERIC BEARING PADS SCHEDULE

MARK	TYPE	DURO.	QUANT.	X	Y	L	W	A	B	C	D	E	F
P-1	A	50	40	2 1/2"	2 1/2"	14"	9"	—	—	—	—	—	—
P-2	AH	50	8	2 1/2"	2 1/2"	14"	9"	—	—	—	—	4 1/2"	7"
P-3	AH	50	24	2 1/2"	2 1/2"	22"	9"	—	—	—	—	4 1/2"	11"
P-4	A	50	44	2 1/2"	2 1/2"	22"	9"	—	—	—	—	—	—
P-5	A	50	44	2 5/8"	2 3/8"	19"	9"	—	—	—	—	—	—
P-6	AH	50	16	2 5/8"	2 3/8"	19"	9"	—	—	—	—	4 1/2"	9 1/2"
P-7	F	50	32	2 1/2"	2 1/2"	—	—	—	—	—	—	—	—
P-8	A	50	36	2 1/2"	2 1/2"	19"	9"	—	—	—	—	—	—
P-9	AH	50	12	2 1/2"	2 1/2"	19"	9"	—	—	—	—	4 1/2"	9 1/2"





SP-6

FOR APPROVAL
JAN 1 1 1994

○ DENOTES 2" ROUND HOLE
• DENOTES ERECTION MARK

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR : GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.	HWY. NO.
6	TEXAS	NH 90(191)M, etc.	LP 1604

STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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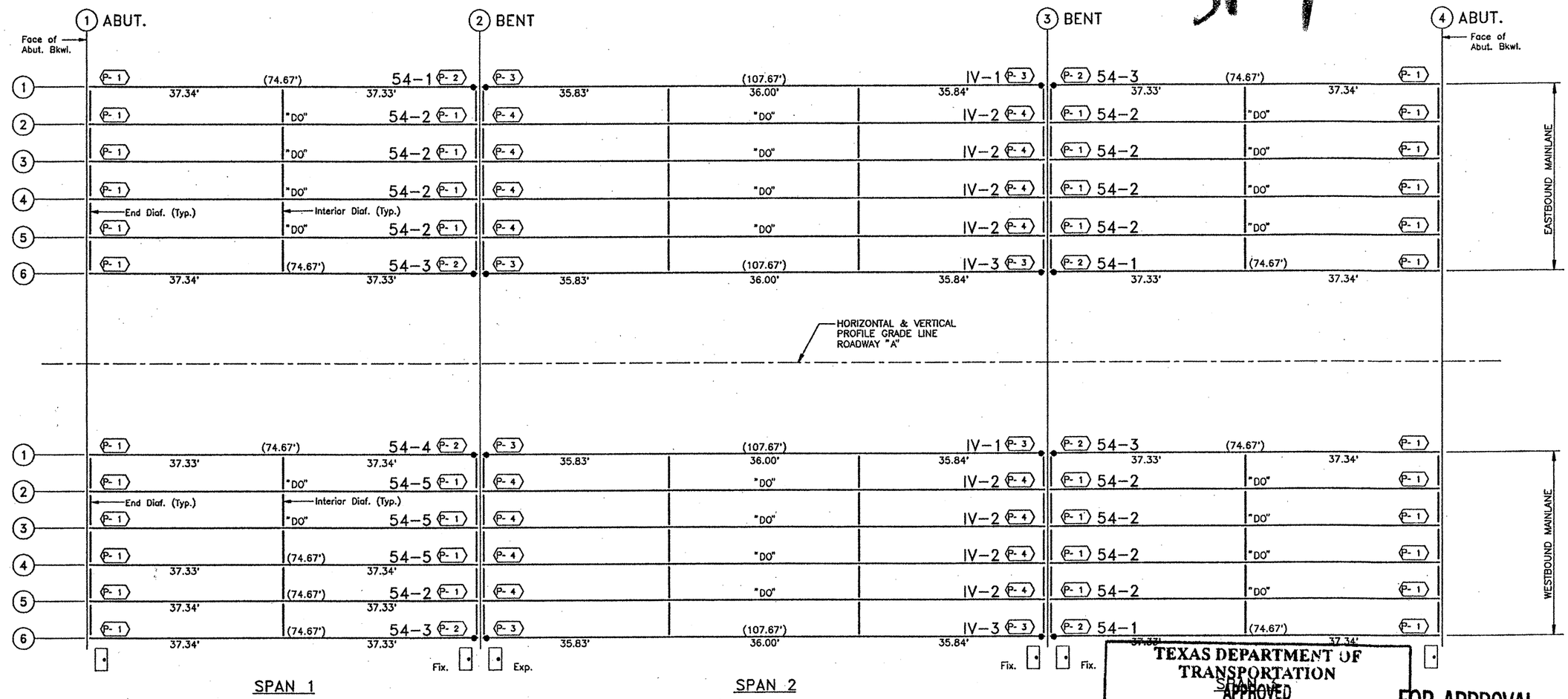
JOB NO.	DRAWN	CHECKED	DATE	SHEET NO.
93-063	C.J.B.	M.J.R.	1-11-94	NP-1
SEA JOB NO. 93-160H	NEOPRENE PADS			
94-018H				

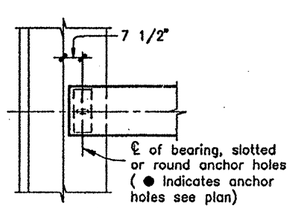
SP-7



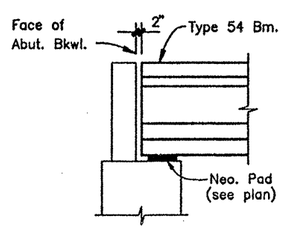
LOOP 1604 OVERPASS AT KYLE SEALE PKWY. EASTBOUND AND WESTBOUND MAINLANES

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION
FEB 16 1994
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

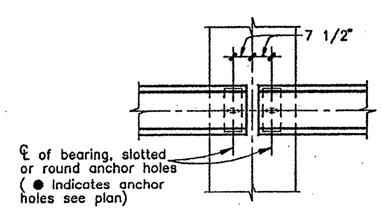
FOR APPROVAL
JAN 11 1994



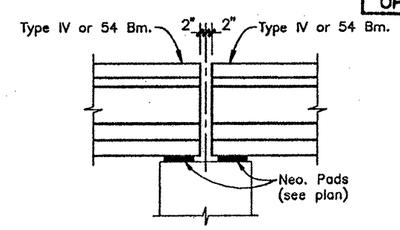
PLAN AT ABUT. 1
(ABUT. 4 SIM.)



ELEV. AT ABUT. 1
(ABUT. 4 SIM.)



PLAN AT BENTS 2 & 3



ELEV. AT BENTS 2 & 3

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR : GILBERT TEXAS CONSTRUCTION CORP.				
CONTRACTORS OPTIONS	END DIAFRAM : E.D.O. #2 INTERIOR DIAFRAM : STEEL			SLAB : PANELS
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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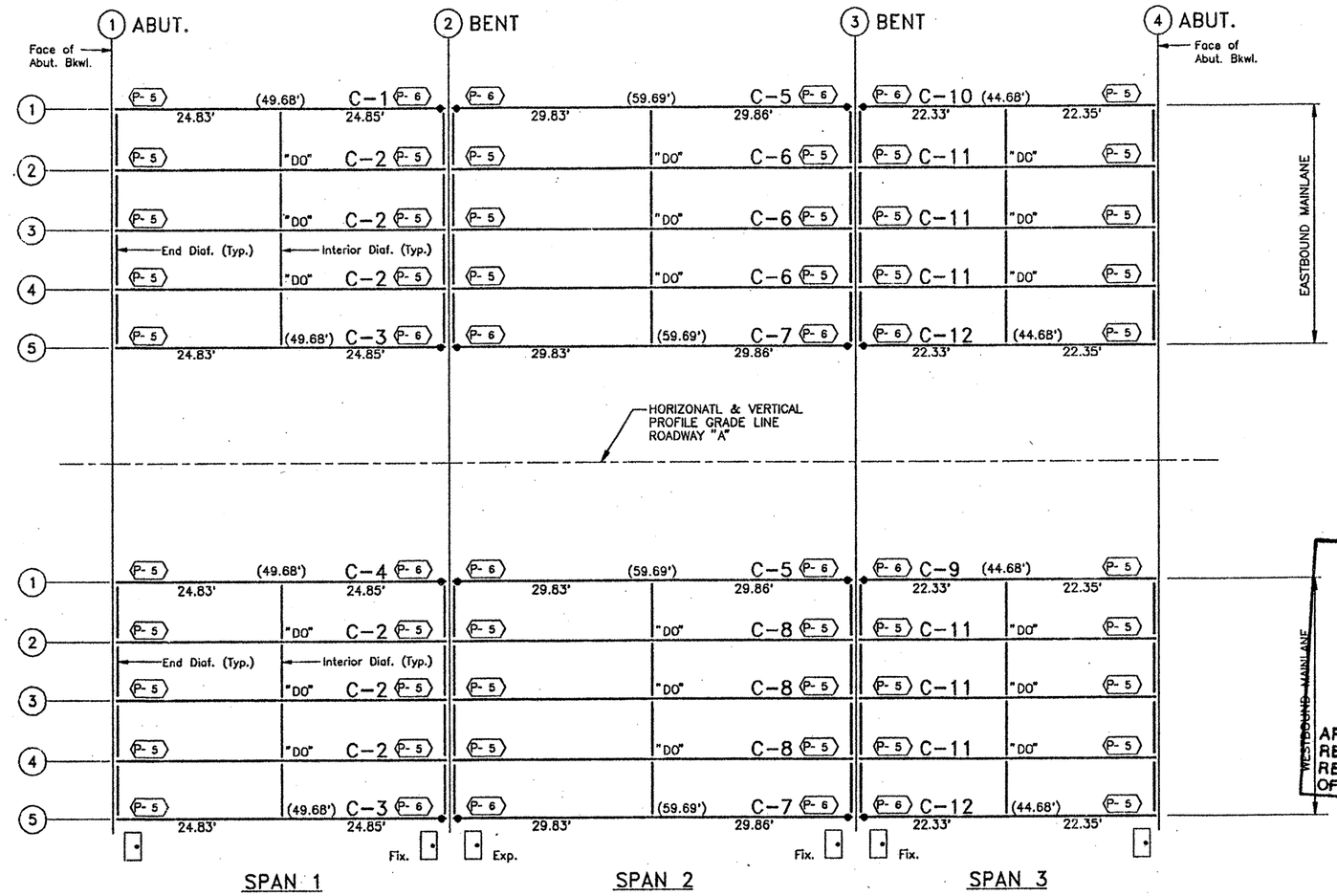
JOB NO. 93-063	DRAWN C.J.B.	CHECKED M.J.R.	DATE 1-11-94	SHEET NO. E-1
SEA JOB NO. 93-160H	ERECTION SHEET			
94-018H				



SP-8

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

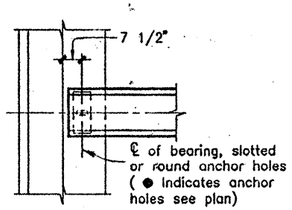
FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

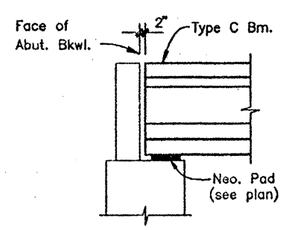
LOOP 1604 EASTBOUND AND WESTBOUND MAINLANES
BRIDGE AT HUESTA CREEK
ROADWAY "A"

FOR APPROVAL
JAN 11 1994

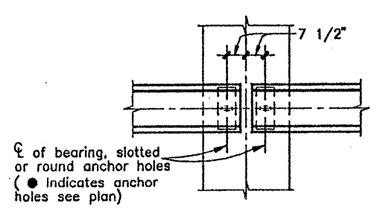
( ) INDICATES BEAM LENGTH



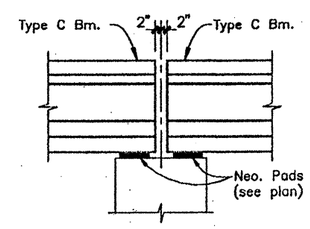
PLAN AT ABUT. 1
(ABUT. 4 SIM.)



ELEV. AT ABUT. 1
(ABUT. 4 SIM.)



PLAN AT BENTS 2 & 3



ELEV. AT BENTS 2 & 3

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR : GILBERT TEXAS CONSTRUCTION CORP.				
CONTRACTORS OPTIONS	END DIAFRAM : E.D.O. #2 INTERIOR DIAFRAM : STEEL			SLAB : PANELS
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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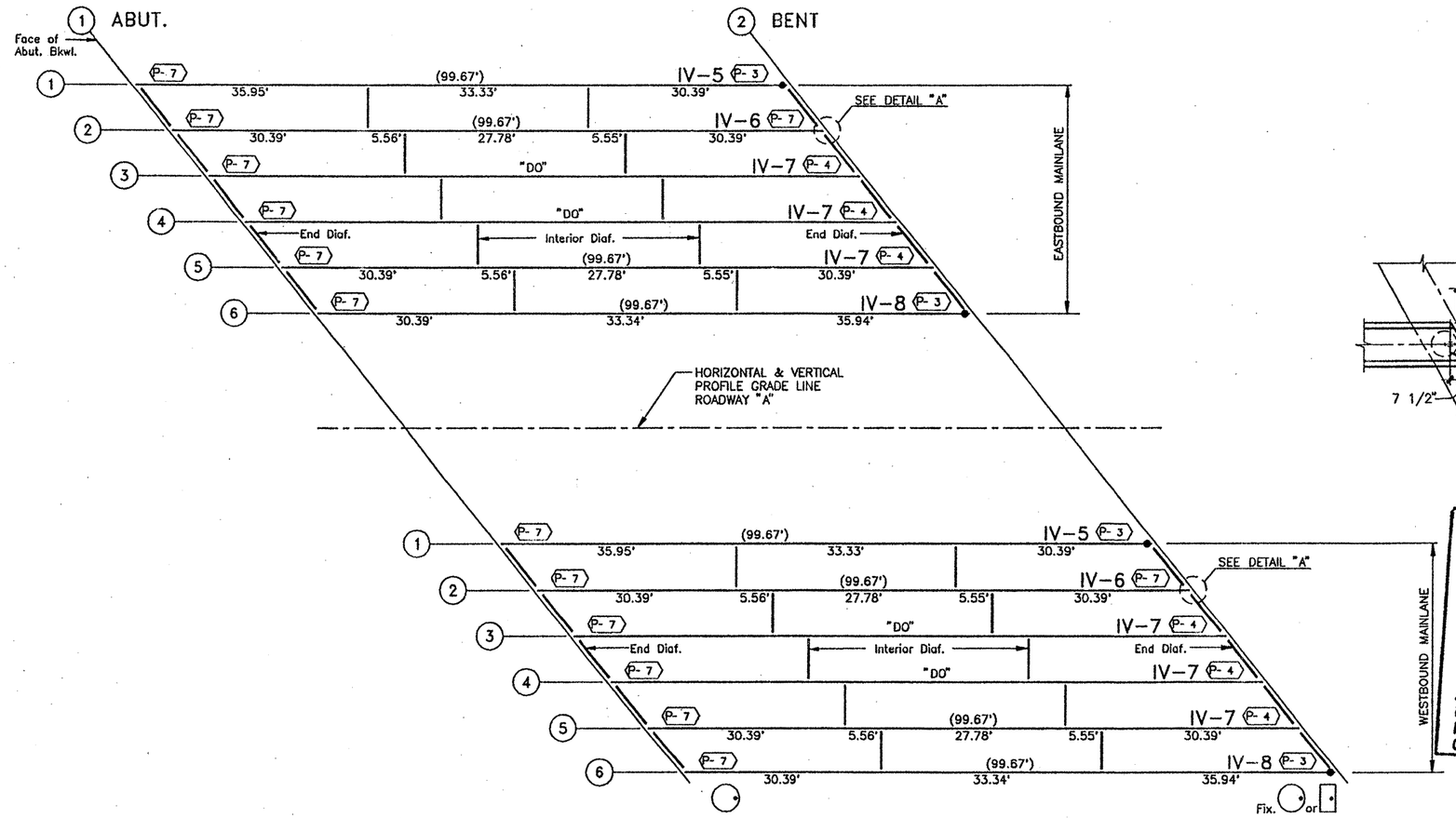
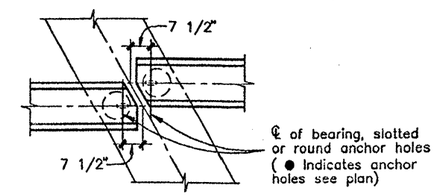
JOB NO. 93-063	DRAWN C.J.B.	CHECKED M.J.R.	DATE 1-11-94	SHEET NO. E-2
SEA JOB NO. 93-160H	ERECTION SHEET			
94-018H				



SPAN 1



DETAIL "A"

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

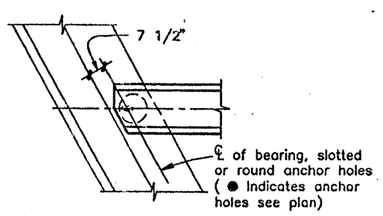
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

SP-9

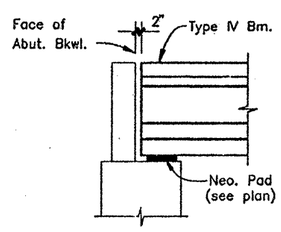
LOOP 1604 OVERPASS AT HAUSMAN RD. EASTBOUND AND WESTBOUND MAINLANES

FOR APPROVAL
JAN 11 1994

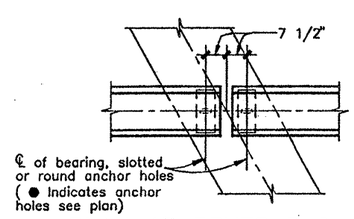
( ) INDICATES BEAM LENGTH



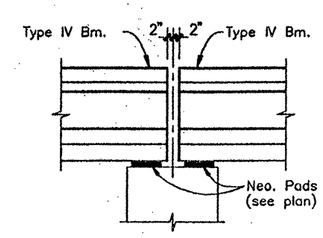
PLAN AT ABUT. 1
(ABUT. 4 SIM.)



ELEV. AT ABUT. 1
(ABUT. 4 SIM.)



PLAN AT BENTS 2 & 3



ELEV. AT BENTS 2 & 3

MANUFACTURED CONCRETE PRODUCTS CO.					
CONTRACTOR : GILBERT TEXAS CONSTRUCTION CORP.					
CONTRACTORS OPTIONS	END DIAFRAM : E.D.O. #2 INTERIOR DIAFRAM : STEEL				SLAB : PANELS
FED.RD. DIV.NO.	STATE	PROJECT NO.			HWY. NO.
6	TEXAS	NH 90(191)M, etc.			LP 1604
STATE DIST.NO.	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR		2452	02	023etc

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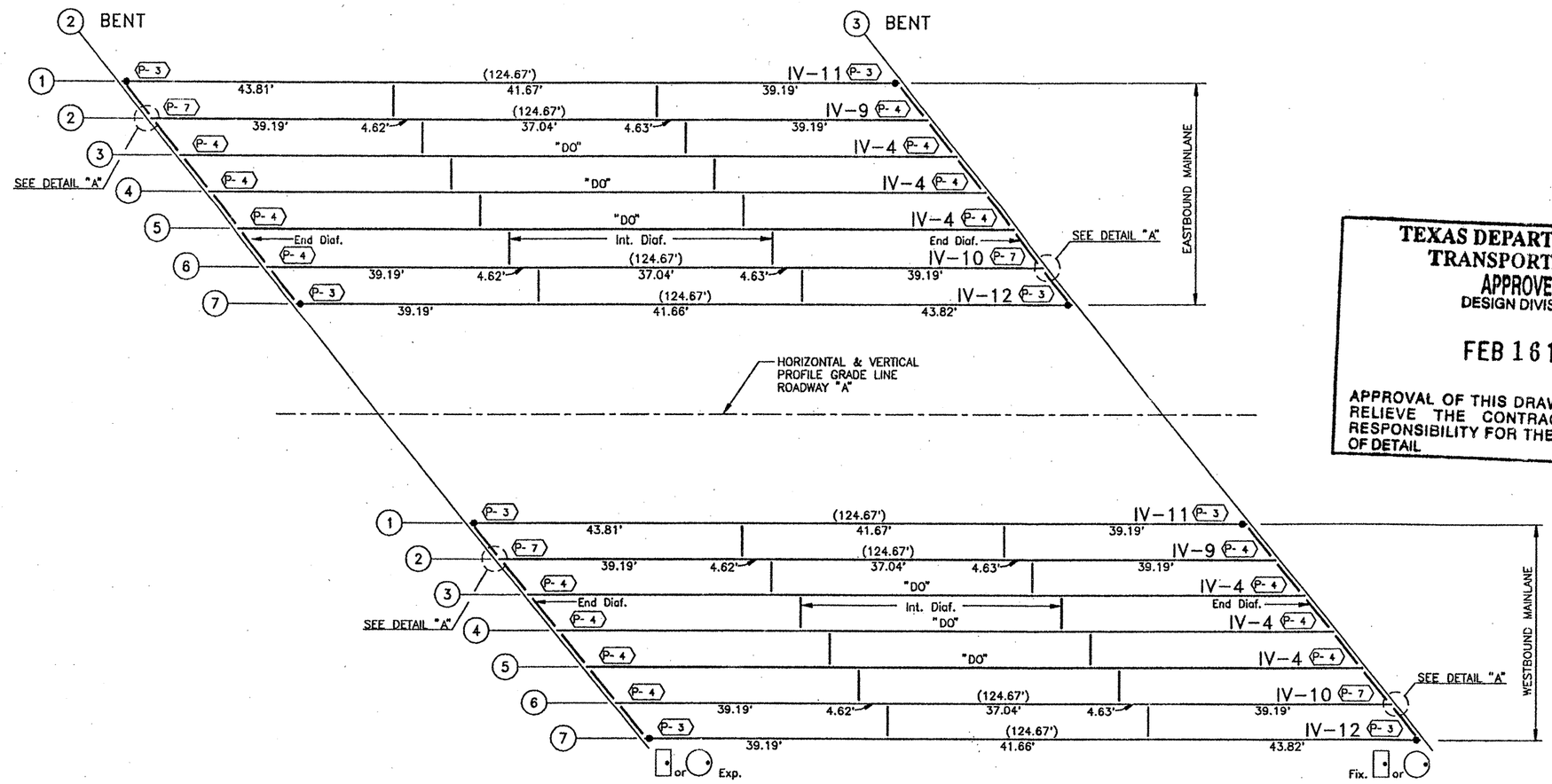
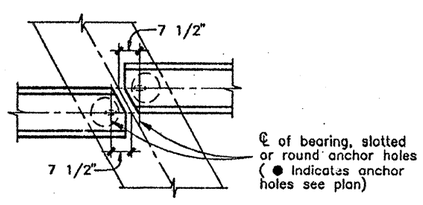
JOB NO.	DRAWN	CHECKED	DATE	SHEET NO.
93-063	C.J.B.	M.J.R.	1-11-94	E-3
SEA JOB NO. 93-160H	ERECTION SHEET			
94-018H				



SPAN 2



DETAIL "A"

LOOP 1604 OVERPASS
AT HAUSMAN RD.
EASTBOUND AND WESTBOUND MAINLANES

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

FOR APPROVAL
JAN 11 1994

SP-10

( ) INDICATES BEAM LENGTH

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR : GILBERT TEXAS CONSTRUCTION CORP.				
CONTRACTORS OPTIONS	END DIAFRAM : E.D.O. #2 INTERIOR DIAFRAM : STEEL			SLAB : PANELS
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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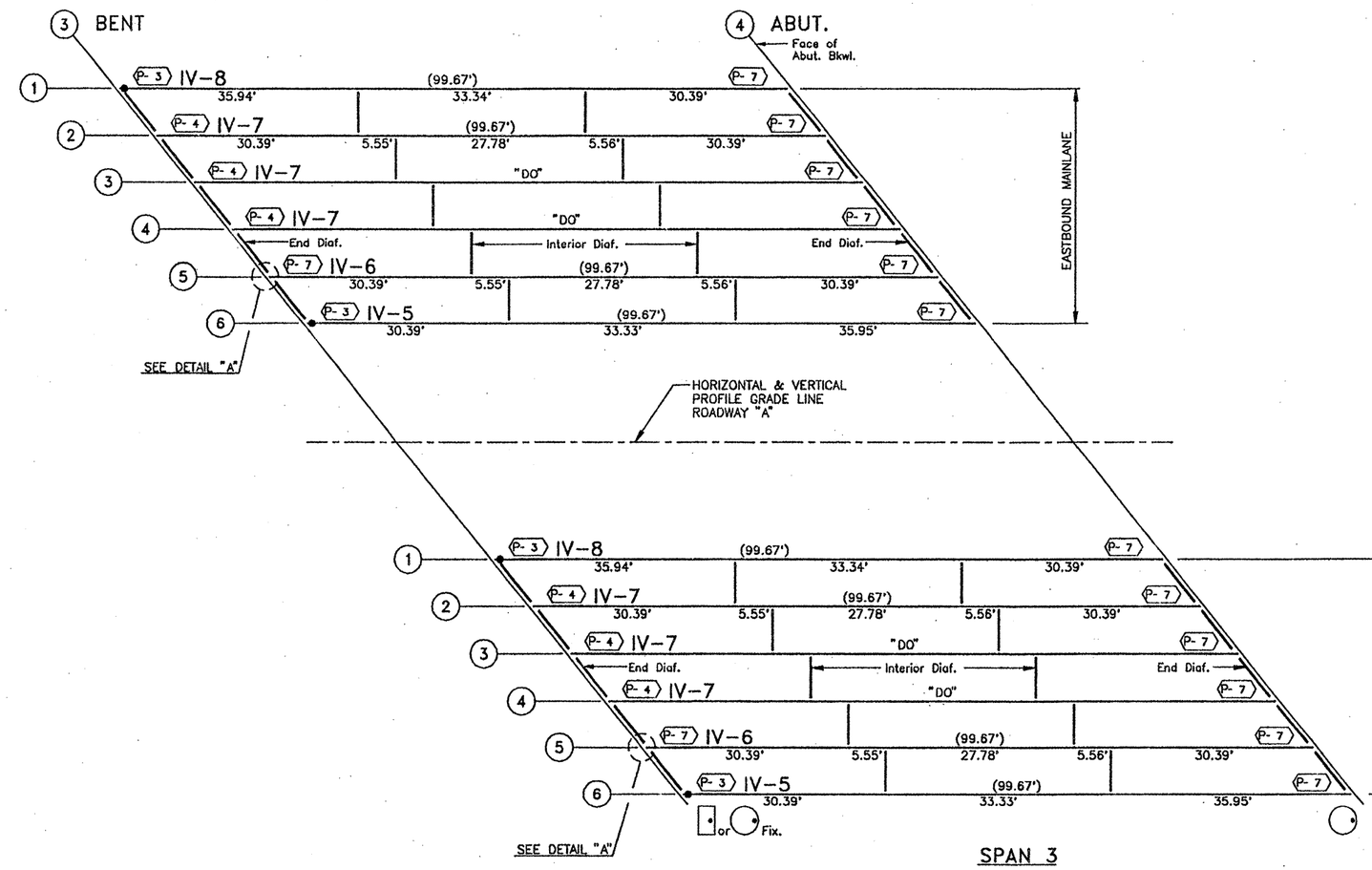
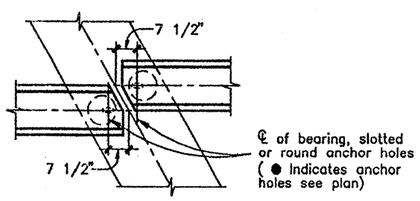
JOB NO. 93-063	DRAWN C.J.B.	CHECKED M.J.R.	DATE 1-11-94	SHEET NO. E-4
SEA JOB NO. 93-160H	ERECTION SHEET			
94-018H				





DETAIL "A"

LOOP 1604 OVERPASS
AT HAUSMAN RD.
EASTBOUND AND WESTBOUND MAINLANES

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

FOR APPROVAL
JAN 11 1994

SP-11

( ) INDICATES BEAM LENGTH

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR : GILBERT TEXAS CONSTRUCTION CORP.				
CONTRACTORS OPTIONS	END DIAFRAM : E.D.O. #2 INTERIOR DIAFRAM : STEEL			SLAB : PANELS
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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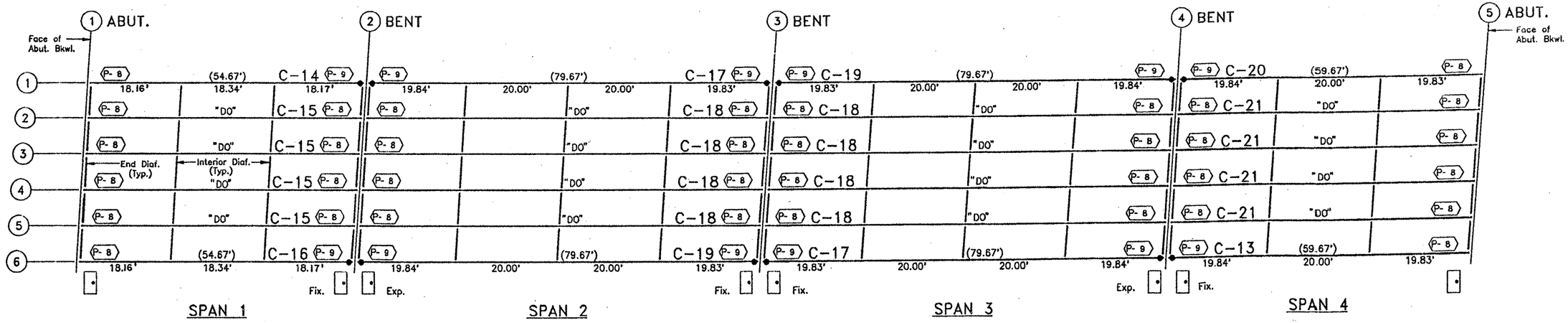
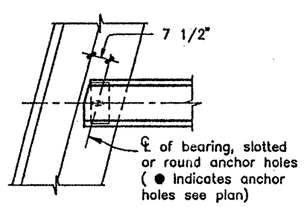
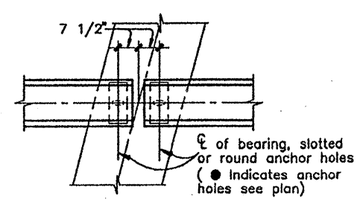
JOB NO. 93-063	DRAWN C.J.B.	CHECKED M.J.R.	DATE 1-11-94	SHEET NO. E-5
SEA JOB NO. 93-160H	ERECTION SHEET			
94-018H				



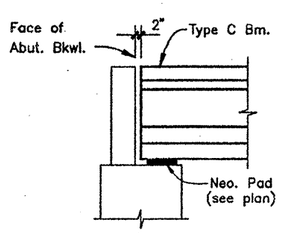
LOOP 1604 OVERPASS
AT S.H. 16 (BANDERA RD.)
WESTBOUND MAINLANES



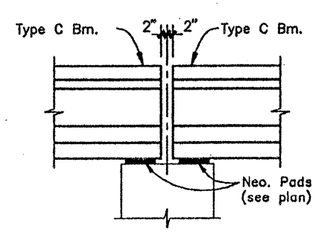
PLAN AT ABUT. 1
(ABUT. 5 SIM.)



PLAN AT BENTS 2–4



ELEV. AT ABUT. 1
(ABUT. 5 SIM.)



ELEV. AT BENTS 2–4

SP-12

( ) INDICATES BEAM LENGTH

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.					
CONTRACTOR : GILBERT TEXAS CONSTRUCTION CORP.					
CONTRACTORS OPTIONS	END DIAFRAM : E.D.O. #2 INTERIOR DIAFRAM : STEEL				SLAB : PANELS
FED.RD. DIV.NO.	STATE	PROJECT NO.			HWY. NO.
6	TEXAS	NH 90(191)M, etc.			LP 1604
STATE DIST.NO.	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR		2452	02	023etc

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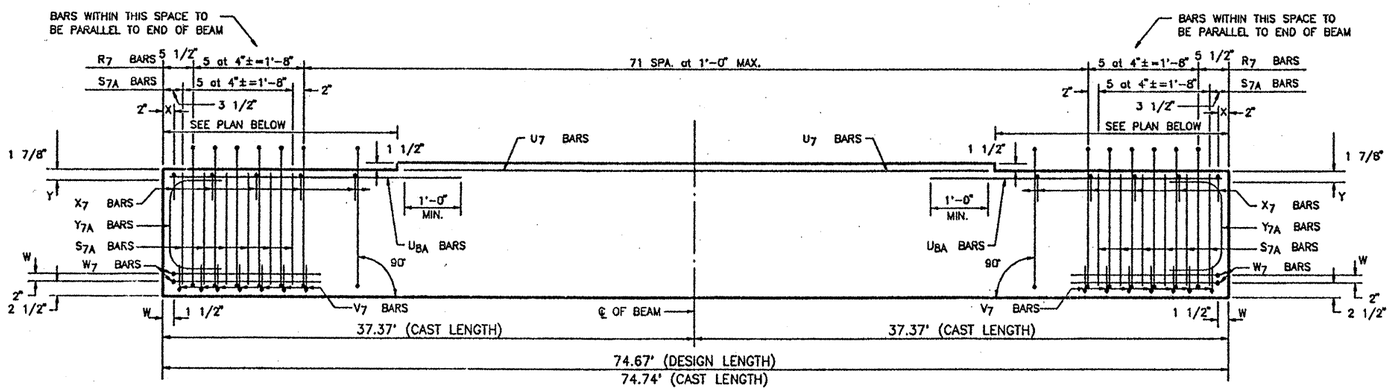
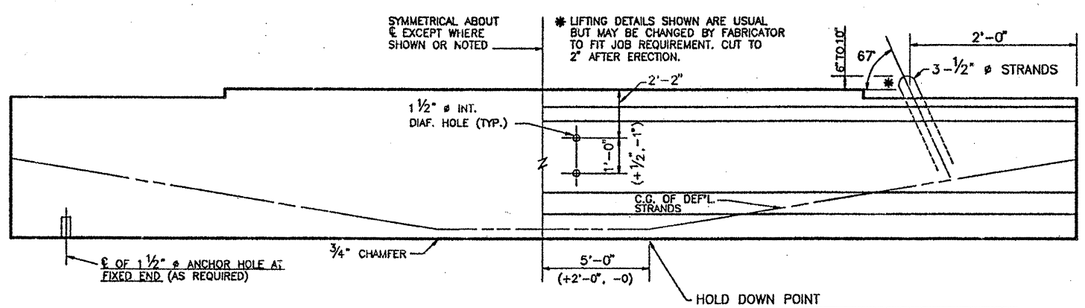
JOB NO. 93-063	DRAWN C.J.B.	CHECKED M.J.R.	DATE 1-11-94	SHEET NO. E-6
SEA JOB NO. 93-160H	ERECTION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

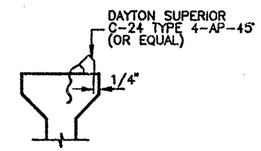
REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_7	82	246	#3	standard
X_7	78	234	#3	standard
Y_{7A}	4	12	#6	standard
S_{7A}	24	72	#5	standard
V_7	14	42	#3	standard
W_7	4	12	#5	standard
U_7	2	6	#5	66'-9"
U_{BA}	4	12	#5	6'-6"



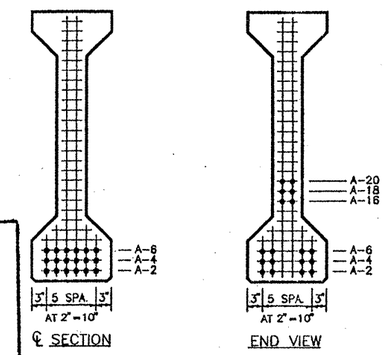
BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL (TYP. FOR BEAMS UNDER 75')



SECTION "A"



℄ SECTION — END VIEW

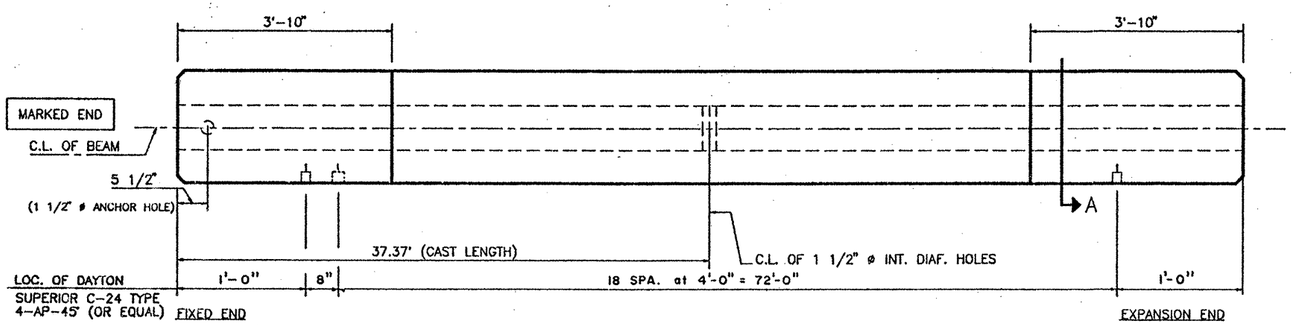
TYPE "54" BEAM — QUANTITY : 3

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 18 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 12	
NUMBER OF DEFLECTED STRANDS	: 6 @ A – 20	
CONCRETE RELEASE STRENGTH	: 4000	PSI
CONCRETE DESIGN STRENGTH	: 5000	PSI
ECCENTRICITY @ ℄	: 21.53"	ECCENTRICITY @ END : 16.86"



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"54" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

SP-13

FOR APPROVAL

JAN 11 1994

DESIGN NO. : Gp-NS-LR

TOTAL BEAM LENGTH OF THIS SHEET : 224.01'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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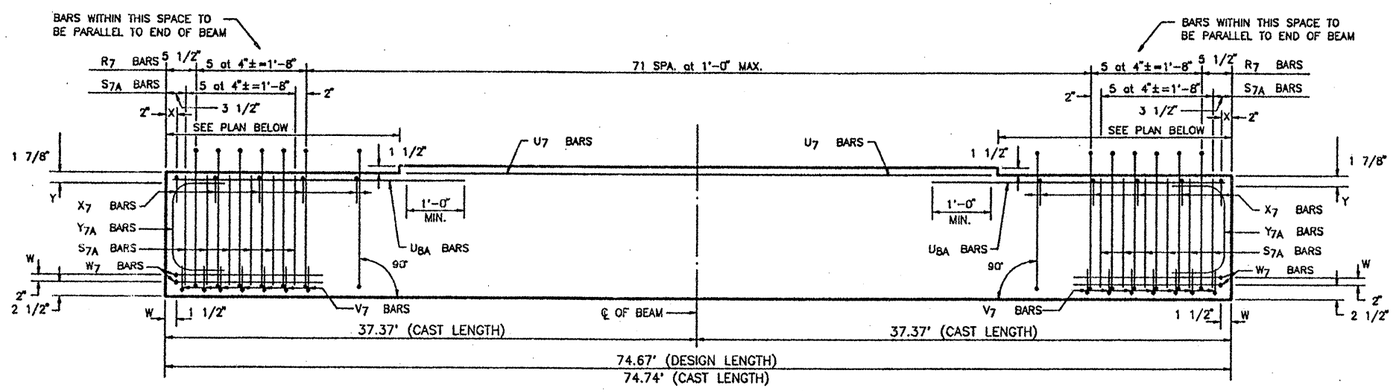
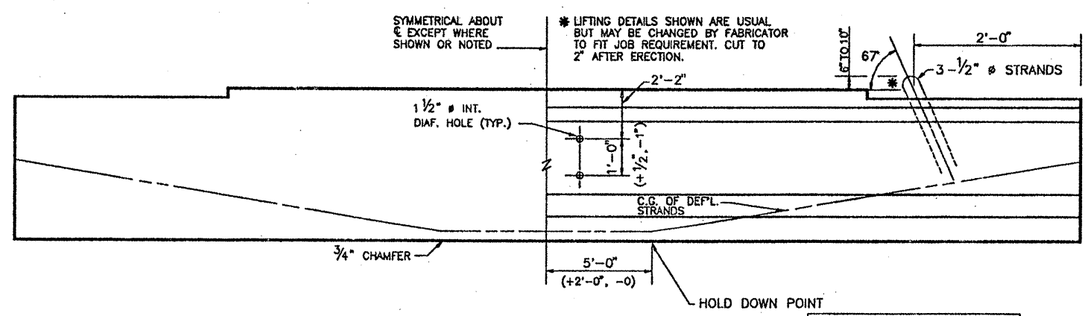
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	54-1
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



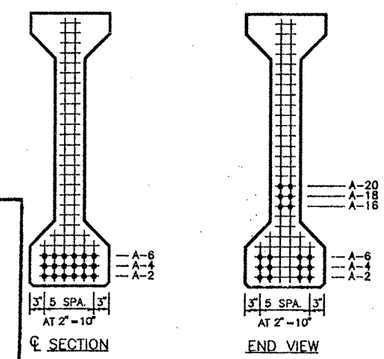
ELEVATION – REINFORCING STEEL

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_7	82	1066	#3	standard
X_7	78	1014	#3	standard
Y_{7A}	4	52	#6	standard
S_{7A}	24	312	#5	standard
V_7	14	182	#3	standard
W_7	4	52	#5	standard
U_7	2	26	#5	66'-9"
U_{8A}	4	52	#5	6'-6"



BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



℄ SECTION

END VIEW

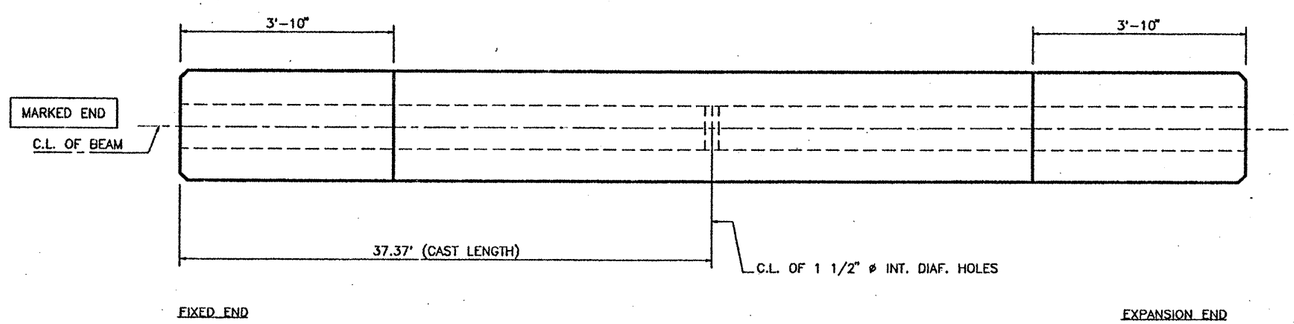
TYPE "54" BEAM QUANTITY : 13

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 18 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 12
NUMBER OF DEFLECTED STRANDS	: 6 @ A – 20
CONCRETE RELEASE STRENGTH	: 4000 PSI
CONCRETE DESIGN STRENGTH	: 5000 PSI
ECCENTRICITY @ ℄	: 21.53" ECCENTRICITY @ END : 16.86"



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"54" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

SP-14
FOR APPROVAL
JAN 11 1994

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 970.71'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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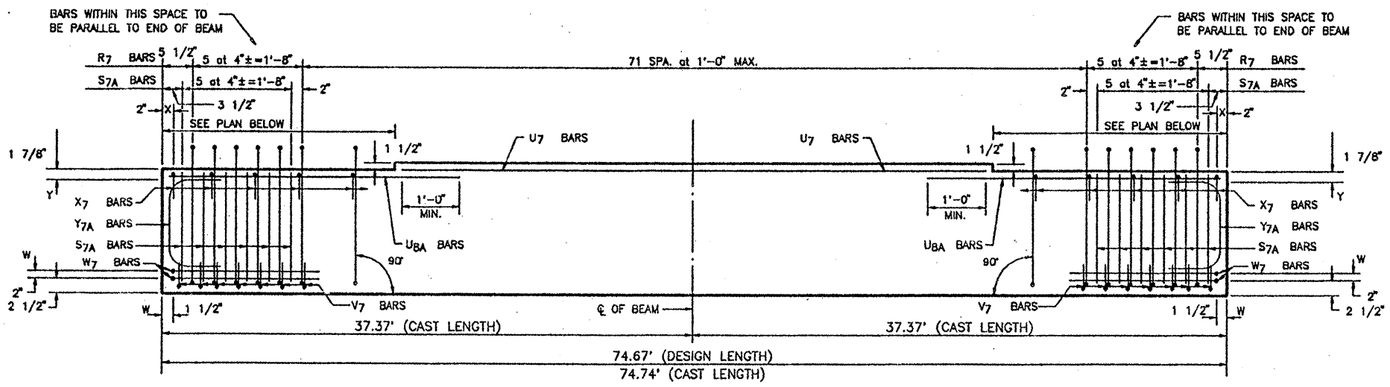
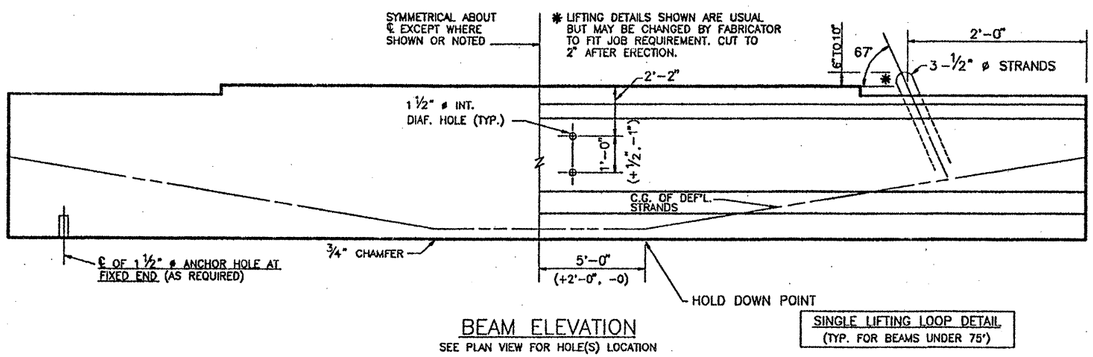
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	54-2
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



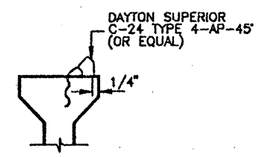
ELEVATION – REINFORCING STEEL

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_7	82	328	#3	standard
X_7	78	312	#3	standard
Y_{7A}	4	16	#6	standard
S_{7A}	24	96	#5	standard
V_7	14	56	#3	standard
W_7	4	16	#5	standard
U_7	2	8	#5	66'-9"
U_{8A}	4	16	#5	6'-6"

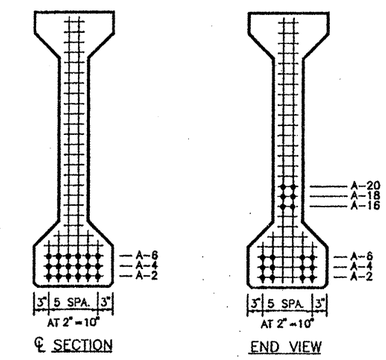


BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION

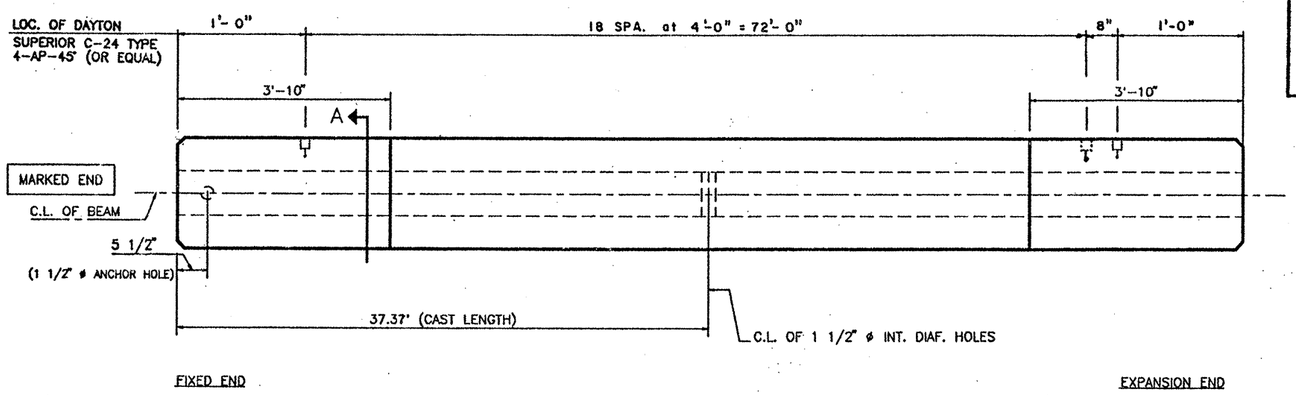
SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



SECTION "A"



TYPE "54" BEAM QUANTITY : 4



PLAN

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

TOP FINISH PANELS
SEE STANDARD SHEET S-"54" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

SP 15

FOR APPROVAL
JAN 11 1994

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 18 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 12	
NUMBER OF DEFLECTED STRANDS	: 6 @ A – 20	
CONCRETE RELEASE STRENGTH	: 4000	PSI
CONCRETE DESIGN STRENGTH	: 5000	PSI
ECCENTRICITY @ ℄	: 21.53"	ECCENTRICITY @ END : 16.86"

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 298.68'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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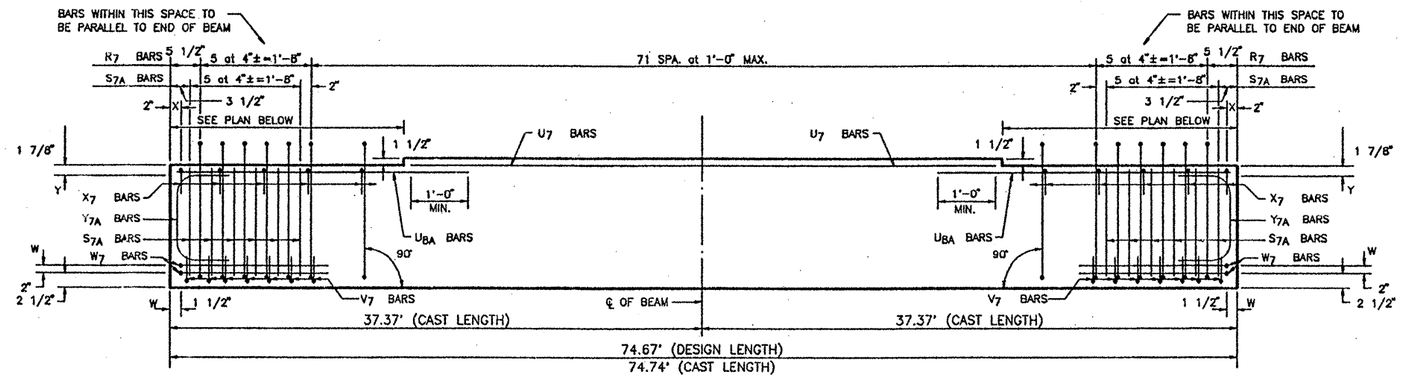
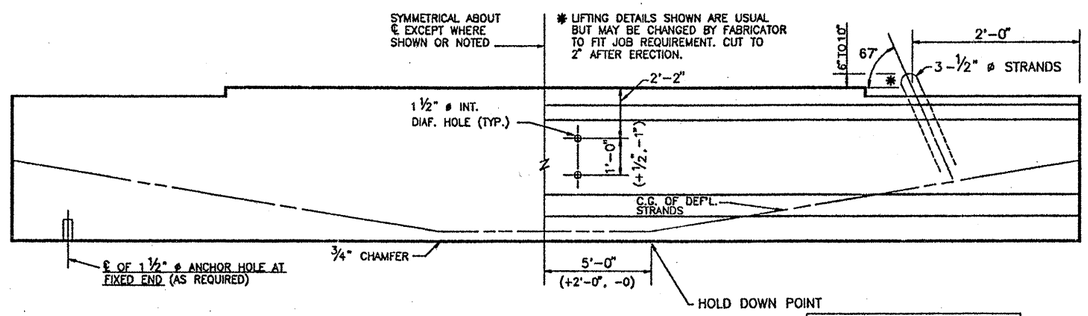
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	54-3
SEA JOB NO. 93-160H	FABRICATION SHEET			

94-018H



ELEVATION – REINFORCING STEEL

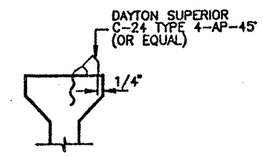
REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_7	82	82	#3	standard
X_7	78	78	#3	standard
Y_{7A}	4	4	#6	standard
S_{7A}	24	24	#5	standard
V_7	14	14	#3	standard
W_7	4	4	#5	standard
U_7	2	2	#5	66'-9"
U_{BA}	4	4	#5	6'-6"



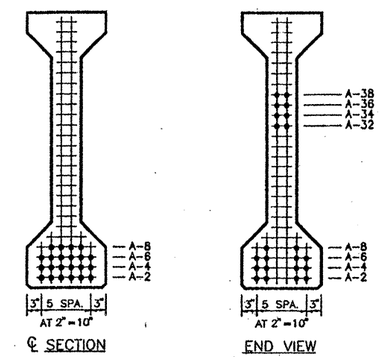
BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



SECTION "A"



℄ SECTION END VIEW

TYPE "54" BEAM QUANTITY : 1

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

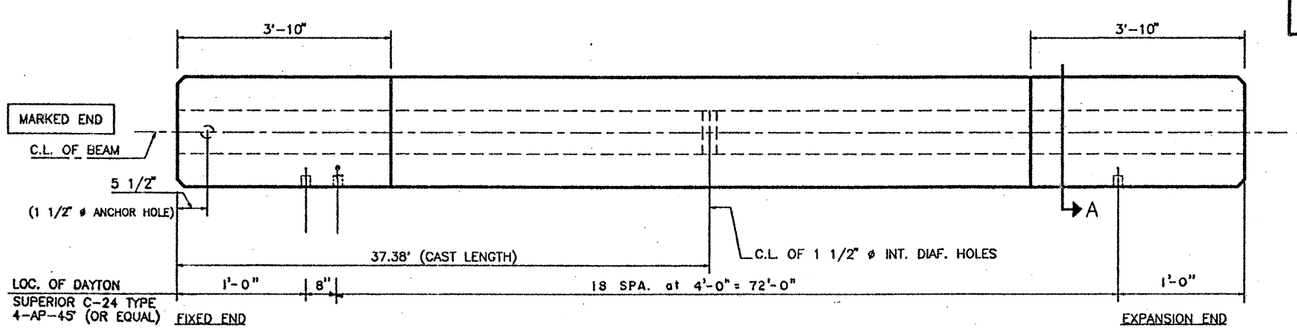
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 22 ~1 1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 14	
NUMBER OF DEFLECTED STRANDS	: 8 @ A – 38	
CONCRETE RELEASE STRENGTH	: 4400 PSI	
CONCRETE DESIGN STRENGTH	: 5000 PSI	
ECCENTRICITY @ ℄ : 20.80"	ECCENTRICITY @ END : 9.89"	

DESIGN NO. : O.D. # 1

TOTAL BEAM LENGTH OF THIS SHEET : 74.67'

TOP FINISH PANELS
SEE STANDARD SHEET S-"54" FOR TOP FINISH AND OTHER NOTES AND DETAILS.



PLAN

SP-16

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.				
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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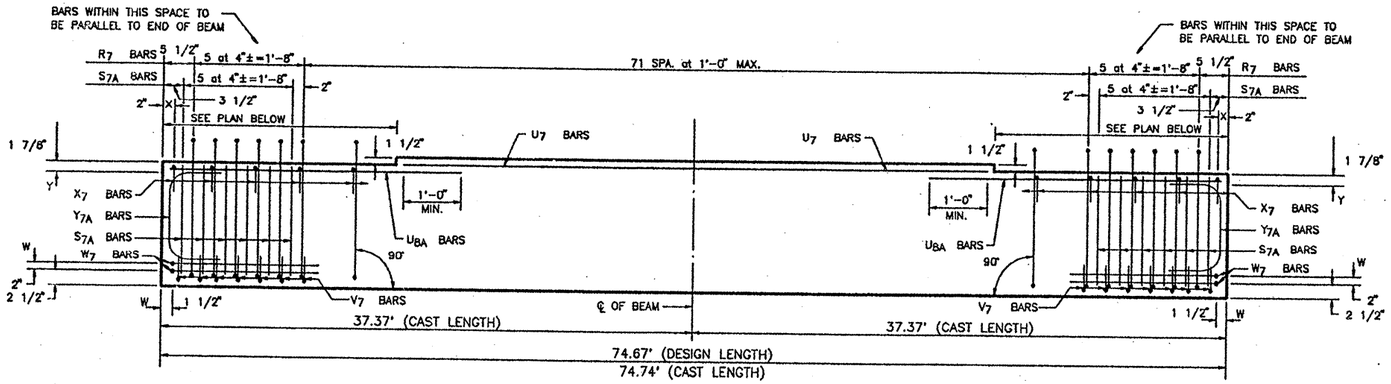
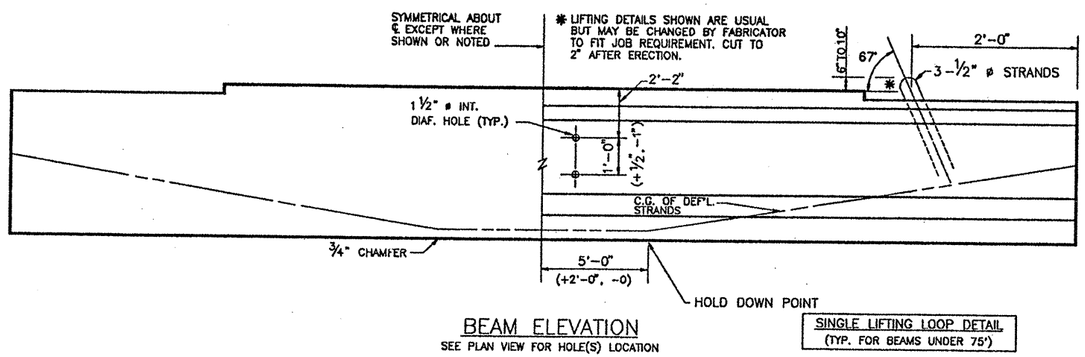
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	54-4
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



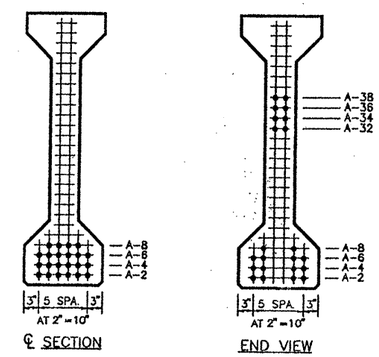
ELEVATION – REINFORCING STEEL

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_7	82	246	#3	standard
X_7	78	234	#3	standard
Y_{7A}	4	12	#6	standard
S_{7A}	24	72	#5	standard
V_7	14	42	#3	standard
W_7	4	12	#5	standard
U_7	2	6	#5	66'-9"
U_{8A}	4	12	#5	6'-6"



BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



℄ SECTION — END VIEW

TYPE "54" BEAM — QUANTITY : 3

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 22 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 14
NUMBER OF DEFLECTED STRANDS	: 8 @ A – 38
CONCRETE RELEASE STRENGTH	: 4400 PSI
CONCRETE DESIGN STRENGTH	: 5000 PSI
ECCENTRICITY @ ℄ : 20.80"	ECCENTRICITY @ END : 9.89"

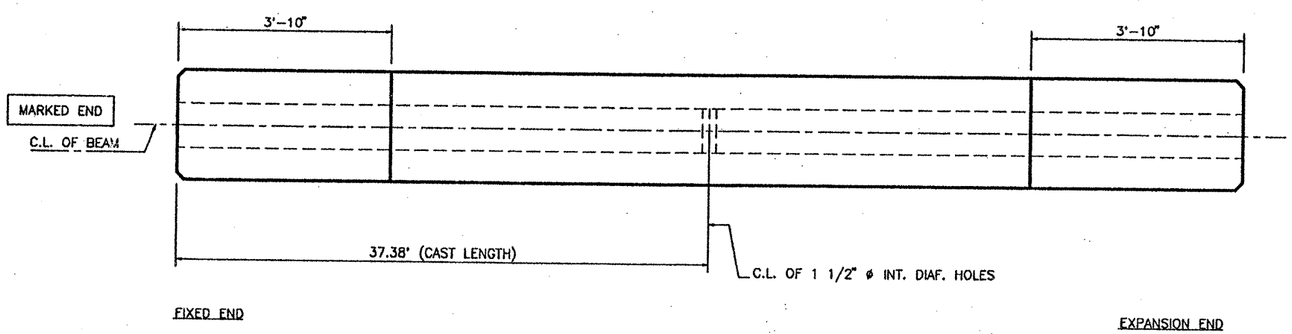
DESIGN NO. : O.D. # 1
TOTAL BEAM LENGTH OF THIS SHEET : 224.01'

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

TOP FINISH PANELS
SEE STANDARD SHEET S-"54" FOR TOP FINISH AND OTHER NOTES AND DETAILS.



PLAN

SP-17

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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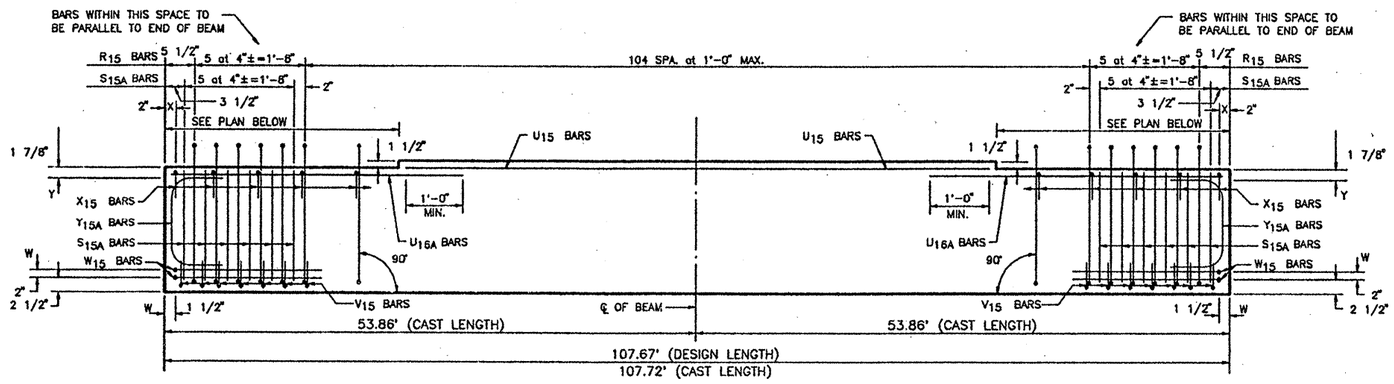
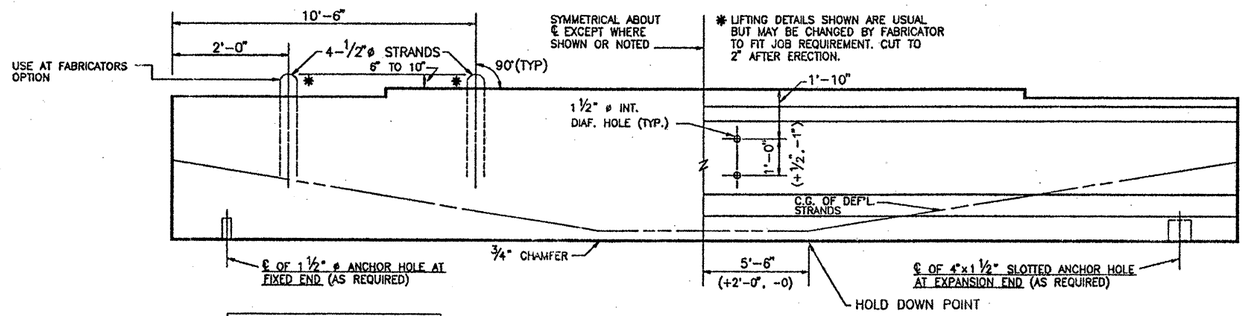
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	54-5
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_{15}	115	230	#3	standard
X_{15}	111	222	#3	standard
Y_{15A}	4	8	#6	standard
S_{15A}	24	48	#7	standard
V_{15}	14	28	#3	standard
W_{15}	4	8	#5	standard
U_{15}	2	4	#5	99'-9"
U_{16A}	4	8	#5	6'-6"

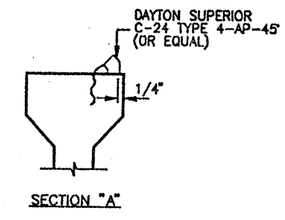
SP-18



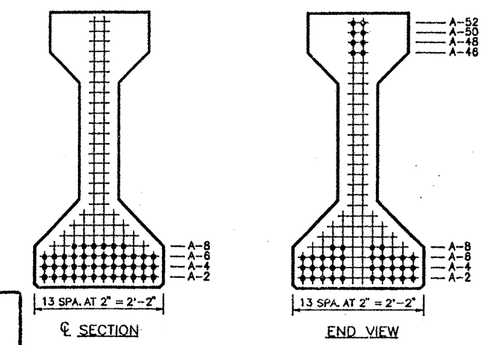
DOUBLE LIFTING LOOP DETAIL (TYP. FOR BEAMS OVER 75')

BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION



SECTION "A"



℄ SECTION

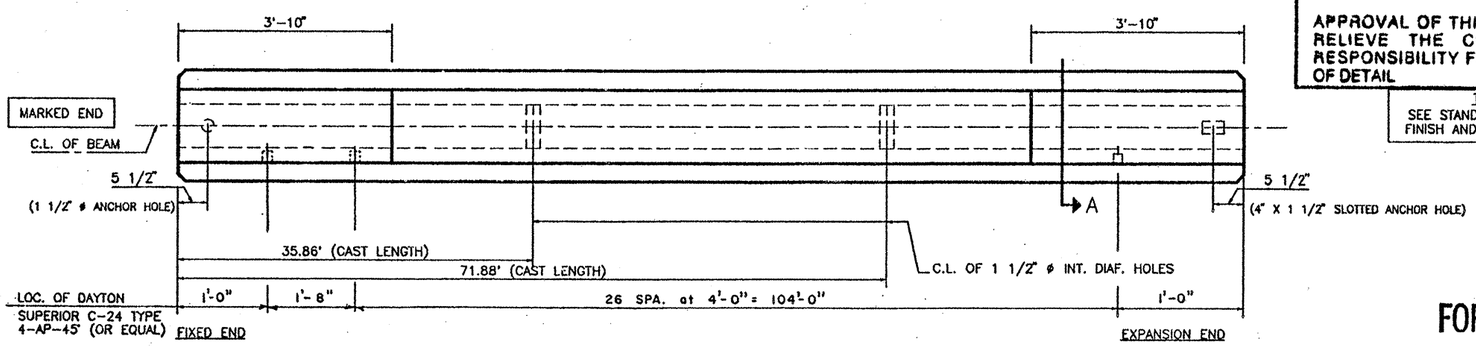
END VIEW

TYPE "IV" BEAM QUANTITY : 2

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 42 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 34
NUMBER OF DEFLECTED STRANDS	: 8 @ A – 52
CONCRETE RELEASE STRENGTH	: 4762 PSI
CONCRETE DESIGN STRENGTH	: 6004 PSI
ECCENTRICITY @ ℄	: 20.18" ECCENTRICITY @ END : 11.80"

DESIGN NO. : Gp-NS-LR

TOTAL BEAM LENGTH OF THIS SHEET : 215.34'



PLAN

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

TOP FINISH PANELS
SEE STANDARD SHEET S-"IV" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.	HWY. NO.
6	TEXAS	NH 90(191)M, etc.	LP 1604

STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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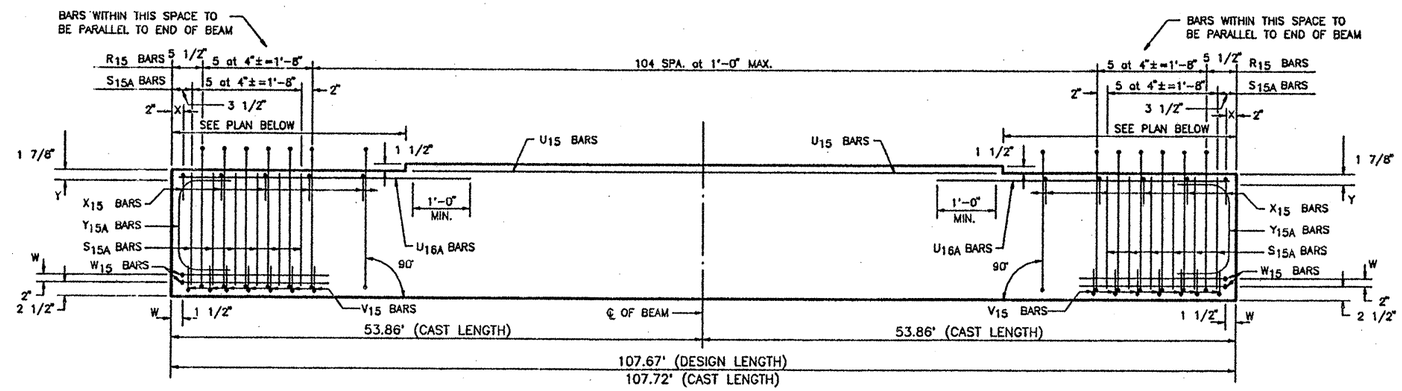
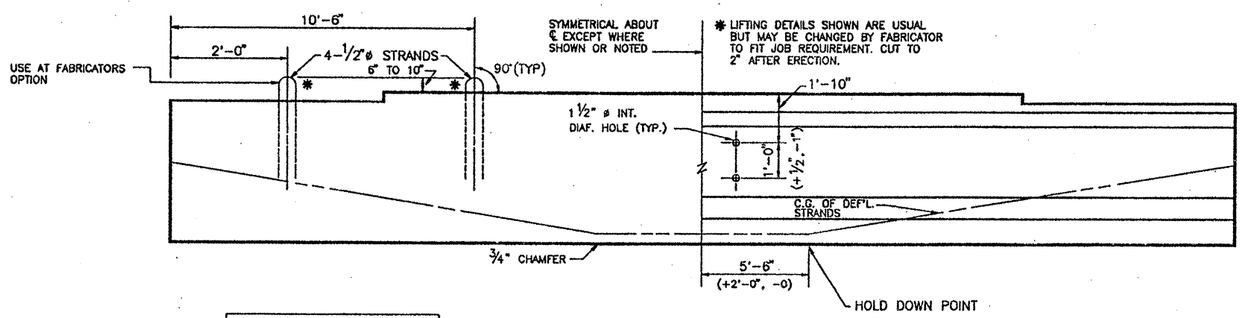
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	IV-1
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_{15}	115	920	#3	standard
X_{15}	111	888	#3	standard
Y_{15A}	4	32	#6	standard
S_{15A}	24	192	#7	standard
V_{15}	14	112	#3	standard
W_{15}	4	32	#5	standard
U_{15}	2	16	#5	99'-9"
U_{16A}	4	32	#5	6'-6"

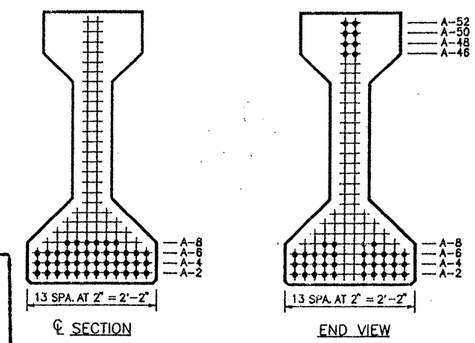
SP-19



DOUBLE LIFTING LOOP DETAIL (TYP. FOR BEAMS OVER 75')

BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION



TYPE "IV" BEAM QUANTITY : 8

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 42 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 34
NUMBER OF DEFLECTED STRANDS	: 8 @ A – 52
CONCRETE RELEASE STRENGTH	: 4762 PSI
CONCRETE DESIGN STRENGTH	: 6004 PSI
ECCENTRICITY @ ℄ : 20.18"	ECCENTRICITY @ END : 11.80"

DESIGN NO. : Gp-NS-LR

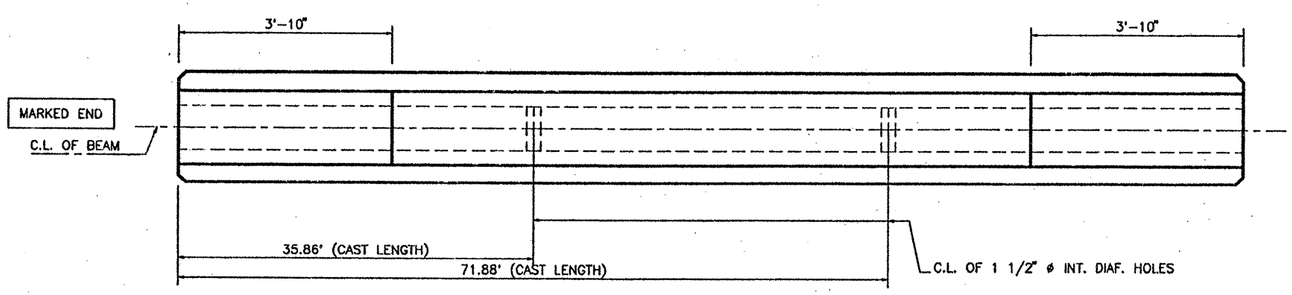
TOTAL BEAM LENGTH OF THIS SHEET : 861.36'

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

TOP FINISH PANELS
SEE STANDARD SHEET S-"IV" FOR TOP FINISH AND OTHER NOTES AND DETAILS.



PLAN

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.				
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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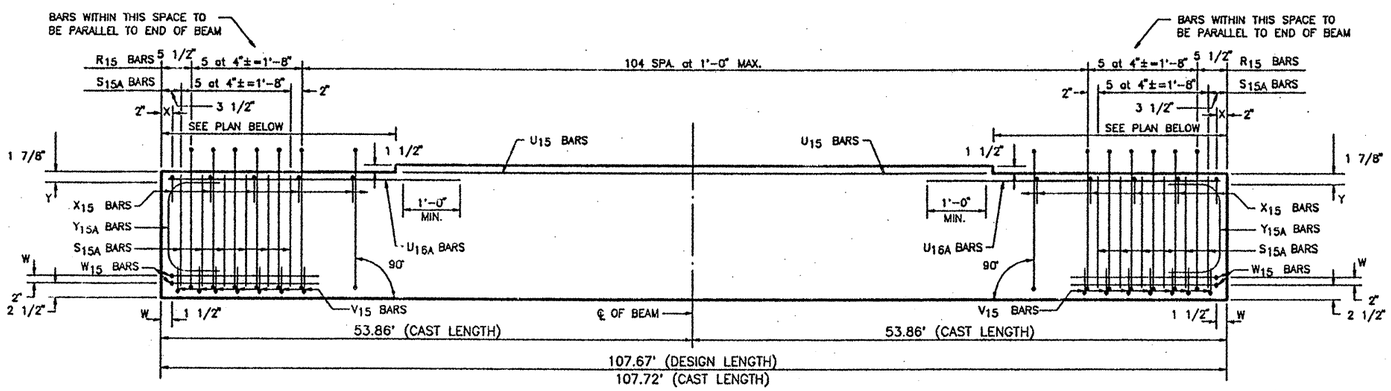
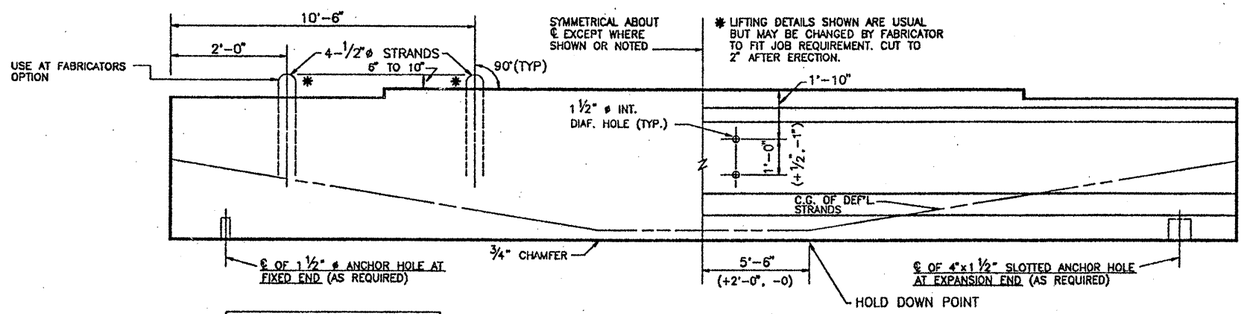
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	IV-2
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_{15}	115	230	#3	standard
X_{15}	111	222	#3	standard
Y_{15A}	4	8	#6	standard
S_{15A}	24	48	#7	standard
V_{15}	14	28	#3	standard
W_{15}	4	8	#5	standard
U_{15}	2	4	#5	99'-9"
U_{16A}	4	8	#5	6'-6"

SP-20

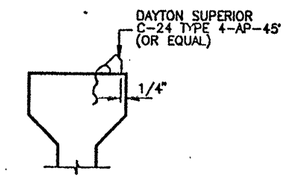


ELEVATION – REINFORCING STEEL

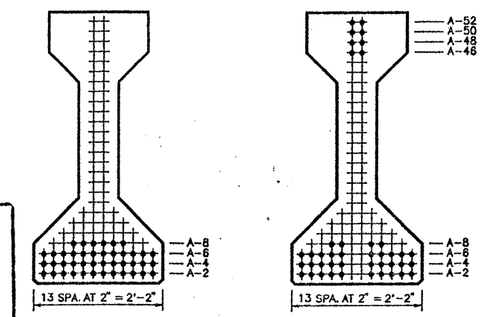


DOUBLE LIFTING LOOP DETAIL (TYP. FOR BEAMS OVER 75')

BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION



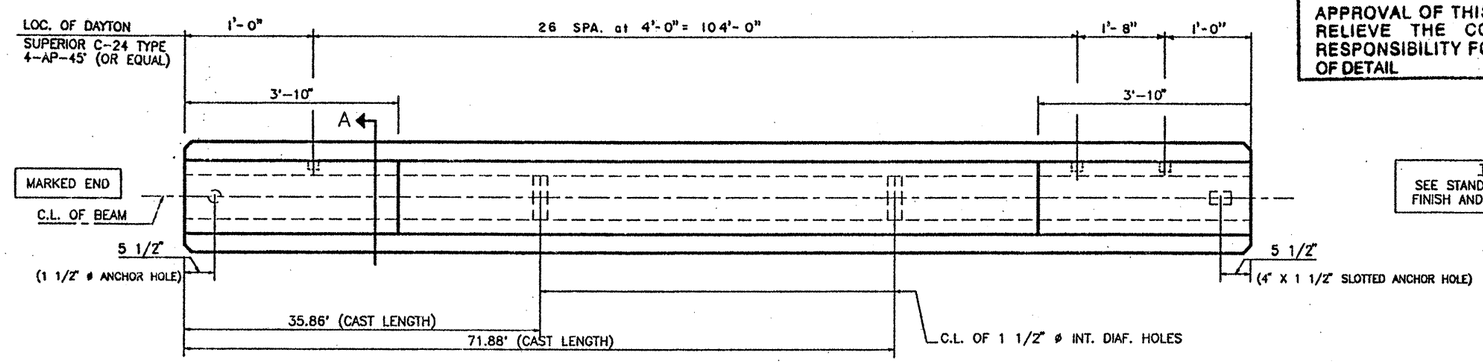
SECTION "A"



℄ SECTION

END VIEW

TYPE "IV" BEAM QUANTITY : 2



PLAN

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

TOP FINISH PANELS
SEE STANDARD SHEET S-"IV" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 42 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 34
NUMBER OF DEFLECTED STRANDS	: 8 @ A – 52
CONCRETE RELEASE STRENGTH	: 4762 PSI
CONCRETE DESIGN STRENGTH	: 6004 PSI
ECCENTRICITY @ ℄	: 20.18" ECCENTRICITY @ END : 11.80"

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 215.34'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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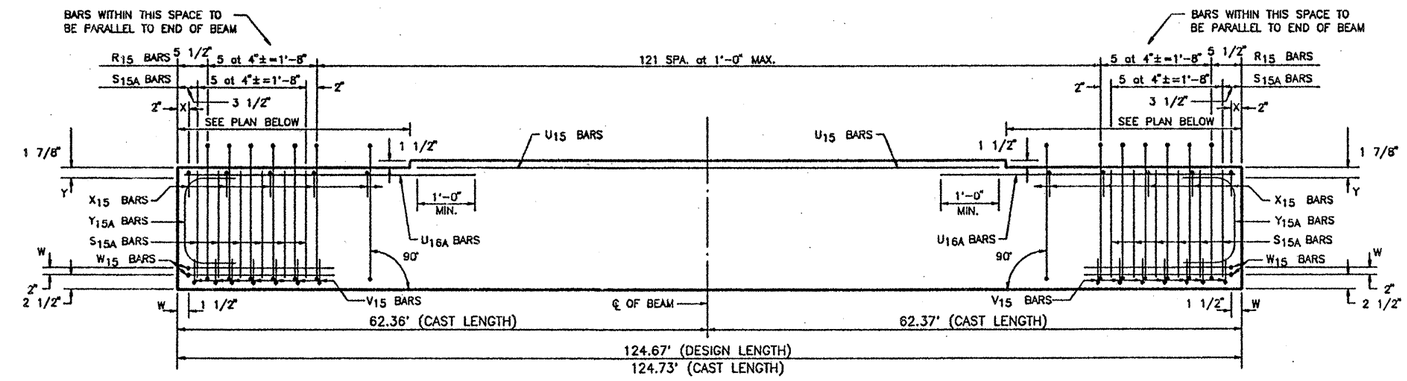
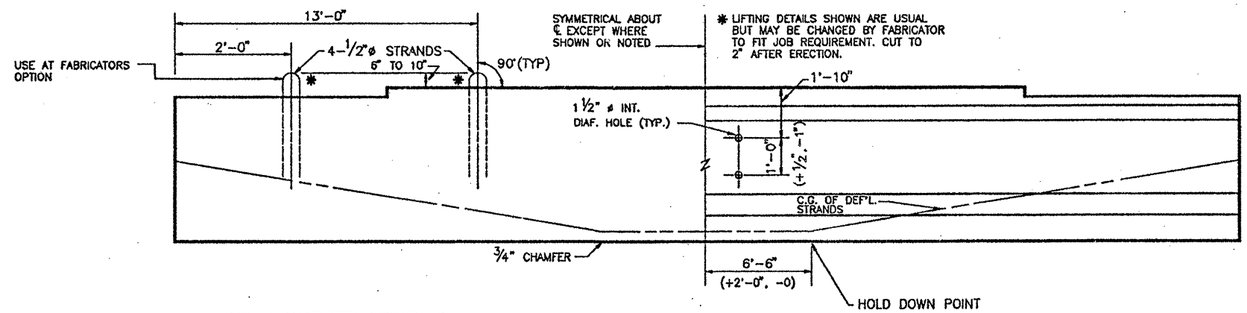
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	IV-3
SEA JOB NO. 93-160H	FABRICATION SHEET			

94-018H

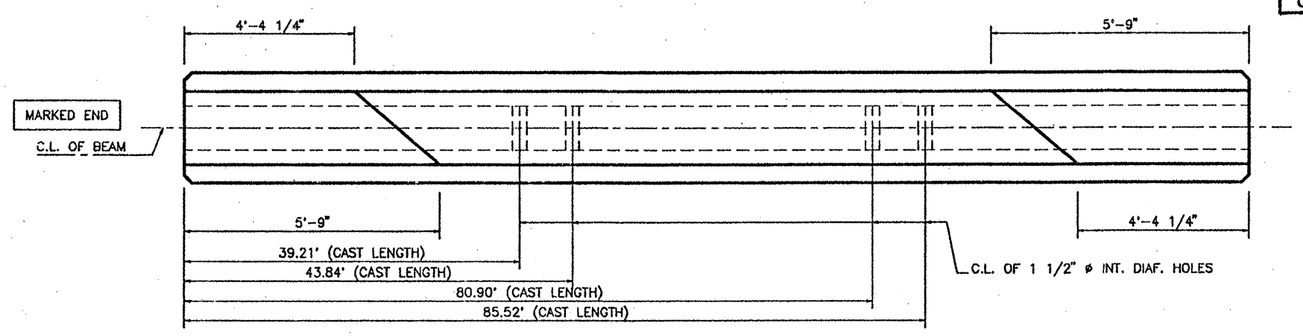


ELEVATION – REINFORCING STEEL



DOUBLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS OVER 75')

BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION



PLAN

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL.

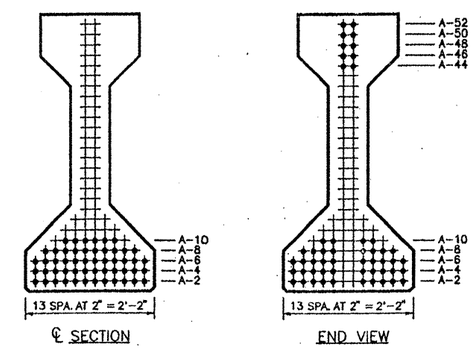
TOP FINISH PANELS
SEE STANDARD SHEET S-"IV" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

REINFORCING STEEL SCHEDULE

BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_{15}	132	792	#3	standard
X_{15}	128	768	#3	standard
Y_{15A}	4	24	#6	standard
S_{15A}	24	144	#7	standard
V_{15}	14	84	#3	standard
W_{15}	4	24	#5	standard
U_{15}	2	12	#5	114'-4"
U_{16A}	4	24	#5	6'-6"

SP-21



TYPE "IV" BEAM QUANTITY : 6

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 52 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 42
NUMBER OF DEFLECTED STRANDS	: 10 @ A – 52
CONCRETE RELEASE STRENGTH	: 5749 PSI
CONCRETE DESIGN STRENGTH	: 7948 PSI
ECCENTRICITY @ ℄ : 19.29"	ECCENTRICITY @ END : 11.21"

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 748.02'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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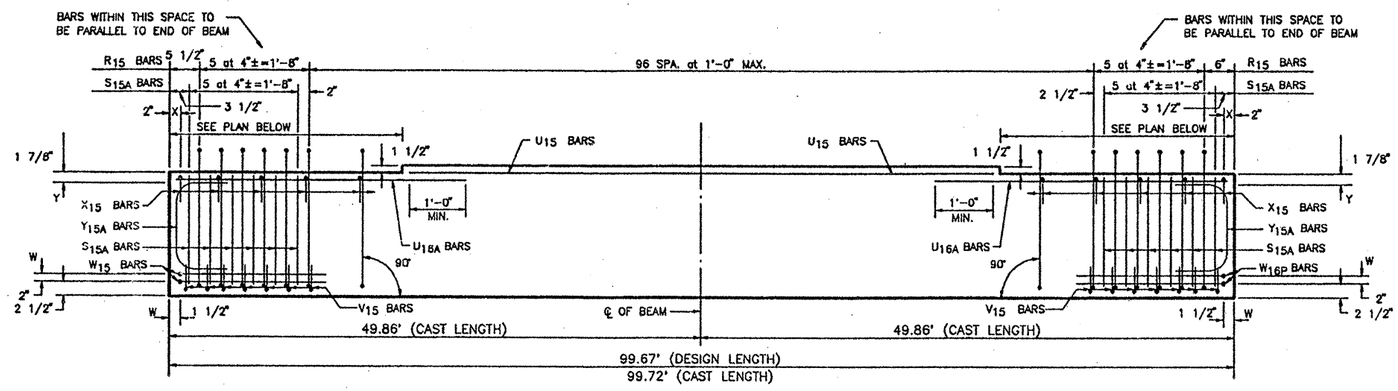
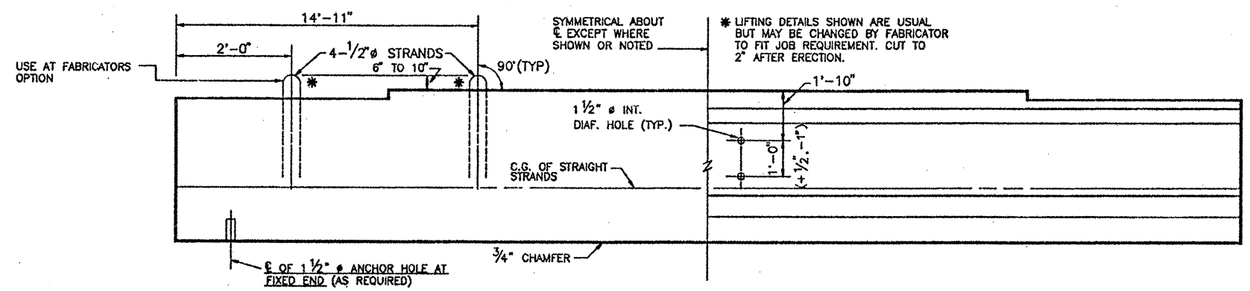
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	IV-4
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

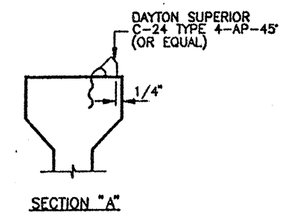
REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_{15}	107	428	#3	standard
X_{15}	103	412	#3	standard
Y_{15A}	4	16	#6	standard
S_{15A}	24	96	#7	standard
V_{15}	14	56	#3	standard
W_{15}	2	8	#5	standard
U_{15}	2	8	#5	89'-4"
W_{16P}	2	8	#5	standard
U_{16A}	4	16	#5	6'-6"

SP-22

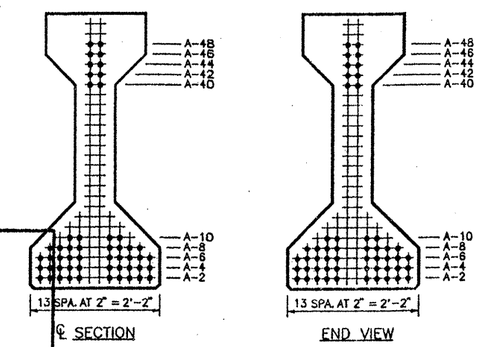


DOUBLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS OVER 75')

BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION



SECTION "A"



℄ SECTION

END VIEW

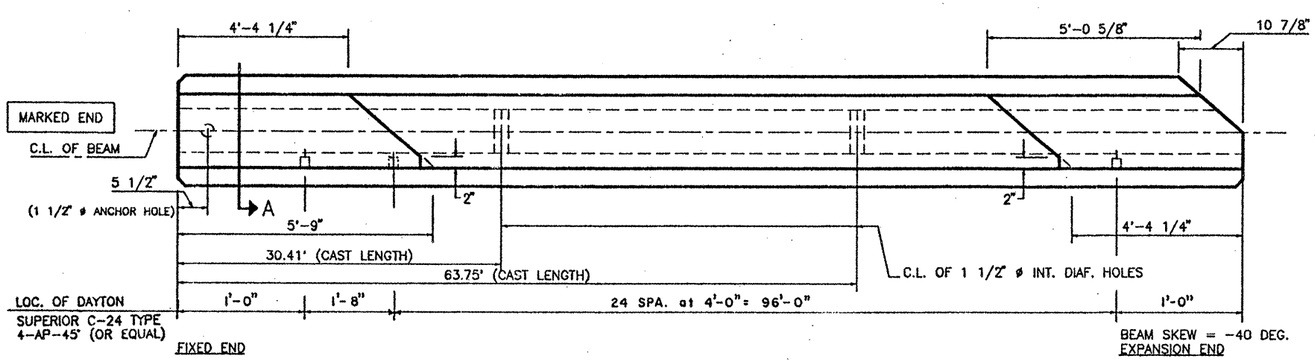
TYPE "IV" BEAM QUANTITY : 4

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 52 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 52	
NUMBER OF DEFLECTED STRANDS	: NONE	
CONCRETE RELEASE STRENGTH	: 6020	PSI
CONCRETE DESIGN STRENGTH	: 7040	PSI
ECCENTRICITY @ ℄	: 11.98"	ECCENTRICITY @ END : 11.98"



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"IV" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

DESIGN NO. : O.D. # 2
TOTAL BEAM LENGTH OF THIS SHEET : 398.68'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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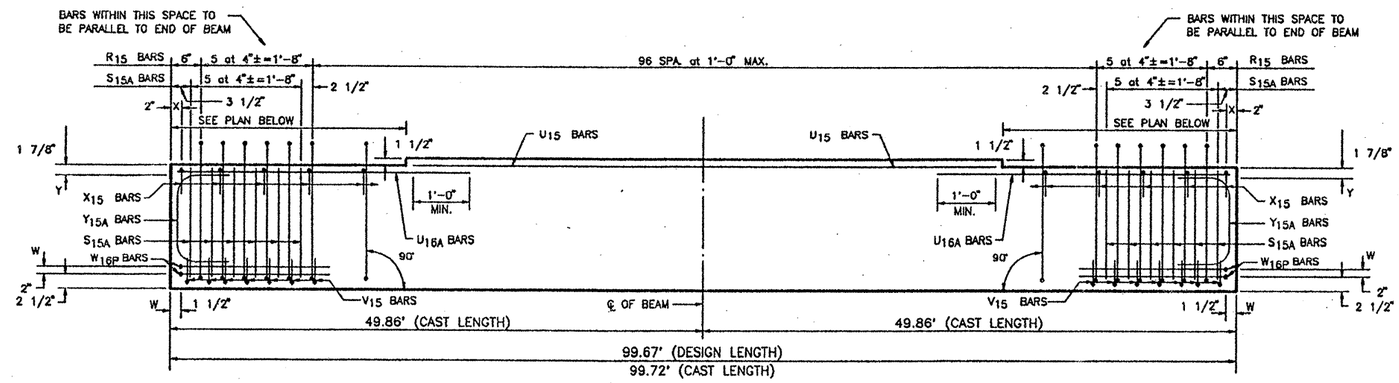
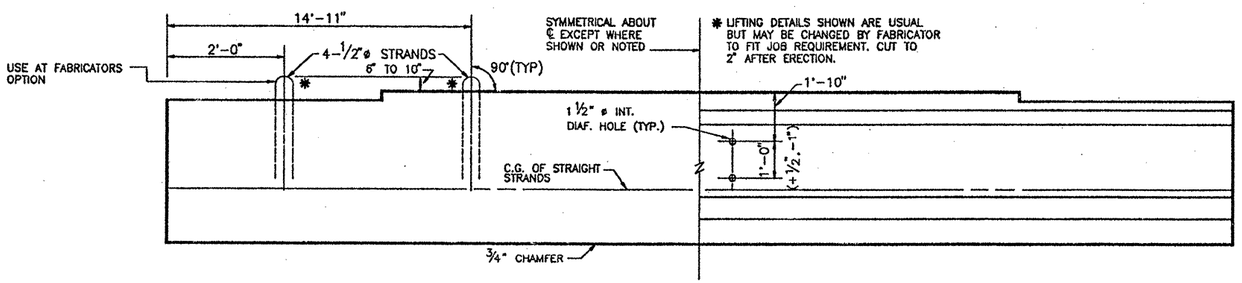
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	IV-5
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_{15}	107	428	#3	standard
X_{15}	103	412	#3	standard
Y_{15A}	4	16	#6	standard
S_{15A}	24	96	#7	standard
V_{15}	14	56	#3	standard
W_{16P}	4	16	#5	standard
U_{15}	2	8	#5	89'-4"
U_{16A}	4	16	#5	6'-6"

SP-23



DOUBLE LIFTING LOOP DETAIL (TYP. FOR BEAMS OVER 75')

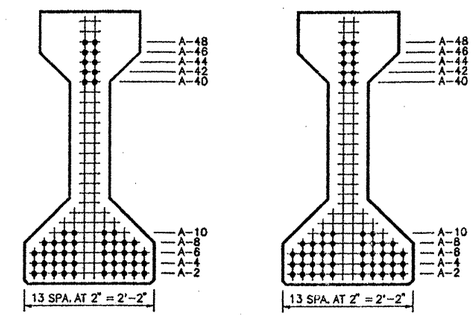
BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

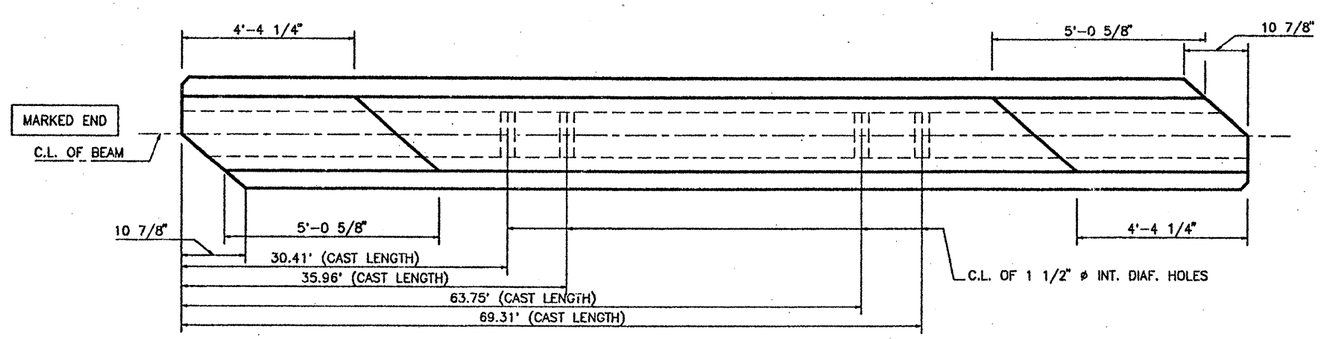


TYPE "IV" BEAM QUANTITY : 4

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 52 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 52	
NUMBER OF DEFLECTED STRANDS	: NONE	
CONCRETE RELEASE STRENGTH	: 6020	PSI
CONCRETE DESIGN STRENGTH	: 7040	PSI
ECCENTRICITY @ ℄ : 11.98"	ECCENTRICITY @ END : 11.98"	

DESIGN NO. : O.D. # 2

TOTAL BEAM LENGTH OF THIS SHEET : 398.68'



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"IV" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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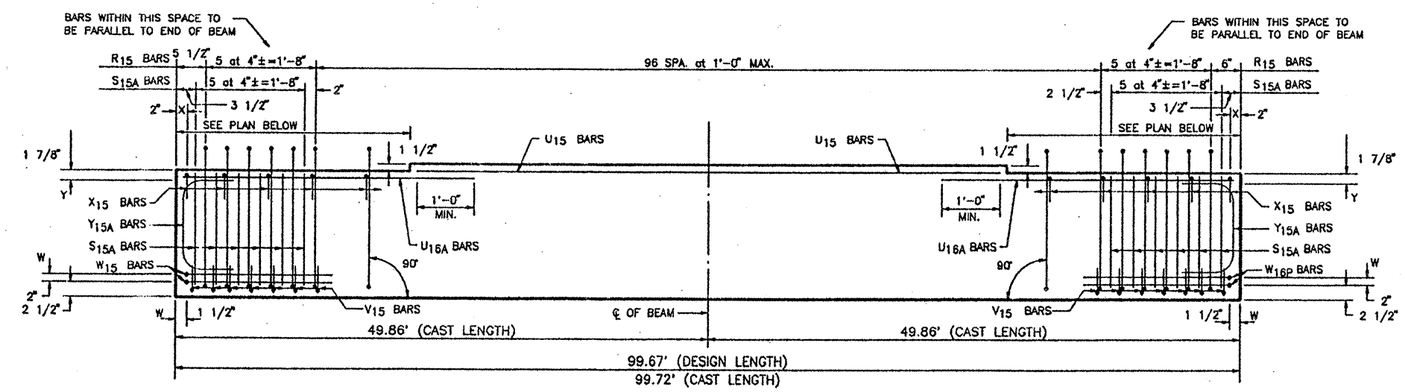
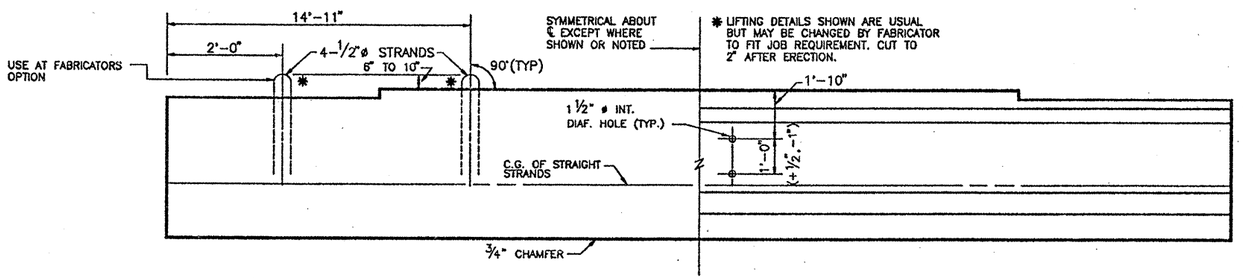
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	IV-6
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_{15}	107	1284	#3	standard
X_{15}	103	1236	#3	standard
Y_{15A}	4	48	#6	standard
S_{15A}	24	288	#7	standard
V_{15}	14	168	#3	standard
W_{15}	2	24	#5	standard
U_{15}	2	24	#5	89'-4"
W_{16P}	2	24	#5	standard
U_{16A}	4	48	#5	6'-6"

SP-24



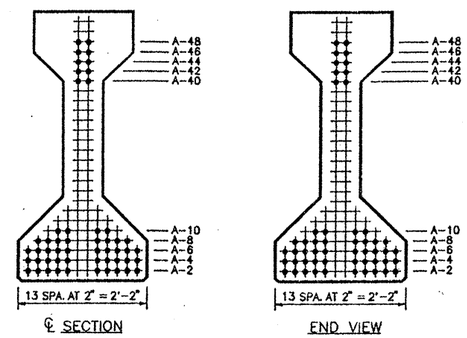
DOUBLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS OVER 75')

BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

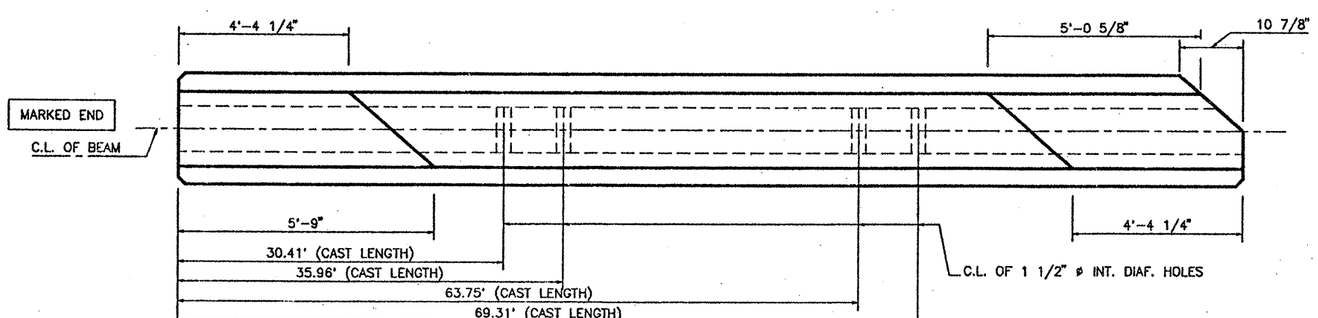
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL



TYPE "IV" BEAM QUANTITY : 12

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 52 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 52	
NUMBER OF DEFLECTED STRANDS	: NONE	
CONCRETE RELEASE STRENGTH	: 6020	PSI
CONCRETE DESIGN STRENGTH	: 7040	PSI
ECCENTRICITY @ ℄ : 11.98"	ECCENTRICITY @ END : 11.98"	

DESIGN NO. : O.D. # 2
TOTAL BEAM LENGTH OF THIS SHEET : 1196.04'



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"IV" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.				
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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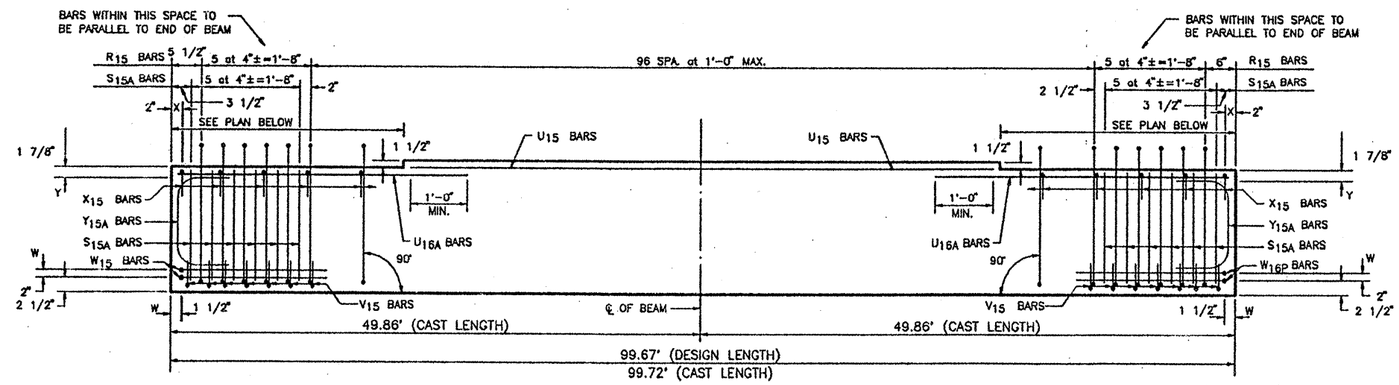
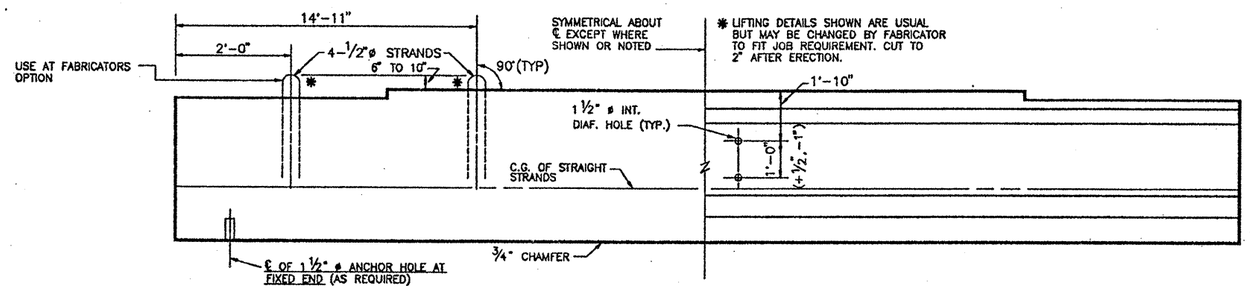
JOB NO. 93-063	DRAWN C.J.B.	CHECKED M.J.R.	DATE 1-11-94	SHEET/MARK NO.
SEA JOB NO. 93-160H	FABRICATION SHEET			IV-7
94-018H				

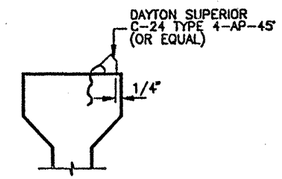


ELEVATION – REINFORCING STEEL

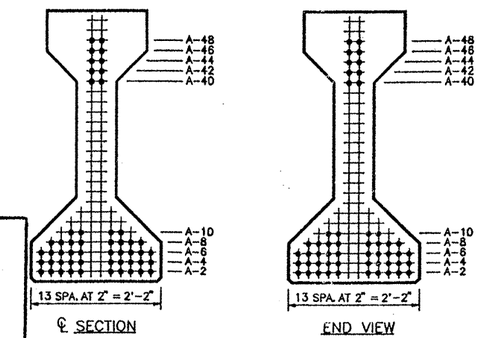


DOUBLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS OVER 75')

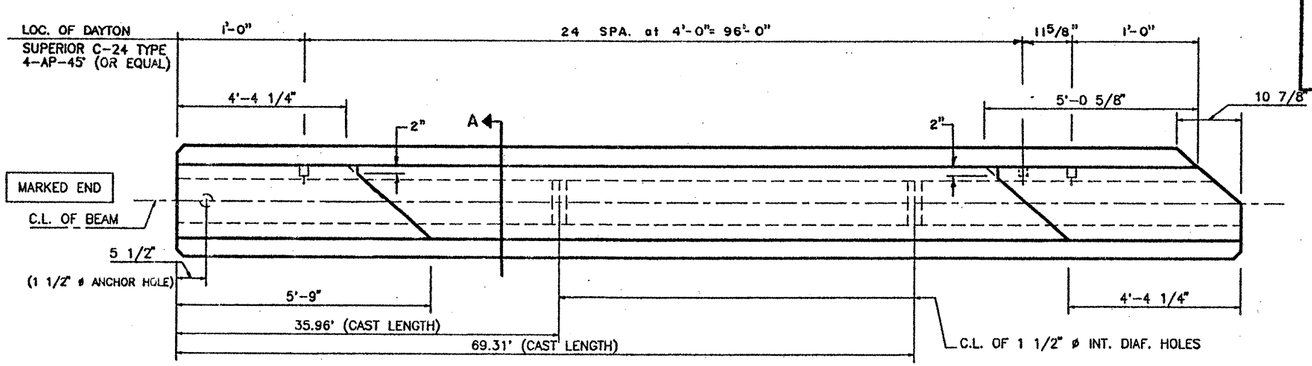
BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION



SECTION "A"



TYPE "IV" BEAM QUANTITY : 4



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"IV" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION
FEB 16 1994
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

FOR APPROVAL
JAN 11 1994

REINFORCING STEEL SCHEDULE

BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_{15}	107	428	#3	standard
X_{15}	103	412	#3	standard
Y_{15A}	4	16	#6	standard
S_{15A}	24	96	#7	standard
V_{15}	14	56	#3	standard
W_{15}	2	8	#5	standard
U_{15}	2	8	#5	89'-4"
W_{16P}	2	8	#5	standard
U_{16A}	4	16	#5	6'-6"

SP-25

LO-LAX STRAND PATTERN

NUMBER OF STRANDS	: 52 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 52	
NUMBER OF DEFLECTED STRANDS	: NONE	
CONCRETE RELEASE STRENGTH	: 6020	PSI
CONCRETE DESIGN STRENGTH	: 7040	PSI
ECCENTRICITY @ ℄	: 11.98"	ECCENTRICITY @ END : 11.98"

DESIGN NO. : O.D. # 2
TOTAL BEAM LENGTH OF THIS SHEET : 398.68'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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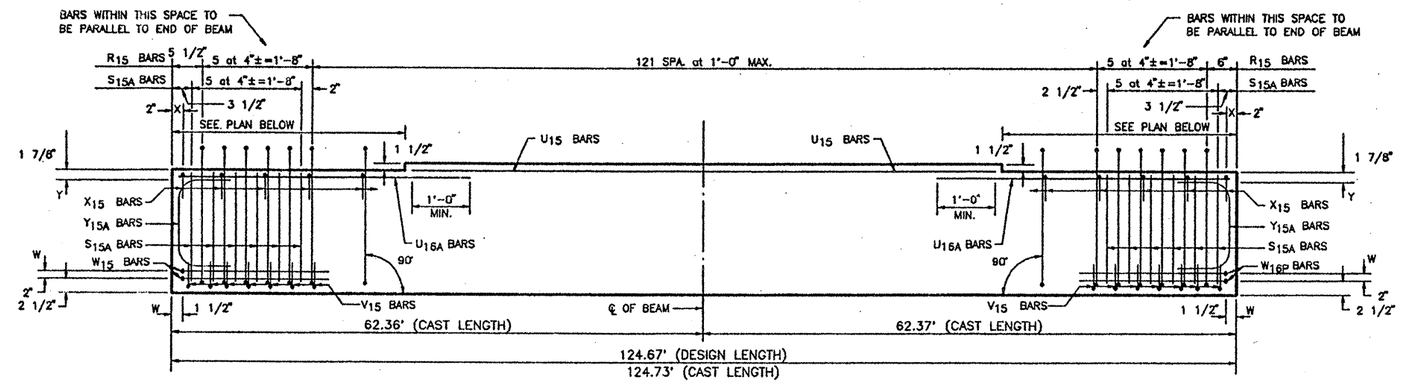
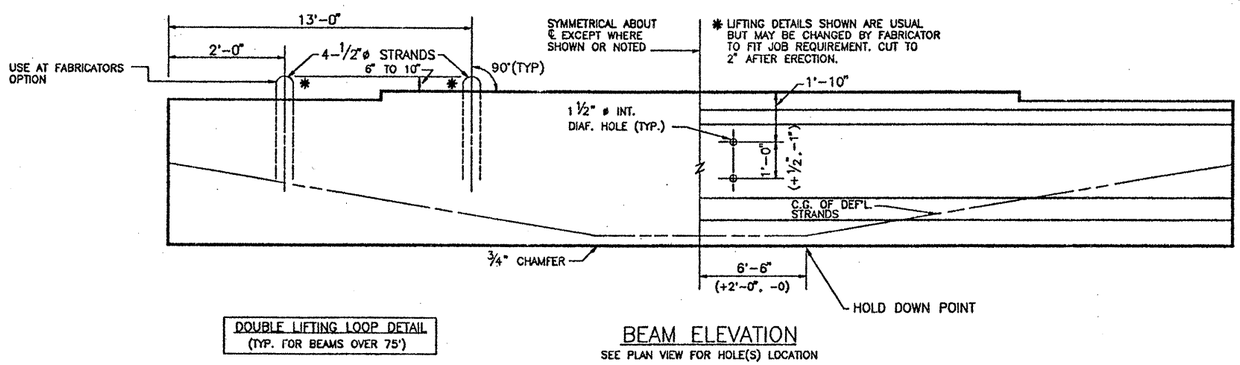
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	IV-8
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_{15}	132	264	#3	standard
X_{15}	128	256	#3	standard
Y_{15A}	4	8	#6	standard
S_{15A}	24	48	#7	standard
V_{15}	14	28	#3	standard
W_{15}	2	4	#5	standard
U_{15}	2	4	#5	114'-4"
W_{16P}	2	4	#5	standard
U_{16A}	4	8	#5	6'-6"

SP-26



DOUBLE LIFTING LOOP DETAIL (TYP. FOR BEAMS OVER 75')

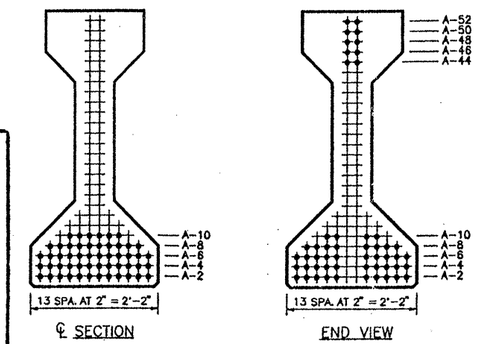
BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL



℄ SECTION

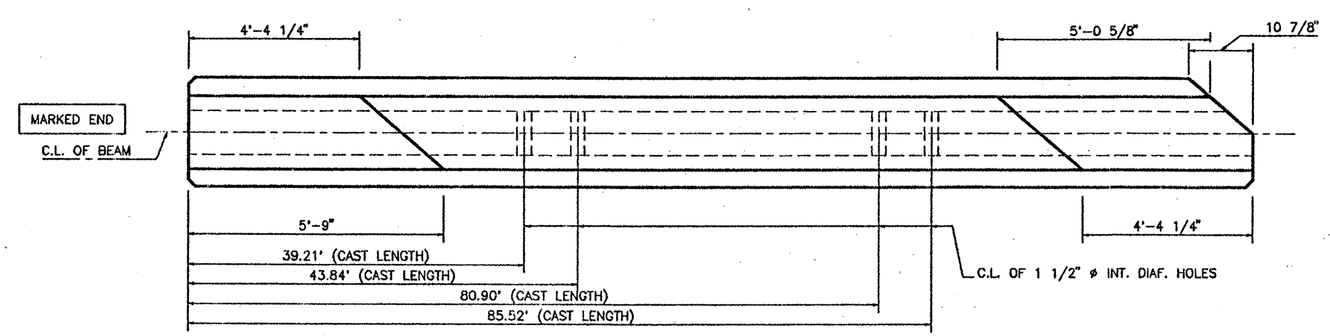
END VIEW

TYPE "IV" BEAM QUANTITY : 2

LO-LAX STRAND PATTERN			
NUMBER OF STRANDS	: 52 ~1/2" ø 270 K @ 31.00 K EACH		
NUMBER OF STRAIGHT STRANDS	: 42		
NUMBER OF DEFLECTED STRANDS	: 10 @ A – 52		
CONCRETE RELEASE STRENGTH	: 5749	PSI	
CONCRETE DESIGN STRENGTH	: 7948	PSI	
ECCENTRICITY @ ℄	: 19.29"	ECCENTRICITY @ END	: 11.21"

DESIGN NO. : Gp-NS-LR

TOTAL BEAM LENGTH OF THIS SHEET : 249.34'



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"IV" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR	GILBERT TEXAS CONSTRUCTION CORP.			
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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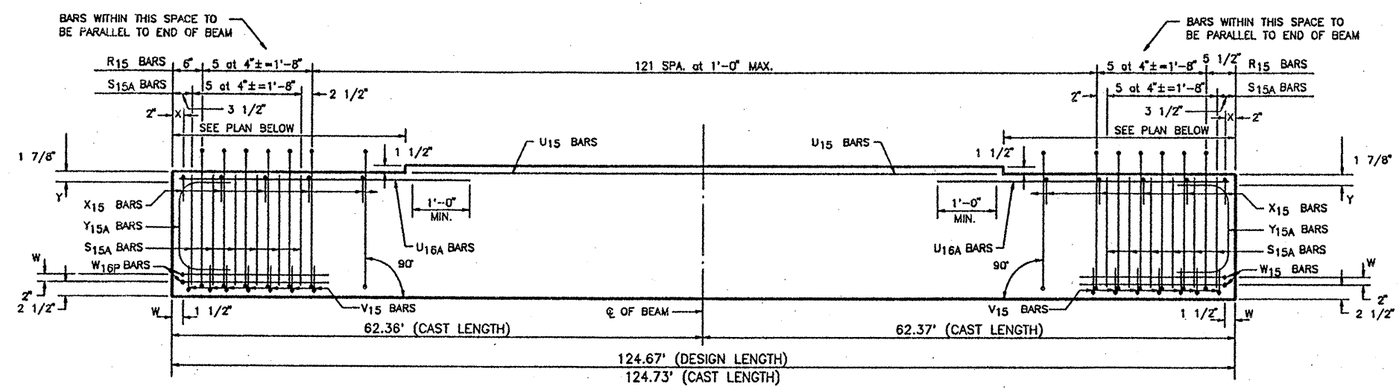
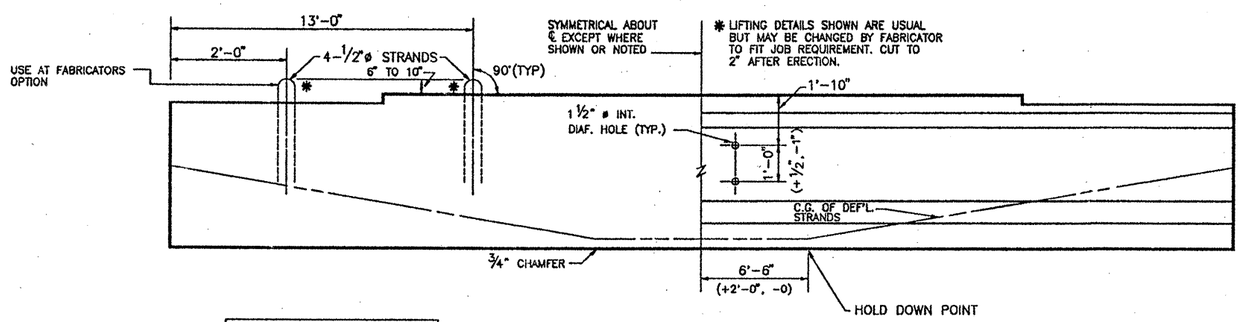
JOB NO. 93-063	DRAWN C.J.B.	CHECKED M.J.R.	DATE 1-11-94	SHEET/MARK NO.
SEA JOB NO. 93-160H	FABRICATION SHEET			IV-9
94-018H				

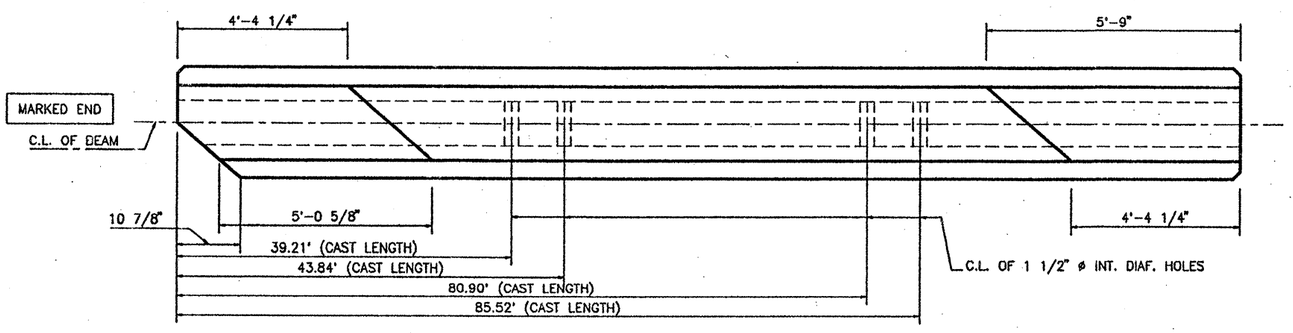


ELEVATION – REINFORCING STEEL



DOUBLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS OVER 75')

BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION



PLAN

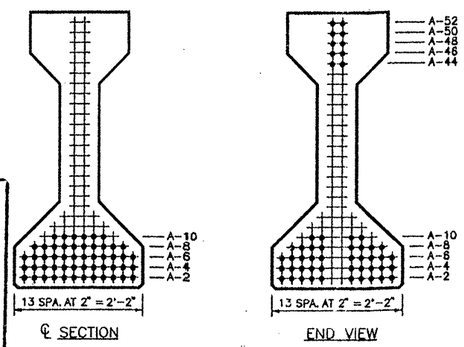
REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_{15}	132	264	#3	standard
X_{15}	128	256	#3	standard
Y_{15A}	4	8	#6	standard
S_{15A}	24	48	#7	standard
V_{15}	14	28	#3	standard
W_{15}	2	4	#5	standard
U_{15}	2	4	#5	114'-4"
W_{16P}	2	4	#5	standard
U_{16A}	4	8	#5	6'-6"

SP-27

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL



TYPE "IV" BEAM QUANTITY : 2

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 52 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 42	
NUMBER OF DEFLECTED STRANDS	: 10 @ A – 52	
CONCRETE RELEASE STRENGTH	: 5749 PSI	
CONCRETE DESIGN STRENGTH	: 7948 PSI	
ECCENTRICITY @ ℄ : 19.29"	ECCENTRICITY @ END : 11.21"	

TOP FINISH PANELS
SEE STANDARD SHEET S-"IV" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 249.34'

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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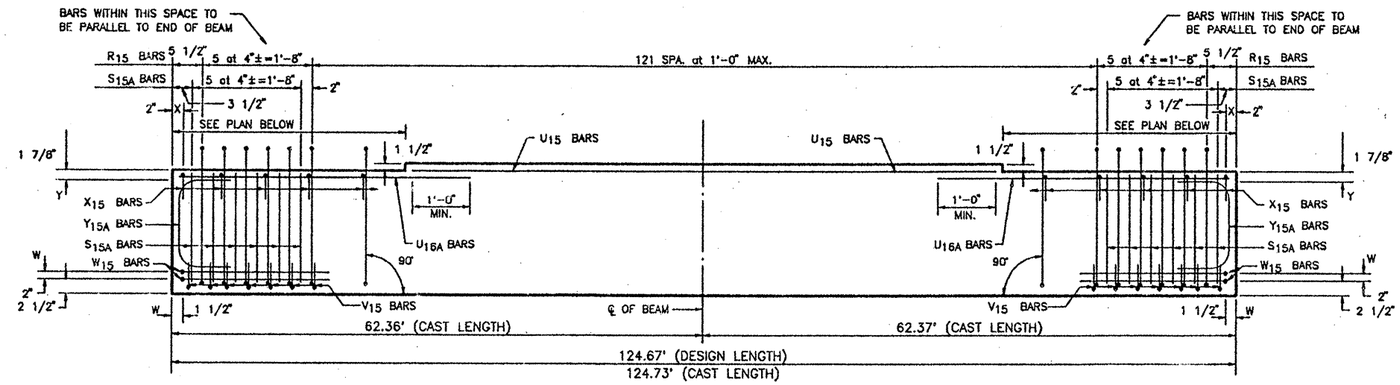
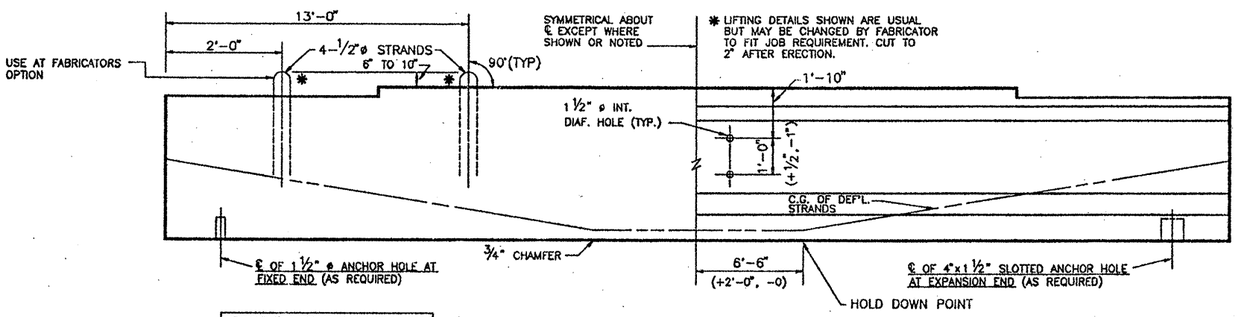
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	IV-10
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_{15}	132	264	#3	standard
X_{15}	128	256	#3	standard
Y_{15A}	4	8	#6	standard
S_{15A}	24	48	#7	standard
V_{15}	14	28	#3	standard
W_{15}	4	8	#5	standard
U_{15}	2	4	#5	114'-4"
U_{16A}	4	8	#5	6'-6"

SP-28



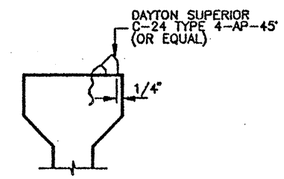
ELEVATION – REINFORCING STEEL



DOUBLE LIFTING LOOP DETAIL (TYP. FOR BEAMS OVER 75')

BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

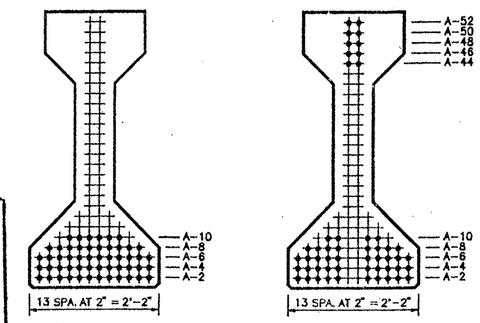


SECTION "A"

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL



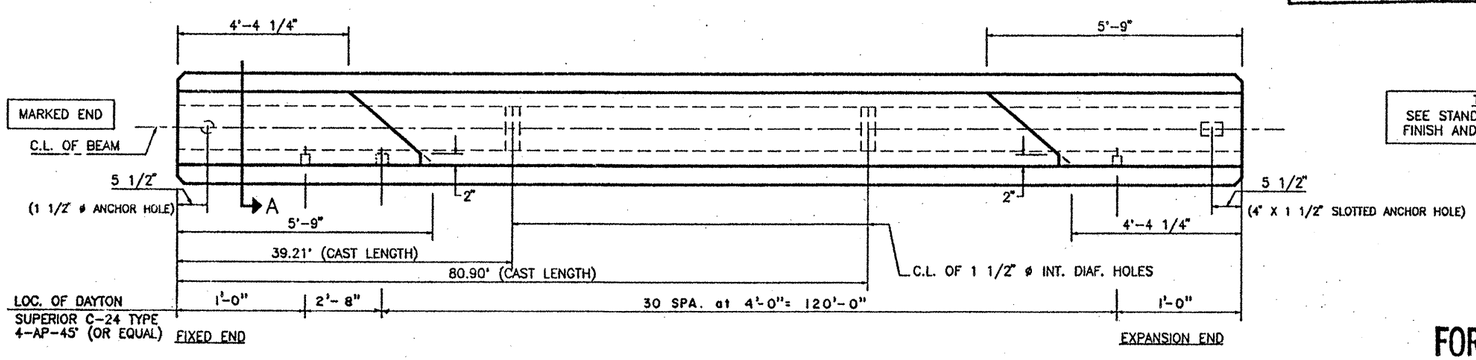
℄ SECTION END VIEW

TYPE "IV" BEAM QUANTITY : 2

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 52 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 42
NUMBER OF DEFLECTED STRANDS	: 10 @ A – 52
CONCRETE RELEASE STRENGTH	: 5749 PSI
CONCRETE DESIGN STRENGTH	: 7948 PSI
ECCENTRICITY @ ℄	: 19.29" ECCENTRICITY @ END : 11.21"

DESIGN NO. : Gp-NS-LR

TOTAL BEAM LENGTH OF THIS SHEET : 249.34'



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"IV" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.				
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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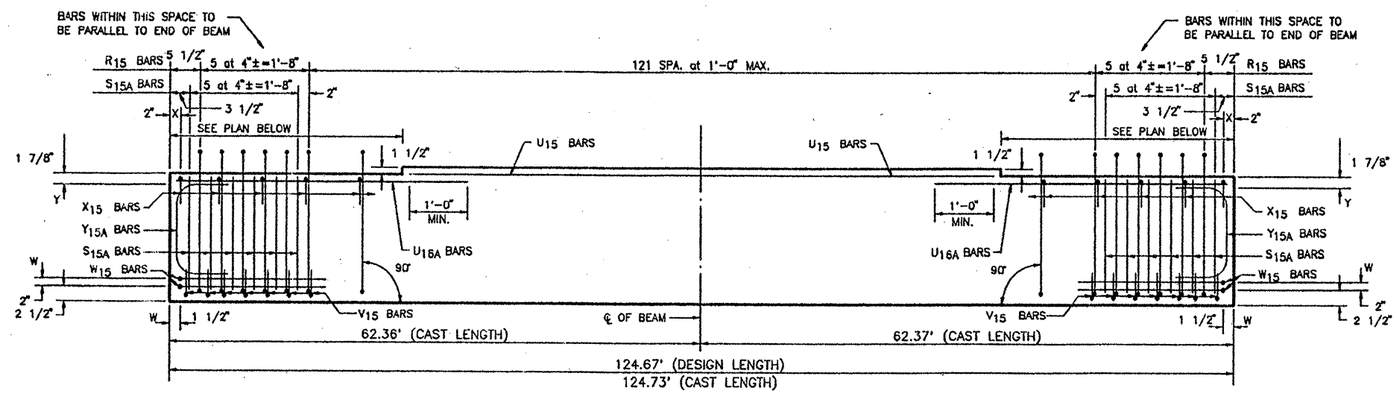
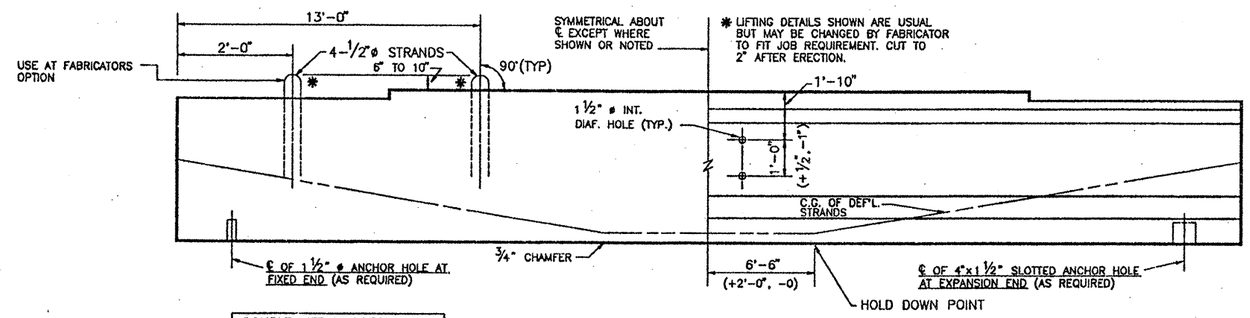
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	IV-11
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



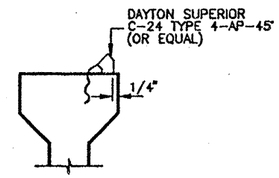
ELEVATION – REINFORCING STEEL



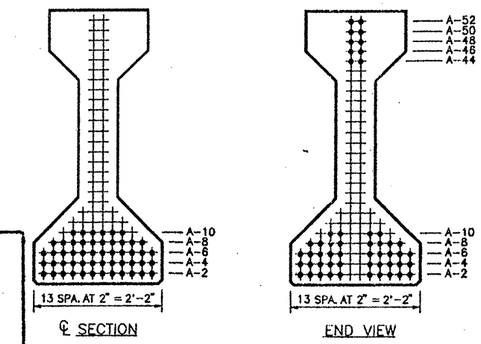
DOUBLE LIFTING LOOP DETAIL (TYP. FOR BEAMS OVER 75')

BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION



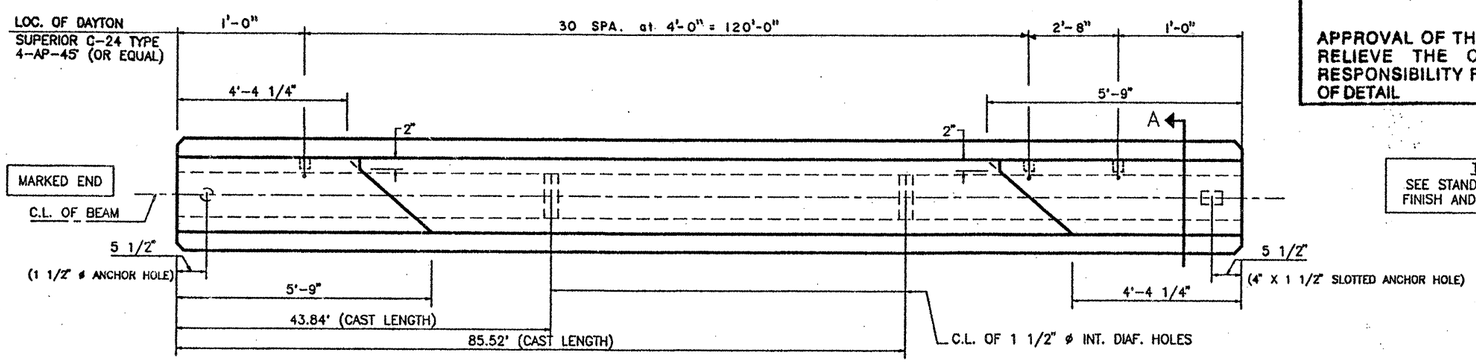
SECTION "A"



℄ SECTION

END VIEW

TYPE "IV" BEAM QUANTITY : 2



FIXED END

EXPANSION END

PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"IV" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

FOR APPROVAL
JAN 11 1994

REINFORCING STEEL SCHEDULE

BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_{15}	132	264	#3	standard
X_{15}	128	256	#3	standard
Y_{15A}	4	8	#6	standard
S_{15A}	24	48	#7	standard
V_{15}	14	28	#3	standard
W_{15}	4	8	#5	standard
U_{15}	2	4	#5	114'-4"
U_{16A}	4	8	#5	6'-6"

SP-29

LO-LAX STRAND PATTERN

NUMBER OF STRANDS	: 52 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 42	
NUMBER OF DEFLECTED STRANDS	: 10 @ A – 52	
CONCRETE RELEASE STRENGTH	: 5749 PSI	
CONCRETE DESIGN STRENGTH	: 7948 PSI	
ECCENTRICITY @ ℄ : 19.29"	ECCENTRICITY @ END : 11.21"	

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 249.34'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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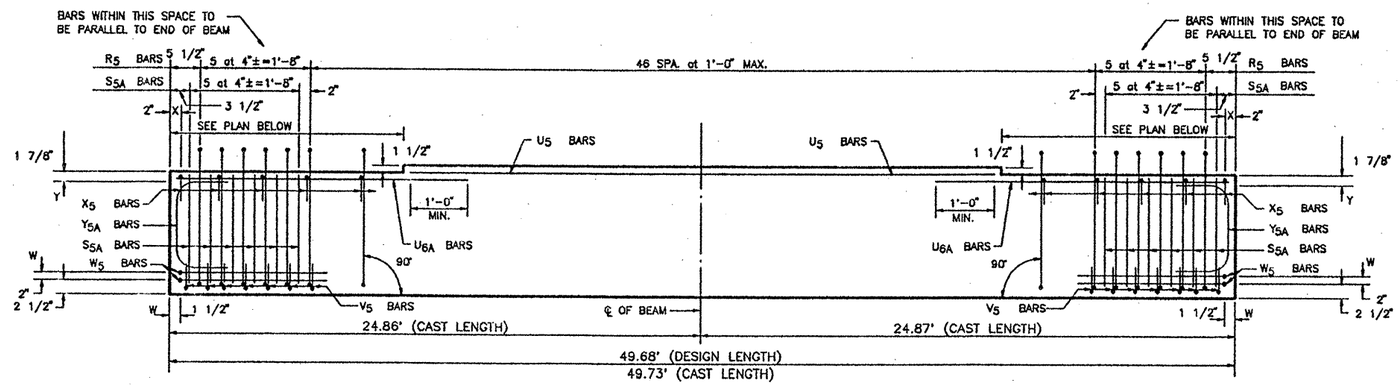
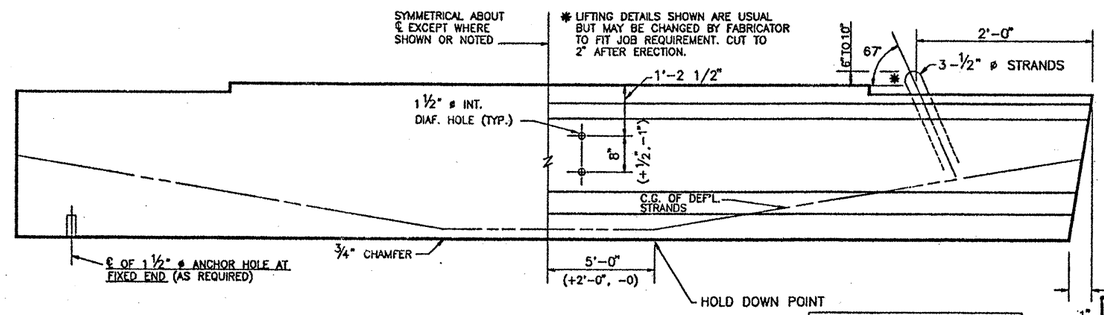
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	IV-12
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

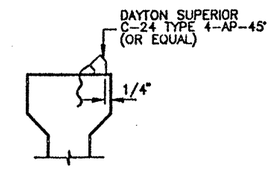
REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	57	57	#3	standard
X_5	53	53	#3	standard
Y_{5A}	4	4	#6	standard
S_{5A}	24	24	#5	standard
V_5	14	14	#3	standard
W_5	4	4	#5	standard
U_5	2	2	#5	41'-10"
U_{6A}	4	4	#5	6'-6"

SP-30

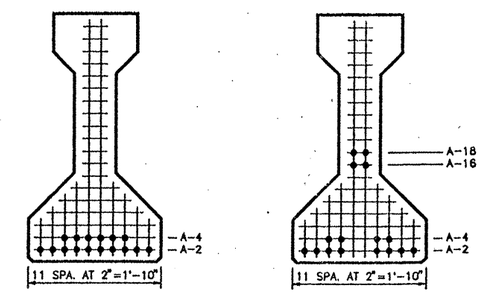


BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



SECTION "A"



℄ SECTION

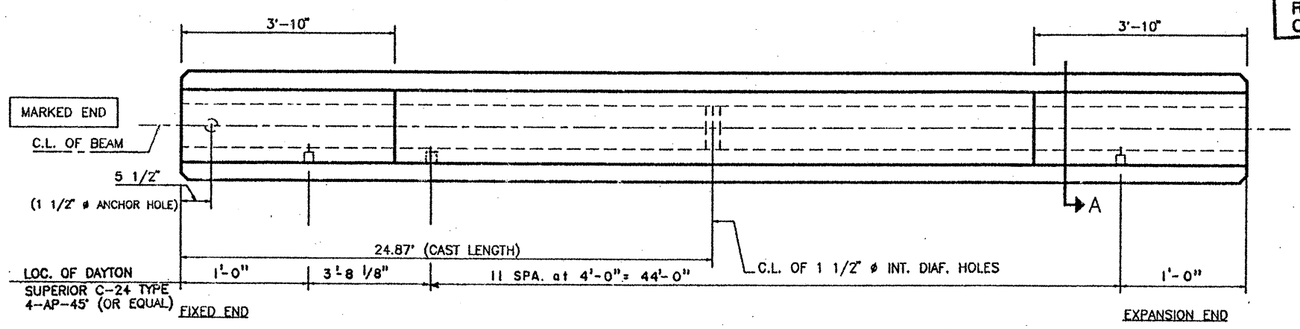
END VIEW

TYPE "C" BEAM QUANTITY : 1

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION
FEB 16 1994
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 16 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 12	
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 18	
CONCRETE RELEASE STRENGTH	: 4000 PSI	
CONCRETE DESIGN STRENGTH	: 5000 PSI	
ECCENTRICITY @ ℄ : 14.34"	ECCENTRICITY @ END : 10.84"	

DESIGN NO. : O.D. # 4
TOTAL BEAM LENGTH OF THIS SHEET : 49.68'



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.				
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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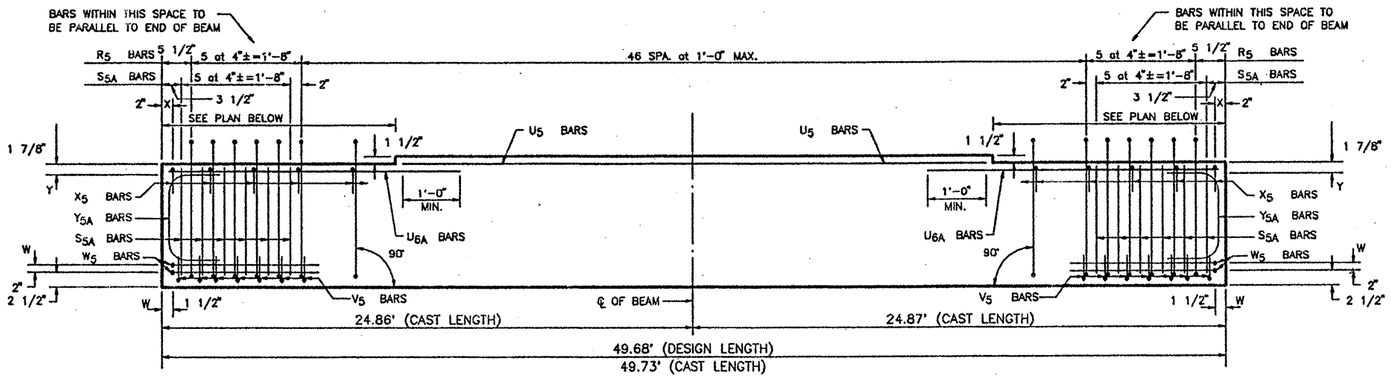
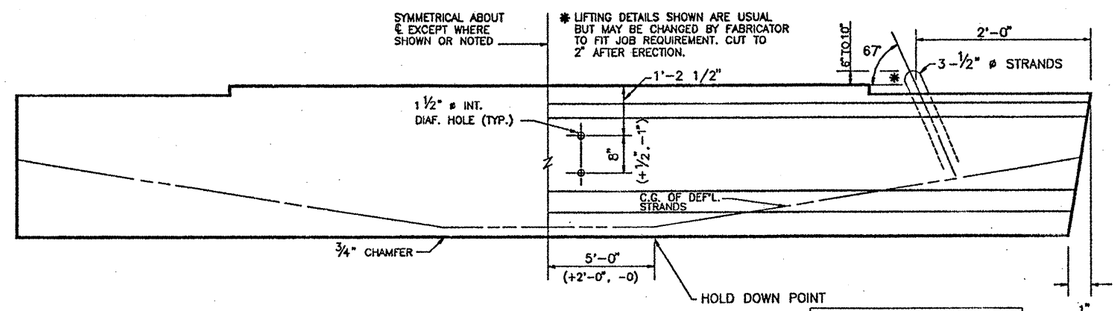
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-1
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				

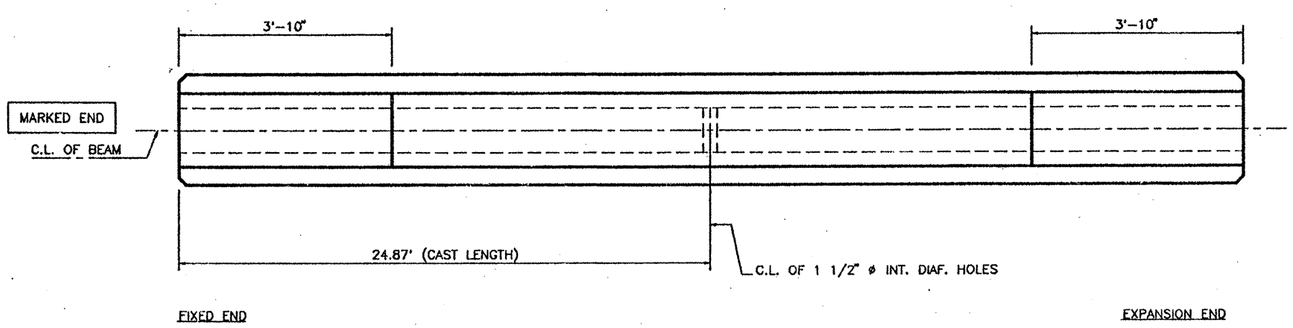


ELEVATION – REINFORCING STEEL



BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



PLAN

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

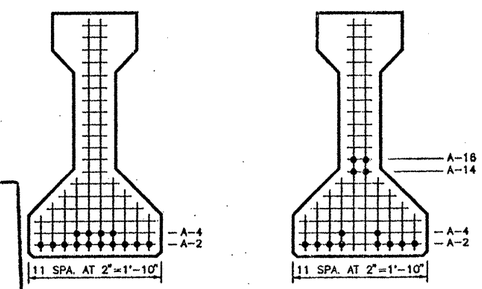
TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

REINFORCING STEEL SCHEDULE

BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	57	342	#3	standard
X_5	53	318	#3	standard
Y_{5A}	4	24	#6	standard
S_{5A}	24	144	#5	standard
V_5	14	84	#3	standard
W_5	4	24	#5	standard
U_5	2	12	#5	41'-10"
U_{6A}	4	24	#5	6'-6"

SP-31



℄ SECTION END VIEW

TYPE "C" BEAM QUANTITY : 6

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 14 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 10
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 16
CONCRETE RELEASE STRENGTH	: 4000 PSI
CONCRETE DESIGN STRENGTH	: 5000 PSI
ECCENTRICITY @ ℄ : 14.52"	ECCENTRICITY @ END : 11.09"

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 298.08'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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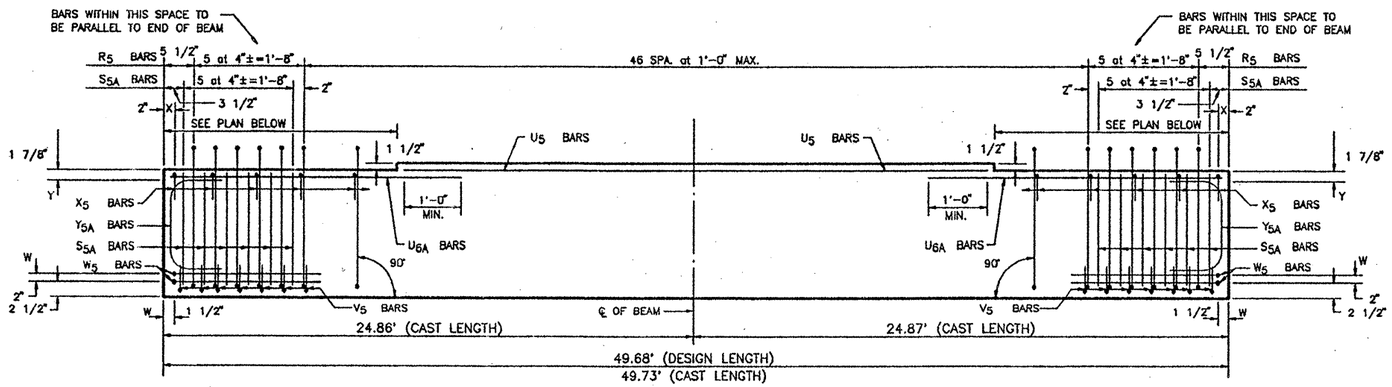
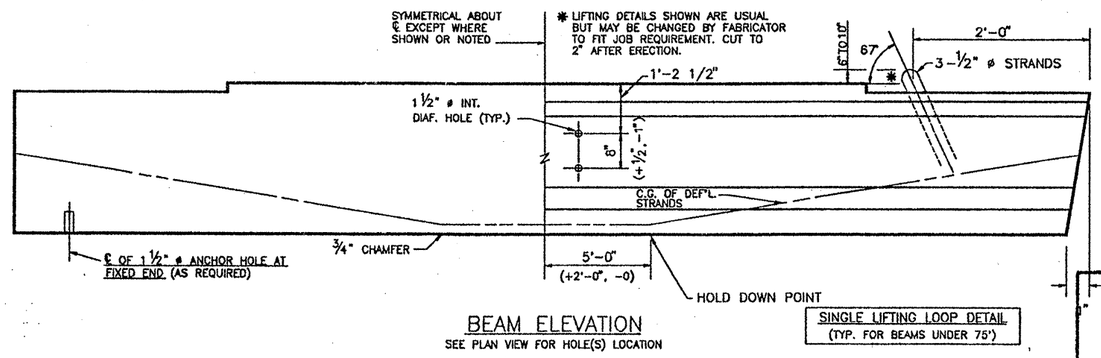
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-2
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

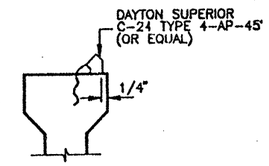
REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	57	114	#3	standard
X_5	53	106	#3	standard
Y_{5A}	4	8	#6	standard
S_{5A}	24	48	#5	standard
V_5	14	28	#3	standard
W_5	4	8	#5	standard
U_5	2	4	#5	41'-10"
U_{6A}	4	8	#5	6'-6"

SP-32

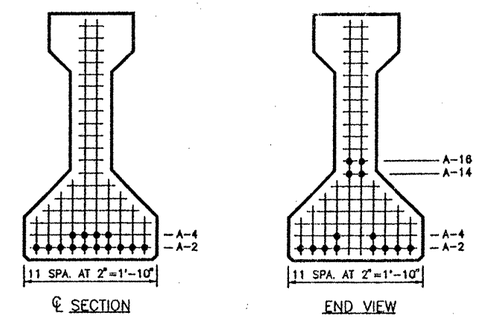


BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



SECTION "A"



℄ SECTION

END VIEW

TYPE "C" BEAM QUANTITY : 2

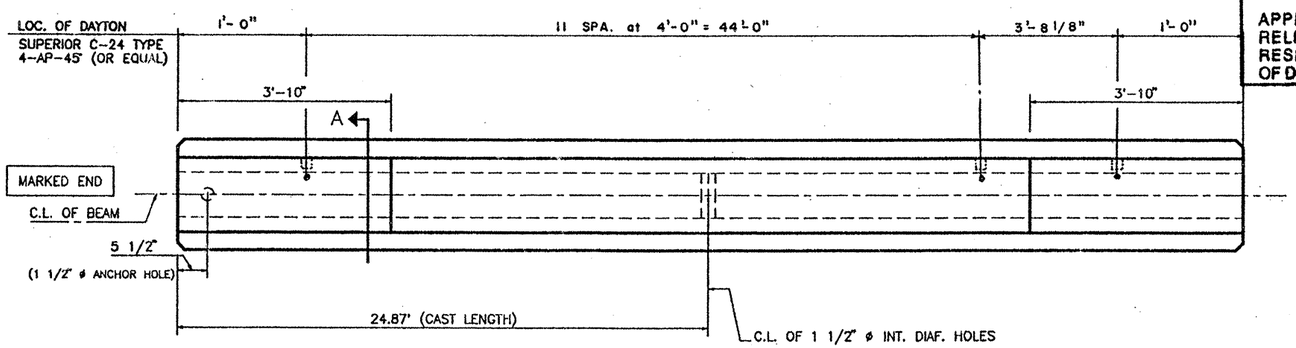
TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 14 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 10
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 16
CONCRETE RELEASE STRENGTH	: 4000 PSI
CONCRETE DESIGN STRENGTH	: 5000 PSI
ECCENTRICITY @ ℄	: 14.52" ECCENTRICITY @ END : 11.09"

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 99.36'



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR : GILBERT TEXAS CONSTRUCTION CORP.				
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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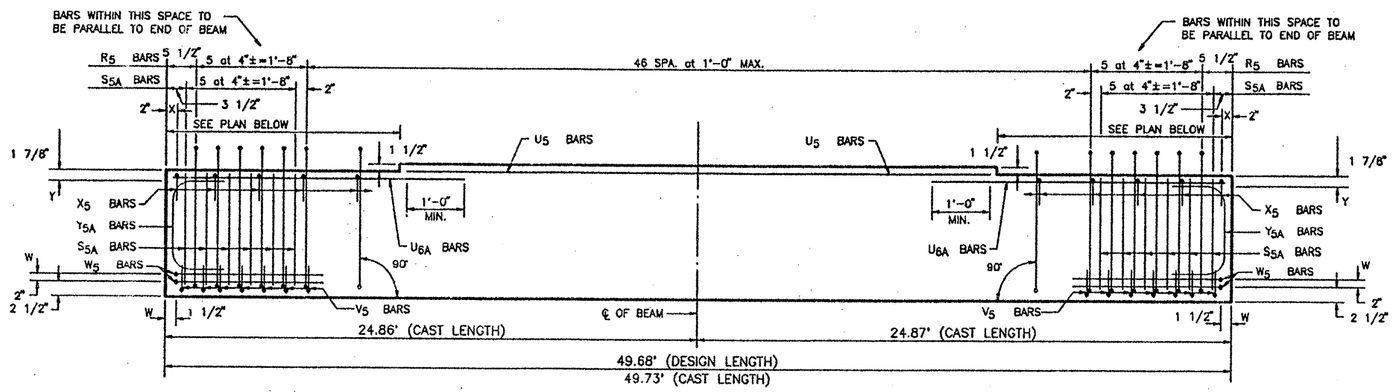
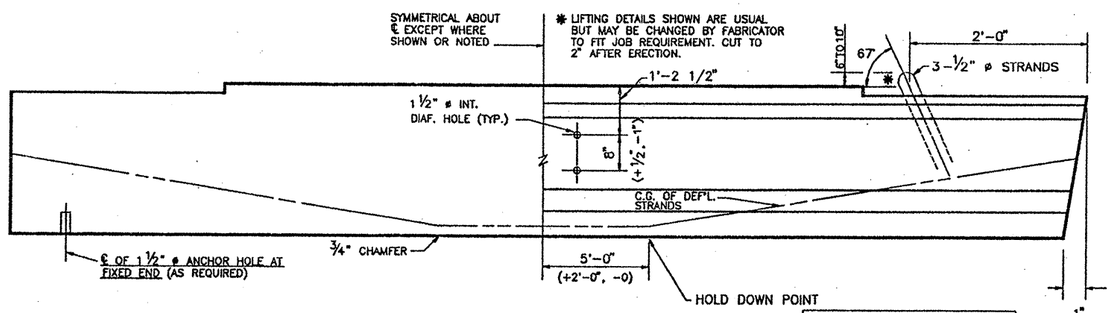
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-3
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

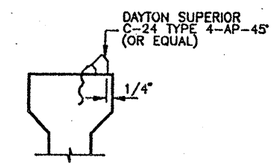
REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	57	57	#3	standard
X_5	53	53	#3	standard
Y_{5A}	4	4	#6	standard
S_{5A}	24	24	#5	standard
V_5	14	14	#3	standard
W_5	4	4	#5	standard
U_5	2	2	#5	41'-10"
U_{6A}	4	4	#5	6'-6"

SP-33

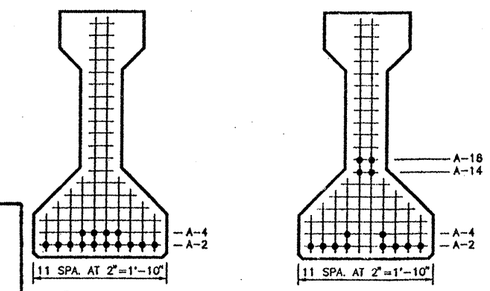


BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



SECTION "A"



℄ SECTION

END VIEW

TYPE "C" BEAM QUANTITY : 1

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 14 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 10	
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 16	
CONCRETE RELEASE STRENGTH	: 4000	PSI
CONCRETE DESIGN STRENGTH	: 5000	PSI
ECCENTRICITY @ ℄	: 14.52"	ECCENTRICITY @ END : 11.09"

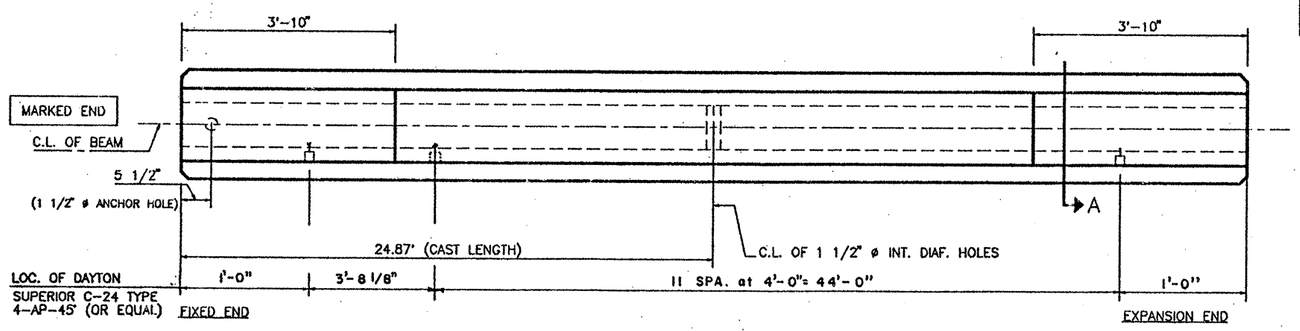
TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 49.68'



PLAN

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.				
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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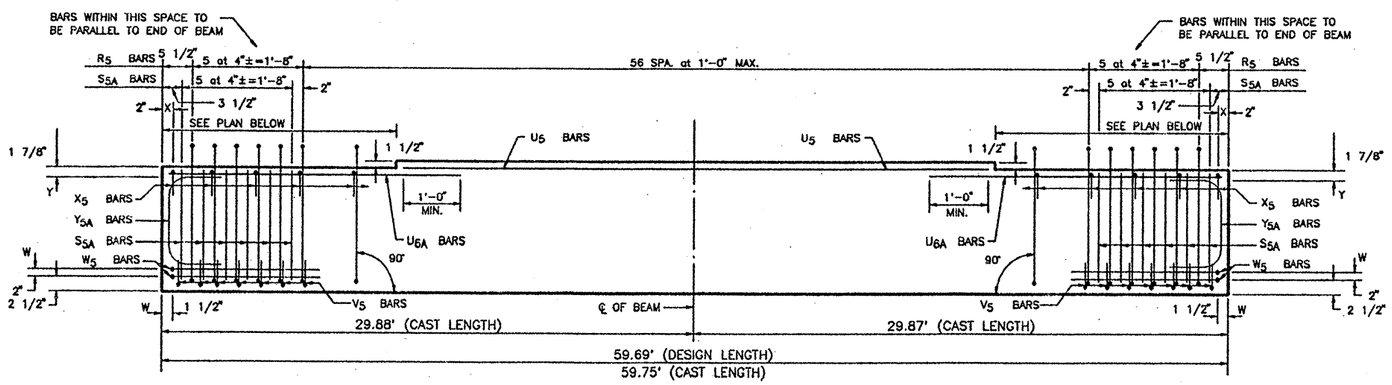
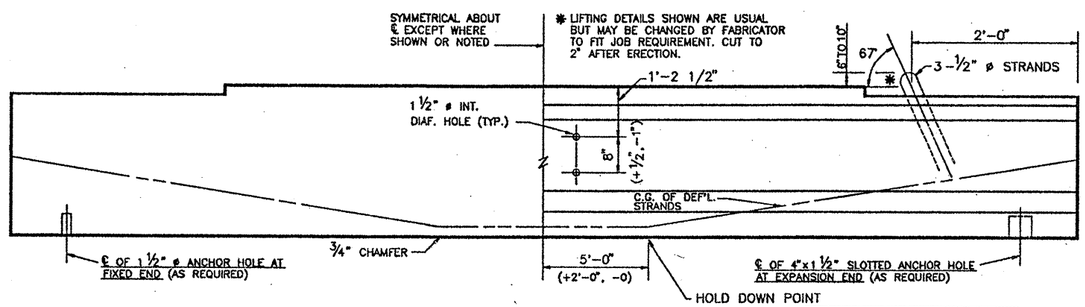
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-4
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



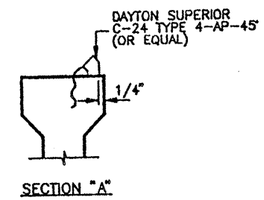
ELEVATION – REINFORCING STEEL



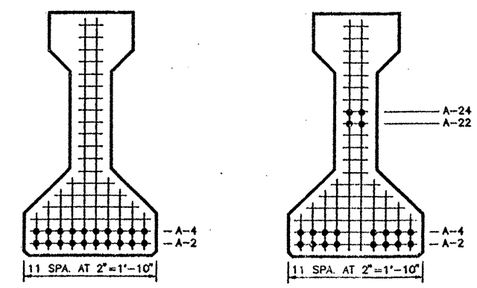
BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL (TYP. FOR BEAMS UNDER 75')



SECTION "A"



℄ SECTION END VIEW

TYPE "C" BEAM QUANTITY : 2

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	67	134	#3	standard
X_5	63	126	#3	standard
Y_{5A}	4	8	#6	standard
S_{5A}	24	48	#5	standard
V_5	14	28	#3	standard
W_5	4	8	#5	standard
U_5	2	4	#5	51'-10"
U_{6A}	4	8	#5	6'-6"

SP-34

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

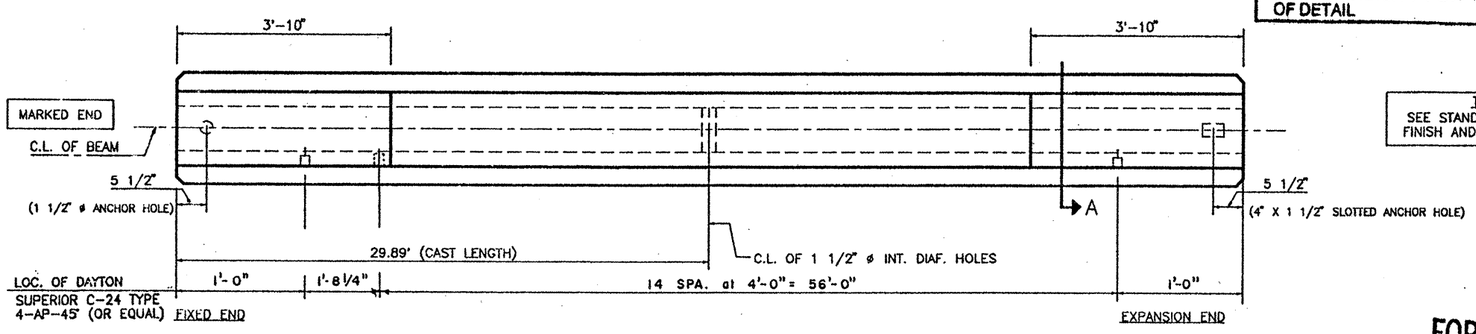
FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 20 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 16
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 24
CONCRETE RELEASE STRENGTH	: 4000 PSI
CONCRETE DESIGN STRENGTH	: 5000 PSI
ECCENTRICITY @ ℄	: 14.09" ECCENTRICITY @ END : 10.09"

DESIGN NO. : Gp-NS-LR

TOTAL BEAM LENGTH OF THIS SHEET : 119.38'



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR	GILBERT TEXAS CONSTRUCTION CORP.			
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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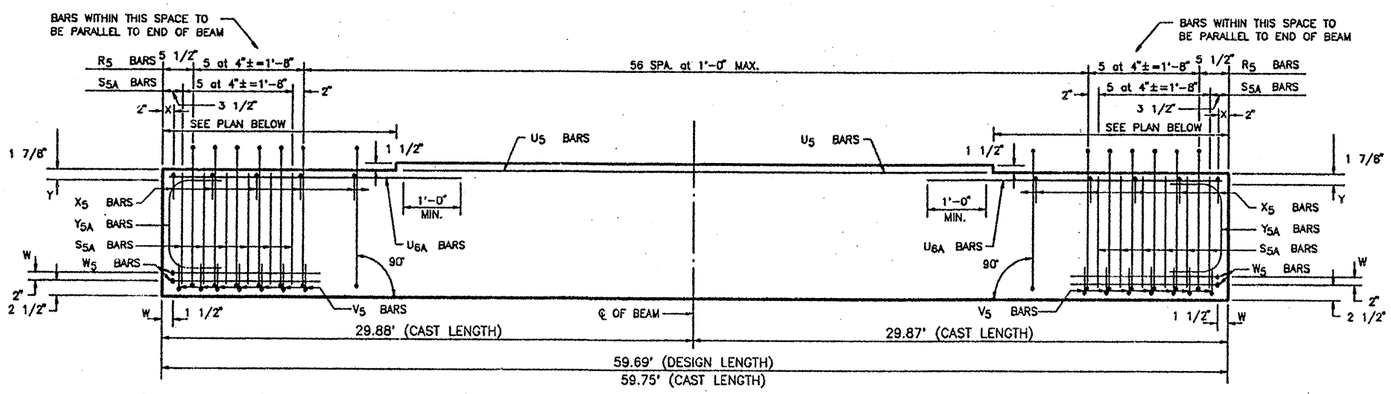
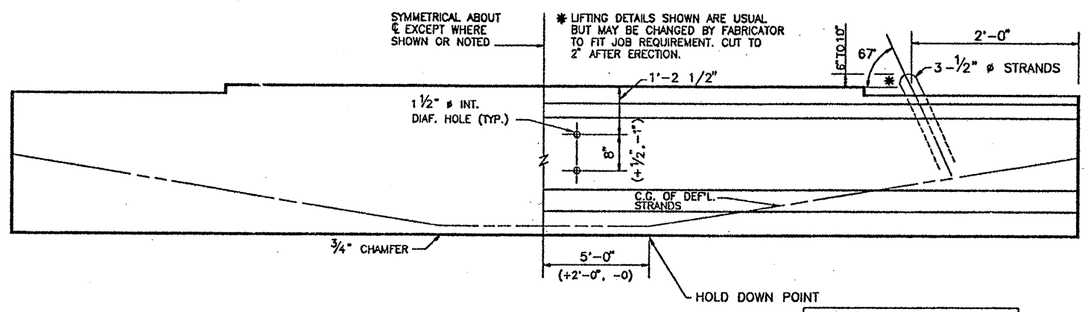
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-5
SEA JOB NO. 93-160H	FABRICATION SHEET			

94-018H



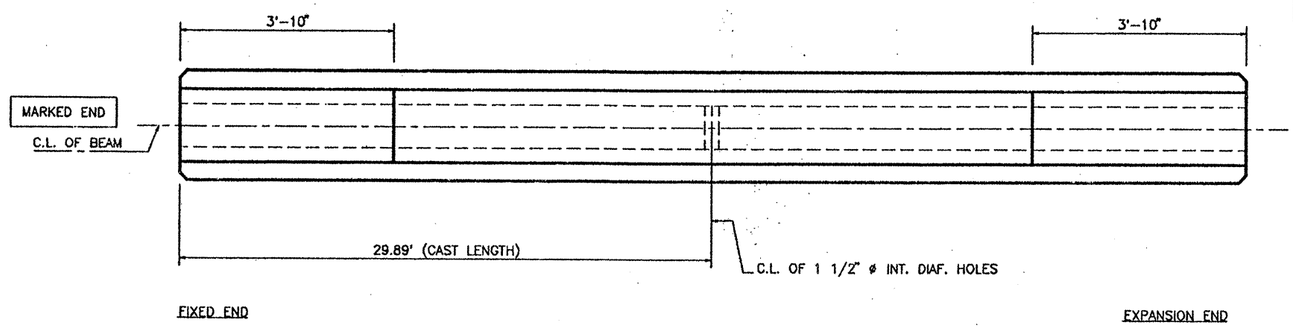
ELEVATION – REINFORCING STEEL



BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



PLAN

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

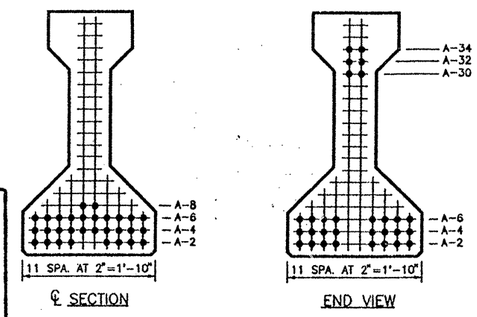
TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

REINFORCING STEEL SCHEDULE

BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	67	201	#3	standard
X_5	63	189	#3	standard
Y_{5A}	4	12	#6	standard
S_{5A}	24	72	#5	standard
V_5	14	42	#3	standard
W_5	4	12	#5	standard
U_5	2	6	#5	51'-10"
U_{6A}	4	12	#5	6'-6"

SP-35



TYPE "C" BEAM QUANTITY : 3

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 30 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 24
NUMBER OF DEFLECTED STRANDS	: 6 @ A – 34
CONCRETE RELEASE STRENGTH	: 5640 PSI
CONCRETE DESIGN STRENGTH	: 5640 PSI
ECCENTRICITY @ ℄ : 12.69"	ECCENTRICITY @ END : 7.49"

DESIGN NO. : O.D. # 3

TOTAL BEAM LENGTH OF THIS SHEET : 179.07'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.	HWY. NO.
6	TEXAS	NH 90(191)M, etc.	LP 1604

STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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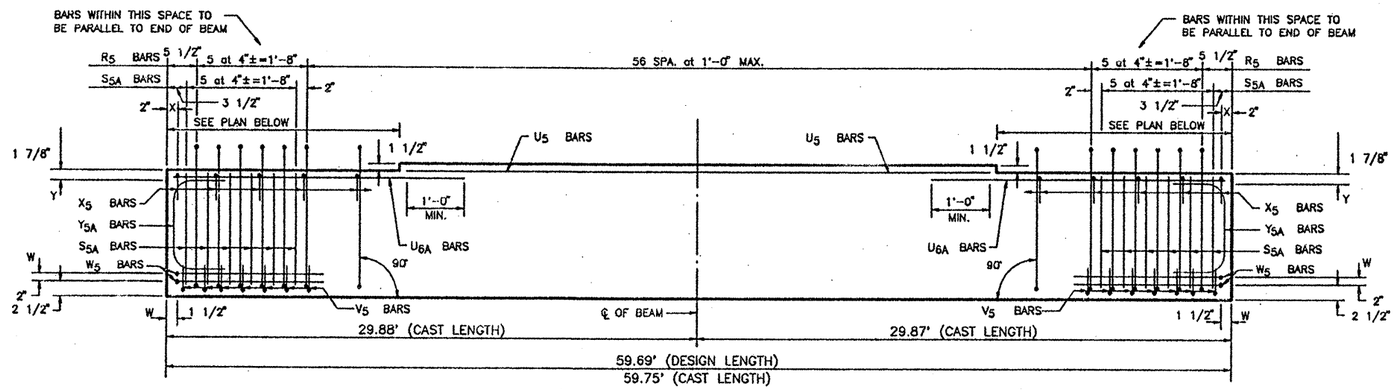
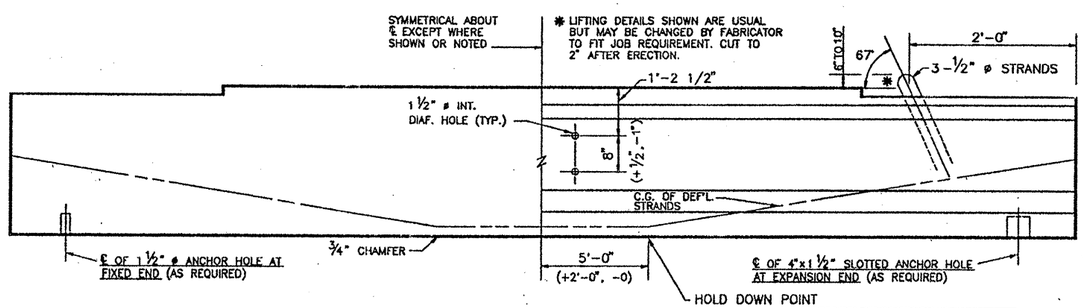
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-6
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	67	134	#3	standard
X_5	63	126	#3	standard
Y_{5A}	4	8	#6	standard
S_{5A}	24	48	#5	standard
V_5	14	28	#3	standard
W_5	4	8	#5	standard
U_5	2	4	#5	51'-10"
U_{6A}	4	8	#5	6'-6"

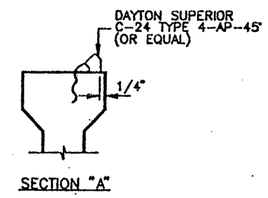
SP-36



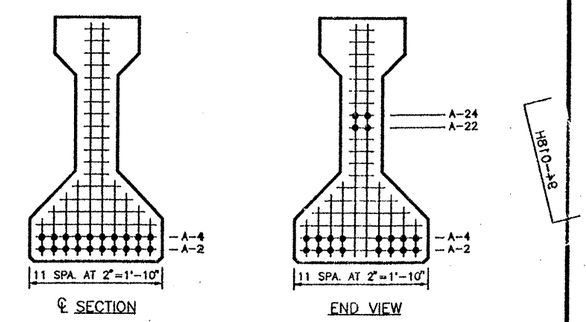
BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



SECTION "A"



℄ SECTION

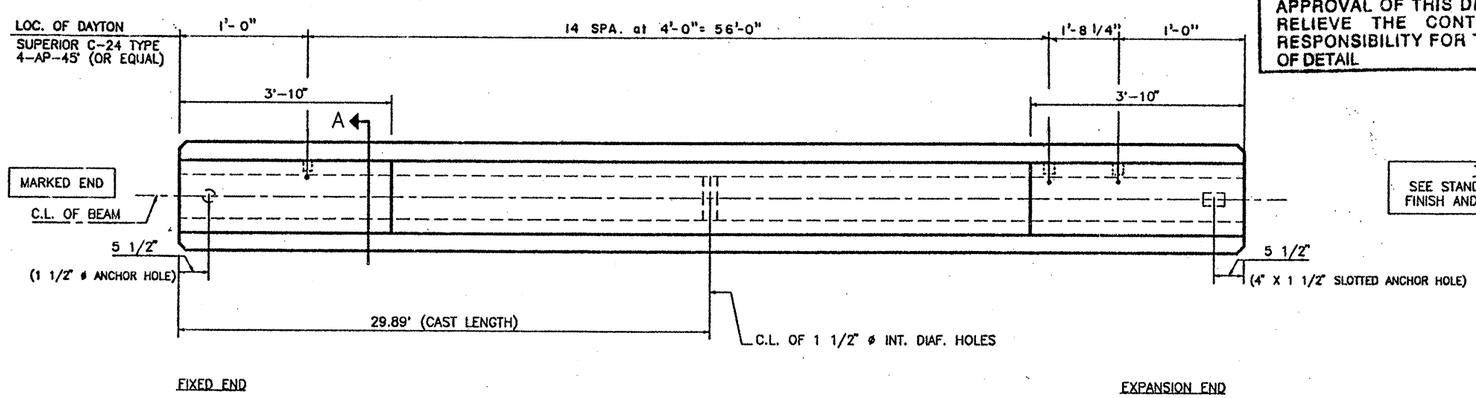
END VIEW

TYPE "C" BEAM QUANTITY : 2

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 20 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 16
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 24
CONCRETE RELEASE STRENGTH	: 4000 PSI
CONCRETE DESIGN STRENGTH	: 5000 PSI
ECCENTRICITY @ ℄	: 14.09" ECCENTRICITY @ END : 10.09"

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 119.38'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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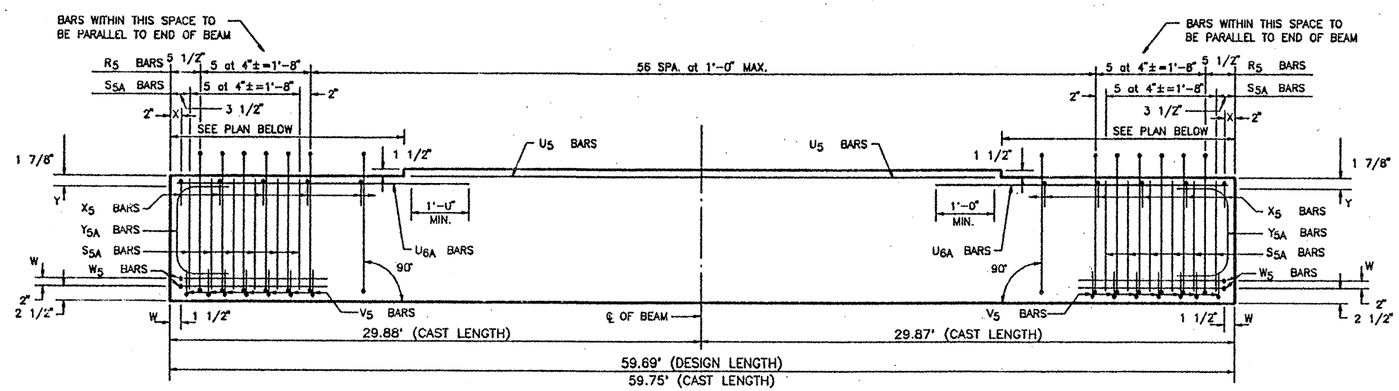
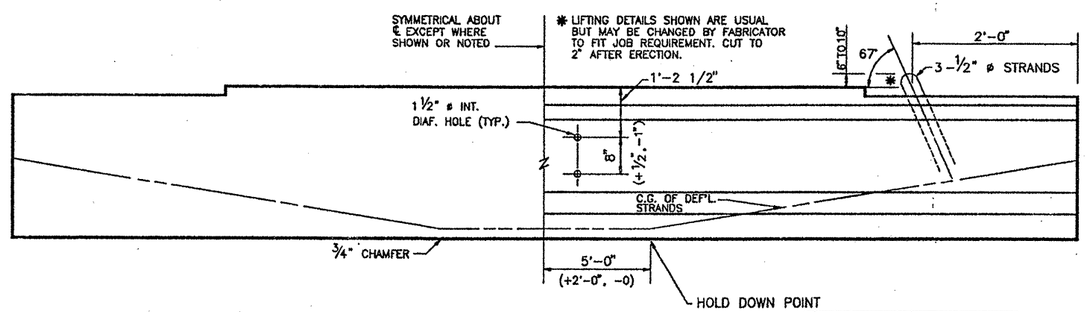
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-7
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



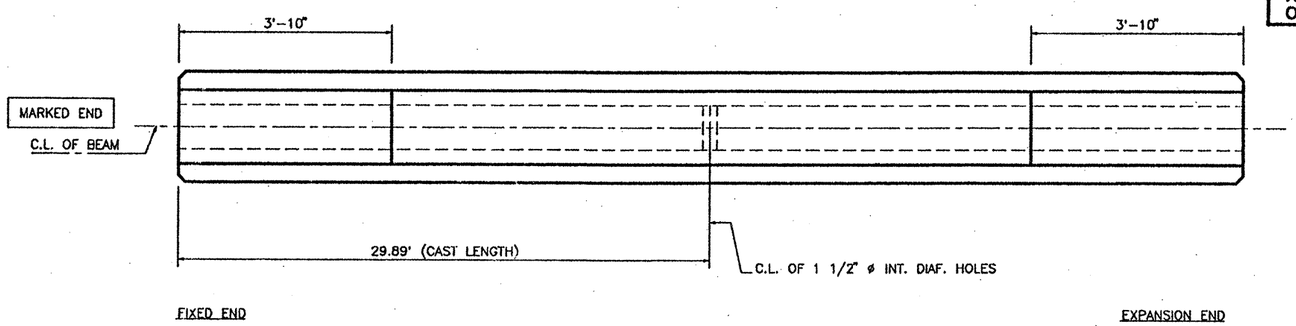
ELEVATION – REINFORCING STEEL



BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



PLAN

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

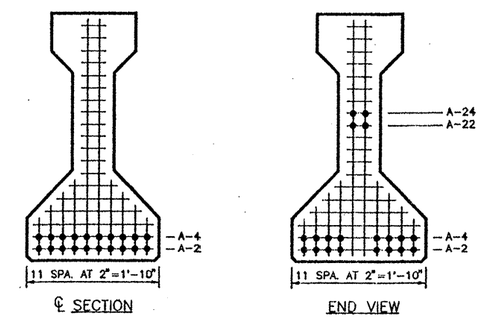
TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

REINFORCING STEEL SCHEDULE

BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	67	201	#3	standard
X_5	63	189	#3	standard
Y_{5A}	4	12	#6	standard
S_{5A}	24	72	#5	standard
V_5	14	42	#3	standard
W_5	4	12	#5	standard
U_5	2	6	#5	51'-10"
U_{6A}	4	12	#5	6'-6"

SP-37



TYPE "C" BEAM QUANTITY : 3

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 20 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 16
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 24
CONCRETE RELEASE STRENGTH	: 4000 PSI
CONCRETE DESIGN STRENGTH	: 5000 PSI
ECCENTRICITY @ ℄ : 14.09"	ECCENTRICITY @ END : 10.09"

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 179.07'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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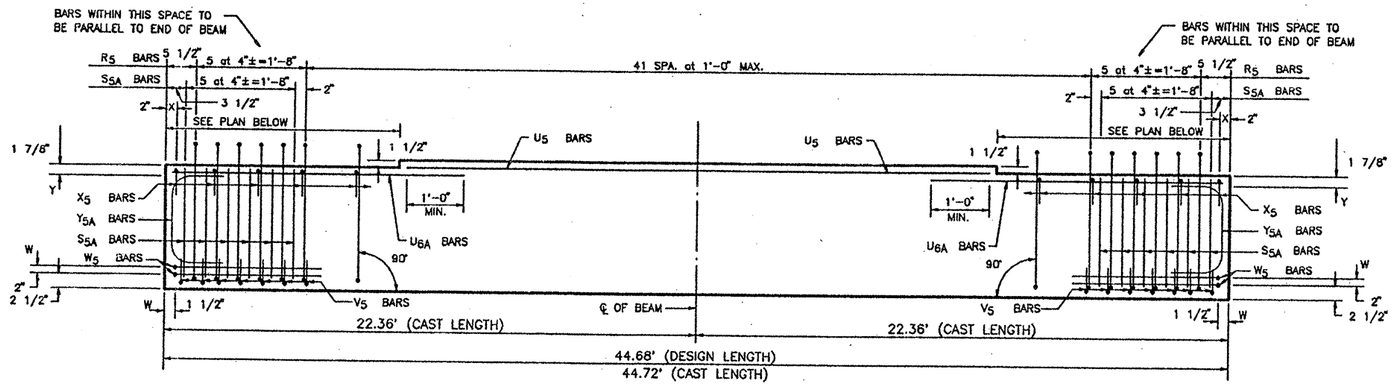
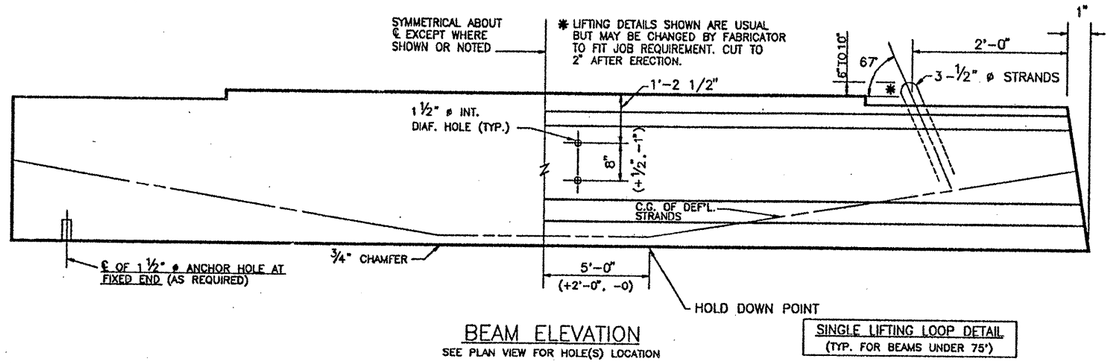
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-8
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	52	52	#3	standard
X_5	48	48	#3	standard
Y_{5A}	4	4	#6	standard
S_{5A}	24	24	#5	standard
V_5	14	14	#3	standard
W_5	4	4	#5	standard
U_5	2	2	#5	36'-10"
U_{6A}	4	4	#5	6'-6"

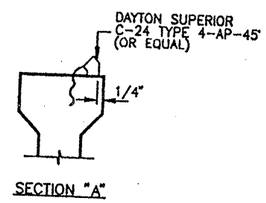
SP-38



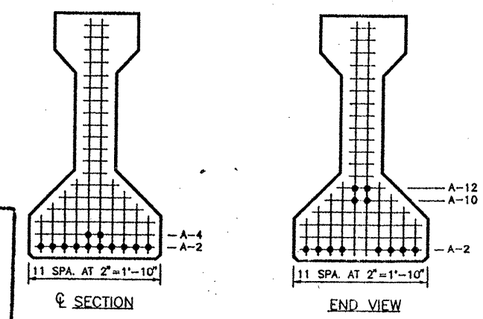
BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL (TYP. FOR BEAMS UNDER 75')



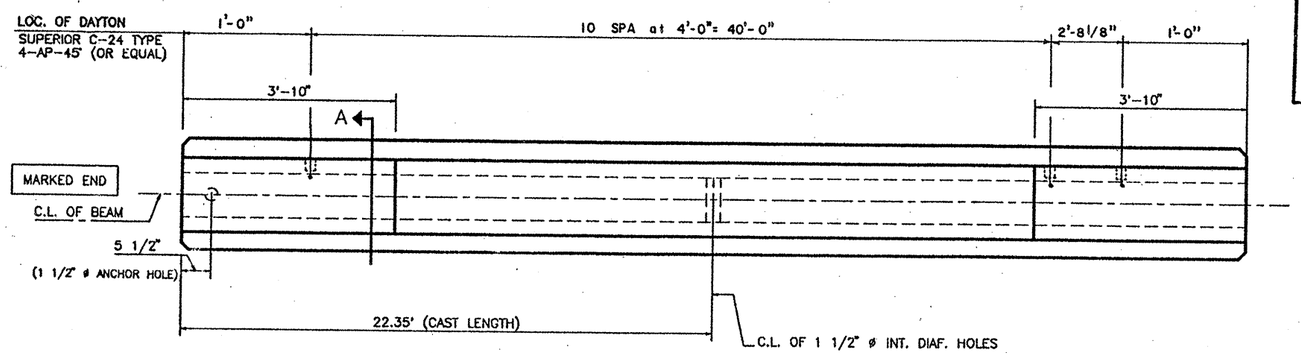
SECTION "A"



℄ SECTION

END VIEW

TYPE "C" BEAM QUANTITY : 1



PLAN

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 12 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 8
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 12
CONCRETE RELEASE STRENGTH	: 4000 PSI
CONCRETE DESIGN STRENGTH	: 5000 PSI
ECCENTRICITY @ ℄	: 14.76" ECCENTRICITY @ END : 12.09"

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 44.68'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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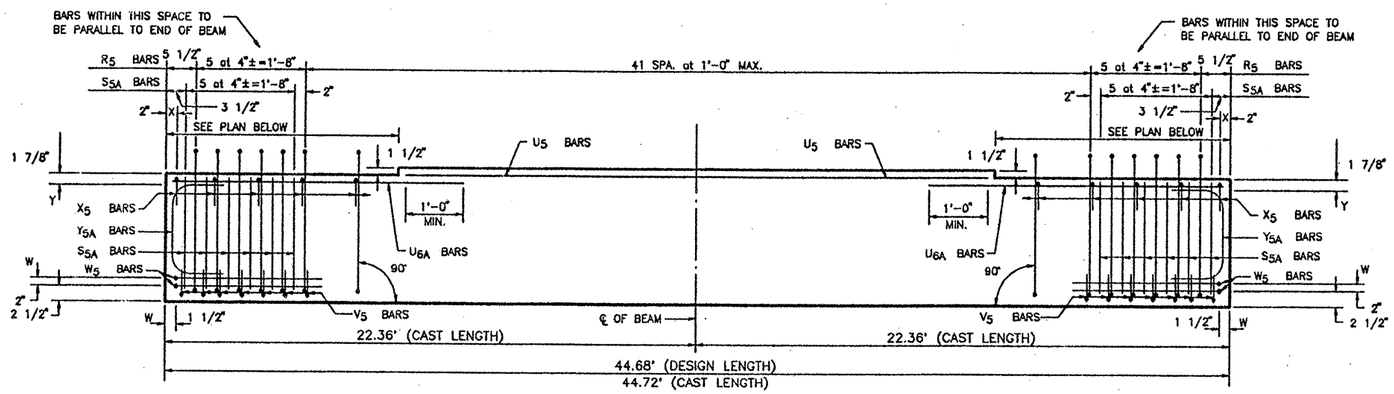
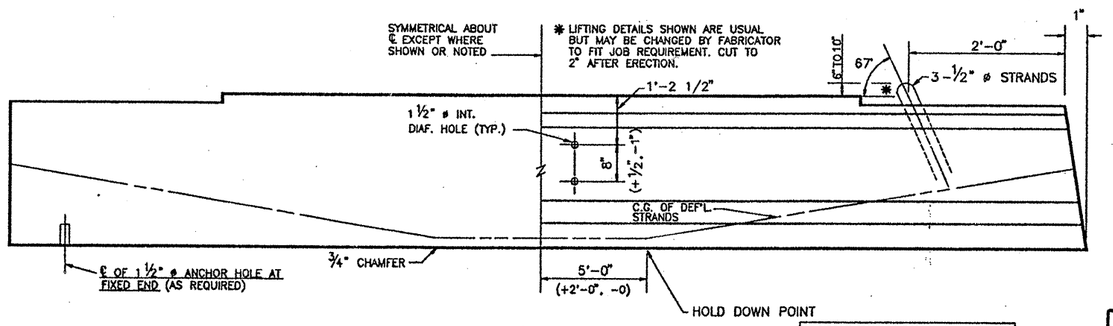
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-9
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	52	52	#3	standard
X_5	48	48	#3	standard
Y_{5A}	4	4	#6	standard
S_{5A}	24	24	#5	standard
V_5	14	14	#3	standard
W_5	4	4	#5	standard
U_5	2	2	#5	36'-10"
U_{6A}	4	4	#5	6'-6"

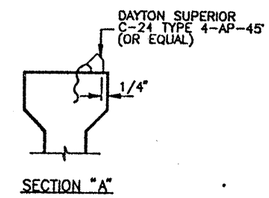
SP-39



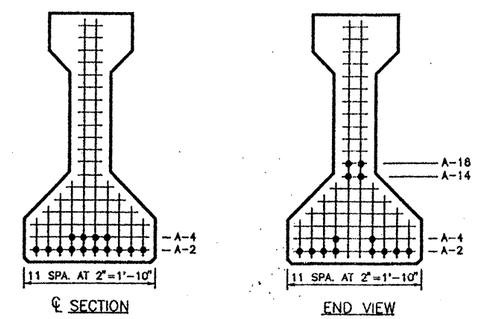
BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



SECTION "A"



℄ SECTION

END VIEW

TYPE "C" BEAM QUANTITY : 1

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 14 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 10	
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 16	
CONCRETE RELEASE STRENGTH	: 4000	PSI
CONCRETE DESIGN STRENGTH	: 5000	PSI
ECCENTRICITY @ ℄ : 14.52"	ECCENTRICITY @ END : 11.09"	

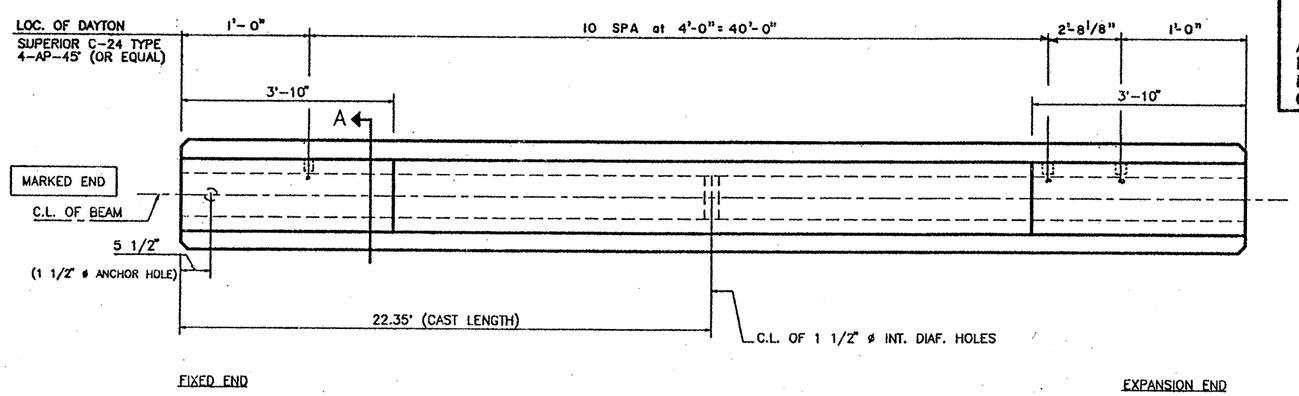
DESIGN NO. : O.D. # 5

TOTAL BEAM LENGTH OF THIS SHEET : 44.68'

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.				
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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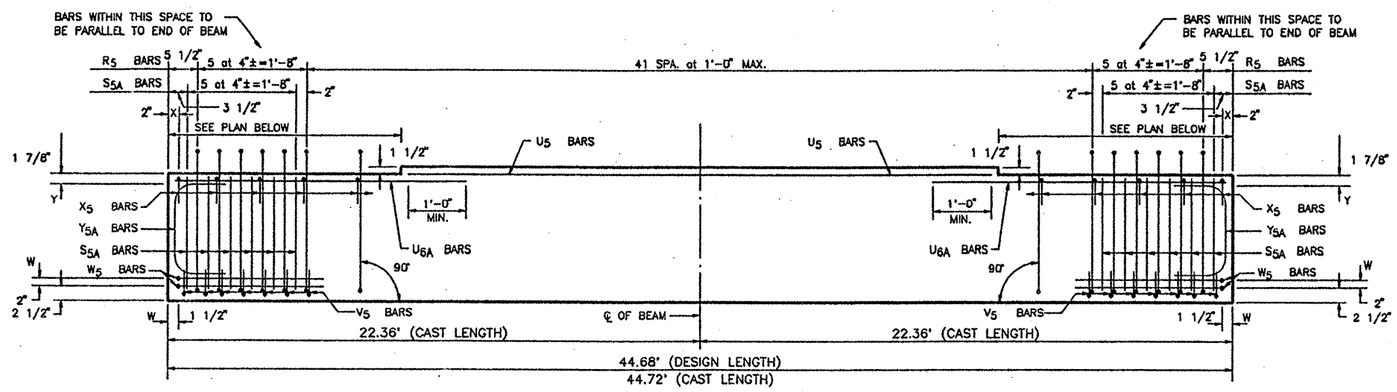
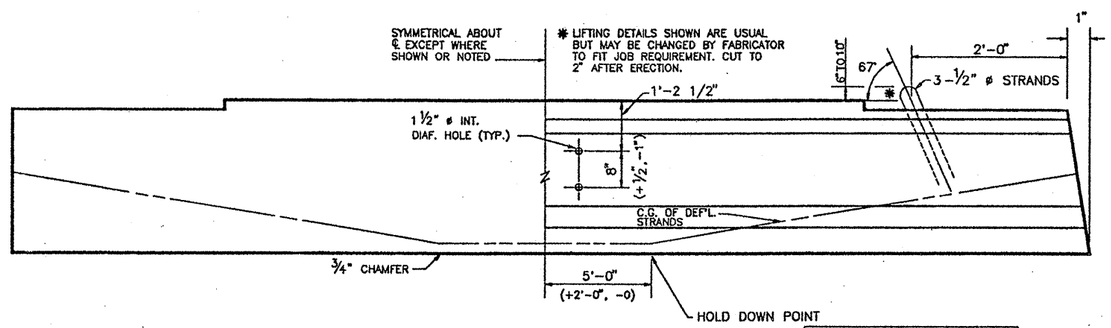
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-93	C-10
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL



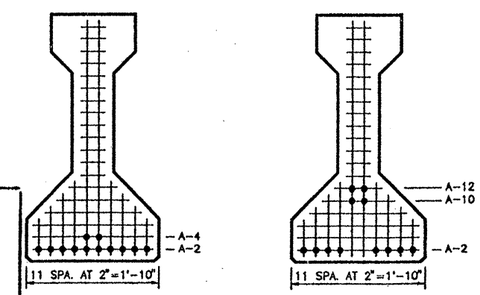
BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	52	312	#3	standard
X_5	48	288	#3	standard
Y_{5A}	4	24	#6	standard
S_{5A}	24	144	#5	standard
V_5	14	84	#3	standard
W_5	4	24	#5	standard
U_5	2	12	#5	36'-10"
U_{6A}	4	24	#5	6'-6"

SP-40



℄ SECTION

END VIEW

TYPE "C" BEAM QUANTITY : 6

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

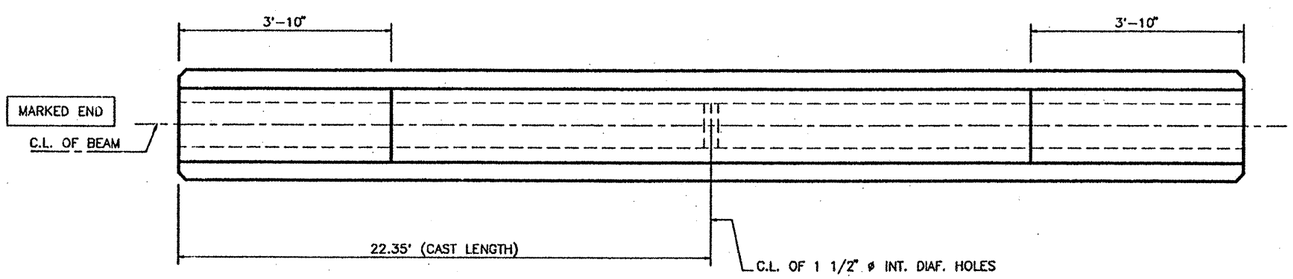
FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 12 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 8	
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 12	
CONCRETE RELEASE STRENGTH	: 4000 PSI	
CONCRETE DESIGN STRENGTH	: 5000 PSI	
ECCENTRICITY @ ℄ : 14.76"	ECCENTRICITY @ END : 12.09"	

DESIGN NO. : Gp-NS-LR

TOTAL BEAM LENGTH OF THIS SHEET : 268.08'



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.				
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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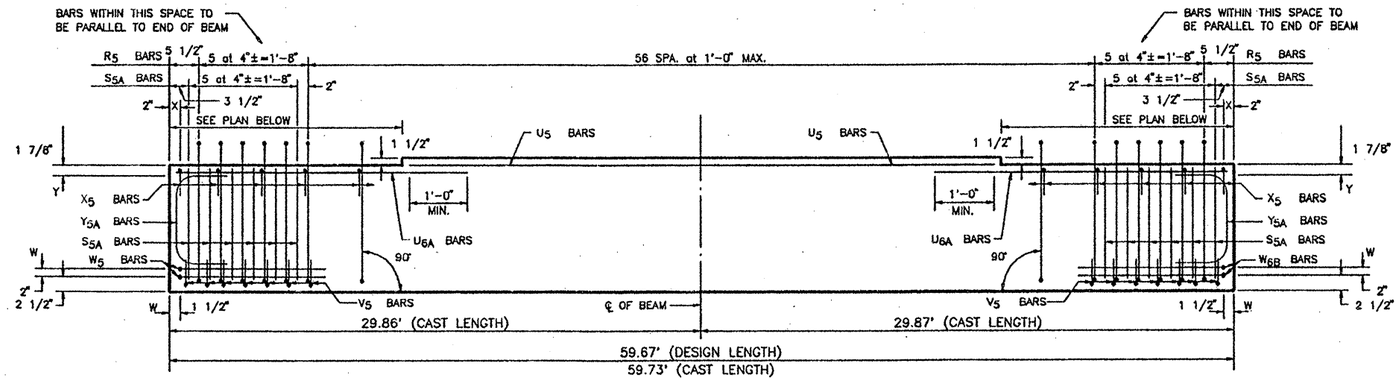
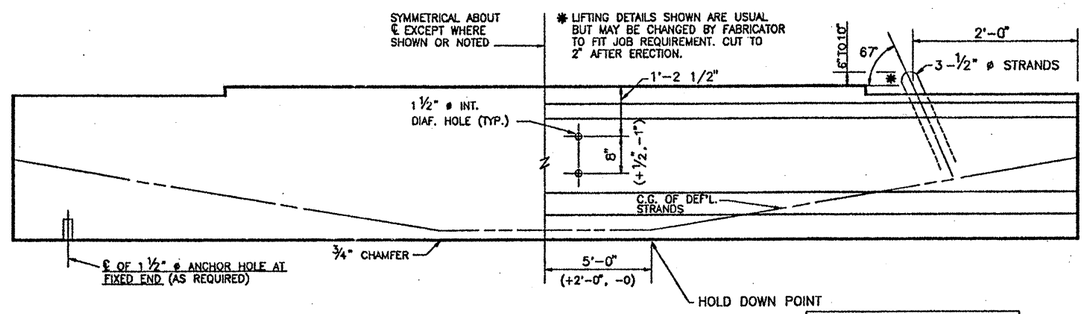
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-11
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	67	67	#3	standard
X_5	63	63	#3	standard
Y_{5A}	4	4	#6	standard
S_{5A}	24	24	#5	standard
V_5	14	14	#3	standard
W_5	2	2	#5	standard
U_5	2	2	#5	51'-9"
W_{6B}	2	2	#5	standard
U_{6A}	4	4	#5	6'-6"

SP-42



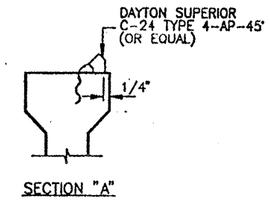
ELEVATION – REINFORCING STEEL



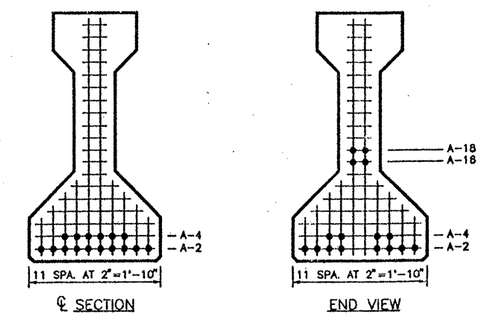
BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



SECTION "A"



℄ SECTION

END VIEW

TYPE "C" BEAM QUANTITY : 1

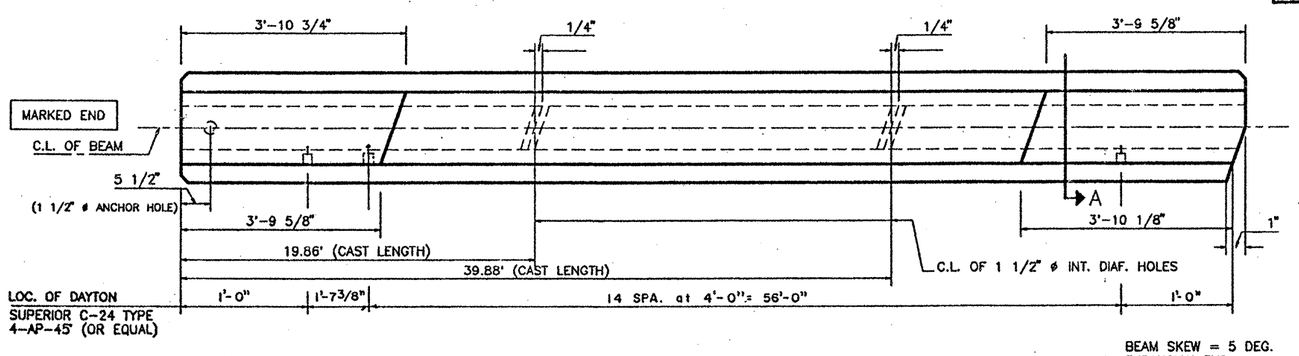
TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 16 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 12
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 18
CONCRETE RELEASE STRENGTH	: 4000 PSI
CONCRETE DESIGN STRENGTH	: 5000 PSI
ECCENTRICITY @ ℄ : 14.34"	ECCENTRICITY @ END : 10.84"

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 59.67'



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	D23etc

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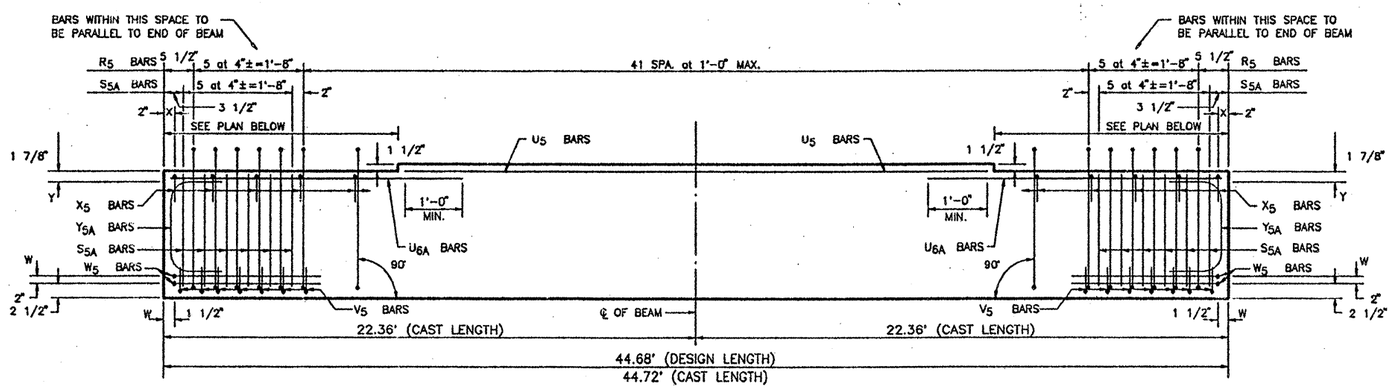
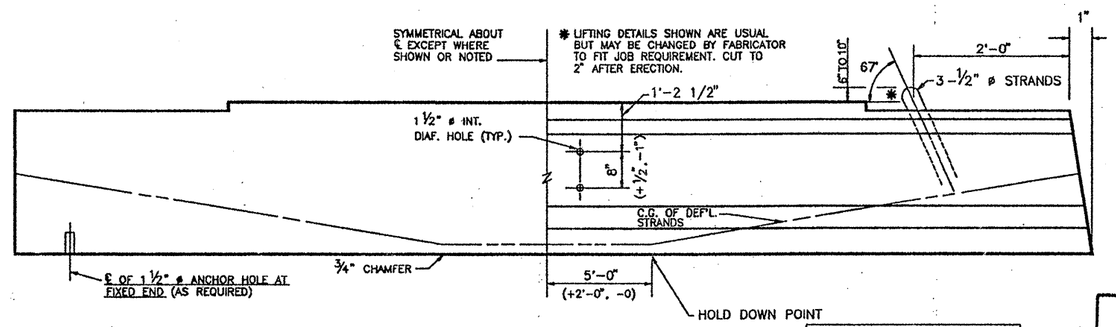
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-13
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				

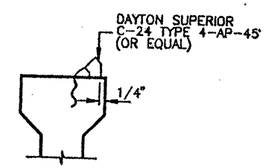


ELEVATION – REINFORCING STEEL

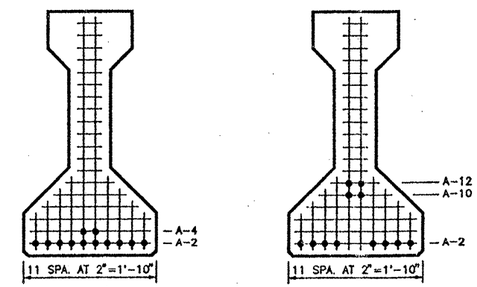


BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



SECTION "A"



℄ SECTION

END VIEW

TYPE "C" BEAM QUANTITY : 2

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	52	104	#3	standard
X_5	48	96	#3	standard
Y_{5A}	4	8	#6	standard
S_{5A}	24	48	#5	standard
V_5	14	28	#3	standard
W_5	4	8	#5	standard
U_5	2	4	#5	36'-10"
U_{6A}	4	8	#5	6'-6"

SP-41

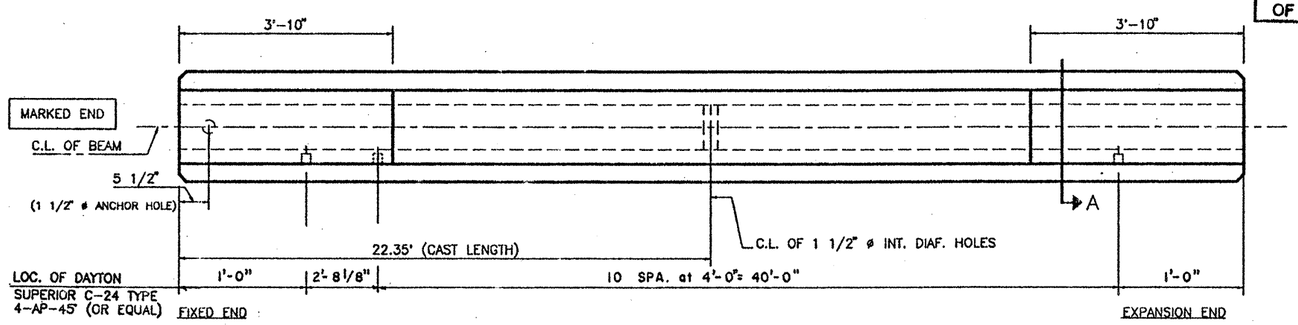
TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 12 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 8
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 12
CONCRETE RELEASE STRENGTH	: 4000 PSI
CONCRETE DESIGN STRENGTH	: 5000 PSI
ECCENTRICITY @ ℄ : 14.76"	ECCENTRICITY @ END : 12.09"

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 89.36'



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.				
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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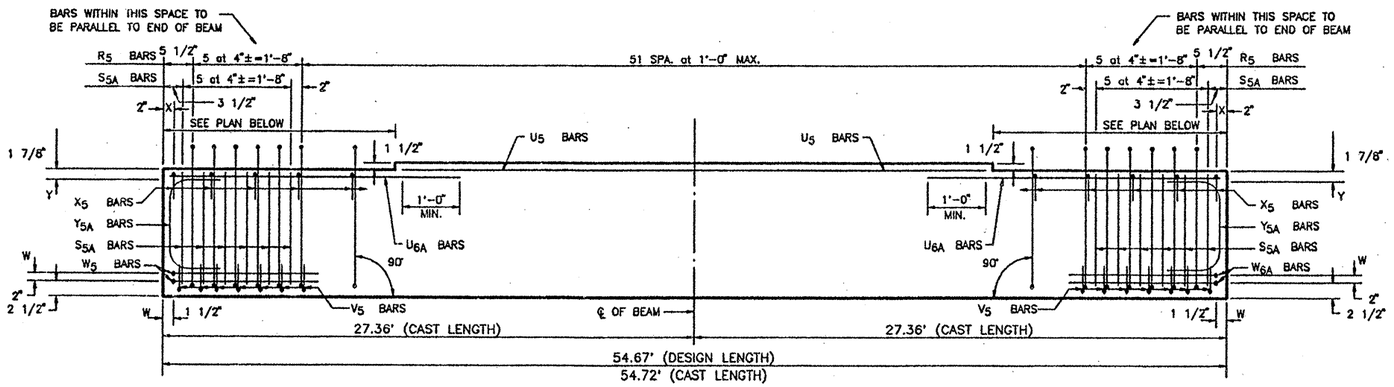
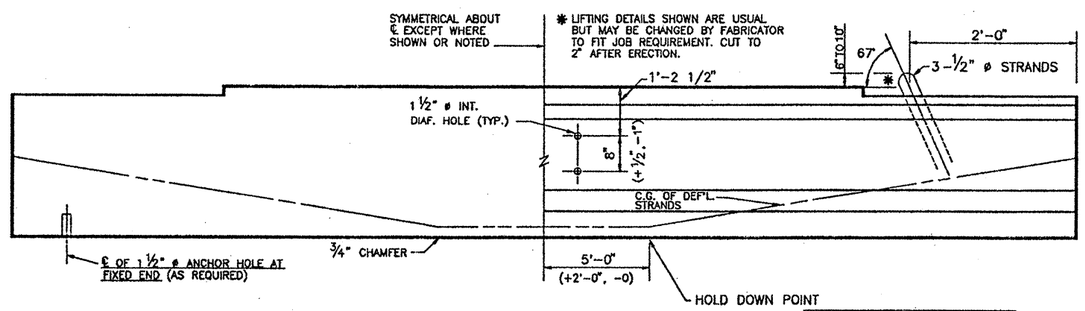
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-12
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

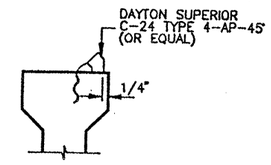
REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	62	62	#3	standard
X_5	58	58	#3	standard
Y_{5A}	4	4	#6	standard
S_{5A}	24	24	#5	standard
V_5	14	14	#3	standard
W_5	2	2	#5	standard
U_5	2	2	#5	46'-9"
W_{6A}	2	2	#5	standard
U_{6A}	4	4	#5	6'-6"

SP-43

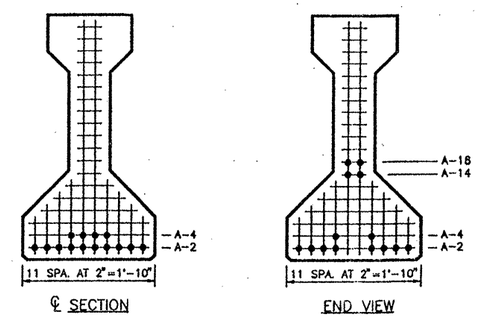


BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



SECTION "A"



℄ SECTION END VIEW

TYPE "C" BEAM QUANTITY : 1

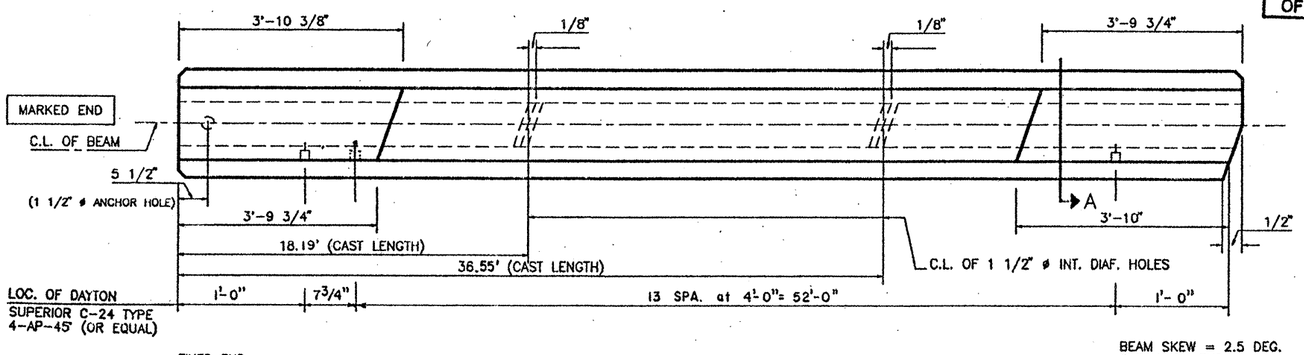
TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL.

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 14 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 10	
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 16	
CONCRETE RELEASE STRENGTH	: 4000 PSI	
CONCRETE DESIGN STRENGTH	: 5000 PSI	
ECCENTRICITY @ ℄ : 14.52"	ECCENTRICITY @ END : 11.09"	

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 54.67'



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.				
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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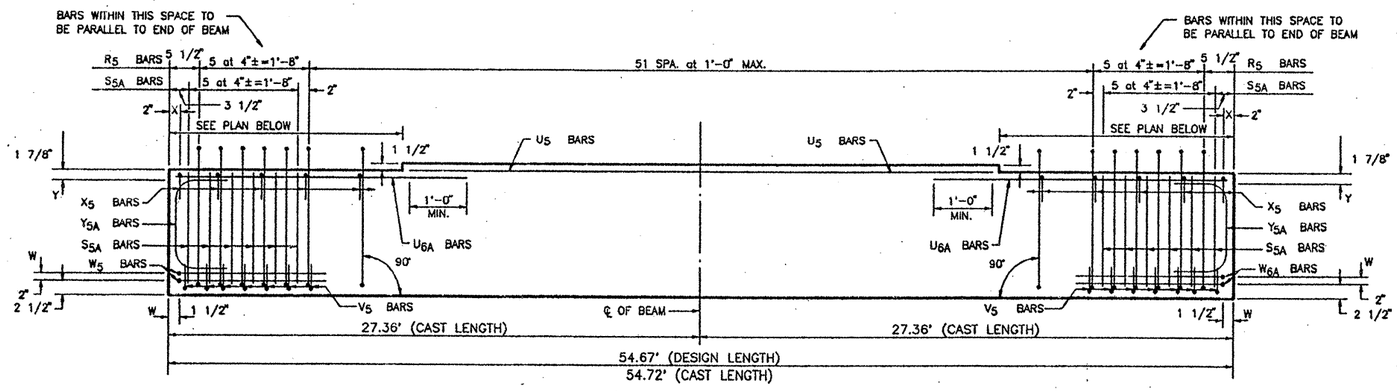
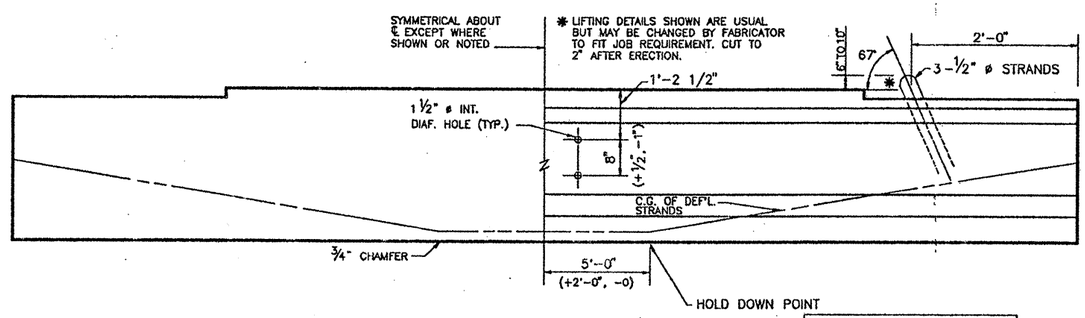
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-14
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



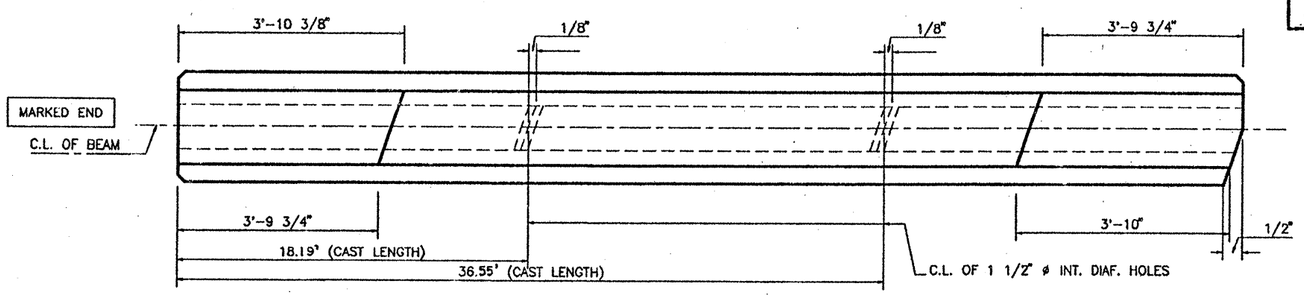
ELEVATION – REINFORCING STEEL



BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



PLAN

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

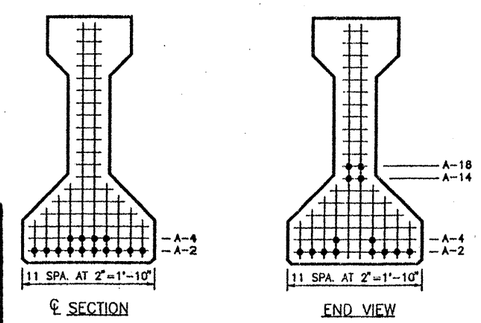
TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

REINFORCING STEEL SCHEDULE

BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	62	248	#3	standard
X_5	58	232	#3	standard
Y_{5A}	4	16	#6	standard
S_{5A}	24	96	#5	standard
V_5	14	56	#3	standard
W_5	2	8	#5	standard
U_5	2	8	#5	46'-9"
W_{6A}	2	8	#5	standard
U_{6A}	4	16	#5	6'-6"

SP-244



℄ SECTION

END VIEW

TYPE "C" BEAM QUANTITY : 4

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 14 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 10	
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 16	
CONCRETE RELEASE STRENGTH	: 4000 PSI	
CONCRETE DESIGN STRENGTH	: 5000 PSI	
ECCENTRICITY @ ℄ : 14.52"	ECCENTRICITY @ END : 11.09"	

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 218.68'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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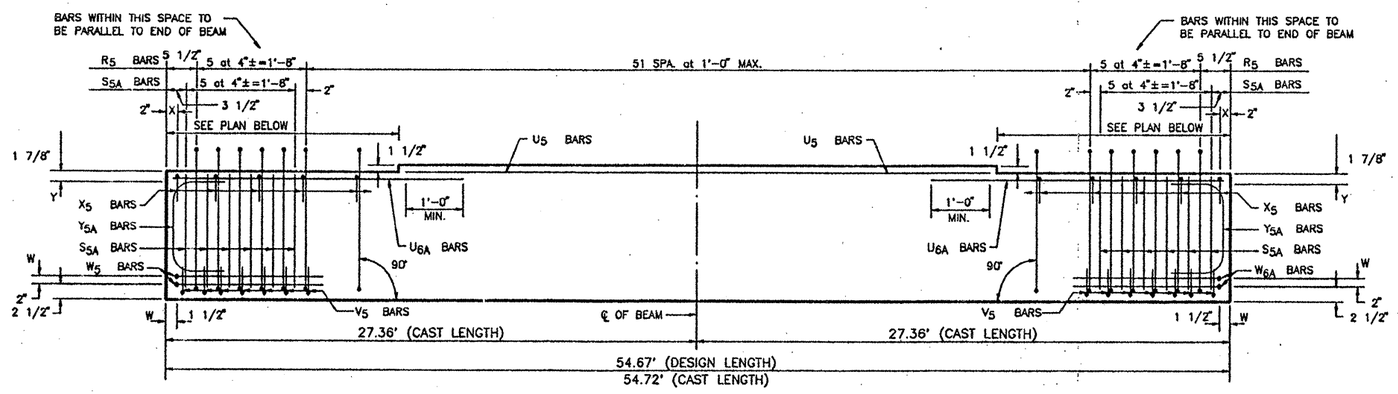
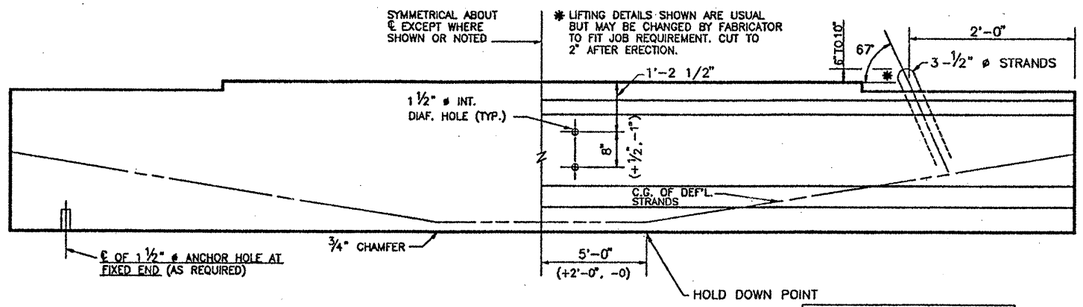
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-15
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

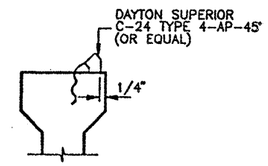
REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	62	62	#3	standard
X_5	58	58	#3	standard
Y_{5A}	4	4	#6	standard
S_{5A}	24	24	#5	standard
V_5	14	14	#3	standard
W_5	2	2	#5	standard
U_5	2	2	#5	46'-9"
W_{6A}	2	2	#5	standard
U_{6A}	4	4	#5	6'-6"

SP-45

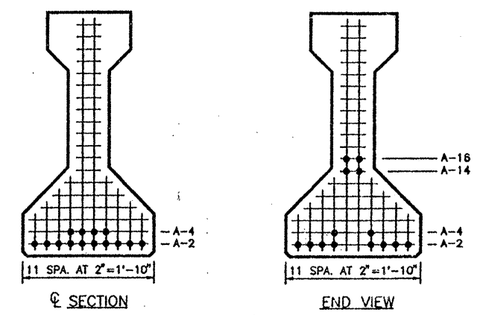


BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



SECTION "A"



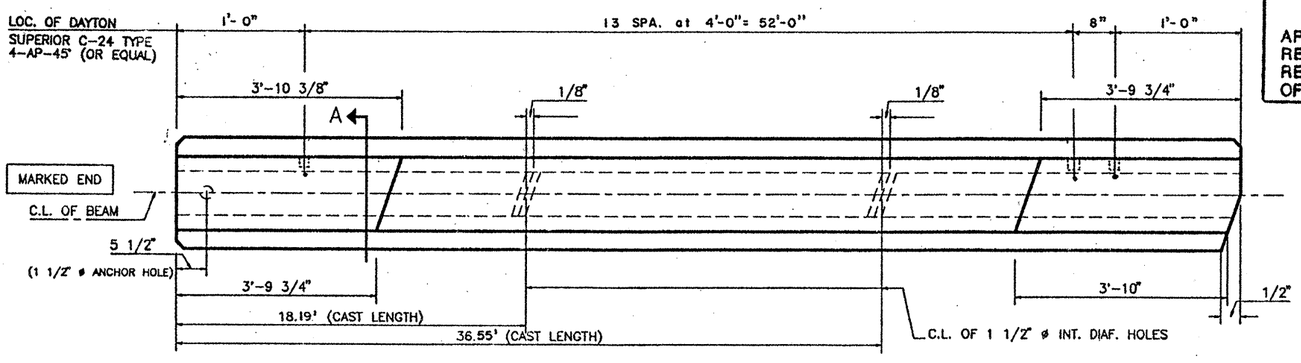
TYPE "C" BEAM QUANTITY : 1

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 14 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 10	
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 16	
CONCRETE RELEASE STRENGTH	: 4000 PSI	
CONCRETE DESIGN STRENGTH	: 5000 PSI	
ECCENTRICITY @ ℄ : 14.52"	ECCENTRICITY @ END : 11.09"	



PLAN

TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 54.67'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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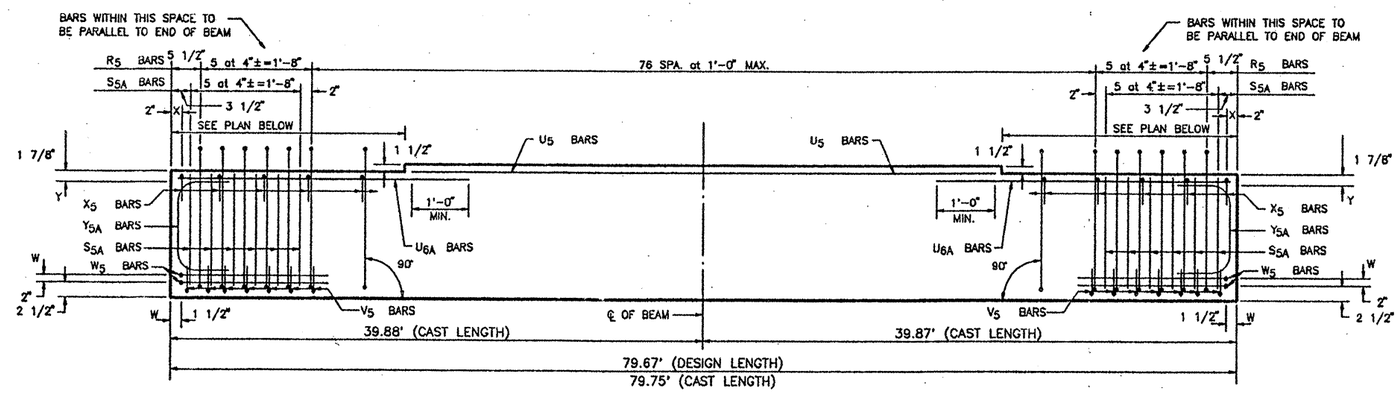
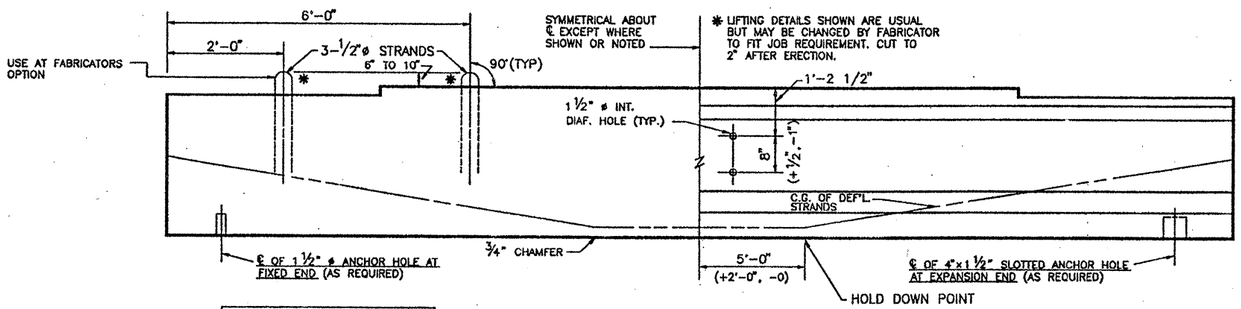
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-16
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-01BH				



ELEVATION – REINFORCING STEEL

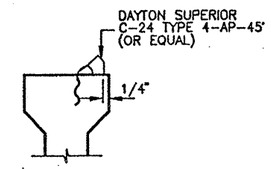
REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	87	174	#3	standard
X_5	83	166	#3	standard
Y_{5A}	4	8	#6	standard
S_{5A}	24	48	#5	standard
V_5	14	28	#3	standard
W_5	4	8	#5	standard
U_5	2	4	#5	71'-9"
U_{6A}	4	8	#5	6'-6"

SP-46

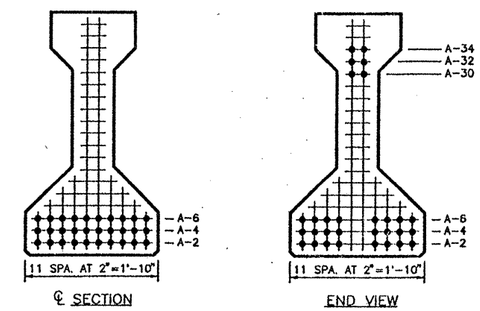


DOUBLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS OVER 75')

BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION



SECTION "A"



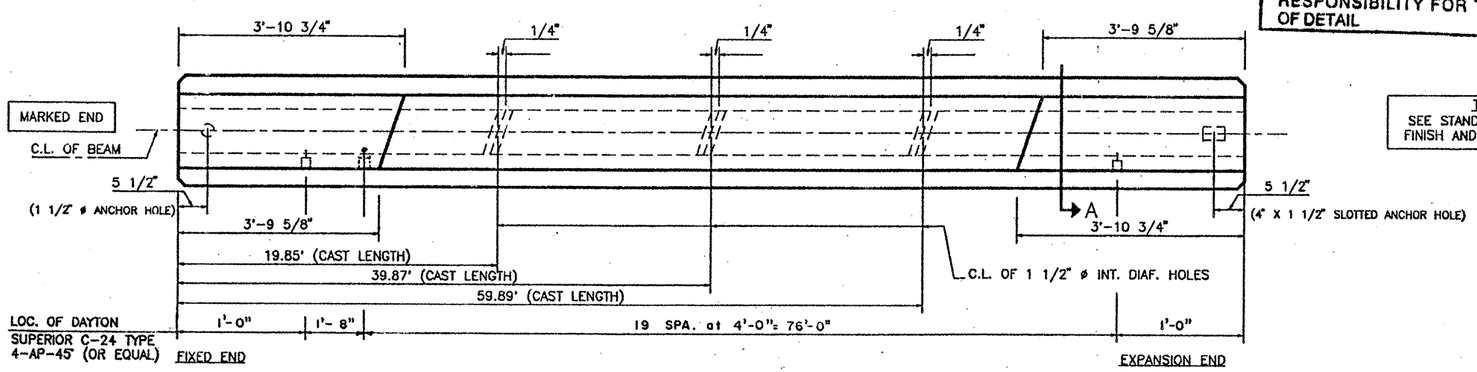
TYPE "C" BEAM QUANTITY : 2

LO-LAX STRAND PATTERN			
NUMBER OF STRANDS	: 30 ~1/2" ø 270 K @ 31.00 K EACH		
NUMBER OF STRAIGHT STRANDS	: 24		
NUMBER OF DEFLECTED STRANDS	: 6 @ A – 34		
CONCRETE RELEASE STRENGTH	: 5031	PSI	
CONCRETE DESIGN STRENGTH	: 6027	PSI	
ECCENTRICITY @ ℄	: 13.09"	ECCENTRICITY @ END	: 7.49"

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 159.34'

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION
FEB 16 1994
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.



PLAN

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.				
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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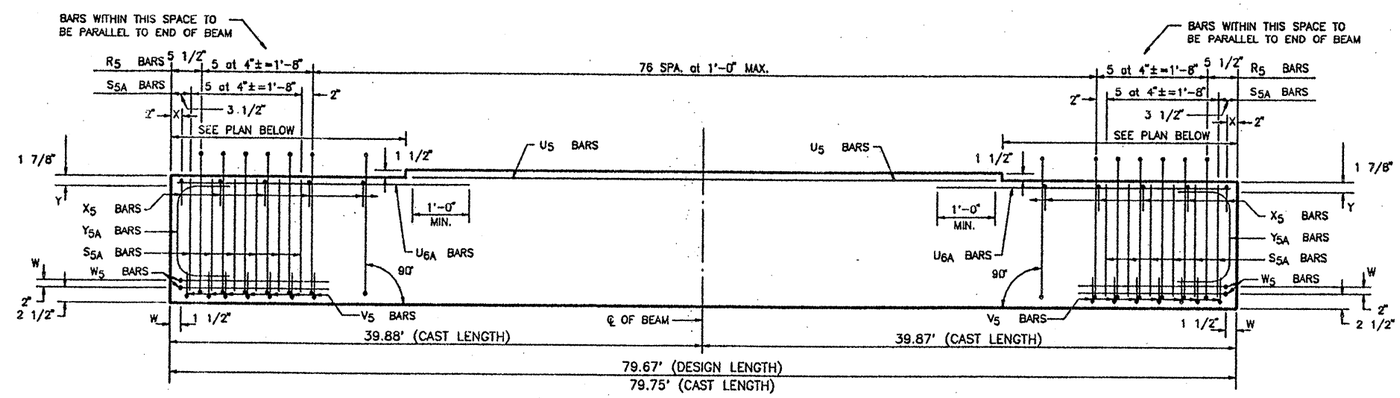
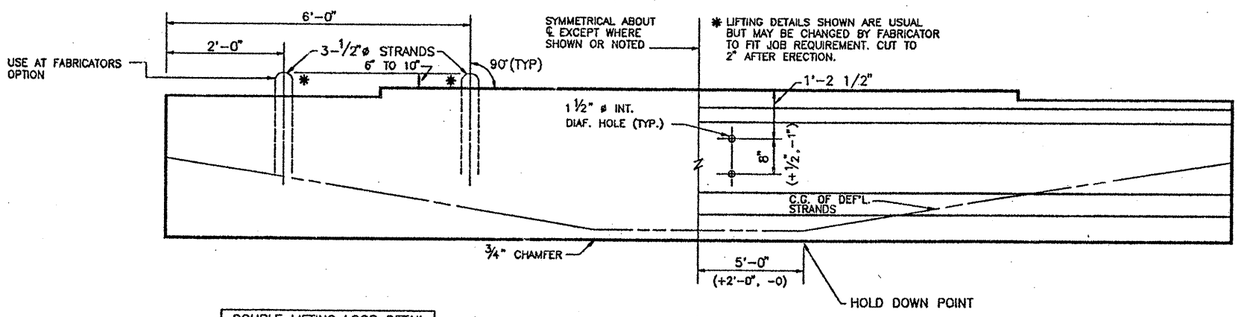
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-17
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				

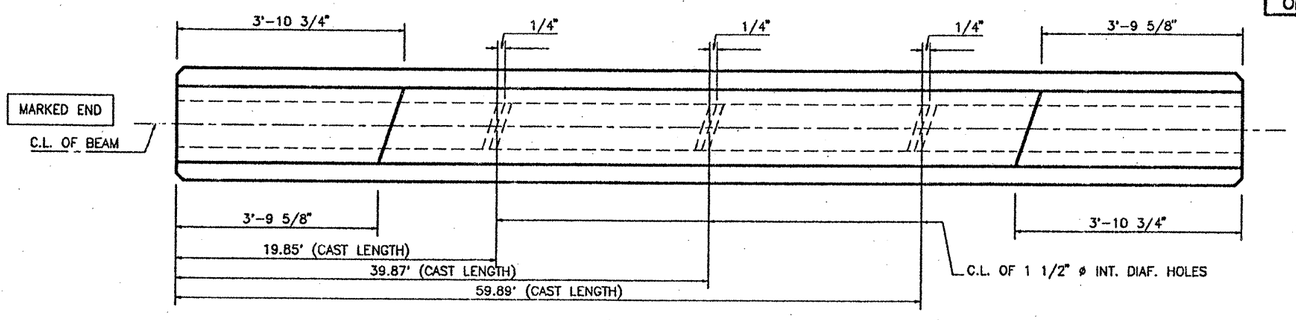


ELEVATION – REINFORCING STEEL



DOUBLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS OVER 75')

BEAM ELEVATION
SEE PLAN VIEW FOR HOLE(S) LOCATION



PLAN

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

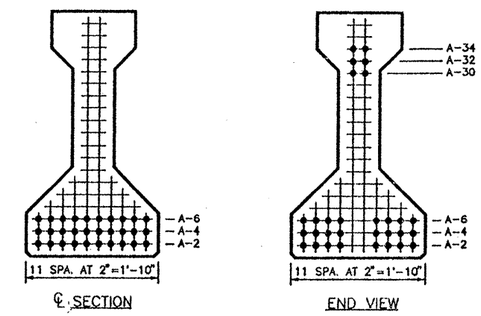
TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

REINFORCING STEEL SCHEDULE

BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	87	696	#3	standard
X_5	83	664	#3	standard
Y_{5A}	4	32	#6	standard
S_{5A}	24	192	#5	standard
V_5	14	112	#3	standard
W_5	4	32	#5	standard
U_5	2	16	#5	71'-9"
U_{6A}	4	32	#5	6'-6"

SP-47



TYPE "C" BEAM QUANTITY : 8

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 30 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 24	
NUMBER OF DEFLECTED STRANDS	: 6 @ A – 34	
CONCRETE RELEASE STRENGTH	: 5031	PSI
CONCRETE DESIGN STRENGTH	: 6027	PSI
ECCENTRICITY @ ℄	: 13.09"	ECCENTRICITY @ END : 7.49"

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 637.36'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.	HWY. NO.
6	TEXAS	NH 90(191)M, etc.	LP 1604

STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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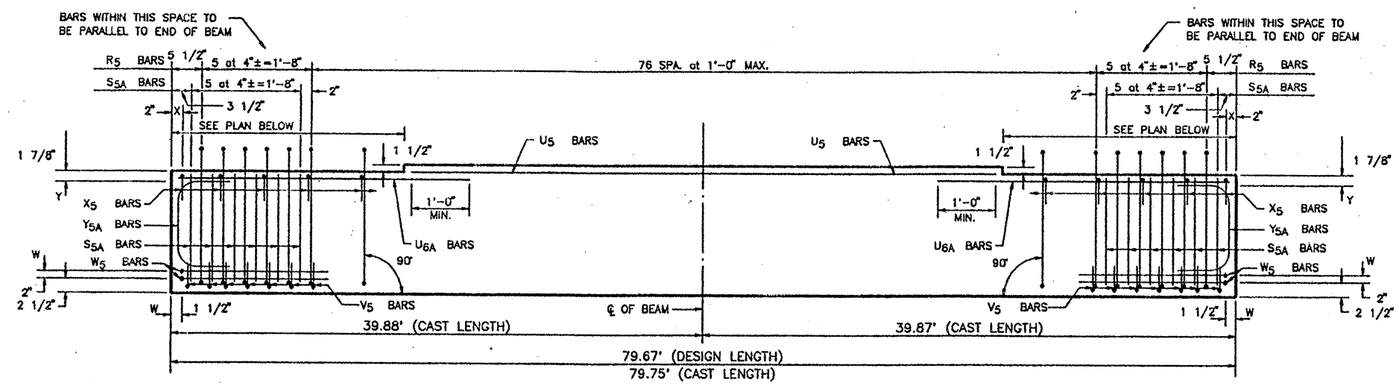
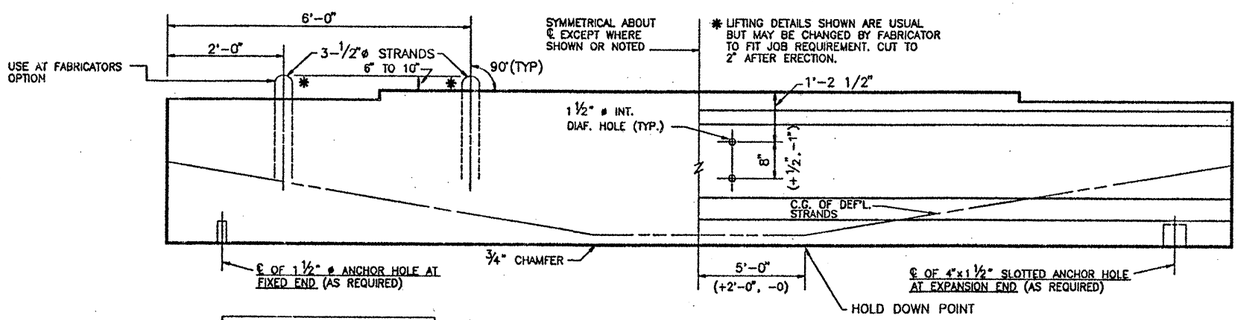
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-18
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



ELEVATION – REINFORCING STEEL

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	87	174	#3	standard
X_5	83	166	#3	standard
Y_{5A}	4	8	#6	standard
S_{5A}	24	48	#5	standard
V_5	14	28	#3	standard
W_5	4	8	#5	standard
U_5	2	4	#5	71'-9"
U_{6A}	4	8	#5	6'-6"

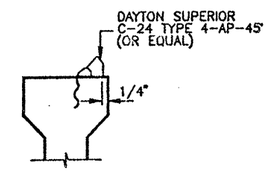
SP-48



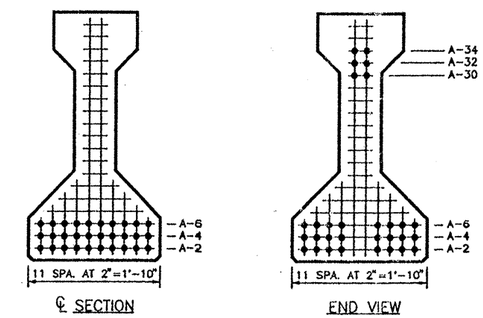
DOUBLE LIFTING LOOP DETAIL (TYP. FOR BEAMS OVER 75')

BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION



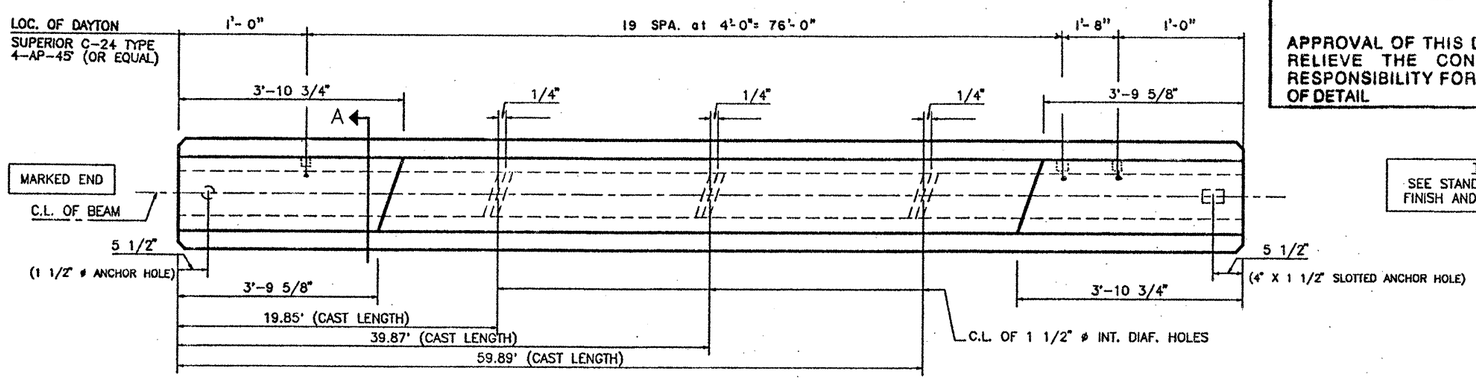
SECTION "A"



℄ SECTION

END VIEW

TYPE "C" BEAM QUANTITY : 2



PLAN

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

LO-LAX STRAND PATTERN		
NUMBER OF STRANDS	: 30 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 24	
NUMBER OF DEFLECTED STRANDS	: 6 @ A – 34	
CONCRETE RELEASE STRENGTH	: 5031 PSI	
CONCRETE DESIGN STRENGTH	: 6027 PSI	
ECCENTRICITY @ ℄	: 13.09"	ECCENTRICITY @ END : 7.49"

DESIGN NO. : Gp-NS-LR

TOTAL BEAM LENGTH OF THIS SHEET : 159.34'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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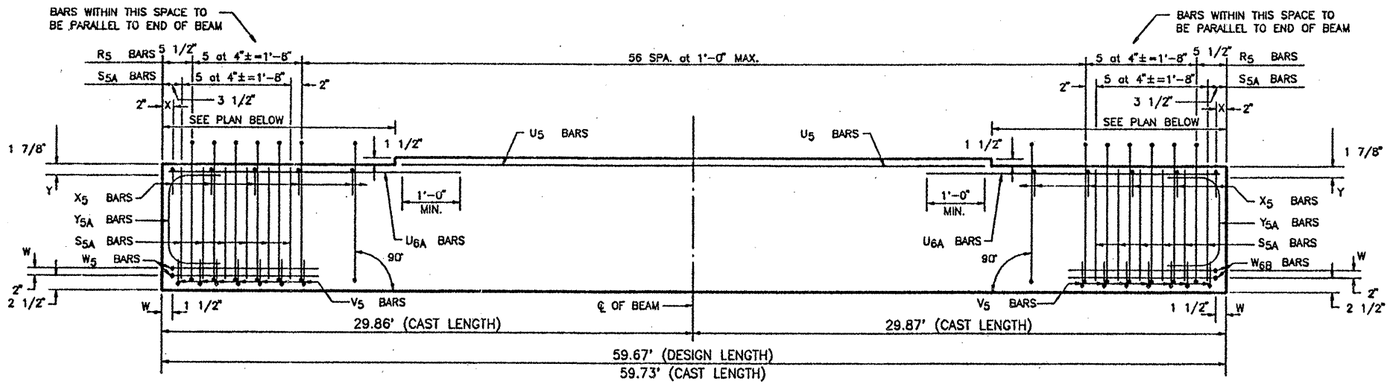
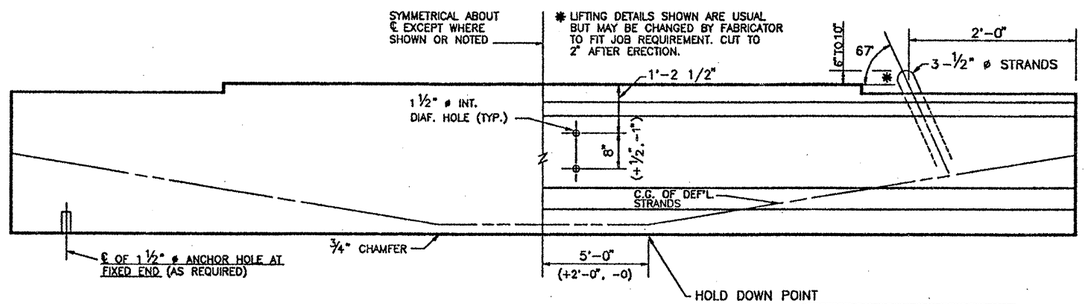
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-19
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



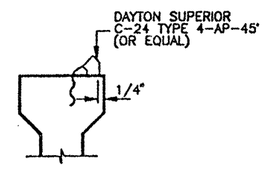
ELEVATION – REINFORCING STEEL



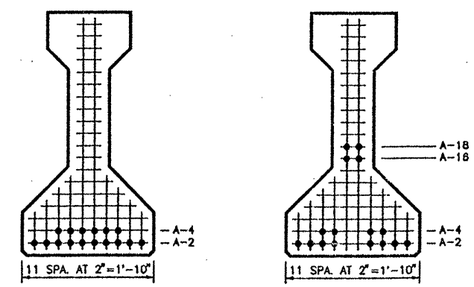
BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



SECTION "A"

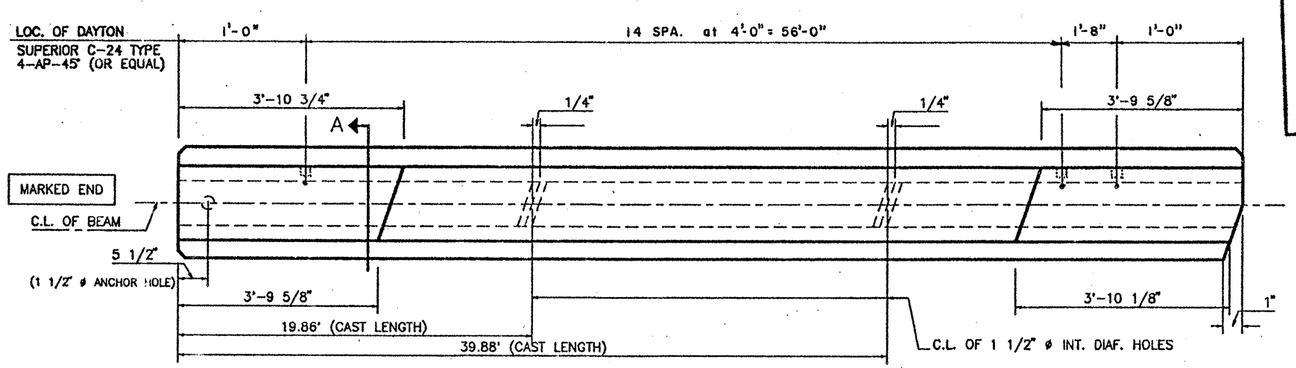


℄ SECTION END VIEW

TYPE "C" BEAM QUANTITY : 1

REINFORCING STEEL SCHEDULE				
BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R_5	67	67	#3	standard
X_5	63	63	#3	standard
Y_{5A}	4	4	#6	standard
S_{5A}	24	24	#5	standard
V_5	14	14	#3	standard
W_5	2	2	#5	standard
U_5	2	2	#5	51'-9"
W_{6B}	2	2	#5	standard
U_{6A}	4	4	#5	6'-6"

SP-49



PLAN

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

LO-LAX STRAND PATTERN	
NUMBER OF STRANDS	: 16 ~1/2" ø 270 K @ 31.00 K EACH
NUMBER OF STRAIGHT STRANDS	: 12
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 18
CONCRETE RELEASE STRENGTH	: 4000 PSI
CONCRETE DESIGN STRENGTH	: 5000 PSI
ECCENTRICITY @ ℄ : 14.34"	ECCENTRICITY @ END : 10.84"

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 59.67'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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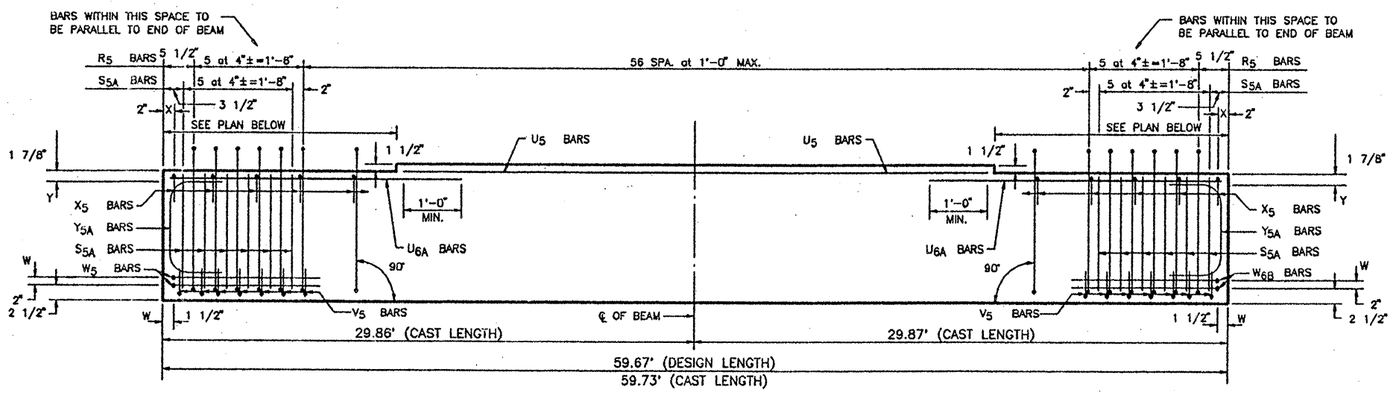
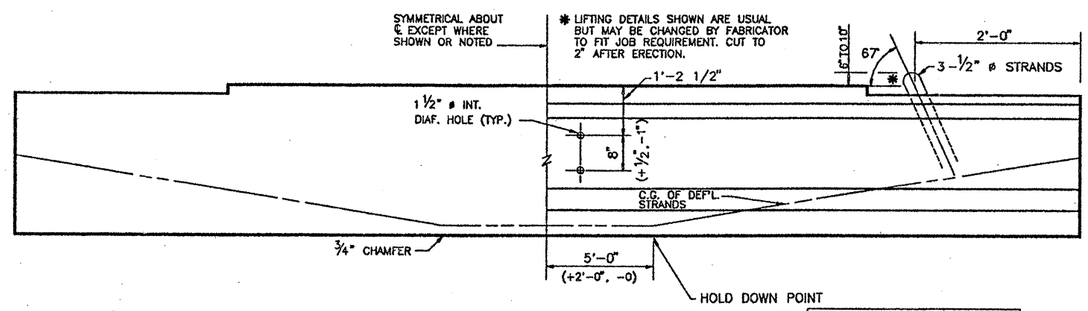
JOB NO. 93-063	DRAWN C.J.B.	CHECKED M.J.R.	DATE 1-11-94	SHEET/MARK NO.
SEA JOB NO. 93-160H	FABRICATION SHEET			C-20
94-018H				



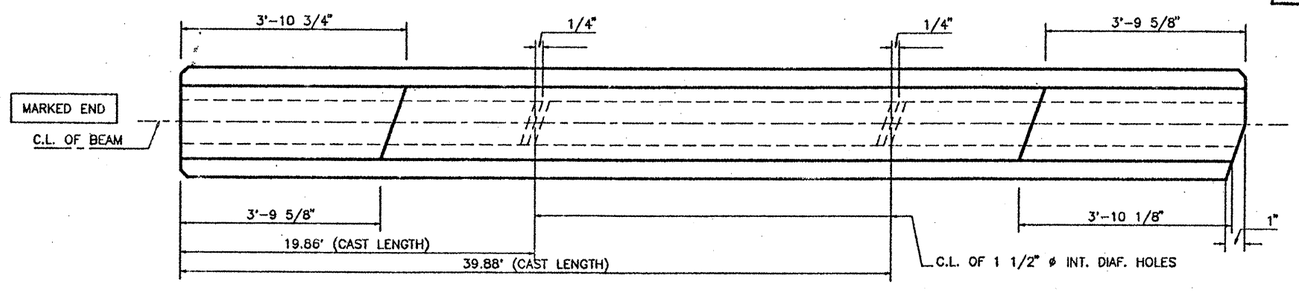
ELEVATION – REINFORCING STEEL



BEAM ELEVATION

SEE PLAN VIEW FOR HOLE(S) LOCATION

SINGLE LIFTING LOOP DETAIL
(TYP. FOR BEAMS UNDER 75')



PLAN

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

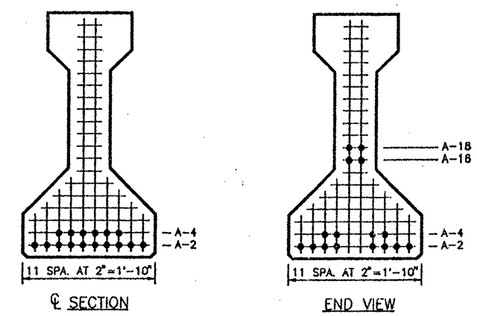
TOP FINISH PANELS
SEE STANDARD SHEET S-"C" FOR TOP FINISH AND OTHER NOTES AND DETAILS.

FOR APPROVAL
JAN 11 1994

REINFORCING STEEL SCHEDULE

BAR	QUANTITY PER BEAM	TOTAL QUANTITY	SIZE	LENGTH
R5	67	268	#3	standard
X5	63	252	#3	standard
Y5A	4	16	#6	standard
S5A	24	96	#5	standard
V5	14	56	#3	standard
W5	2	8	#5	standard
U5	2	8	#5	51'-9"
W6B	2	8	#5	standard
U6A	4	16	#5	6'-6"

SP-50



℄ SECTION

END VIEW

TYPE "C" BEAM QUANTITY : 4

LO-LAX STRAND PATTERN

NUMBER OF STRANDS	: 16 ~1/2" ø 270 K @ 31.00 K EACH	
NUMBER OF STRAIGHT STRANDS	: 12	
NUMBER OF DEFLECTED STRANDS	: 4 @ A – 18	
CONCRETE RELEASE STRENGTH	: 4000 PSI	
CONCRETE DESIGN STRENGTH	: 5000 PSI	
ECCENTRICITY @ ℄	: 14.34"	ECCENTRICITY @ END : 10.84"

DESIGN NO. : Gp-NS-LR
TOTAL BEAM LENGTH OF THIS SHEET : 238.68'

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	D23etc

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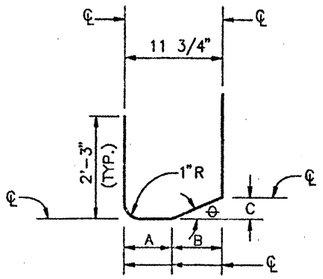
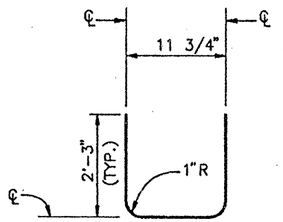
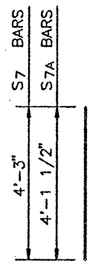
JOB NO.	DRAWN	CHECKED	DATE	SHEET/MARK NO.
93-063	C.J.B.	M.J.R.	1-11-94	C-21
SEA JOB NO. 93-160H	FABRICATION SHEET			
94-018H				



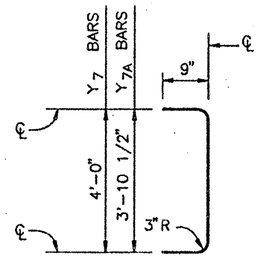
W 8A THRU W 8Z BARS



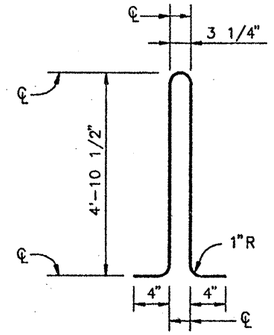
W7 BARS



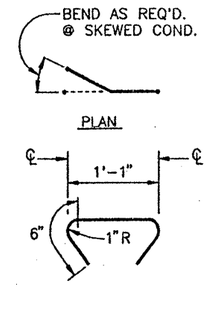
S7 or S7A BARS



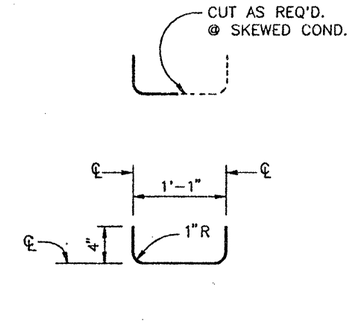
Y7 or Y7A BARS



R7 BARS

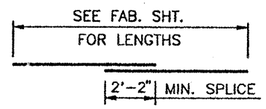


X7 BARS



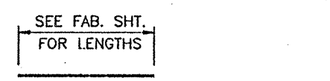
V7 BARS

BAR	"A"	"B"	"C"	"θ"
W8A	5 3/4"	6"	1/4"	2 1/2°
W8B	5 3/4"	6"	1/2"	5°
W8C	5 3/4"	6"	3/4"	7 1/2°
W8D	5 3/4"	6"	1"	10°
W8E	5 5/8"	6 1/8"	1 3/8"	12 1/2°
W8F	5 5/8"	6 1/8"	1 5/8"	15°
W8G	5 5/8"	6 1/8"	1 7/8"	17 1/2°
W8H	5 5/8"	6 1/8"	2 1/4"	20°
W8I	5 1/2"	6 1/4"	2 5/8"	22 1/2°
W8J	5 1/2"	6 1/4"	2 7/8"	25°
W8K	5 1/2"	6 1/4"	3 1/4"	27 1/2°
W8L	5 1/2"	6 1/4"	3 5/8"	30°
W8M	5 3/8"	6 3/8"	4"	32 1/2°
W8N	5 3/8"	6 3/8"	4 1/2"	35°
W8O	5 3/8"	6 3/8"	4 7/8"	37 1/2°
W8P	5 1/4"	6 1/2"	5 1/2"	40°
W8Q	5 1/4"	6 1/2"	6"	42 1/2°
W8R	5 1/4"	6 1/2"	6 1/2"	45°
W8S	5 1/8"	6 5/8"	7 1/4"	47 1/2°
W8T	5 1/8"	6 5/8"	7 7/8"	50°
W8U	5 1/8"	6 5/8"	8 5/8"	52 1/2°
W8V	5 1/8"	6 5/8"	9 1/2"	55°
W8W	5"	6 3/4"	10 3/4"	57 1/2°
W8X	5"	6 3/4"	11 5/8"	60°
W8Y	4 7/8"	6 7/8"	1'-1 1/4"	62 1/2°
W8Z	4 7/8"	6 7/8"	1'-2 3/4"	65°

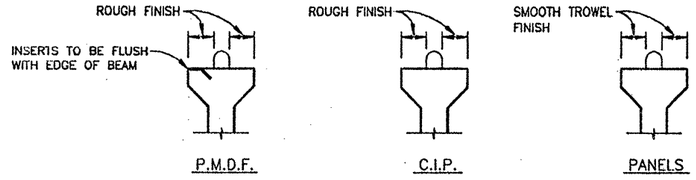


U7 BARS

U BAR SPLICES PERMITTED (40'-0" MIN. C-C SPLICES) NO PORTION OF BAR TO BE LESS THAN 10'-0" (LAP 2'-2" MIN.).U BAR LENGTH INDICATED IS OVERALL LENGTH, DOES NOT INCLUDE SPLICE.



U8A, U8B, U8C, U8D & U8E BARS



P.M.D.F. C.I.P. PANELS

BEAM TOP FINISH

GENERAL NOTES

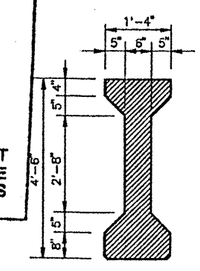
1. SPACING OF BARS R AND S MAY BE VARIED TO AVOID DIAFRAM HOLES.
2. REINFORCING BARS AND/OR STRANDS MAY COME IN CONTACT WITH MATERIALS USED IN FORMING DIAFRAM HOLES.
3. DIMENSIONS RELATING TO BARS OR STRANDS ARE CENTER TO CENTER.
4. BARS V AND X MAY BE TILTED THUS ✓ OR SKEWED AS REQUIRED TO MAINTAIN 1" MIN. CONCRETE COVER.
5. STRANDS MAY BE SPREAD TO MISS DIAFRAM HOLES.
6. STRANDS MAY BE RECESSED 1/2" MAX. INTO END OF BEAM.
7. BEAM ENDS MAY BE FORMED WITH WOOD.
8. BOTTOM CORNERS OF ALL BEAM FLANGES AND OUTSIDE CORNERS OF EXTERIOR BEAM ENDS SHALL BE CHAMFERED OR ROUNDED TO A 3/4" RADIUS. AT FABRICATORS OPTION, ALL VERTICAL EDGES ON ALL BEAMS MAY BE CHAMFERED.
9. BEAM MARKS TO BE PLACED ON FIXED END OR AS NOTED.
10. ALL DIMENSIONS MEASURED ALONG BOTTOM OF BEAM AT ℄ UNLESS NOTED OTHERWISE.

SP-51

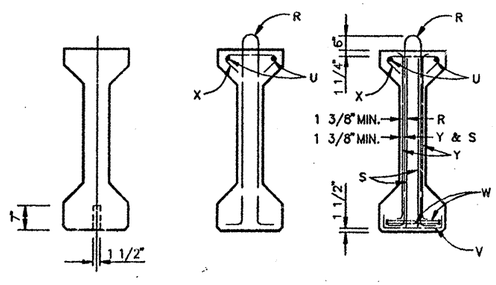
TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL



WT./FT.: 514 LBS.
C.Y.: .13

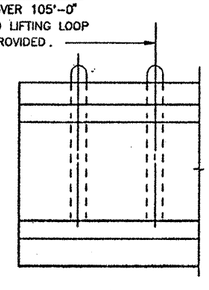


END VIEW ℄ SECTION END VIEW

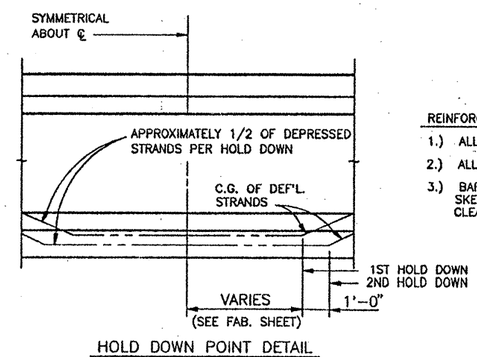
(✳ ANCHOR HOLE)

✳ NOTE : ANCHOR HOLES MAY BE TAPERED (4 3/4" x 1 5/8" EXP. END) (1 5/8" ø FIXED END) AT BASE. IF HOLES ARE FORMED WITH SHEET METAL, FORMS MAY BE LEFT IN PLACE . HOLES AT FIXED END MAY EXTEND FULL DEPTH OF BEAM. PLUG TOP OR FILL WITH ASPHALT MASTIC. AT FABRICATORS OPTION, ALL BEAMS MAY BE FURNISHED WITH ANCHOR HOLES.

FOR BEAM ERECTION;
BEAMS OVER 105'-0" USE 2ND LIFTING LOOP WHEN PROVIDED.



BEAM ERECTION – LIFTING LOOPS



HOLD DOWN POINT DETAIL
(USED WHEN UPLIFT FORCE EXCEEDS BED CAPACITY)

REINFORCING STEEL NOTES:

1.) ALL DIMENSIONS ARE CENTER TO CENTER
2.) ALL STEEL TO BE A.S.T.M. A-615, GR. 60
3.) BARS R AND S MAY BE ADJUSTED FOR SKEWED END CONDITIONS AND ADJUSTED TO CLEAR DIAFRAM HOLE.

FOR APPROVAL
JAN 11 1994

TYPE "54" BEAM

MANUFACTURED CONCRETE PRODUCTS CO.				
CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.				
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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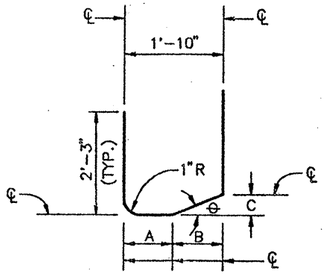
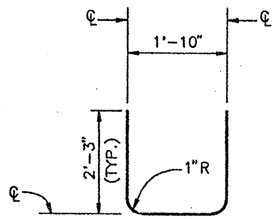
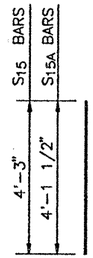
JOB NO. 93-063	DRAWN C.J.B.	CHECKED M.J.R.	DATE 1-11-94	SHEET S-"54"
SEA JOB NO. 93-160H	STANDARD SHEET			
94-018H				



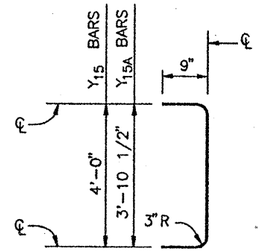
W16A THRU W16Z BARS



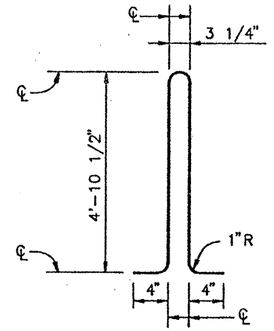
W15 BARS



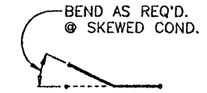
S15 or S15A BARS



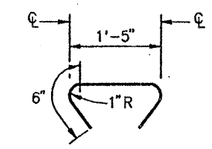
Y15 or Y15A BARS



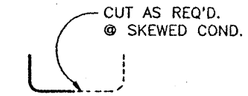
R15 BARS

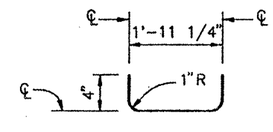


PLAN



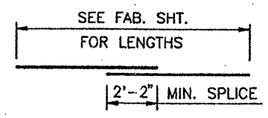
X15 BARS





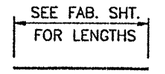
V15 BARS

BAR	"A"	"B"	"C"	"θ"
W16A	10 7/8"	11 1/8"	1/2"	2 1/2°
W16B	10 7/8"	11 1/8"	1"	5°
W16C	10 7/8"	11 1/8"	1 1/2"	7 1/2°
W16D	10 7/8"	11 1/8"	2"	10°
W16E	10 3/4"	11 1/4"	2 1/2"	12 1/2°
W16F	10 3/4"	11 1/4"	3"	15°
W16G	10 3/4"	11 1/4"	3 1/2"	17 1/2°
W16H	10 3/4"	11 1/4"	4 1/8"	20°
W16I	10 5/8"	11 3/8"	4 3/4"	22 1/2°
W16J	10 5/8"	11 3/8"	5 1/4"	25°
W16K	10 5/8"	11 3/8"	5 7/8"	27 1/2°
W16L	10 5/8"	11 3/8"	6 5/8"	30°
W16M	10 1/2"	11 1/2"	7 3/8"	32 1/2°
W16N	10 1/2"	11 1/2"	8"	35°
W16O	10 1/2"	11 1/2"	8 7/8"	37 1/2°
W16P	10 3/8"	11 5/8"	9 3/4"	40°
W16Q	10 3/8"	11 5/8"	10 5/8"	42 1/2°
W16R	10 3/8"	11 5/8"	11 5/8"	45°
W16S	10 1/4"	11 3/4"	1'-0 7/8"	47 1/2°
W16T	10 1/4"	11 3/4"	1'-2"	50°
W16U	10 1/4"	11 3/4"	1'-3 3/8"	52 1/2°
W16V	10 1/4"	11 3/4"	1'-4 3/4"	55°
W16W	10 1/8"	11 7/8"	1'-6 5/8"	57 1/2°
W16X	10 1/8"	11 7/8"	1'-8 5/8"	60°
W16Y	10"	1'-0"	1'-11"	62 1/2°
W16Z	10"	1'-0"	2'-1 3/4"	65°

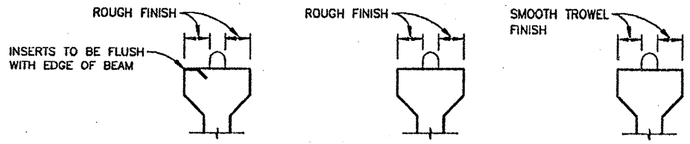


U15 BARS

U BAR SPLICES PERMITTED (40'-0" MIN. C-C SPLICES) NO PORTION OF BAR TO BE LESS THAN 10'-0" (LAP 2'-2" MIN.). U BAR LENGTH INDICATED IS OVERALL LENGTH, DOES NOT INCLUDE SPLICE.



U16A, U16B, U16C, U16D, & U16E BARS



P.M.D.F. C.I.P. PANELS

BEAM TOP FINISH

GENERAL NOTES

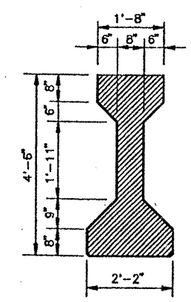
1. SPACING OF BARS R AND S MAY BE VARIED TO AVOID DIAFRAM HOLES.
2. REINFORCING BARS AND/OR STRANDS MAY COME IN CONTACT WITH MATERIALS USED IN FORMING DIAFRAM HOLES.
3. DIMENSIONS RELATING TO BARS OR STRANDS ARE CENTER TO CENTER.
4. BARS V AND X MAY BE TILTED THUS ✓ OR SKEWED AS REQUIRED TO MAINTAIN 1" MIN. CONCRETE COVER.
5. STRANDS MAY BE SPREAD TO MISS DIAFRAM HOLES.
6. STRANDS MAY BE RECESSED 1/2" MAX. INTO END OF BEAM.
7. BEAM ENDS MAY BE FORMED WITH WOOD.
8. BOTTOM CORNERS OF ALL BEAM FLANGES AND OUTSIDE CORNERS OF EXTERIOR BEAM ENDS SHALL BE CHAMFERED OR ROUNDED TO A 3/4" RADIUS. AT FABRICATORS OPTION, ALL VERTICAL EDGES ON ALL BEAMS MAY BE CHAMFERED.
9. BEAM MARKS TO BE PLACED ON FIXED END OR AS NOTED.
10. ALL DIMENSIONS MEASURED ALONG BOTTOM OF BEAM AT ℄ UNLESS NOTED OTHERWISE.

SP-52

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

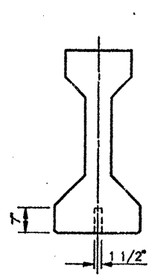
FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

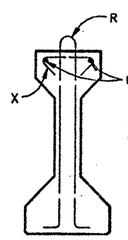


WT./FT.: 821 LBS.
C.Y.: .20

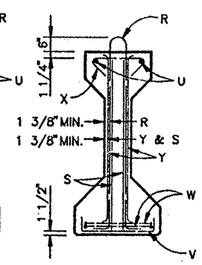
TYPE "IV" BEAM



END VIEW
(✳ ANCHOR HOLE)



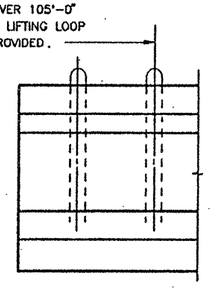
℄ SECTION



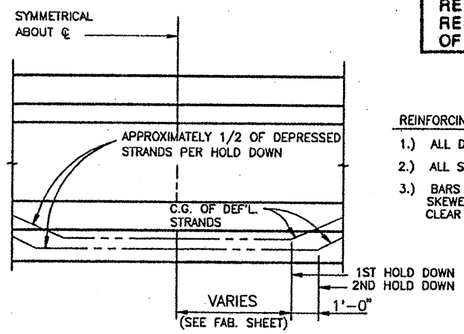
END VIEW

✳ NOTE : ANCHOR HOLES MAY BE TAPERED (4 3/4" x 1 5/8" EXP. END) (1 5/8" ø FIXED END) AT BASE. IF HOLES ARE FORMED WITH SHEET METAL, FORMS MAY BE LEFT IN PLACE HOLES AT FIXED END MAY EXTEND FULL DEPTH OF BEAM. PLUG TOP OR FILL WITH ASPHALT MASTIC. AT FABRICATORS OPTION, ALL BEAMS MAY BE FURNISHED WITH ANCHOR HOLES.

FOR BEAM ERECTION:
BEAMS OVER 105'-0" USE 2nd LIFTING LOOP WHEN PROVIDED.



BEAM ERECTION - LIFTING LOOPS



HOLD DOWN POINT DETAIL
(USED WHEN UPLIFT FORCE EXCEEDS BED CAPACITY)

REINFORCING STEEL NOTES:

1.) ALL DIMENSIONS ARE CENTER TO CENTER
2.) ALL STEEL TO BE A.S.T.M. A-615, GR. 60
3.) BARS R AND S MAY BE ADJUSTED FOR SKEWED END CONDITIONS AND ADJUSTED TO CLEAR DIAFRAM HOLE.

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.					
CONTRACTOR	GILBERT TEXAS CONSTRUCTION CORP.				
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.	
6	TEXAS	NH 90(191)M, etc.		LP 1604	
STATE DIST.NO.	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR		2452	02	023etc

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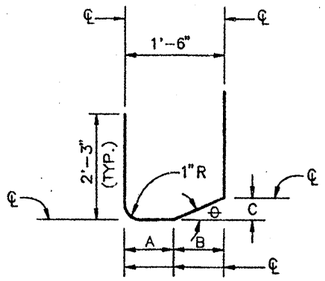
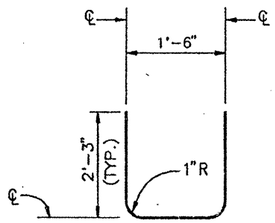
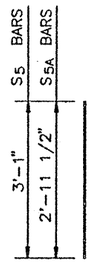
JOB NO. 93-063	DRAWN C.J.B.	CHECKED M.J.R.	DATE 1-11-94	SHEET S-"IV"
SEA JOB NO. 93-160H	STANDARD SHEET			
94-018H				



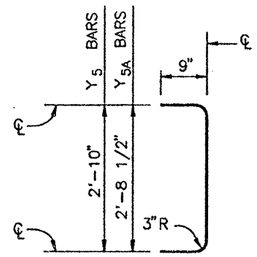
W6A THRU W6Z BARS



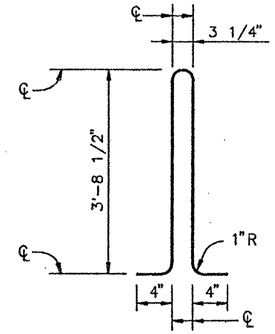
W5 BARS



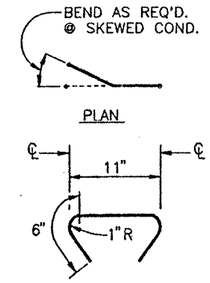
S5 or S5A BARS



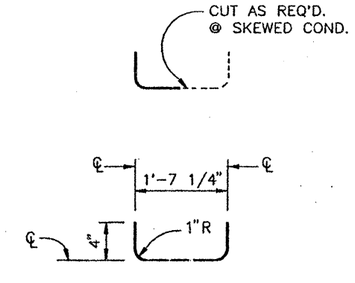
Y5 or Y5A BARS



R5 BARS

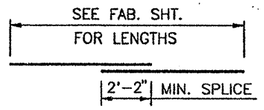


X5 BARS



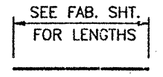
V5 BARS

BAR	"A"	"B"	"C"	"θ"
W6A	8 7/8"	9 1/8"	3/8"	2 1/2°
W6B	8 7/8"	9 1/8"	3/4"	5°
W6C	8 7/8"	9 1/8"	1 1/4"	7 1/2°
W6D	8 7/8"	9 1/8"	1 5/8"	10°
W6E	8 3/4"	9 1/4"	2"	12 1/2°
W6F	8 3/4"	9 1/4"	2 1/2"	15°
W6G	8 3/4"	9 1/4"	2 7/8"	17 1/2°
W6H	8 3/4"	9 1/4"	3 3/8"	20°
W6I	8 5/8"	9 3/8"	3 7/8"	22 1/2°
W6J	8 5/8"	9 3/8"	4 3/8"	25°
W6K	8 5/8"	9 3/8"	4 7/8"	27 1/2°
W6L	8 5/8"	9 3/8"	5 3/8"	30°
W6M	8 1/2"	9 1/2"	6"	32 1/2°
W6N	8 1/2"	9 1/2"	6 5/8"	35°
W6O	8 1/2"	9 1/2"	7 1/4"	37 1/2°
W6P	8 3/8"	9 5/8"	8 1/8"	40°
W6Q	8 3/8"	9 5/8"	8 7/8"	42 1/2°
W6R	8 3/8"	9 5/8"	9 5/8"	45°
W6S	8 1/4"	9 3/4"	10 5/8"	47 1/2°
W6T	8 1/4"	9 3/4"	11 5/8"	50°
W6U	8 1/4"	9 3/4"	1'-0 3/4"	52 1/2°
W6V	8 1/4"	9 3/4"	1'-1 7/8"	55°
W6W	8 1/8"	9 7/8"	1'-3 1/2"	57 1/2°
W6X	8 1/8"	9 7/8"	1'-5 1/8"	60°
W6Y	8"	10"	1'-7 1/4"	62 1/2°
W6Z	8"	10"	1'-9 1/2"	65°

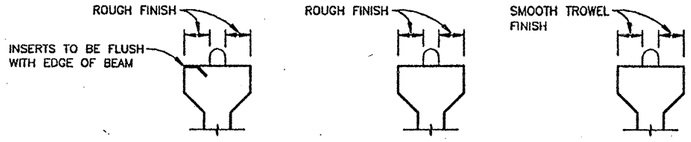


U5 BARS

U BAR SPLICES PERMITTED (40'-0" MIN. C-C SPLICES) NO PORTION OF BAR TO BE LESS THAN 10'-0" (LAP 2'-2" MIN.).U BAR LENGTH INDICATED IS OVERALL LENGTH, DOES NOT INCLUDE SPLICE.



U6A , U6B , U6C , U6D & U6E BARS



P.M.D.F. C.I.P. PANELS

BEAM TOP FINISH

GENERAL NOTES

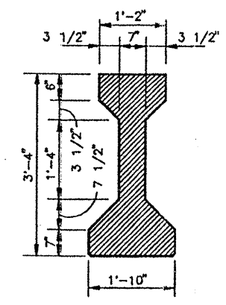
1. SPACING OF BARS R AND S MAY BE VARIED TO AVOID DIAFRAM HOLES.
2. REINFORCING BARS AND/OR STRANDS MAY COME IN CONTACT WITH MATERIALS USED IN FORMING DIAFRAM HOLES.
3. DIMENSIONS RELATING TO BARS OR STRANDS ARE CENTER TO CENTER.
4. BARS V AND X MAY BE TILTED THUS ⁄ OR SKEWED AS REQUIRED TO MAINTAIN 1" MIN. CONCRETE COVER.
5. STRANDS MAY BE SPREAD TO MISS DIAFRAM HOLES.
6. STRANDS MAY BE RECESSED 1/2" MAX. INTO END OF BEAM.
7. BEAM ENDS MAY BE FORMED WITH WOOD.
8. BOTTOM CORNERS OF ALL BEAM FLANGES AND OUTSIDE CORNERS OF EXTERIOR BEAM ENDS SHALL BE CHAMFERED OR ROUNDED TO A 3/4" RADIUS. AT FABRICATORS OPTION, ALL VERTICAL EDGES ON ALL BEAMS MAY BE CHAMFERED.
9. BEAM MARKS TO BE PLACED ON FIXED END OR AS NOTED.
10. ALL DIMENSIONS MEASURED ALONG BOTTOM OF BEAM AT ℄ UNLESS NOTED OTHERWISE.

SP-53

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

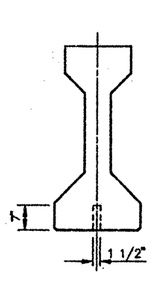
FEB 16 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

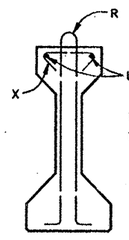


WT./FT.: 516 LBS.
C.Y.: .13

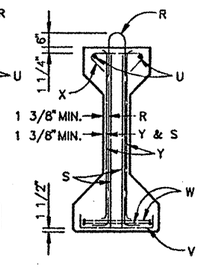
TYPE "C" BEAM



END VIEW



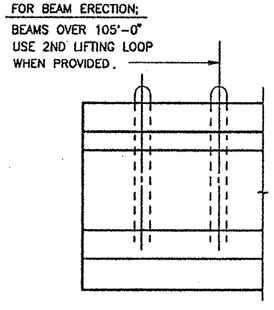
℄ SECTION



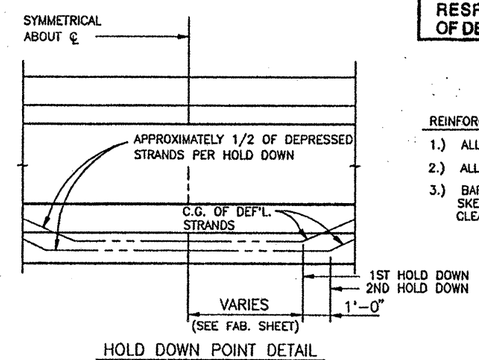
END VIEW

(✳ ANCHOR HOLE)

✳ NOTE : ANCHOR HOLES MAY BE TAPERED (4 3/4" x 1 5/8" EXP. END) (1 5/8" ø FIXED END) AT BASE. IF HOLES ARE FORMED WITH SHEET METAL, FORMS MAY BE LEFT IN PLACE . HOLES AT FIXED END MAY EXTEND FULL DEPTH OF BEAM. PLUG TOP OR FILL WITH ASPHALT MASTIC. AT FABRICATORS OPTION, ALL BEAMS MAY BE FURNISHED WITH ANCHOR HOLES.



BEAM ERECTION - LIFTING LOOPS



HOLD DOWN POINT DETAIL

(USED WHEN UPLIFT FORCE EXCEEDS BED CAPACITY)

REINFORCING STEEL NOTES:

1.) ALL DIMENSIONS ARE CENTER TO CENTER
2.) ALL STEEL TO BE A.S.T.M. A-615, GR. 60
3.) BARS R AND S MAY BE ADJUSTED FOR SKEWED END CONDITIONS AND ADJUSTED TO CLEAR DIAFRAM HOLE.

FOR APPROVAL
JAN 11 1994

MANUFACTURED CONCRETE PRODUCTS CO.

CONTRACTOR GILBERT TEXAS CONSTRUCTION CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.	HWY. NO.
6	TEXAS	NH 90(191)M, etc.	LP 1604

STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023etc

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JOB NO.	DRAWN	CHECKED	DATE	SHEET
93-063	C.J.B.	M.J.R.	1-11-94	S-"C"
SEA JOB NO. 93-160H	STANDARD SHEET			
94-018H				

Texas Department of Transportation

DEWITT C. GREER STATE HIGHWAY BLDG. • 125 E. 11TH STREET • AUSTIN, TEXAS 78701-2483 • (512) 463-8585

January 26, 1994

Shop Plan File No. P-~~3081~~ 7209
Your Order: 93-173H

County: Bexar
Control: 2452-02-023
Project: NH 90(191)M
Highway: LP 1604
Structure: Loop 1604 O'Pass at
Kyle Seale Pkwy.
Eastbound and Westbound Mainlanes

Structural Engineering Associates
3838 N. W. Loop 410, Suite 200
San Antonio, TX 78229

SP-54

Attention: Mr. Ralph S. Moralez

Gentlemen:

We have reviewed your shop drawings, sheets EP1 thru EP6, & FP1 thru FP9, covering panels on the above project. The drawings are approved for fabrication and are enclosed.

Any corrections noted in red must be incorporated into the work. Revised prints for these corrections will not be necessary.

One set of any erection drawings, included herein, has been sent to the Contractor.

Sincerely,
Original Signed for
Robert L. Wilson, P.E.

Robert L. Wilson, P.E. CCT
Director, Design Division

MAB:ew
Encl.

cc: San Antonio District
Materials & Tests Division
Gilbert Texas Const. Corp.

P3081 743

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS

(210) 735-9202
FAX (210) 735-2074

3838 N.W. LOOP 410
SUITE 200
SAN ANTONIO, TX 78229

LETTER OF TRANSMITTAL

DATE 12/23/93 JOB. NO. 93-173H
ATTENTION Mr. Greg Kindle
RE: Bexar Co. LP. 1604
Project No. NH 90(191)M, etc.
Control No. 2452-02-023, etc.
(Panels)

TO Texas Department of Transportation
125 E. 11th St.
Austin, Texas 78701-2483

GENTLEMEN:

WE ARE SENDING YOU ☑ Attached ☐ Under separate cover via _____ the following items:
☑ Shop drawings ☑ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
7			EP-1 thru EP-6
6			FP-1 thru FP-9

THESE ARE TRANSMITTED as checked below:
☑ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS Please return one complete set after reviewing

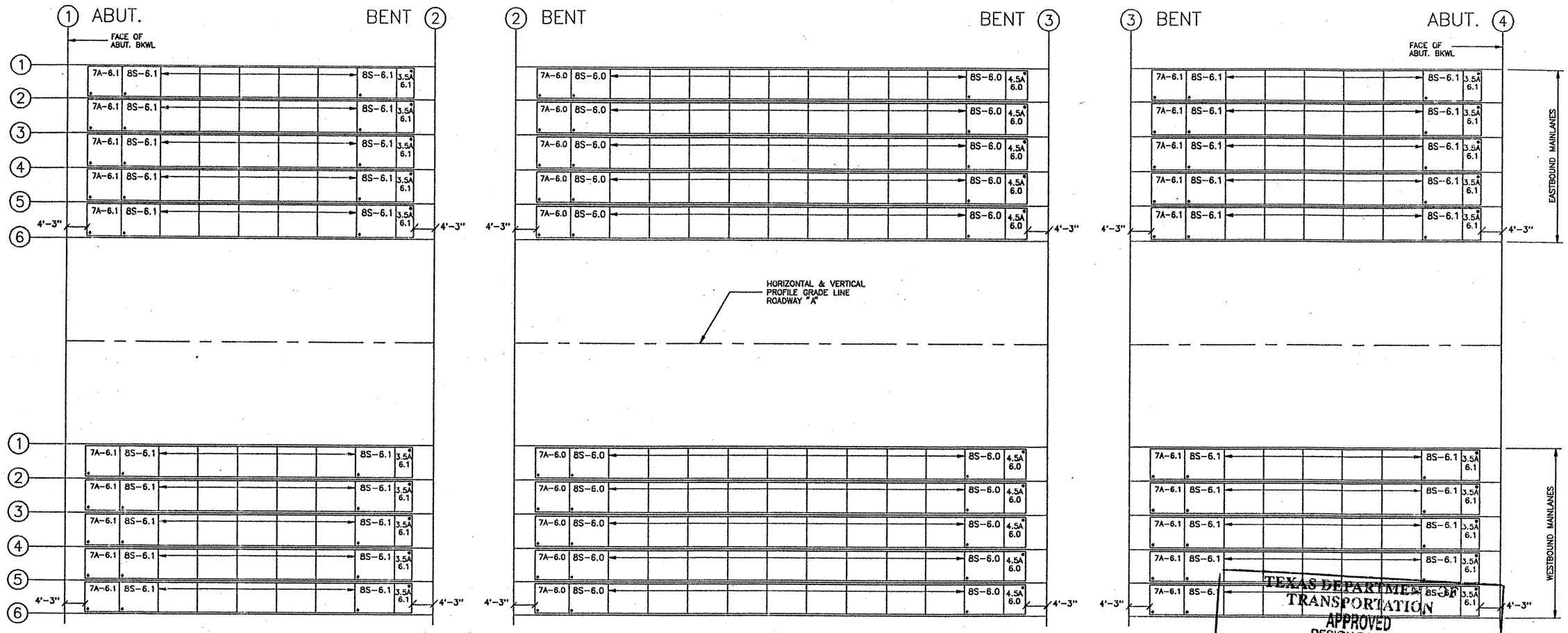
TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION
JAN 26 1994
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

RECEIVED
DEC 28 1993
BRIDGE DIVISION

Thank You

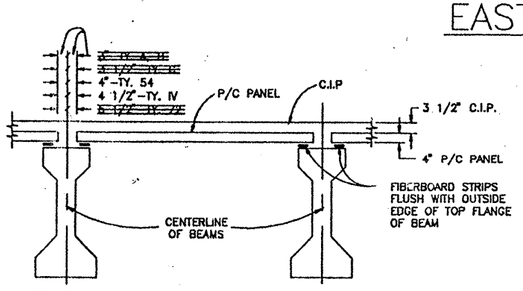
COPY TO _____

SIGNED: Ralph S. Moralez
RALPH S. MORALEZ

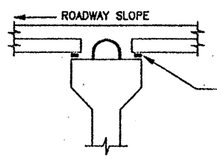


SUMMARY	
SPAN 1	
3.5A6.1	10
7A6.1	10
8S6.1	70
SPAN 2	
4.5A6.0	10
7A6.0	10
8S6.0	110
SPAN 3	
3.5A6.1	10
7A6.1	10
8S6.1	70
TOTAL	
3.5A6.1	20
4.5A6.0	10
7A6.0	10
7A6.1	20
8S6.0	110
8S6.1	140

LOOP 1604 OVERPASS AT KYLE SEALE PKWY. EASTBOUND AND WESTBOUND MAINLANES



TYPICAL CROSS SECTION



MAXIMUM ROADWAY SLOPE				BEAMS
.08'/ft	.06'/ft	.04'/ft	.02'/ft	
1"x 1"	1"x 1"	1"x 1"	1"x 1/2"	A, B, C
1 1/2"x 1/2"	1"x 1"	1"x 1"	1"x 1/2"	54
1 1/2"x 1/2"	1 1/2"x 1/2"	1"x 1"	1"x 1/2"	IV

THICKNESS MAY BE MADE OF 1/2" LAYERS

FIBERBOARD DIMENSIONS

FOR APPROVAL
DEC 2 3 1993

NOTE

1. ALL DIMENSIONS SHOWN ARE ON A HORIZONTAL PLANE.
2. ALL DIMENSIONS SHOWN ARE MEASURED FROM CENTERLINE OF BENT OR FACE OF ABUTMENT BACKWALL OR FACE OF I.T. BENT CAP BACKWALL, ALONG CENTERLINE OF BEAM.

● DENOTES ERECTION MARK

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION
JAN 26 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

SP-55

TOTAL PANEL AREA OF THIS PROJECT ~~48,616~~ Sq. Ft.

SAPSCO

CONTRACTOR GILBERT TEXAS CONSTR. CORP.

CONTRACTORS OPTIONS	END DIAFRAM : E.D.O. #2 INTERIOR DIAFRAM : N/A	SLAB : PANELS

FED.RD. DIV.NO.	STATE	PROJECT NO.	HWY. NO.
6	TEXAS	NH 90(191)M, etc.	LP. 1604

STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023 etc.

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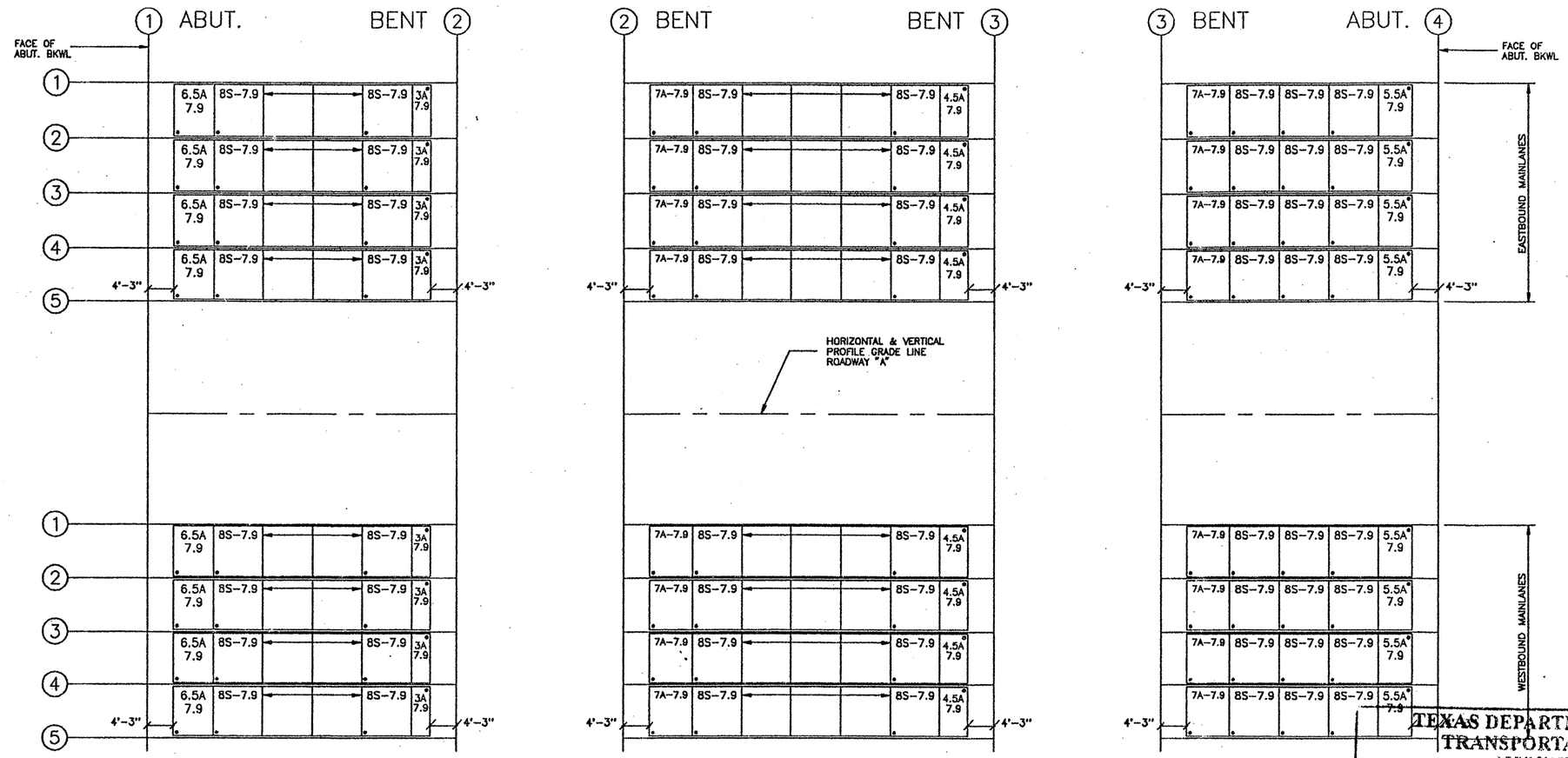
JOB NO.	DRAWN	CHECKED	DATE	SHEET NO.
93-670	L.L.A.	R.S.M.	12/23/93	EP- 1
SEA JOB NO. 93-173H	ERECTION SHEET			

SUMMARY	
SPAN 1	
3A7.9	8
6.5A7.9	8
8S7.9	32
SPAN 2	
4.5A7.9	8
7A7.9	8
8S7.9	40
SPAN 3	
5.5A7.9	8
7A7.9	8
8S7.9	24
TOTAL	
3A7.9	8
4.5A7.9	8
5.5A7.9	8
6.5A7.9	8
7A7.9	16
8S7.9	96



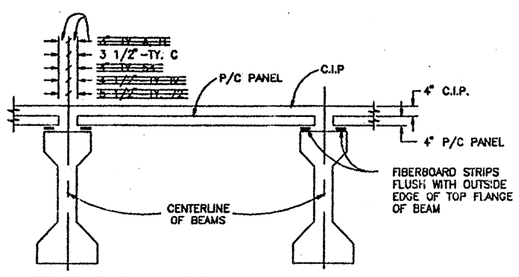
SP-56

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

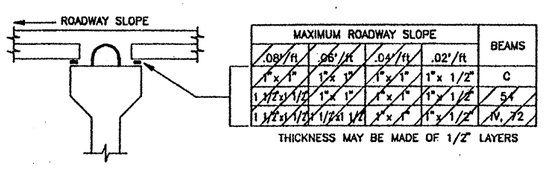
JAN 26 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

LOOP 1604 EASTBOUND AND WESTBOUND MAINLANE BRIDGE AT HUESTA CREEK ROADWAY "A"



TYPICAL CROSS SECTION



MAXIMUM ROADWAY SLOPE				BEAMS
.08'/ft	.06'/ft	.04'/ft	.02'/ft	
1"x 1"	1"x 1"	1"x 1"	1"x 1/2"	C
1 1/2"x 1/2"	1"x 1"	1"x 1"	1"x 1/2"	54
1 1/2"x 1/2"	1 1/2"x 1/2"	1"x 1"	1"x 1/2"	N, 72

THICKNESS MAY BE MADE OF 1/2" LAYERS

FIBERBOARD DIMENSIONS

FOR APPROVAL
DEC 23 1993

NOTE

1. ALL DIMENSIONS SHOWN ARE ON A HORIZONTAL PLANE.
2. ALL DIMENSIONS SHOWN ARE MEASURED FROM CENTERLINE OF BENT OR FACE OF ABUTMENT BACKWALL OR FACE OF I.T. BENT CAP BACKWALL, ALONG CENTERLINE OF BEAM.

● DENOTES ERECTION MARK

SAPSCO

CONTRACTOR GILBERT TEXAS CONSTR. CORP.

CONTRACTORS OPTIONS	END DIAFRAM : E.D.O. #2 INTERIOR DIAFRAM : N/A		SLAB : PANELS
FED.RD. DIV.NO.	STATE	PROJECT NO.	HWY. NO.
6	TEXAS	NH 90(191)M, etc.	LP. 1604

STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023 etc.

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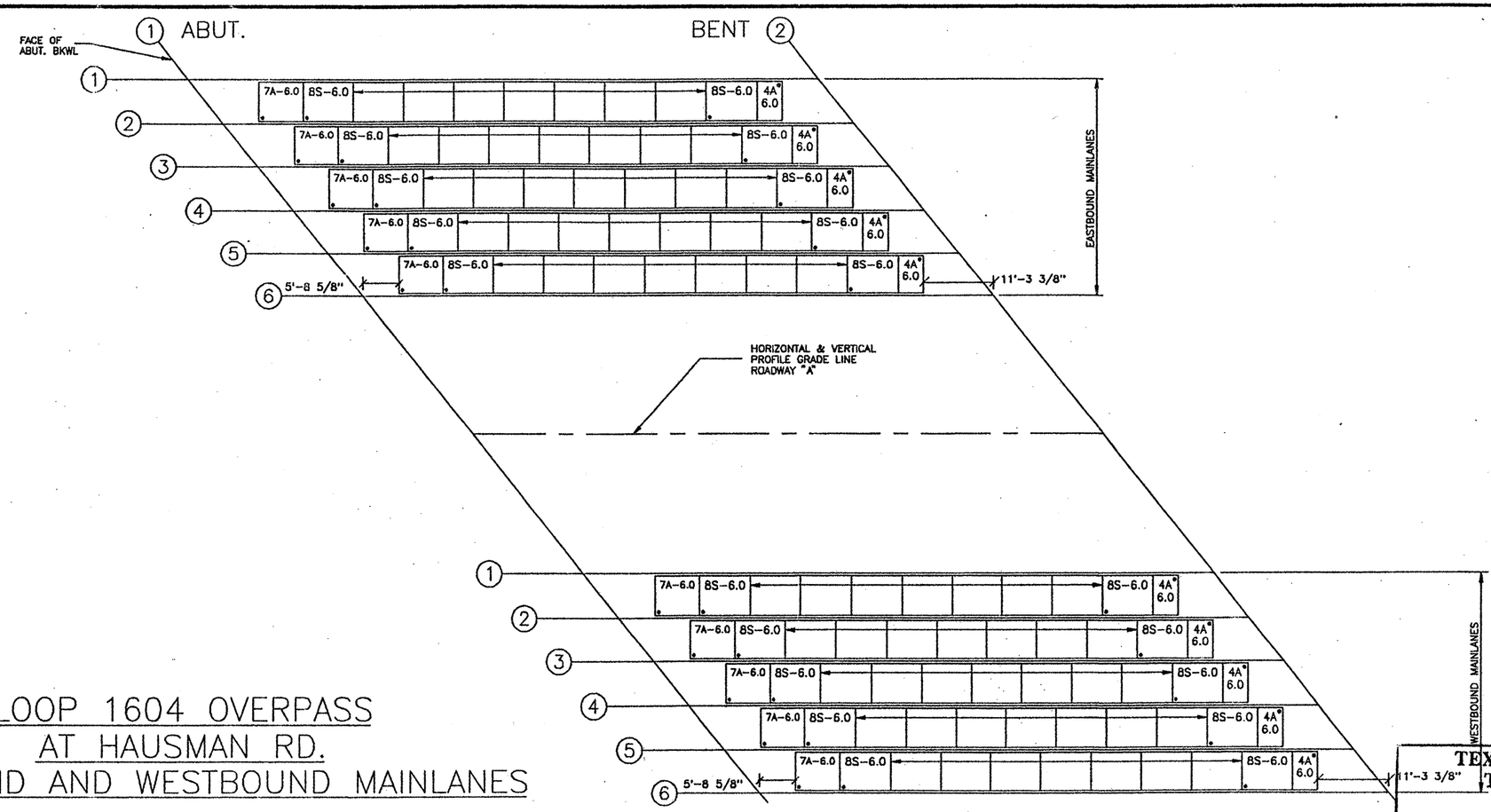
JOB NO.	DRAWN	CHECKED	DATE	SHEET NO.
93-670	L.L.A.	R.S.M.	12/23/93	EP- 2
SEA JOB NO. 93-173H	ERECTION SHEET			

SP-57

SUMMARY SPAN 1	
4A6.0	10
7A6.0	10
8S6.0	90
TOTAL	
4A6.0	10
7A6.0	10
8S6.0	90



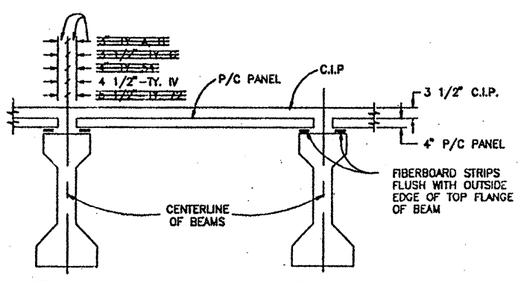
SPAN 1

LOOP 1604 OVERPASS AT HAUSMAN RD. EASTBOUND AND WESTBOUND MAINLANES

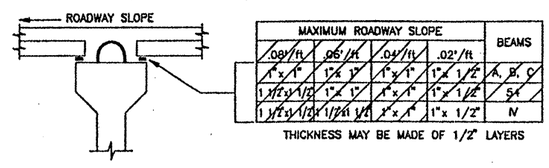
TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

JAN 26 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL



TYPICAL CROSS SECTION



MAXIMUM ROADWAY SLOPE				BEAMS
.08'/ft	.06'/ft	.04'/ft	.02'/ft	
1"x 1"	1"x 1"	1"x 1"	1"x 1/2"	A, B, C
1 1/2"x 1/2"	1"x 1"	1"x 1"	1"x 1/2"	54
1 1/2"x 1/2"	1 1/2"x 1/2"	1"x 1"	1"x 1/2"	N

THICKNESS MAY BE MADE OF 1/2" LAYERS

FIBERBOARD DIMENSIONS

FOR APPROVAL
DEC 23 1993

NOTE

1. ALL DIMENSIONS SHOWN ARE ON A HORIZONTAL PLANE.
2. ALL DIMENSIONS SHOWN ARE MEASURED FROM CENTERLINE OF BENT OR FACE OF ABUTMENT BACKWALL OR FACE OF I.T. BENT CAP BACKWALL, ALONG CENTERLINE OF BEAM.

● DENOTES ERECTION MARK

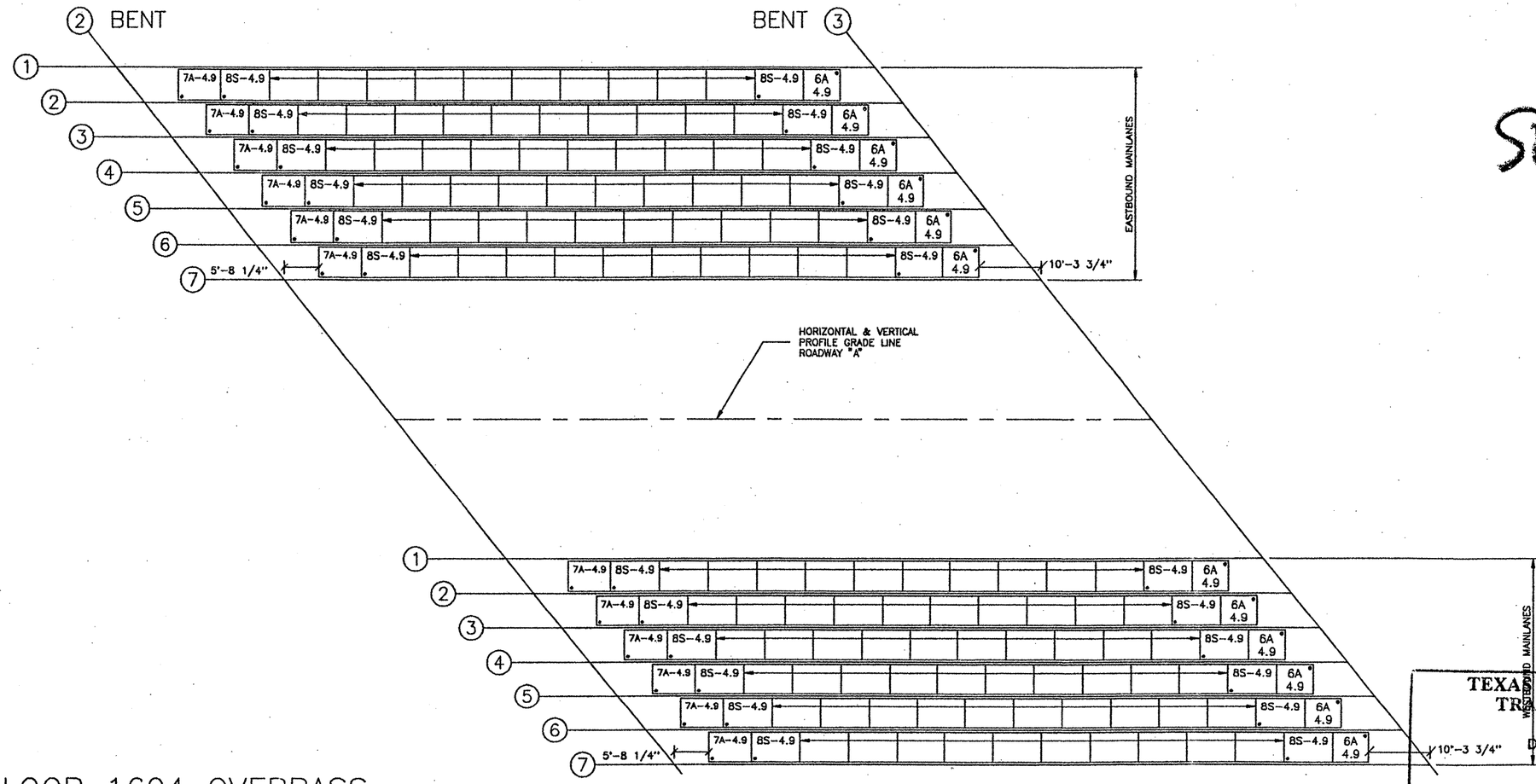
SAPSCO					
CONTRACTOR	GILBERT TEXAS CONSTR. CORP.				
CONTRACTORS OPTIONS	END DIAFRAM : E.D.O. #2 INTERIOR DIAFRAM : N/A			SLAB : PANELS	
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.	
6	TEXAS	NH 90(191)M, etc.		LP. 1604	
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	
15	BEXAR	2452	02	023	etc.
COPYRIGHT 1989 BY	SEA STRUCTURAL ENGINEERING ASSOCIATES, INC. CONSULTING ENGINEERS, SAN ANTONIO, TEXAS				
JOB NO. 93-670	DRAWN L.L.A.	CHECKED R.S.M.	DATE 12/23/93	SHEET NO. EP- 3	
SEA JOB NO. 93-173H	ERECTION SHEET				

SP-58

SUMMARY

SPAN 2	
6A4.9	12
7A4.9	12
8S4.9	144

TOTAL	
6A4.9	12
7A4.9	12
8S4.9	144



SPAN 2

LOOP 1604 OVERPASS AT HAUSMAN RD. EASTBOUND AND WESTBOUND MAINLANES

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION
JAN 26 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

FOR APPROVAL
DEC 23 1993

NOTE

1. ALL DIMENSIONS SHOWN ARE ON A HORIZONTAL PLANE.
2. ALL DIMENSIONS SHOWN ARE MEASURED FROM CENTERLINE OF BENT OR FACE OF ABUTMENT BACKWALL OR FACE OF I.T. BENT CAP BACKWALL, ALONG CENTERLINE OF BEAM.

● DENOTES ERECTION MARK

SAPSCO

CONTRACTOR GILBERT TEXAS CONSTR. CORP.

CONTRACTORS OPTIONS	END DIAFRAM : E.D.O. #2 INTERIOR DIAFRAM : N/A	SLAB : PANELS

FED.RD. DIV.NO.	STATE	PROJECT NO.	HWY. NO.
6	TEXAS	NH 90(191)M, etc.	LP. 1604

STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023 etc.

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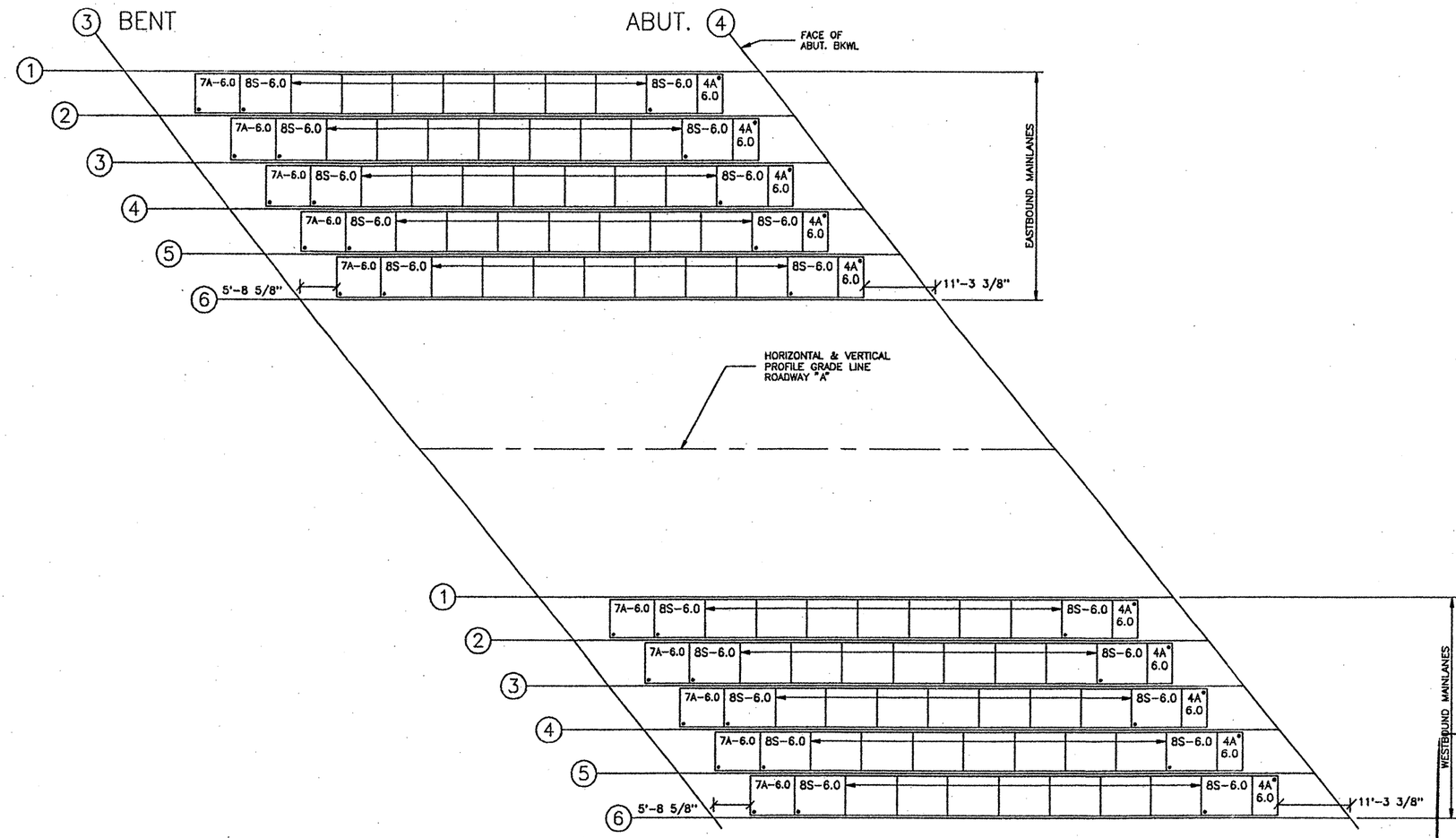
JOB NO.	DRAWN	CHECKED	DATE	SHEET NO.
93-670	L.L.A.	R.S.M.	12/23/93	EP- 4
SEA JOB NO. 93-173H	ERECTION SHEET			

SP-59

SUMMARY SPAN 3	
4A6.0	10
7A6.0	10
8S6.0	90

TOTAL	
4A6.0	10
7A6.0	10
8S6.0	90



SPAN 3

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

JAN 26 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

LOOP 1604 OVERPASS AT HAUSMAN RD. EASTBOUND AND WESTBOUND MAINLANES

FOR APPROVAL
DEC 23 1993

NOTE

1. ALL DIMENSIONS SHOWN ARE ON A HORIZONTAL PLANE.
2. ALL DIMENSIONS SHOWN ARE MEASURED FROM CENTERLINE OF BENT OR FACE OF ABUTMENT BACKWALL OR FACE OF I.T. BENT CAP BACKWALL, ALONG CENTERLINE OF BEAM.

● DENOTES ERECTION MARK

SAPSCO

CONTRACTOR GILBERT TEXAS CONSTR. CORP.

CONTRACTORS OPTIONS	END DIAFRAM : E.D.O. #2 INTERIOR DIAFRAM : N/A	SLAB : PANELS

FED.RD. DIV.NO.	STATE	PROJECT NO.	HWY. NO.
6	TEXAS	NH 90(191)M, etc.	LP. 1604

STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023 etc.

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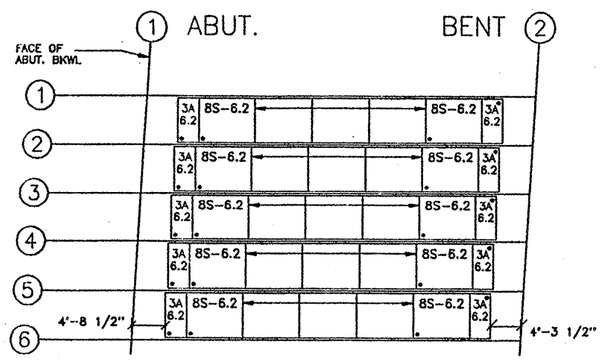
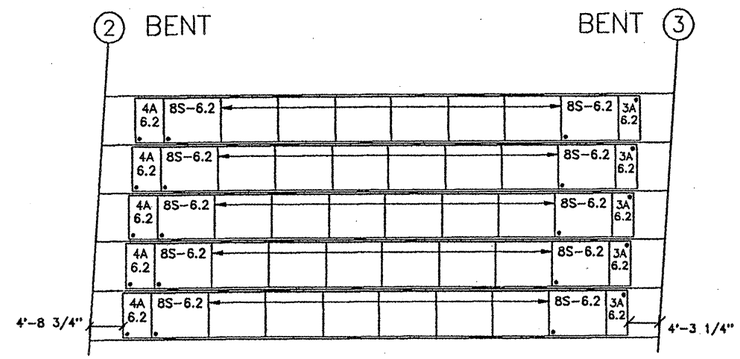
JOB NO.	DRAWN	CHECKED	DATE	SHEET NO.
93-670	L.L.A.	R.S.M.	12/23/93	EP- 5
SEA JOB NO. 93-173H	ERECTION SHEET			

SUMMARY

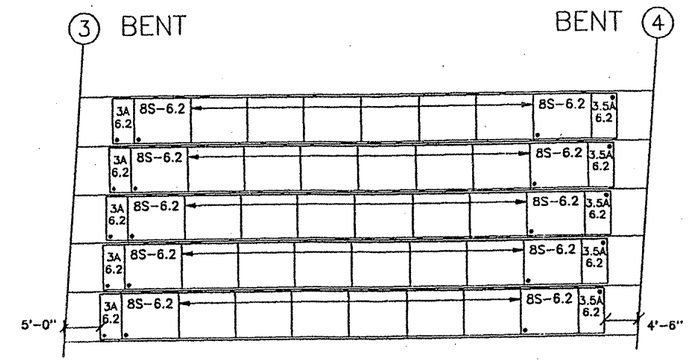
SPAN 1	
3A6.2	10
8S6.2	25
SPAN 2	
3A6.2	5
4A6.2	5
8S6.2	40
SPAN 3	
3A6.2	5
3.5A6.2	5
8S6.2	40
SPAN 4	
3.5A6.2	5
7A6.2	5
8S6.2	25
TOTAL	
3A6.2	20
3.5A6.2	10
4A6.2	5
7A6.2	5
8S6.2	130



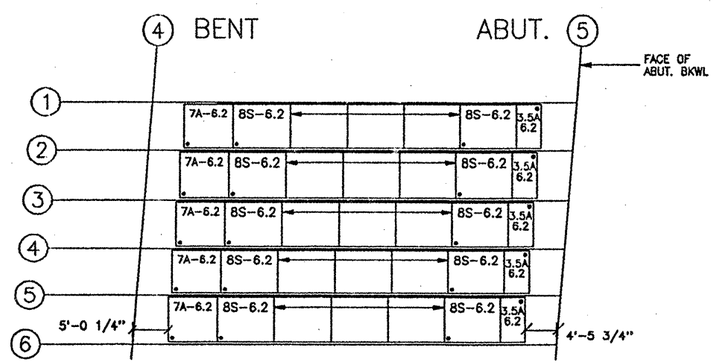
SPAN 1



SPAN 2



SPAN 3



SPAN 4

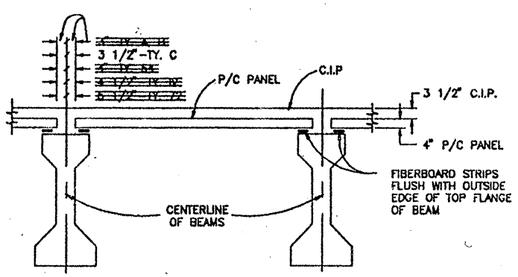
LOOP 1604 OVERPASS AT S.H. 16 (BANDERA RD.) WESTBOUND MAINLANES

SP-60

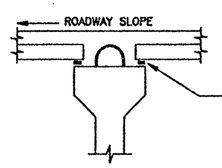
TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

JAN 26 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL



TYPICAL CROSS SECTION



MAXIMUM ROADWAY SLOPE				BEAMS
.08'/ft	.06'/ft	.04'/ft	.02'/ft	
1"x 1"	1"x 1"	1"x 1"	1"x 1/2"	C
1 1/2"x 1/2"	1"x 1"	1"x 1"	1"x 1/2"	54
1 1/2"x 1/2"	1 1/2"x 1/2"	1"x 1"	1"x 1/2"	N, 72

THICKNESS MAY BE MADE OF 1/2" LAYERS

FIBERBOARD DIMENSIONS

NOTE

1. ALL DIMENSIONS SHOWN ARE ON A HORIZONTAL PLANE.
2. ALL DIMENSIONS SHOWN ARE MEASURED FROM CENTERLINE OF BENT OR FACE OF ABUTMENT BACKWALL OR FACE OF I.T. BENT CAP BACKWALL, ALONG CENTERLINE OF BEAM.

● DENOTES ERECTION MARK

FOR APPROVAL
DEC 23 1993

SAPSCO					
CONTRACTOR GILBERT TEXAS CONSTR. CORP.					
CONTRACTORS OPTIONS	END DIAFRAM : E.D.O. #2 INTERIOR DIAFRAM : N/A			SLAB : PANELS	
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.	
6	TEXAS	NH 90(191)M, etc.		LP. 1604	
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	
15	BEXAR	2452	02	023	etc.
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JOB NO. 93-670	DRAWN L.L.A.	CHECKED R.S.M.	DATE 12/23/93	SHEET NO. EP- 6	
SEA JOB NO. 93-173H	ERECTION SHEET				

SCHEDULE OF PANEL DIMENSIONS — TOTAL AREA THIS TABLE ____ Sq.Ft.

PANEL MARK	3A-3.0	3A-3.1	3A-3.2	3A-3.3	3A-3.4	3A-3.5	3A-3.6	3A-3.7	3A-3.8	3A-3.9
NO. REQ'D										
"W"	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
MIN. WWF WIDTH	2.67	2.77	2.87	2.97	3.07	3.17	3.27	3.37	3.47	3.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	7	7	7	7	8	8	8	8	8	9
AREA / PANEL	9.00 ♦	9.30 ♦	9.60 ♦	9.90 ♦	10.20 ♦	10.50 ♦	10.80 ♦	11.10 ♦	11.40 ♦	11.70 ♦
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS — TOTAL AREA THIS TABLE ____ Sq.Ft.

PANEL MARK	3A-4.0	3A-4.1	3A-4.2	3A-4.3	3A-4.4	3A-4.5	3A-4.6	3A-4.7	3A-4.8	3A-4.9
NO. REQ'D										
"W"	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9
MIN. WWF WIDTH	3.67	3.77	3.87	3.97	4.07	4.17	4.27	4.37	4.47	4.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	8	9	9	9	10	10	10	10	10	11
AREA / PANEL	12.00 ♦	12.30 ♦	12.60 ♦	12.90 ♦	13.20 ♦	13.50 ♦	13.80 ♦	14.10 ♦	14.40 ♦	14.70 ♦
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS — TOTAL AREA THIS TABLE ____ Sq.Ft.

PANEL MARK	3A-5.0	3A-5.1	3A-5.2	3A-5.3	3A-5.4	3A-5.5	3A-5.6	3A-5.7	3A-5.8	3A-5.9
NO. REQ'D										
"W"	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9
MIN. WWF WIDTH	4.67	4.77	4.87	4.97	5.07	5.17	5.27	5.37	5.47	5.57
BAR U TYPE	A	A	A	A	B	B	B	B	B	B
BAR A	11	11	11	11	12	12	12	12	12	13
AREA / PANEL	15.00 ♦	15.30 ♦	15.60 ♦	15.90 ♦	16.20 ♦	16.50 ♦	16.80 ♦	17.10 ♦	17.40 ♦	17.70 ♦
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS — TOTAL AREA THIS TABLE 372 Sq.Ft.

PANEL MARK			3A-6.2							
NO. REQ'D			20							
"W"	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9
MIN. WWF WIDTH	5.67	5.77	5.87	5.97	6.07	6.17	6.27	6.37	6.47	6.57
BAR U TYPE	B	B	B	B	B	B	B	B	B	B
BAR A	13	13	13	13	14	14	14	14	14	15
AREA / PANEL	18.00 ♦	18.30 ♦	18.60 ♦	18.90 ♦	19.20 ♦	19.50 ♦	19.80 ♦	20.10 ♦	20.40 ♦	20.70 ♦
AREA (Sq.Ft.)			372							

SCHEDULE OF PANEL DIMENSIONS — TOTAL AREA THIS TABLE 190 Sq.Ft.

PANEL MARK										3A-7.9
NO. REQ'D										8
"W"	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9
MIN. WWF WIDTH	6.67	6.77	6.87	6.97	7.07	7.17	7.27	7.37	7.47	7.57
BAR U TYPE	B	B	B	B	B	B	B	C	C	C
BAR A	15	15	15	15	16	16	16	16	16	17
AREA / PANEL	21.00 ♦	21.30 ♦	21.60 ♦	21.90 ♦	22.20 ♦	22.50 ♦	22.80 ♦	23.10 ♦	23.40 ♦	23.70 ♦
AREA (Sq.Ft.)										190

SCHEDULE OF PANEL DIMENSIONS — TOTAL AREA THIS TABLE ____ Sq.Ft.

PANEL MARK	3A-8.0	3A-8.1	3A-8.2	3A-8.3	3A-8.4	3A-8.5	3A-8.6	3A-8.7	3A-8.8	3A-8.9
NO. REQ'D										
"W"	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9
MIN. WWF WIDTH	7.67	7.77	7.87	7.97	8.07	8.17	8.27	8.37	8.47	8.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	17	17	17	17	18	18	18	18	18	19
AREA / PANEL	24.00 ♦	24.30 ♦	24.60 ♦	24.90 ♦	25.20 ♦	25.50 ♦	25.80 ♦	26.10 ♦	26.40 ♦	26.70 ♦
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS — TOTAL AREA THIS TABLE ____ Sq.Ft.

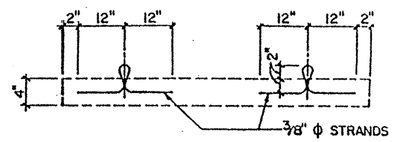
PANEL MARK	3A-9.0	3A-9.1	3A-9.2	3A-9.3	3A-9.4	3A-9.5	3A-9.6	3A-9.7	3A-9.8	3A-9.9
NO. REQ'D										
"W"	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9
MIN. WWF WIDTH	8.67	8.77	8.87	8.97	9.07	9.17	9.27	9.37	9.47	9.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	19	19	19	19	20	20	20	20	20	21
AREA / PANEL	27.00 ♦	27.30 ♦	27.60 ♦	27.90 ♦	28.20 ♦	28.50 ♦	28.80 ♦	29.10 ♦	29.40 ♦	29.70 ♦
AREA (Sq.Ft.)										

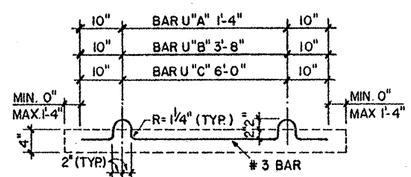
TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

JAN 26 1994

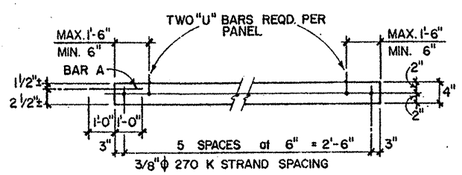
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL.

FOR APPROVAL
DEC 23 1993

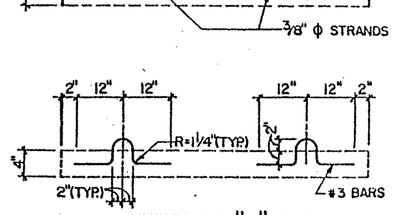




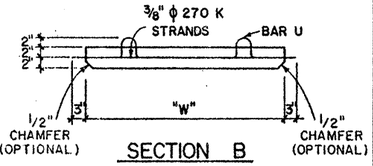
TYP. "U" BAR



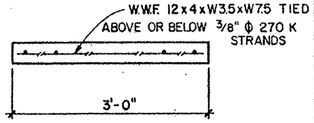
SECTION A
(SHOWING STRANDS)



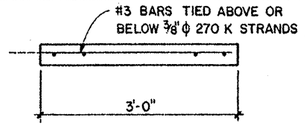
OPTIONAL "U" BAR
(4 REQUIRED PER PANEL)



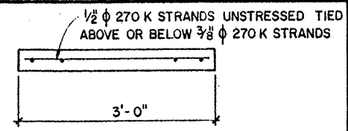
SECTION B



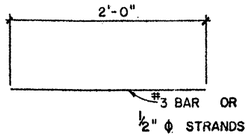
SECTION C



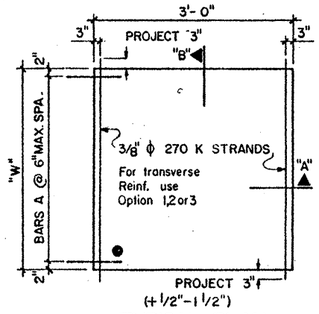
SECTION D



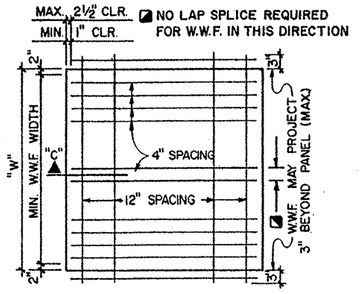
SECTION E



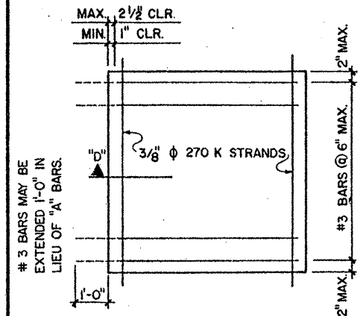
TYP. "A" BAR



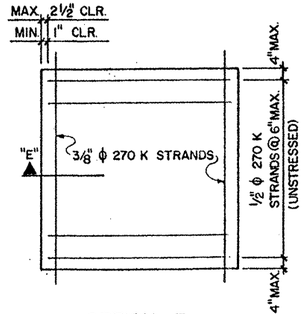
TYPICAL PLAN



OPTION 1 (TRANSVERSE REINF.)



OPTION 2 (TRANSVERSE REINF.)



OPTION 3 (TRANSVERSE REINF.)

6 3/8" ϕ 270K STRANDS STRESS TO 16.1 KIPS EACH
CONCRETE CLASS: H
RELEASE STRENGTH: 4,000 p.s.i.
28 DAY STRENGTH: 5,000 p.s.i.
TOP FINISH: BROOM
● ERECTION MARK

TOTAL PANEL AREA THIS SHEET 562 Sq.Ft.

SAPSCO
SAN ANTONIO PRE-STRESSED CO.

CONTRACTOR GILBERT TEXAS CONSTR. CORP.

FED. RD. DIV. NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023 etc.

DRAWN	CHECK	DATE	SHEET
L. L. A.	R.S.M.	12/23/93	FP- 1
JOB NO. 93-670	3A-FAB. SHEET		

93-173H

MOD. 8-16-82

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	3.5A-3.0	3.5A-3.1	3.5A-3.2	3.5A-3.3	3.5A-3.4	3.5A-3.5	3.5A-3.6	3.5A-3.7	3.5A-3.8	3.5A-3.9
NO. REQ'D										
"W"	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
MIN. WWF WIDTH	2.67	2.77	2.87	2.97	3.07	3.17	3.27	3.37	3.47	3.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	7	7	7	7	8	8	8	8	8	9
AREA / PANEL	10.50 ϕ	10.85 ϕ	11.20 ϕ	11.55 ϕ	11.90 ϕ	12.25 ϕ	12.60 ϕ	12.95 ϕ	13.30 ϕ	13.65 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	3.5A-4.0	3.5A-4.1	3.5A-4.2	3.5A-4.3	3.5A-4.4	3.5A-4.5	3.5A-4.6	3.5A-4.7	3.5A-4.8	3.5A-4.9
NO. REQ'D										
"W"	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9
MIN. WWF WIDTH	3.67	3.77	3.87	3.97	4.07	4.17	4.27	4.37	4.47	4.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	8	9	9	9	10	10	10	10	10	11
AREA / PANEL	14.00 ϕ	14.35 ϕ	14.70 ϕ	15.05 ϕ	15.40 ϕ	15.75 ϕ	16.10 ϕ	16.45 ϕ	16.80 ϕ	17.15 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	3.5A-5.0	3.5A-5.1	3.5A-5.2	3.5A-5.3	3.5A-5.4	3.5A-5.5	3.5A-5.6	3.5A-5.7	3.5A-5.8	3.5A-5.9
NO. REQ'D										
"W"	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9
MIN. WWF WIDTH	4.67	4.77	4.87	4.97	5.07	5.17	5.27	5.37	5.47	5.57
BAR U TYPE	A	A	A	A	B	B	B	B	B	B
BAR A	11	11	11	11	12	12	12	12	12	13
AREA / PANEL	17.50 ϕ	17.85 ϕ	18.20 ϕ	18.55 ϕ	18.90 ϕ	19.25 ϕ	19.60 ϕ	19.95 ϕ	20.30 ϕ	20.65 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ 644 Sq.Ft.

PANEL MARK		3.5A-6.1	3.5A-6.2							
NO. REQ'D		20	10							
"W"	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9
MIN. WWF WIDTH	5.67	5.77	5.87	5.97	6.07	6.17	6.27	6.37	6.47	6.57
BAR U TYPE	B	B	B	B	B	B	B	B	B	B
BAR A	13	13	13	13	14	14	14	14	14	15
AREA / PANEL	21.00 ϕ	21.35 ϕ	21.70 ϕ	22.05 ϕ	22.40 ϕ	22.75 ϕ	23.10 ϕ	23.45 ϕ	23.80 ϕ	24.15 ϕ
AREA (Sq.Ft.)		427	217							

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	3.5A-7.0	3.5A-7.1	3.5A-7.2	3.5A-7.3	3.5A-7.4	3.5A-7.5	3.5A-7.6	3.5A-7.7	3.5A-7.8	3.5A-7.9
NO. REQ'D										
"W"	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9
MIN. WWF WIDTH	6.67	6.77	6.87	6.97	7.07	7.17	7.27	7.37	7.47	7.57
BAR U TYPE	B	B	B	B	B	B	B	C	C	C
BAR A	15	15	15	15	16	16	16	16	16	17
AREA / PANEL	24.50 ϕ	24.85 ϕ	25.20 ϕ	25.55 ϕ	25.90 ϕ	26.25 ϕ	26.60 ϕ	26.95 ϕ	27.30 ϕ	27.65 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	3.5A-8.0	3.5A-8.1	3.5A-8.2	3.5A-8.3	3.5A-8.4	3.5A-8.5	3.5A-8.6	3.5A-8.7	3.5A-8.8	3.5A-8.9
NO. REQ'D										
"W"	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9
MIN. WWF WIDTH	7.67	7.77	7.87	7.97	8.07	8.17	8.27	8.37	8.47	8.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	17	17	17	17	18	18	18	18	18	19
AREA / PANEL	28.00 ϕ	28.35 ϕ	28.70 ϕ	29.05 ϕ	29.40 ϕ	29.75 ϕ	30.10 ϕ	30.45 ϕ	30.80 ϕ	31.15 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	3.5A-9.0	3.5A-9.1	3.5A-9.2	3.5A-9.3	3.5A-9.4	3.5A-9.5	3.5A-9.6	3.5A-9.7	3.5A-9.8	3.5A-9.9
NO. REQ'D										
"W"	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9
MIN. WWF WIDTH	8.67	8.77	8.87	8.97	9.07	9.17	9.27	9.37	9.47	9.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	18	19	19	19	20	20	20	20	20	21
AREA / PANEL	31.50 ϕ	31.85 ϕ	32.20 ϕ	32.55 ϕ	32.90 ϕ	33.25 ϕ	33.60 ϕ	33.95 ϕ	34.30 ϕ	34.65 ϕ
AREA (Sq.Ft.)										

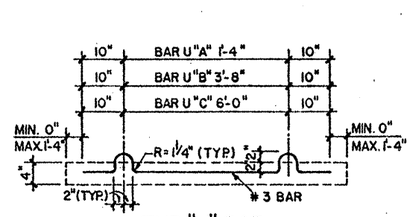
TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

JAN 26 1994

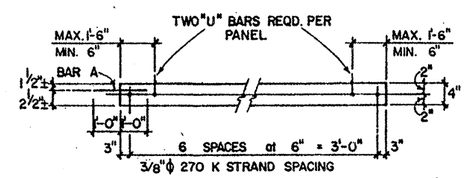
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

SP-62

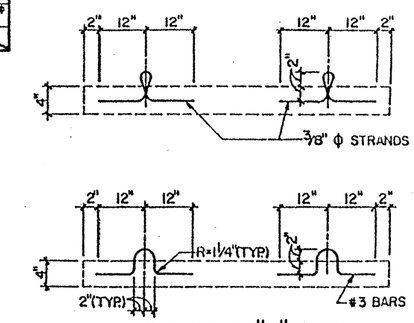
FOR APPROVAL
DEC 23 1993



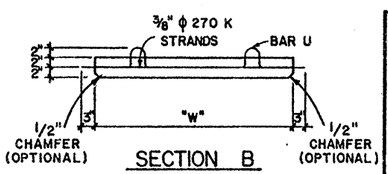
TYP "U" BAR



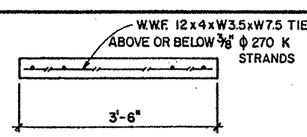
SECTION A
(SHOWING STRANDS)



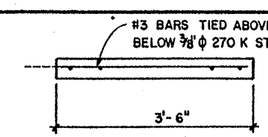
OPTIONAL "U" BAR
(4 REQUIRED PER PANEL.)



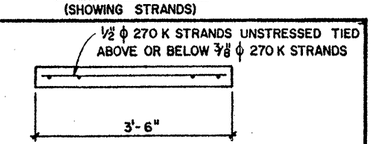
SECTION B



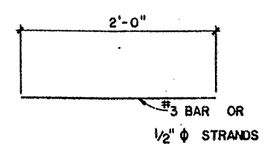
SECTION C



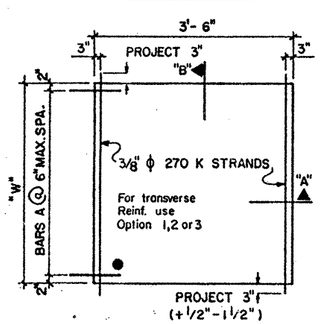
SECTION D



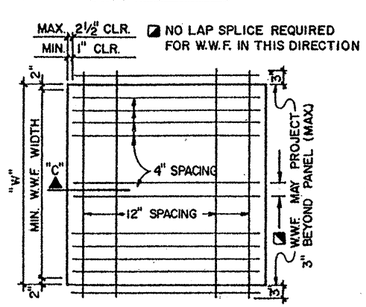
SECTION E



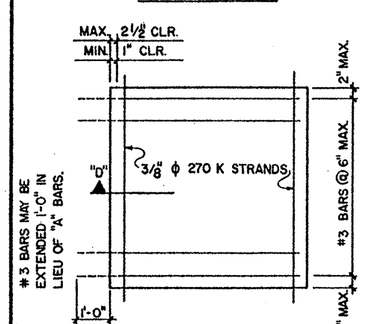
TYP. "A" BAR



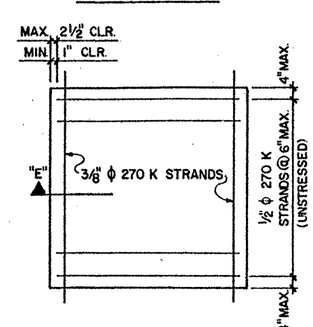
TYPICAL PLAN



OPTION 1 (TRANSVERSE REINF.)



OPTION 2 (TRANSVERSE REINF.)



OPTION 3 (TRANSVERSE REINF.)

7 3/8" ϕ 270K STRANDS STRESS TO 16.1 KIPS EACH
CONCRETE CLASS: H
RELEASE STRENGTH: 4,000 p.s.i.
28 DAY STRENGTH 5,000 p.s.i.
TOP FINISH: BROOM
● ERECTION MARK

TOTAL PANEL AREA THIS SHEET 644 Sq.Ft.

SAPSCO
SAN ANTONIO PRE-STRESSED CO.

CONTRACTOR GILBERT TEXAS CONSTR. CORP.

FED. RD. DIV. NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP.1604
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023 etc.

DRAWN	CHECK	DATE	SHEET
L. L. A.	R. S. M.	12/23/93	FP- 2
JOB NO. 93-670	3.5A-FAB. SHEET		

93-173H

MOD. 8-16-82

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	4A-3.0	4A-3.1	4A-3.2	4A-3.3	4A-3.4	4A-3.5	4A-3.6	4A-3.7	4A-3.8	4A-3.9
NO. REQ'D										
"W"	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
MIN. WWF WIDTH	2.67	2.77	2.87	2.97	3.07	3.17	3.27	3.37	3.47	3.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	7	7	7	7	8	8	8	8	8	9
AREA / PANEL	12.00#	12.40#	12.80#	13.20#	13.60#	14.00#	14.40#	14.80#	15.20#	15.60#
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	4A-4.0	4A-4.1	4A-4.2	4A-4.3	4A-4.4	4A-4.5	4A-4.6	4A-4.7	4A-4.8	4A-4.9
NO. REQ'D										
"W"	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9
MIN. WWF WIDTH	3.67	3.77	3.87	3.97	4.07	4.17	4.27	4.37	4.47	4.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	8	9	9	9	10	10	10	10	10	11
AREA / PANEL	16.00#	16.40#	16.80#	17.20#	17.60#	18.00#	18.40#	18.80#	19.20#	19.60#
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	4A-5.0	4A-5.1	4A-5.2	4A-5.3	4A-5.4	4A-5.5	4A-5.6	4A-5.7	4A-5.8	4A-5.9
NO. REQ'D										
"W"	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9
MIN. WWF WIDTH	4.67	4.77	4.87	4.97	5.07	5.17	5.27	5.37	5.47	5.57
BAR U TYPE	A	A	A	A	B	B	B	B	B	B
BAR A	11	11	11	11	12	12	12	12	12	13
AREA / PANEL	20.00#	20.40#	20.80#	21.20#	21.60#	22.00#	22.40#	22.80#	23.20#	23.60#
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ 604 Sq.Ft.

PANEL MARK	4A-6.0		4A-6.2							
NO. REQ'D	20		5							
"W"	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9
MIN. WWF WIDTH	5.67	5.77	5.87	5.97	6.07	6.17	6.27	6.37	6.47	6.57
BAR U TYPE	B	B	B	B	B	B	B	B	B	B
BAR A	13	13	13	13	14	14	14	14	14	15
AREA / PANEL	24.00#	24.40#	24.80#	25.20#	25.60#	26.00#	26.40#	26.80#	27.20#	27.60#
AREA (Sq.Ft.)	480		124							

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	4A-7.0	4A-7.1	4A-7.2	4A-7.3	4A-7.4	4A-7.5	4A-7.6	4A-7.7	4A-7.8	4A-7.9
NO. REQ'D										
"W"	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9
MIN. WWF WIDTH	6.67	6.77	6.87	6.97	7.07	7.17	7.27	7.37	7.47	7.57
BAR U TYPE	B	B	B	B	B	B	B	C	C	C
BAR A	15	15	15	15	16	16	16	16	16	17
AREA / PANEL	28.00#	28.40#	28.80#	29.20#	29.60#	30.00#	30.40#	30.80#	31.20#	31.60#
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	4A-8.0	4A-8.1	4A-8.2	4A-8.3	4A-8.4	4A-8.5	4A-8.6	4A-8.7	4A-8.8	4A-8.9
NO. REQ'D										
"W"	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9
MIN. WWF WIDTH	7.67	7.77	7.87	7.97	8.07	8.17	8.27	8.37	8.47	8.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	17	17	17	17	18	18	18	18	18	19
AREA / PANEL	32.00#	32.40#	32.80#	33.20#	33.60#	34.00#	34.40#	34.80#	35.20#	35.60#
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	4A-9.0	4A-9.1	4A-9.2	4A-9.3	4A-9.4	4A-9.5	4A-9.6	4A-9.7	4A-9.8	4A-9.9
NO. REQ'D										
"W"	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9
MIN. WWF WIDTH	8.67	8.77	8.87	8.97	9.07	9.17	9.27	9.37	9.47	9.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	18	19	19	19	20	20	20	20	20	21
AREA / PANEL	36.00#	36.40#	36.80#	37.20#	37.60#	38.00#	38.40#	38.80#	39.20#	39.60#
AREA (Sq.Ft.)										

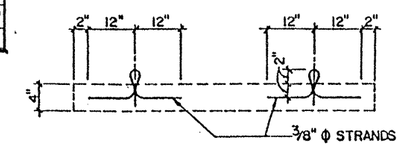
TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

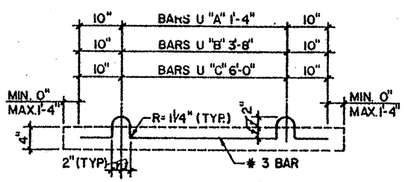
JAN 26 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

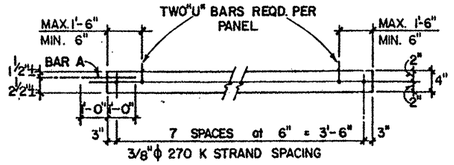
SP-63

FOR APPROVAL
DEC 23 1993

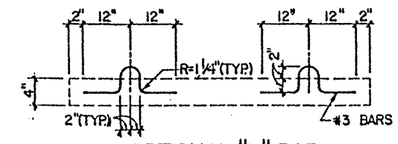




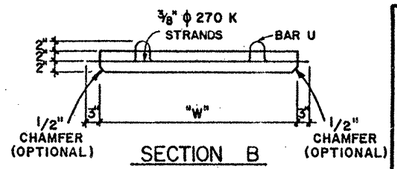
TYP. "U" BAR



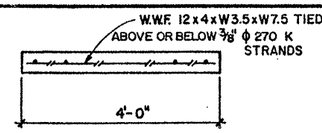
SECTION A
(SHOWING STRANDS)



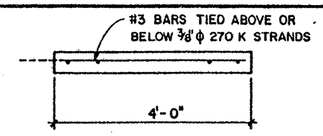
OPTIONAL "U" BAR
(4 REQUIRED PER PANEL)



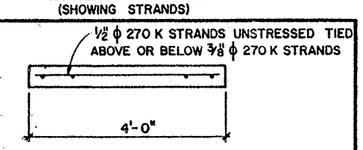
SECTION B



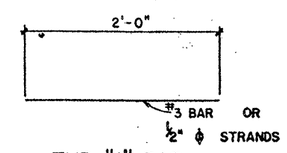
SECTION C



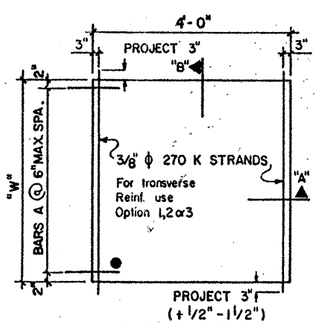
SECTION D



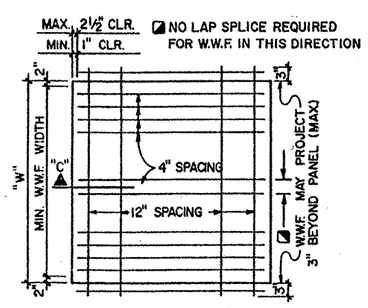
SECTION E



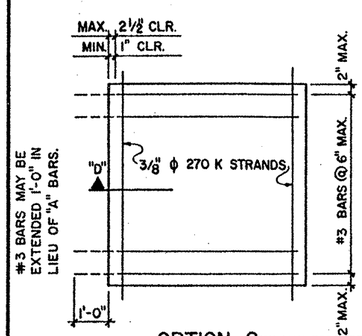
TYP. "A" BAR



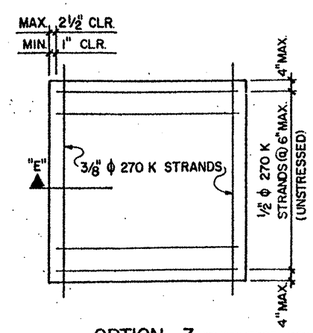
TYPICAL PLAN



OPTION 1 (TRANSVERSE REINF.)



OPTION 2 (TRANSVERSE REINF.)



OPTION 3 (TRANSVERSE REINF.)

8 3/8" ϕ 270K STRANDS STRESS TO 16.1 KIPS EACH
CONCRETE CLASS: H
RELEASE STRENGTH: 4,000 p.s.i.
28 DAY STRENGTH: 5,000 p.s.i.
TOP FINISH: BROOM
● ERECTION MARK

TOTAL PANEL AREA THIS SHEET 604 Sq.Ft.

SAPSCO
SAN ANTONIO PRE-STRESSED CO

CONTRACTOR GILBERT TEXAS CONSTR. CORP.

FED. RD. DIV. NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP 1604
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023 etc.

DRAWN	CHECK	DATE	SHEET
L. L. A.	R. S. M.	12/23/93	FP- 3
JOB NO. 93-670	4A-FAB. SHEET		

93-173H

MOD. 8-16-82

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE ____ Sq.Ft.

PANEL MARK	4.5A-3.0	4.5A-3.1	4.5A-3.2	4.5A-3.3	4.5A-3.4	4.5A-3.5	4.5A-3.6	4.5A-3.7	4.5A-3.8	4.5A-3.9
NO. REQ'D										
"W"	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
MIN. WWF WIDTH	2.67	2.77	2.87	2.97	3.07	3.17	3.27	3.37	3.47	3.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	7	7	7	7	8	8	8	8	8	9
AREA / PANEL	13.50#	13.95#	14.40#	14.85#	15.30#	15.75#	16.20#	16.65#	17.10#	17.55#
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE ____ Sq.Ft.

PANEL MARK	4.5A-4.0	4.5A-4.1	4.5A-4.2	4.5A-4.3	4.5A-4.4	4.5A-4.5	4.5A-4.6	4.5A-4.7	4.5A-4.8	4.5A-4.9
NO. REQ'D										
"W"	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9
MIN. WWF WIDTH	3.67	3.77	3.87	3.97	4.07	4.17	4.27	4.37	4.47	4.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	9	9	9	9	10	10	10	10	10	11
AREA / PANEL	18.00#	18.45#	18.90#	19.35#	19.80#	20.25#	20.70#	21.15#	21.60#	22.05#
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE ____ Sq.Ft.

PANEL MARK	4.5A-5.0	4.5A-5.1	4.5A-5.2	4.5A-5.3	4.5A-5.4	4.5A-5.5	4.5A-5.6	4.5A-5.7	4.5A-5.8	4.5A-5.9
NO. REQ'D										
"W"	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9
MIN. WWF WIDTH	4.67	4.77	4.87	4.97	5.07	5.17	5.27	5.37	5.47	5.57
BAR U TYPE	A	A	A	A	B	B	B	B	B	B
BAR A	11	11	11	11	12	12	12	12	12	13
AREA / PANEL	22.50#	22.95#	23.40#	23.85#	24.30#	24.75#	25.20#	25.65#	26.10#	26.55#
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE ____ 270 Sq.Ft.

PANEL MARK	4.5A-6.0									
NO. REQ'D	10									
"W"	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9
MIN. WWF WIDTH	5.67	5.77	5.87	5.97	6.07	6.17	6.27	6.37	6.47	6.57
BAR U TYPE	B	B	B	B	B	B	B	B	B	B
BAR A	13	13	13	13	14	14	14	14	14	15
AREA / PANEL	27.00#	27.45#	27.90#	28.35#	28.80#	29.25#	29.70#	30.15#	30.60#	31.05#
AREA (Sq.Ft.)	270									

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE ____ 284 Sq.Ft.

PANEL MARK										4.5A-7.9
NO. REQ'D										8
"W"	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9
MIN. WWF WIDTH	6.67	6.77	6.87	6.97	7.07	7.17	7.27	7.37	7.47	7.57
BAR U TYPE	B	B	B	B	B	B	B	C	C	C
BAR A	15	15	15	15	16	16	16	16	16	17
AREA / PANEL	31.50#	31.95#	32.40#	32.85#	33.30#	33.75#	34.20#	34.65#	35.10#	35.55#
AREA (Sq.Ft.)										284

SCHEDULE OF PANEL DIMENSIONS

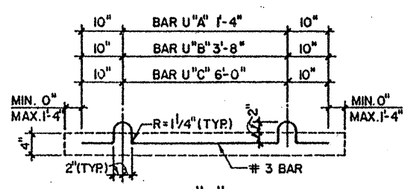
TOTAL AREA THIS TABLE ____ Sq.Ft.

PANEL MARK	4.5A-8.0	4.5A-8.1	4.5A-8.2	4.5A-8.3	4.5A-8.4	4.5A-8.5	4.5A-8.6	4.5A-8.7	4.5A-8.8	4.5A-8.9
NO. REQ'D										
"W"	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9
MIN. WWF WIDTH	7.67	7.77	7.87	7.97	8.07	8.17	8.27	8.37	8.47	8.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	17	17	17	17	18	18	18	18	18	19
AREA / PANEL	36.00#	36.45#	36.90#	37.35#	37.80#	38.25#	38.70#	39.15#	39.60#	40.05#
AREA (Sq.Ft.)										

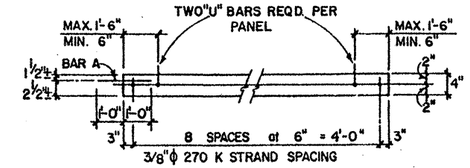
SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE ____ Sq.Ft.

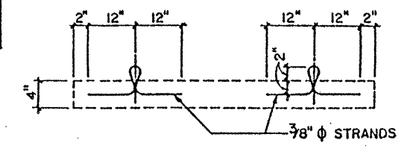
PANEL MARK	4.5A-9.0	4.5A-9.1	4.5A-9.2	4.5A-9.3	4.5A-9.4	4.5A-9.5	4.5A-9.6	4.5A-9.7	4.5A-9.8	4.5A-9.9
NO. REQ'D										
"W"	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9
MIN. WWF WIDTH	8.67	8.77	8.87	8.97	9.07	9.17	9.27	9.37	9.47	9.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	19	19	19	19	20	20	20	20	20	21
AREA / PANEL	40.50#	40.95#	41.40#	41.85#	42.30#	42.75#	43.20#	43.65#	44.10#	44.55#
AREA (Sq.Ft.)										

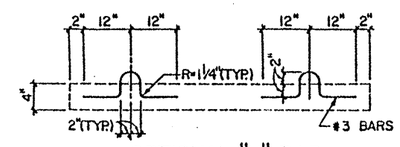


TYP. "U" BAR

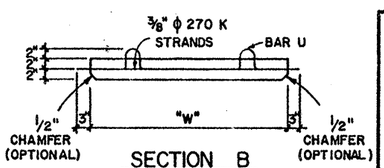


SECTION A
(SHOWING STRANDS)

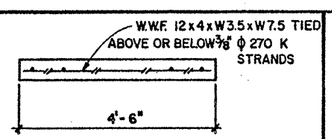




OPTIONAL "U" BAR
(4 REQUIRED PER PANEL)



SECTION B



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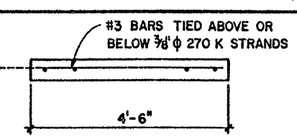

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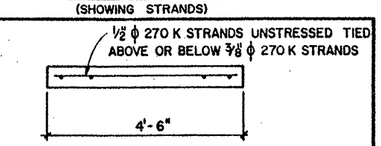
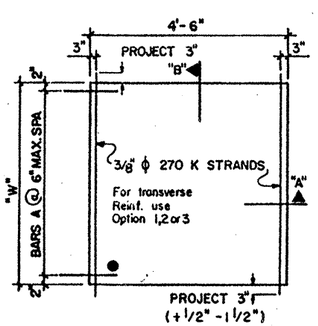
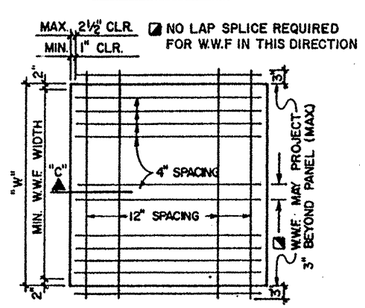


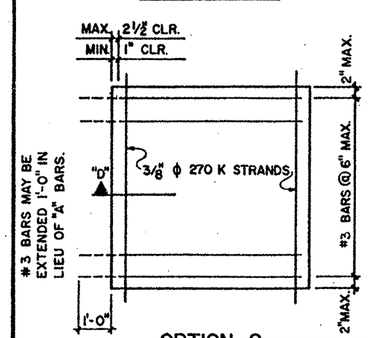
SECTION E



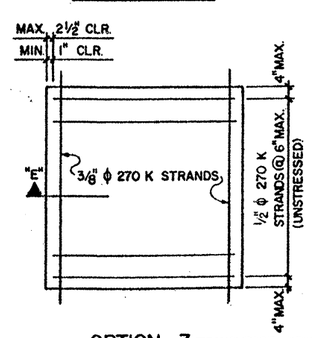
TYPICAL PLAN



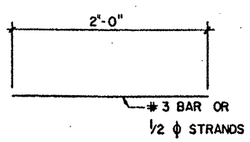
OPTION 1 (TRANSVERSE REINF.)



OPTION 2 (TRANSVERSE REINF.)



OPTION 3 (TRANSVERSE REINF.)



TYP. "A" BAR

9 3/8" ϕ 270K STRANDS STRESS TO 16.1 KIPS EACH

CONCRETE CLASS: H

RELEASE STRENGTH: 4,000 p.s.i.

28 DAY STRENGTH: 5,000 p.s.i.

TOP FINISH: BROOM

● ERECTION MARK

TOTAL PANEL AREA THIS SHEET 554 Sq.Ft.

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

JAN 26 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

SP 64

FOR APPROVAL
DEC 23 1993

SAPSCO
SAN ANTONIO PRE-STRESSED CO.

CONTRACTOR GILBERT TEXAS CONSTR. CORP.

FED. RD. DIV. NO.	STATE	PROJECT NO.			HWY. NO.
6	TEXAS	NH 90(191)M, etc.			LP1604
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	
15	BEXAR	2452	02	023	etc.

DRAWN	CHECK	DATE	SHEET
L.L.A.	R.S.M.	12/23/93	FP-4
JOB NO. 93-670	4.5A-FAB. SHEET		
93-173H			

MOD. 8-16-82

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	5.5A-3.0	5.5A-3.1	5.5A-3.2	5.5A-3.3	5.5A-3.4	5.5A-3.5	5.5A-3.6	5.5A-3.7	5.5A-3.8	5.5A-3.9
NO. REQ'D										
"W"	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
MIN. WWF WIDTH	2.67	2.77	2.87	2.97	3.07	3.17	3.27	3.37	3.47	3.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	7	7	7	7	8	8	8	8	8	9
AREA / PANEL	16.50 ϕ	17.05 ϕ	17.60 ϕ	18.15 ϕ	18.70 ϕ	19.25 ϕ	19.80 ϕ	20.35 ϕ	20.90 ϕ	21.45 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	5.5A-4.0	5.5A-4.1	5.5A-4.2	5.5A-4.3	5.5A-4.4	5.5A-4.5	5.5A-4.6	5.5A-4.7	5.5A-4.8	5.5A-4.9
NO. REQ'D										
"W"	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9
MIN. WWF WIDTH	3.67	3.77	3.87	3.97	4.07	4.17	4.27	4.37	4.47	4.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	9	9	9	9	10	10	10	10	10	11
AREA / PANEL	22.00 ϕ	22.55 ϕ	23.10 ϕ	23.65 ϕ	24.20 ϕ	24.75 ϕ	25.30 ϕ	25.85 ϕ	26.40 ϕ	26.95 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	5.5A-5.0	5.5A-5.1	5.5A-5.2	5.5A-5.3	5.5A-5.4	5.5A-5.5	5.5A-5.6	5.5A-5.7	5.5A-5.8	5.5A-5.9
NO. REQ'D										
"W"	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9
MIN. WWF WIDTH	4.67	4.77	4.87	4.97	5.07	5.17	5.27	5.37	5.47	5.57
BAR U TYPE	A	A	A	A	B	B	B	B	B	B
BAR A	11	11	11	11	12	12	12	12	12	13
AREA / PANEL	27.50 ϕ	28.05 ϕ	28.60 ϕ	29.15 ϕ	29.70 ϕ	30.25 ϕ	30.80 ϕ	31.35 ϕ	31.90 ϕ	32.45 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	5.5A-6.0	5.5A-6.1	5.5A-6.2	5.5A-6.3	5.5A-6.4	5.5A-6.5	5.5A-6.6	5.5A-6.7	5.5A-6.8	5.5A-6.9
NO. REQ'D										
"W"	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9
MIN. WWF WIDTH	5.67	5.77	5.87	5.97	6.07	6.17	6.27	6.37	6.47	6.57
BAR U TYPE	B	B	B	B	B	B	B	B	B	B
BAR A	13	13	13	13	14	14	14	14	14	15
AREA / PANEL	33.00 ϕ	33.55 ϕ	34.10 ϕ	34.65 ϕ	35.20 ϕ	35.75 ϕ	36.30 ϕ	36.85 ϕ	37.40 ϕ	37.95 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ 348 Sq.Ft.

PANEL MARK										5.5A-7.9
NO. REQ'D										8
"W"	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9
MIN. WWF WIDTH	6.67	6.77	6.87	6.97	7.07	7.17	7.27	7.37	7.47	7.57
BAR U TYPE	B	B	B	B	B	B	B	C	C	C
BAR A	15	15	15	15	16	16	16	16	16	17
AREA / PANEL	38.50 ϕ	39.05 ϕ	39.60 ϕ	40.15 ϕ	40.70 ϕ	41.25 ϕ	41.80 ϕ	42.35 ϕ	42.90 ϕ	43.45 ϕ
AREA (Sq.Ft.)										348

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	5.5A-8.0	5.5A-8.1	5.5A-8.2	5.5A-8.3	5.5A-8.4	5.5A-8.5	5.5A-8.6	5.5A-8.7	5.5A-8.8	5.5A-8.9
NO. REQ'D										
"W"	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9
MIN. WWF WIDTH	7.67	7.77	7.87	7.97	8.07	8.17	8.27	8.37	8.47	8.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	17	17	17	17	18	18	18	18	18	19
AREA / PANEL	44.00 ϕ	44.55 ϕ	45.10 ϕ	45.65 ϕ	46.20 ϕ	46.75 ϕ	47.30 ϕ	47.85 ϕ	48.40 ϕ	48.95 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

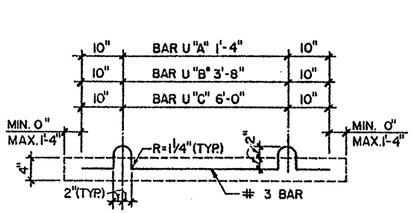
PANEL MARK	5.5A-9.0	5.5A-9.1	5.5A-9.2	5.5A-9.3	5.5A-9.4	5.5A-9.5	5.5A-9.6	5.5A-9.7	5.5A-9.8	5.5A-9.9
NO. REQ'D										
"W"	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9
MIN. WWF WIDTH	8.67	8.77	8.87	8.97	9.07	9.17	9.27	9.37	9.47	9.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	19	19	19	19	20	20	20	20	20	21
AREA / PANEL	49.50 ϕ	50.05 ϕ	50.60 ϕ	51.15 ϕ	51.70 ϕ	52.25 ϕ	52.80 ϕ	53.35 ϕ	53.90 ϕ	54.45 ϕ
AREA (Sq.Ft.)										

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

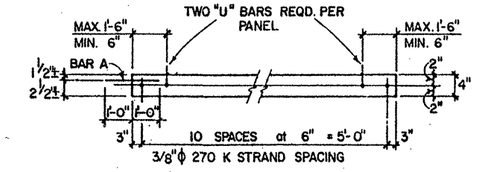
JAN 26 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL.

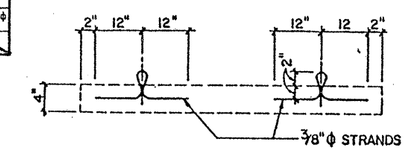
FOR APPROVAL
DEC 23 1993

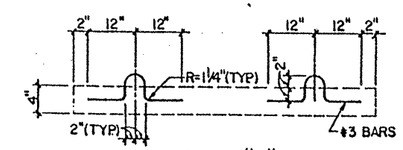


TYP. "U" BAR

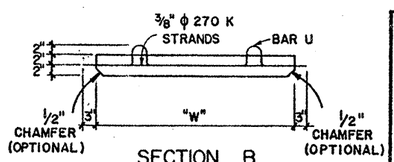


SECTION A
(SHOWING STRANDS)





OPTIONAL "U" BAR
(4 REQUIRED PER PANEL)



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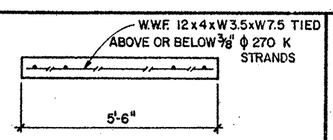

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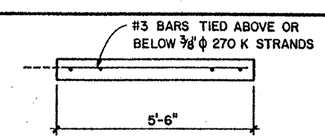

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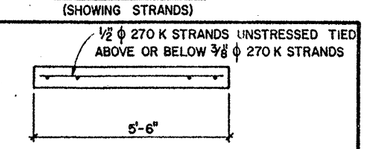

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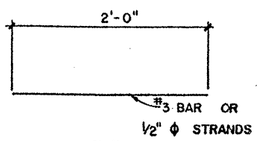
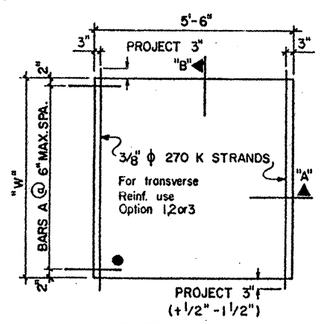
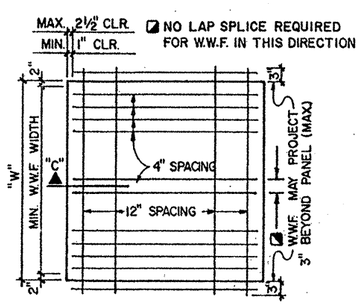


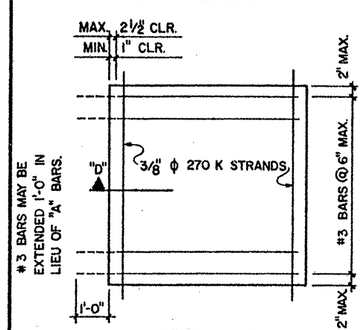
TYP. "A" BAR



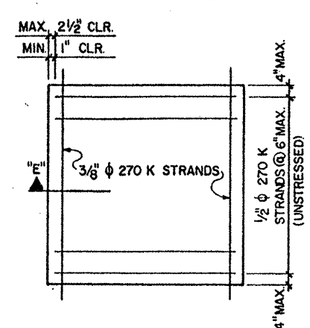
TYPICAL PLAN



OPTION 1 (TRANSVERSE REINF.)



OPTION 2 (TRANSVERSE REINF.)



OPTION 3 (TRANSVERSE REINF.)

11 3/8" ϕ 270K STRANDS STRESS TO 16.1 KIPS EACH
CONCRETE CLASS: H
RELEASE STRENGTH: 4,000 p.s.i.
28 DAY STRENGTH: 5,000 p.s.i.
TOP FINISH: BROOM
● ERECTION MARK

TOTAL PANEL AREA THIS SHEET 348 Sq.Ft.

SAPSCO
SAN ANTONIO PRE-STRESSED CO.

CONTRACTOR GILBERT TEXAS CONSTR. CORP.

FED. RD. DIV. NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191) M, etc.		LR 1604 etc.
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023
DRAWN L. L. A.	CHECK R.S.M.	DATE 12/23/93	SHEET FP- 5	
JOB NO. 93-670	5.5A-FAB. SHEET			

93-173H

MOD. 8-16-82

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	6A-3.0	6A-3.1	6A-3.2	6A-3.3	6A-3.4	6A-3.5	6A-3.6	6A-3.7	6A-3.8	6A-3.9
NO. REQ'D										
"W"	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
MIN. WWF WIDTH	2.67	2.77	2.87	2.97	3.07	3.17	3.27	3.37	3.47	3.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	7	7	7	7	8	8	8	8	8	9
AREA / PANEL	18.00#	18.60#	19.20#	19.80#	20.40#	21.00#	21.60#	22.20#	22.80#	23.40#
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE 353 Sq.Ft.

PANEL MARK										6A-4.9
NO. REQ'D										12
"W"	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9
MIN. WWF WIDTH	3.67	3.77	3.87	3.97	4.07	4.17	4.27	4.37	4.47	4.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	9	9	9	9	10	10	10	10	10	11
AREA / PANEL	24.00#	24.60#	25.20#	25.80#	26.40#	27.00#	27.60#	28.20#	28.80#	29.40#
AREA (Sq.Ft.)										353

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	6A-5.0	6A-5.1	6A-5.2	6A-5.3	6A-5.4	6A-5.5	6A-5.6	6A-5.7	6A-5.8	6A-5.9
NO. REQ'D										
"W"	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9
MIN. WWF WIDTH	4.67	4.77	4.87	4.97	5.07	5.17	5.27	5.37	5.47	5.57
BAR U TYPE	A	A	A	A	B	B	B	B	B	B
BAR A	11	11	11	11	12	12	12	12	12	13
AREA / PANEL	30.00#	30.60#	31.20#	31.80#	32.40#	33.00#	33.60#	34.20#	34.80#	35.40#
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL. MARK	6A-6.0	6A-6.1	6A-6.2	6A-6.3	6A-6.4	6A-6.5	6A-6.6	6A-6.7	6A-6.8	6A-6.9
NO. REQ'D										
"W"	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9
MIN. WWF WIDTH	5.67	5.77	5.87	5.97	6.07	6.17	6.27	6.37	6.47	6.57
BAR U TYPE	B	B	B	B	B	B	B	B	B	B
BAR A	13	13	13	13	14	14	14	14	14	15
AREA / PANEL	36.00#	36.60#	37.20#	37.80#	38.40#	39.00#	39.60#	40.20#	40.80#	41.40#
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	6A-7.0	6A-7.1	6A-7.2	6A-7.3	6A-7.4	6A-7.5	6A-7.6	6A-7.7	6A-7.8	6A-7.9
NO. REQ'D										
"W"	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9
MIN. WWF WIDTH	6.67	6.77	6.87	6.97	7.07	7.17	7.27	7.37	7.47	7.57
BAR U TYPE	B	B	B	B	B	B	B	C	C	C
BAR A	15	15	15	15	16	16	16	16	16	17
AREA / PANEL	42.00#	42.60#	43.20#	43.80#	44.40#	45.00#	45.60#	46.20#	46.80#	47.40#
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

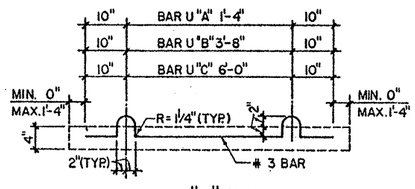
TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	6A-8.0	6A-8.1	6A-8.2	6A-8.3	6A-8.4	6A-8.5	6A-8.6	6A-8.7	6A-8.8	6A-8.9
NO. REQ'D										
"W"	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9
MIN. WWF WIDTH	7.67	7.77	7.87	7.97	8.07	8.17	8.27	8.37	8.47	8.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	17	17	17	17	18	18	18	18	18	19
AREA / PANEL	48.00#	48.60#	49.20#	49.80#	50.40#	51.00#	51.60#	52.20#	52.80#	53.40#
AREA (Sq.Ft.)										

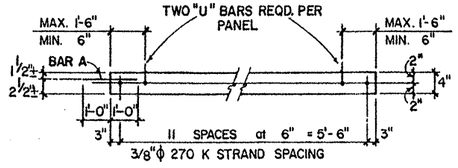
SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

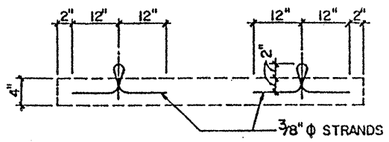
PANEL MARK	6A-9.0	6A-9.1	6A-9.2	6A-9.3	6A-9.4	6A-9.5	6A-9.6	6A-9.7	6A-9.8	6A-9.9
NO. REQ'D										
"W"	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9
MIN. WWF WIDTH	8.67	8.77	8.87	8.97	9.07	9.17	9.27	9.37	9.47	9.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	19	19	19	19	20	20	20	20	20	21
AREA / PANEL	54.00#	54.60#	55.20#	55.80#	56.40#	57.00#	57.60#	58.20#	58.80#	59.40#
AREA (Sq.Ft.)										

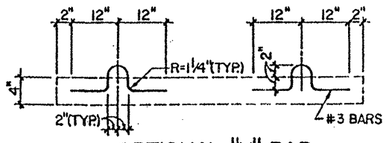


TYP. "U" BAR

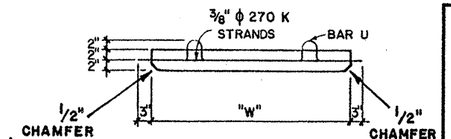


SECTION A
(SHOWING STRANDS)

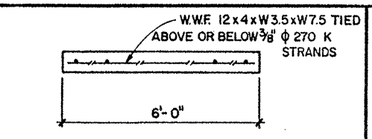




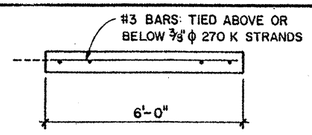
OPTIONAL "U" BAR
(4 REQUIRED PER PANEL.)



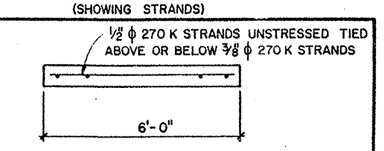
SECTION B



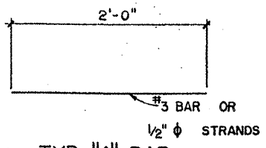
SECTION C



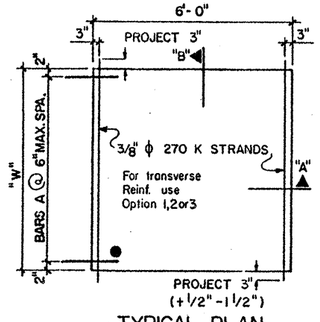
SECTION D



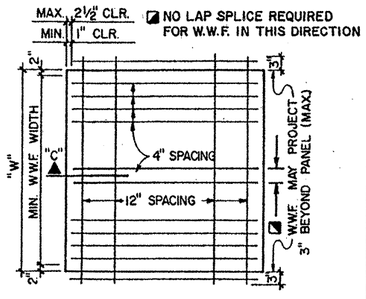
SECTION E



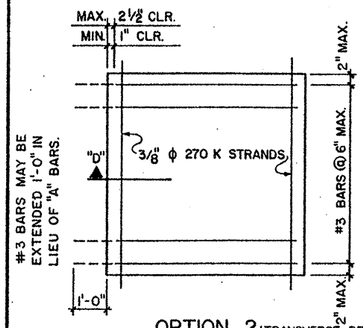
TYP. "A" BAR



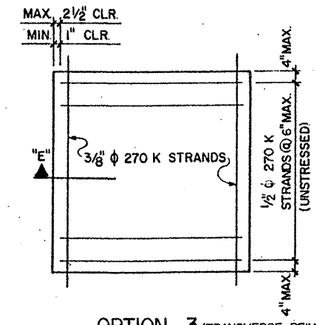
TYPICAL PLAN



OPTION 1 (TRANSVERSE REINF.)



OPTION 2 (TRANSVERSE REINF.)



OPTION 3 (TRANSVERSE REINF.)

12 3/8" ϕ 270K STRANDS STRESS TO 161 KIPS EACH

CONCRETE CLASS: H

RELEASE STRENGTH: 4,000 p.s.i.

28 DAY STRENGTH: 5,000 p.s.i.

TOP FINISH: BROOM

● ERECTION MARK

TOTAL PANEL AREA THIS SHEET 353 Sq.Ft.

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

JAN 26 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL.

SP-66

FOR APPROVAL
DEC 23 1993

SAPSCO
SAN ANTONIO PRE-STRESSED CO.

CONTRACTOR GILBERT TEXAS CONSTR. CORP.

FED RD. DIV. NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191) M, etc.		LP1604
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023 etc.

DRAWN	CHECK	DATE	SHEET
L.L.A.	R.S.M.	12/23/93	FP-6
JOB NO. 93-670	6A-FAB. SHEET		

93-173H

MOD. 8-16-82

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	6.5A-3.0	6.5A-3.1	6.5A-3.2	6.5A-3.3	6.5A-3.4	6.5A-3.5	6.5A-3.6	6.5A-3.7	6.5A-3.8	6.5A-3.9
NO. REQ'D										
"W"	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
MIN. WWF WIDTH	2.67	2.77	2.87	2.97	3.07	3.17	3.27	3.37	3.47	3.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	7	7	7	7	8	8	8	8	8	9
AREA / PANEL	19.50 ϕ	20.15 ϕ	20.80 ϕ	21.45 ϕ	22.10 ϕ	22.75 ϕ	23.40 ϕ	24.05 ϕ	24.70 ϕ	25.35 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	6.5A-4.0	6.5A-4.1	6.5A-4.2	6.5A-4.3	6.5A-4.4	6.5A-4.5	6.5A-4.6	6.5A-4.7	6.5A-4.8	6.5A-4.9
NO. REQ'D										
"W"	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9
MIN. WWF WIDTH	3.67	3.77	3.87	3.97	4.07	4.17	4.27	4.37	4.47	4.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	9	9	9	9	10	10	10	10	10	11
AREA / PANEL	26.00 ϕ	26.65 ϕ	27.30 ϕ	27.95 ϕ	28.60 ϕ	29.25 ϕ	29.90 ϕ	30.55 ϕ	31.20 ϕ	31.85 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	6.5A-5.0	6.5A-5.1	6.5A-5.2	6.5A-5.3	6.5A-5.4	6.5A-5.5	6.5A-5.6	6.5A-5.7	6.5A-5.8	6.5A-5.9
NO. REQ'D										
"W"	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9
MIN. WWF WIDTH	4.67	4.77	4.87	4.97	5.07	5.17	5.27	5.37	5.47	5.57
BAR U TYPE	A	A	A	A	B	B	B	B	B	B
BAR A	11	11	11	11	12	12	12	12	12	13
AREA / PANEL	32.50 ϕ	33.15 ϕ	33.80 ϕ	34.45 ϕ	35.10 ϕ	35.75 ϕ	36.40 ϕ	37.05 ϕ	37.70 ϕ	38.35 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	6.5A-6.0	6.5A-6.1	6.5A-6.2	6.5A-6.3	6.5A-6.4	6.5A-6.5	6.5A-6.6	6.5A-6.7	6.5A-6.8	6.5A-6.9
NO. REQ'D										
"W"	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9
MIN. WWF WIDTH	5.67	5.77	5.87	5.97	6.07	6.17	6.27	6.37	6.47	6.57
BAR U TYPE	B	B	B	B	B	B	B	B	B	B
BAR A	13	13	13	13	14	14	14	14	14	15
AREA / PANEL	39.00 ϕ	39.65 ϕ	40.30 ϕ	40.95 ϕ	41.60 ϕ	42.25 ϕ	42.90 ϕ	43.55 ϕ	44.20 ϕ	44.85 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ 411 Sq.Ft.

PANEL MARK										6.5A-7.9
NO. REQ'D										8
"W"	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9
MIN. WWF WIDTH	6.67	6.77	6.87	6.97	7.07	7.17	7.27	7.37	7.47	7.57
BAR U TYPE	B	B	B	B	B	B	B	C	C	C
BAR A	15	15	15	15	16	16	16	16	16	17
AREA / PANEL	45.50 ϕ	46.15 ϕ	46.80 ϕ	47.45 ϕ	48.10 ϕ	48.75 ϕ	49.40 ϕ	50.05 ϕ	50.70 ϕ	51.35 ϕ
AREA (Sq.Ft.)										411

SCHEDULE OF PANEL DIMENSIONS

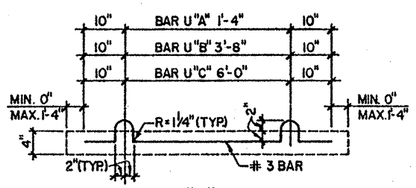
TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	6.5A-8.0	6.5A-8.1	6.5A-8.2	6.5A-8.3	6.5A-8.4	6.5A-8.5	6.5A-8.6	6.5A-8.7	6.5A-8.8	6.5A-8.9
NO. REQ'D										
"W"	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9
MIN. WWF WIDTH	7.67	7.77	7.87	7.97	8.07	8.17	8.27	8.37	8.47	8.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	17	17	17	17	18	18	18	18	18	19
AREA / PANEL	52.00 ϕ	52.65 ϕ	53.30 ϕ	53.95 ϕ	54.60 ϕ	55.25 ϕ	55.90 ϕ	56.55 ϕ	57.20 ϕ	57.85 ϕ
AREA (Sq.Ft.)										

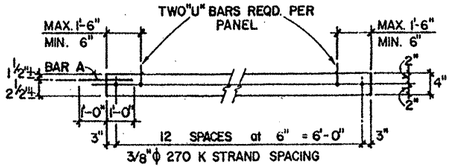
SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

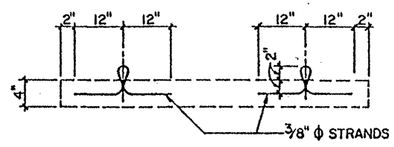
PANEL MARK	6.5A-9.0	6.5A-9.1	6.5A-9.2	6.5A-9.3	6.5A-9.4	6.5A-9.5	6.5A-9.6	6.5A-9.7	6.5A-9.8	6.5A-9.9
NO. REQ'D										
"W"	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9
MIN. WWF WIDTH	8.67	8.77	8.87	8.97	9.07	9.17	9.27	9.37	9.47	9.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	19	19	19	19	20	20	20	20	20	21
AREA / PANEL	58.50 ϕ	59.15 ϕ	59.80 ϕ	60.45 ϕ	61.10 ϕ	61.75 ϕ	62.40 ϕ	63.05 ϕ	63.70 ϕ	64.35 ϕ
AREA (Sq.Ft.)										

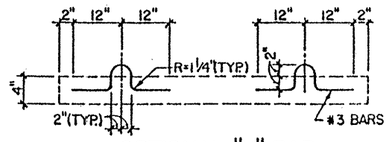


TYP. "U" BAR

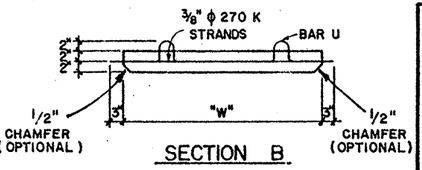


SECTION A
(SHOWING STRANDS)

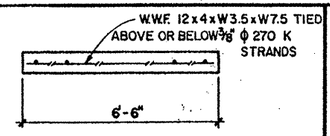




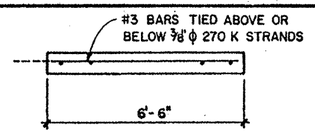
OPTIONAL "U" BAR
(4 REQUIRED PER PANEL)



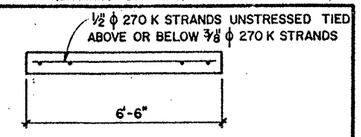
SECTION B



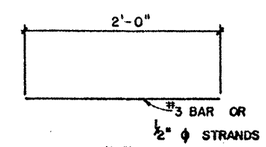
SECTION C



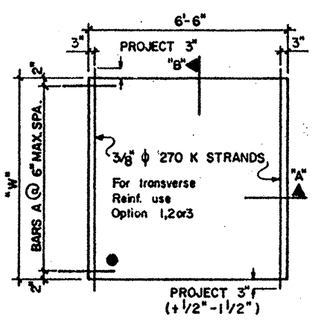
SECTION D



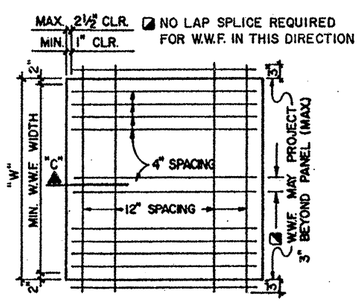
SECTION E



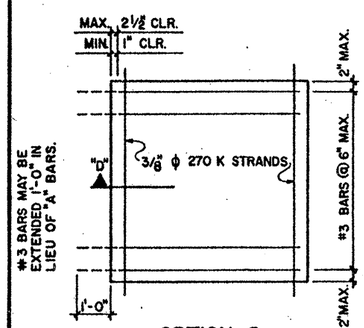
TYP. "A" BAR



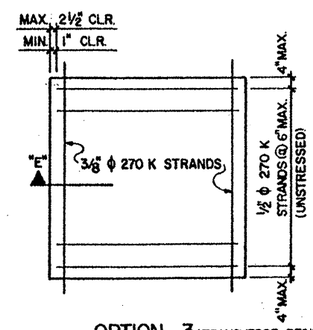
TYPICAL PLAN



OPTION 1 (TRANSVERSE REINF.)



OPTION 2 (TRANSVERSE REINF.)



OPTION 3 (TRANSVERSE REINF.)

13 3/8" ϕ 270K STRANDS STRESS TO 16.1 KIPS EACH

CONCRETE CLASS: H

RELEASE STRENGTH 4,000 p.s.i.

28 DAY STRENGTH: 5,000 p.s.i

TOP FINISH: BROOM

● ERECTION MARK

TOTAL PANEL AREA THIS SHEET 411 Sq.Ft.

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

JAN 26 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL.

SP67

FOR APPROVAL
DEC 23 1993

SAPSCO
SAN ANTONIO PRE-STRESSED CO.

CONTRACTOR GILBERT TEXAS CONSTR. CORP.

FED. RD. DIV. NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M, etc.		LP1604
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023 etc.

DRAWN	CHECK	DATE	SHEET
L.L.A.	R.S.M.	12/23/93	FP- 7
JOB NO. 93-670	6.5A-FAB. SHEET		

93-173H

MOD. 8-16-82

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	7A-3.0	7A-3.1	7A-3.2	7A-3.3	7A-3.4	7A-3.5	7A-3.6	7A-3.7	7A-3.8	7A-3.9
NO. REQ'D										
"W"	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
MIN. WWF WIDTH	2.67	2.77	2.87	2.97	3.07	3.17	3.27	3.37	3.47	3.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	7	7	7	7	8	8	8	8	8	9
AREA / PANEL	21.00 ϕ	21.70 ϕ	22.40 ϕ	23.10 ϕ	23.80 ϕ	24.50 ϕ	25.20 ϕ	25.90 ϕ	26.60 ϕ	27.30 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE 412 Sq.Ft.

PANEL MARK										7A-4.9
NO. REQ'D										12
"W"	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9
MIN. WWF WIDTH	3.67	3.77	3.87	3.97	4.07	4.17	4.27	4.37	4.47	4.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
BAR A	9	9	9	9	10	10	10	10	10	11
AREA / PANEL	28.00 ϕ	28.70 ϕ	29.40 ϕ	30.10 ϕ	30.80 ϕ	31.50 ϕ	32.20 ϕ	32.90 ϕ	33.60 ϕ	34.30 ϕ
AREA (Sq.Ft.)										412

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	7A-5.0	7A-5.1	7A-5.2	7A-5.3	7A-5.4	7A-5.5	7A-5.6	7A-5.7	7A-5.8	7A-5.9
NO. REQ'D										
"W"	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9
MIN. WWF WIDTH	4.67	4.77	4.87	4.97	5.07	5.17	5.27	5.37	5.47	5.57
BAR U TYPE	A	A	A	A	B	B	B	B	B	B
BAR A	11	11	11	11	12	12	12	12	12	13
AREA / PANEL	35.00 ϕ	35.70 ϕ	36.40 ϕ	37.10 ϕ	37.80 ϕ	38.50 ϕ	39.20 ϕ	39.90 ϕ	40.60 ϕ	41.30 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE 2,331 Sq.Ft.

PANEL MARK	7A-6.0	7A-6.1	7A-6.2							
NO. REQ'D	30	20	5							
"W"	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9
MIN. WWF WIDTH	5.67	5.77	5.87	5.97	6.07	6.17	6.27	6.37	6.47	6.57
BAR U TYPE	B	B	B	B	B	B	B	B	B	B
BAR A	13	13	13	13	14	14	14	14	14	15
AREA / PANEL	42.00 ϕ	42.70 ϕ	43.40 ϕ	44.10 ϕ	44.80 ϕ	45.50 ϕ	46.20 ϕ	46.90 ϕ	47.60 ϕ	48.30 ϕ
AREA (Sq.Ft.)	1,260	854	217							

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE 885 Sq.Ft.

PANEL MARK										7A-7.9
NO. REQ'D										16
"W"	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9
MIN. WWF WIDTH	6.67	6.77	6.87	6.97	7.07	7.17	7.27	7.37	7.47	7.57
BAR U TYPE	B	B	B	B	B	B	B	C	C	C
BAR A	15	15	15	15	16	16	16	16	16	17
AREA / PANEL	49.00 ϕ	49.70 ϕ	50.40 ϕ	51.10 ϕ	51.80 ϕ	52.50 ϕ	53.20 ϕ	53.90 ϕ	54.60 ϕ	55.30 ϕ
AREA (Sq.Ft.)										885

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	7A-8.0	7A-8.1	7A-8.2	7A-8.3	7A-8.4	7A-8.5	7A-8.6	7A-8.7	7A-8.8	7A-8.9
NO. REQ'D										
"W"	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9
MIN. WWF WIDTH	7.67	7.77	7.87	7.97	8.07	8.17	8.27	8.37	8.47	8.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	17	17	17	17	18	18	18	18	18	19
AREA / PANEL	56.00 ϕ	56.70 ϕ	57.40 ϕ	58.10 ϕ	58.80 ϕ	59.50 ϕ	60.20 ϕ	60.90 ϕ	61.60 ϕ	62.30 ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

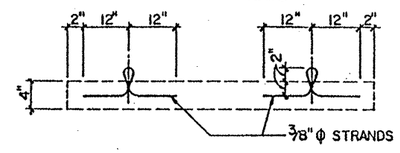
PANEL MARK	7A-9.0	7A-9.1	7A-9.2	7A-9.3	7A-9.4	7A-9.5	7A-9.6	7A-9.7	7A-9.8	7A-9.9
NO. REQ'D										
"W"	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9
MIN. WWF WIDTH	8.67	8.77	8.87	8.97	9.07	9.17	9.27	9.37	9.47	9.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
BAR A	19	19	19	19	20	20	20	20	20	21
AREA / PANEL	63.00 ϕ	63.70 ϕ	64.40 ϕ	65.10 ϕ	65.80 ϕ	66.50 ϕ	67.20 ϕ	67.90 ϕ	68.60 ϕ	69.30 ϕ
AREA (Sq.Ft.)										

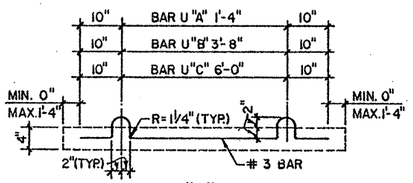
TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

JAN 26 1994

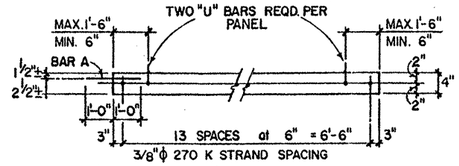
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

FOR APPROVAL
DEC 23 1993

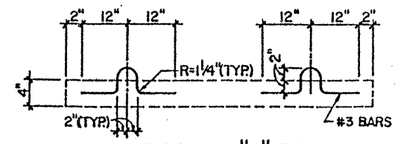




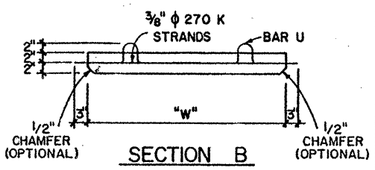
TYP "U" BAR



SECTION A
(SHOWING STRANDS)



OPTIONAL "U" BAR
(4 REQUIRED PER PANEL)



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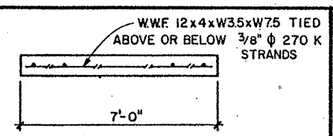

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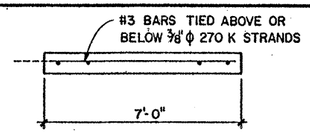

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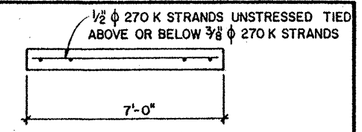

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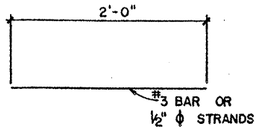

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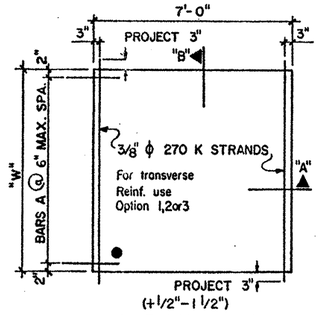
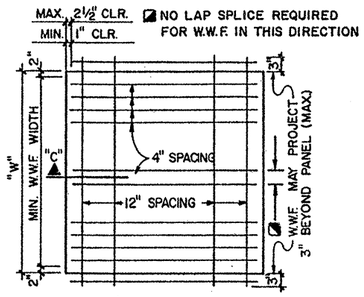
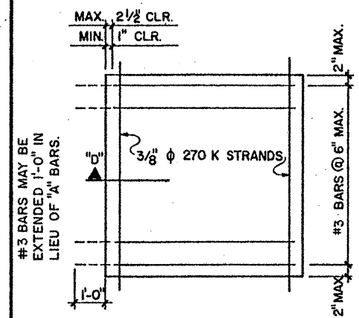


TYPICAL PLAN



OPTION 1 (TRANSVERSE REINF.)



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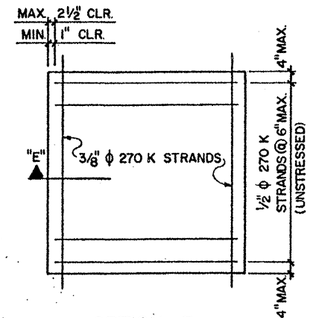


OPTION 3 (TRANSVERSE REINF.)

14 3/8" ϕ 270K STRANDS STRESS TO 16.1 KIPS EACH

CONCRETE CLASS: H

RELEASE STRENGTH: 4,000 psi.

28 DAY STRENGTH: 5,000 psi.

TOP FINISH: BROOM

● ERECTION MARK

TOTAL PANEL AREA THIS SHEET 3,628 Sq.Ft.

SAPSCO
SAN ANTONIO PRE-STRESSED CO.

CONTRACTOR GILBERT TEXAS CONSTR. CORP.

FED. RD. DIV. NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191) M, etc.		LR1604
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023 etc.

DRAWN	CHECK	DATE	SHEET
L. L. A.	R. S. M.	12/23/93	FP- 8
JOB NO. 93-670	7A-FAB. SHEET		

93-173H

MOD. 8-16-82

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	8S-3.0	8S-3.1	8S-3.2	8S-3.3	8S-3.4	8S-3.5	8S-3.6	8S-3.7	8S-3.8	8S-3.9
NO. REQ'D										
"W"	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
MIN. WWF WIDTH	2.67	2.77	2.87	2.97	3.07	3.17	3.27	3.37	3.47	3.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
AREA / PANEL	24.00ϕ	24.80ϕ	25.60ϕ	26.40ϕ	27.20ϕ	28.00ϕ	28.80ϕ	29.60ϕ	30.40ϕ	31.20ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE 5,645 Sq.Ft.

PANEL MARK										8S-4.9
NO. REQ'D										144
"W"	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9
MIN. WWF WIDTH	3.67	3.77	3.87	3.97	4.07	4.17	4.27	4.37	4.47	4.57
BAR U TYPE	A	A	A	A	A	A	A	A	A	A
AREA / PANEL	32.00ϕ	32.80ϕ	33.60ϕ	34.40ϕ	35.20ϕ	36.00ϕ	36.80ϕ	37.60ϕ	38.40ϕ	39.20ϕ
AREA (Sq.Ft.)										5,645

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	8S-5.0	8S-5.1	8S-5.2	8S-5.3	8S-5.4	8S-5.5	8S-5.6	8S-5.7	8S-5.8	8S-5.9
NO. REQ'D										
"W"	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9
MIN. WWF WIDTH	4.67	4.77	4.87	4.97	5.07	5.17	5.27	5.37	5.47	5.57
BAR U TYPE	A	A	A	A	B	B	B	B	B	B
AREA / PANEL	40.00ϕ	40.80ϕ	41.60ϕ	42.40ϕ	43.20ϕ	44.00ϕ	44.80ϕ	45.60ϕ	46.40ϕ	47.20ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE 27,200 Sq.Ft.

PANEL MARK	8S-6.0	8S-6.1	8S-6.2							
NO. REQ'D	290	140	130							
"W"	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9
MIN. WWF WIDTH	5.67	5.77	5.87	5.97	6.07	6.17	6.27	6.37	6.47	6.57
BAR U TYPE	B	B	B	B	B	B	B	B	B	B
AREA / PANEL	48.00ϕ	48.80ϕ	49.60ϕ	50.40ϕ	51.20ϕ	52.00ϕ	52.80ϕ	53.60ϕ	54.40ϕ	55.20ϕ
AREA (Sq.Ft.)	13,920	6,832	6,448							

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE 6,067 Sq.Ft.

PANEL MARK										8S-7.9
NO. REQ'D										96
"W"	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9
MIN. WWF WIDTH	6.67	6.77	6.87	6.97	7.07	7.17	7.27	7.37	7.47	7.57
BAR U TYPE	B	B	B	B	B	B	B	C	C	C
AREA / PANEL	56.00ϕ	56.80ϕ	57.60ϕ	58.40ϕ	59.20ϕ	60.00ϕ	60.80ϕ	61.60ϕ	62.40ϕ	63.20ϕ
AREA (Sq.Ft.)										6,067

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	8S-8.0	8S-8.1	8S-8.2	8S-8.3	8S-8.4	8S-8.5	8S-8.6	8S-8.7	8S-8.8	8S-8.9
NO. REQ'D										
"W"	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9
MIN. WWF WIDTH	7.67	7.77	7.87	7.97	8.07	8.17	8.27	8.37	8.47	8.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
AREA / PANEL	64.00ϕ	64.80ϕ	65.60ϕ	66.40ϕ	67.20ϕ	68.00ϕ	68.80ϕ	69.60ϕ	70.40ϕ	71.20ϕ
AREA (Sq.Ft.)										

SCHEDULE OF PANEL DIMENSIONS

TOTAL AREA THIS TABLE _____ Sq.Ft.

PANEL MARK	8S-9.0	8S-9.1	8S-9.2	8S-9.3	8S-9.4	8S-9.5	8S-9.6	8S-9.7	8S-9.8	8S-9.9
NO. REQ'D										
"W"	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9
MIN. WWF WIDTH	8.67	8.77	8.87	8.97	9.07	9.17	9.27	9.37	9.47	9.57
BAR U TYPE	C	C	C	C	C	C	C	C	C	C
AREA / PANEL	72.00ϕ	72.80ϕ	73.60ϕ	74.40ϕ	75.20ϕ	76.00ϕ	76.80ϕ	77.60ϕ	78.40ϕ	79.20ϕ
AREA (Sq.Ft.)										

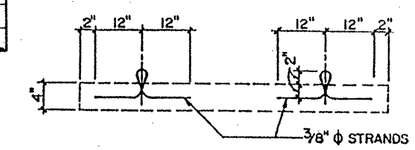
TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

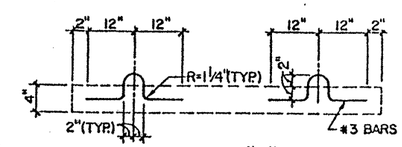
JAN 26 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

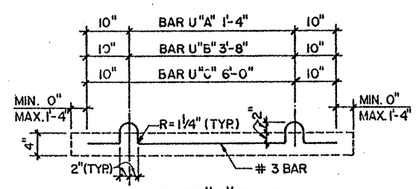
SP-69

FOR APPROVAL
DEC 23 1993





OPTIONAL "U" BAR
(4 REQUIRED PER PANEL)



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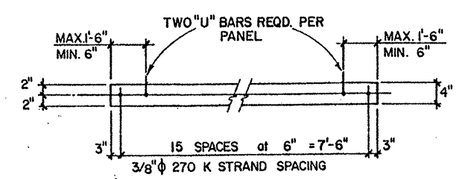
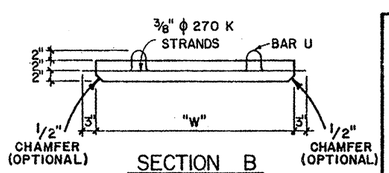
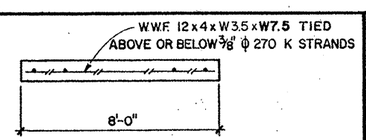


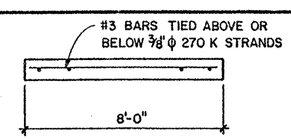
SECTION A
(SHOWING STRANDS)



SECTION B



SECTION C



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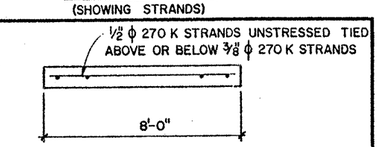

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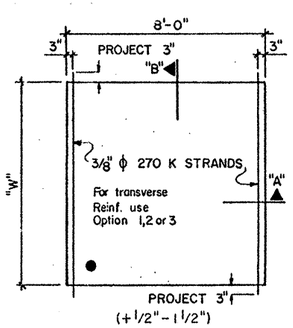
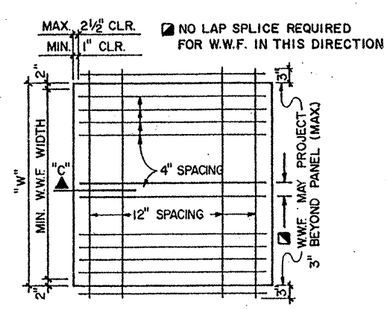
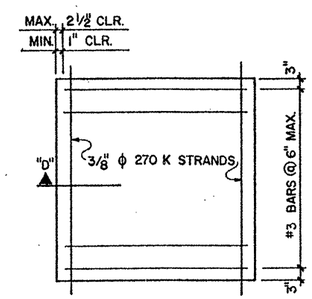


TYPICAL PLAN



OPTION 1 (TRANSVERSE REINF.)



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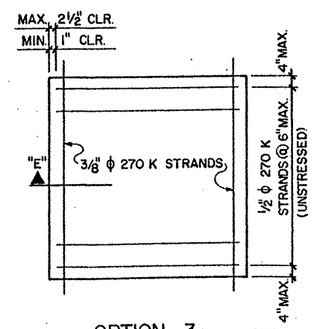


OPTION 3 (TRANSVERSE REINF.)

16 3/8" ϕ 270K STRANDS STRESS TO 16.1 KIPS EACH
CONCRETE CLASS: H
RELEASE STRENGTH: 4,000 psi.
28 DAY STRENGTH: 5,000 psi.
TOP FINISH: BROOM
● ERECTION MARK

TOTAL PANEL AREA THIS SHEET 38,912 Sq.Ft.

SAPSCO
SAN ANTONIO PRE-STRESSED CO

CONTRACTOR GILBERT TEXAS CONSTR. CORP.

FED. RD. DIV. NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191) M, etc.		LP1604
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023 etc.

DRAWN	CHECK	DATE	SHEET
L.L.A.	R.S.M.	12/23/93	FP-9
JOB NO. 93-670	8S-FAB. SHEET		
93-173H			

MOD. 8-16-82

P3081 10/93

LETTER OF TRANSMITTAL

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS

(210) 735-9202
FAX (210) 735-2074

3838 N.W. LOOP 410
SUITE 200
SAN ANTONIO, TX 78229

DATE 1-6-94 JOB. NO. 94-022H

ATTENTION Mr. Greg Kindle

RE: Bexar County LP 1604
Project No. NH 90(191)M, etc.
Control No. 2452-02-023, etc.
Box Beams

TO Texas Dept. of Transportation
125 E. 11th St.
Austin, Texas 78701

GENTLEMEN:

WE ARE SENDING YOU ☒ Attached ☒ Under separate cover via Texas Overnight the following items:

☒ Shop drawings ☒ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐

COPIES	DATE	NO.	DESCRIPTION
7			E-1 & E-2
6			I-1, NP-1 & F-1 thru F-6

RECEIVED
JAN 07 1994
BRIDGE DIVISION

THESE ARE TRANSMITTED as checked below:

☒ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval

☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution

☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints

☐ For review and comment ☐

☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS Please return one complete set asap to our office after reviewing.

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION
FEB 8 1994
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

Thank you,

COPY TO _____

SIGNED: David M. Perez
David M. Perez

Texas Department of Transportation

DEWITT C. GREER STATE HIGHWAY BLDG. • 125 E. 11TH STREET • AUSTIN, TEXAS 78701-2483 • (512) 463-8585

February 8, 1994

Shop Plan File No. P-~~3081~~ 7209
Your Order: 94-022H

County: Bexar
Control: 2452-02-023
Project: NH 90(191)M
Highway: LP 1604
Structure: Loop 1604 Eastbound and Westbound Frontage Roads at Huesta Creek

Structural Engineering Associates
3838 N. W. Loop 410, Suite 200
San Antonio, TX 78229

SP-70

Attention: Mr. David M. Perez

Gentlemen:

We have reviewed your shop drawings, sheets E1, E2, I1, NP1, & F1 thru F6, covering box beams and neoprene pads on the above project. The drawings are approved for fabrication and are enclosed.

Any corrections noted in red must be incorporated into the work. Revised prints for these corrections will not be necessary.

One set of any erection drawings, included herein, has been sent to the Contractor.

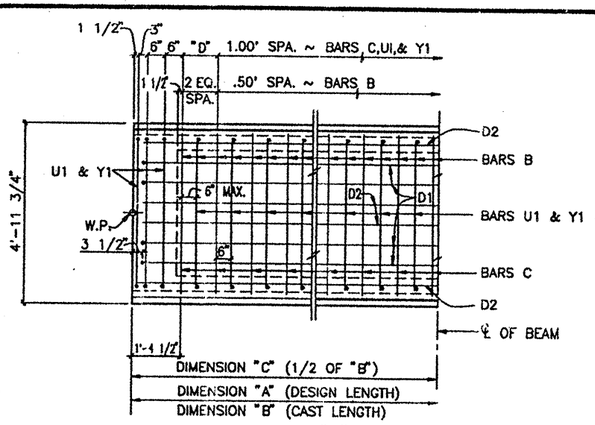
Sincerely,

Original Signed for
Robert L. Wilson, P.E.

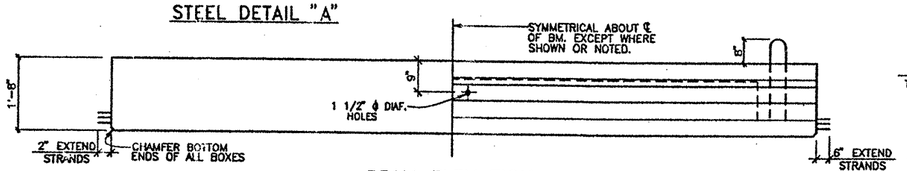
Robert L. Wilson, P.E.
Director, Design Division

MAB:ew
Encl.

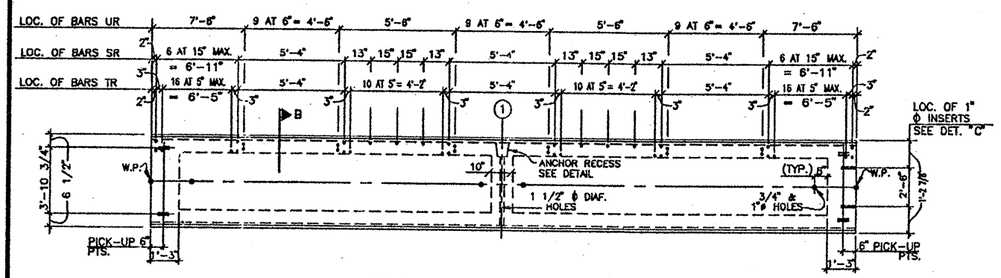
cc: San Antonio District
Materials & Tests Division
Gilbert Texas Const. Corp.



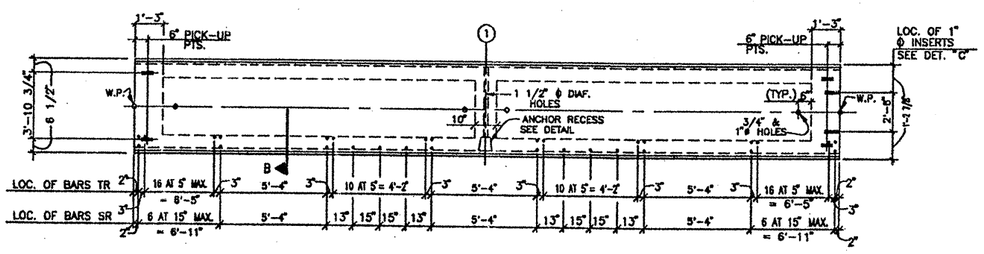
STEEL DETAIL "A"



BEAM ELEVATION



MARKED END-SEE STEEL DET "A" PLAN TYPE NUMBER 1 UNMARKED END-SEE STEEL DET "A"



MARKED END-SEE STEEL DET "A" PLAN TYPE NUMBER 2 UNMARKED END-SEE STEEL DET "A"

GENERAL NOTES

1.) TOPS OF ALL BOXES SHALL HAVE A ROUGH WOOD FLOAT FINISH.

2.) THE BOTTOM CORNERS OF ALL BOXES SHALL BE CHAMFERED 3/4".

3.) STRANDS WITH BOND BREAKAGE SHALL BE TIGHTLY WRAPPED WITH A WATERPROOF ADHESIVE TAPE OR PLASTIC TUBING MAY BE USED PROVIDED BOTH ENDS AND THE SEAM OF THE TUBE ARE SEALED WITH A WATERPROOF TAPE.

4.) BEAM MAY BE CURED BY STEAM OR WATER.

5.) ALL REINFORCING STEEL TO BE GRADE 60.

6.) IF CAROBOARD FORMS ARE USED FOR VOIDS, THEY SHALL BE WATERPROOFED.

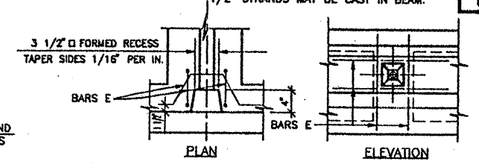
7.) USE 2 ~BUNDLES OF 2 ~1/2"ϕ 270K STRANDS PER PICK-UP POINTS.

8.) BOX BEAMS MAY BE CASTED BY EITHER (1) ONE STAGE MONOLITHICALLY OR (2) TWO STAGE MONOLITHICALLY FOR WHICH ADDITIONAL RETARDATION MAY BE REQUIRED.

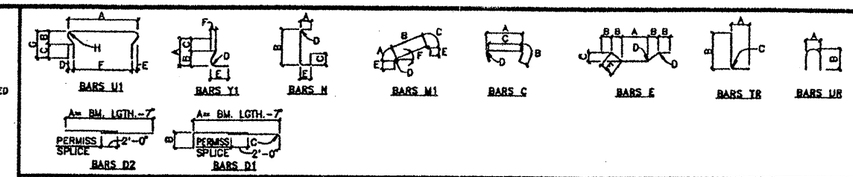
9.) TOP AND BOTTOM MATS MAY BE TACK WELDED AS PERMITTED ON PRESTRESSED CONCRETE BOX BEAM SUPPLEMENTARY REQUIREMENTS.

10.) VENT HOLES ARE NOT REQUIRED WHEN STYROFOAM VOIDS ARE USED.

NOTE: IN LIEU OF USING FORMED RECESS, COMMERCIAL ANCHORAGE DEVICES FOR 1/2" STRANDS MAY BE CAST IN BEAM.



ANCHOR RECESS DETAIL



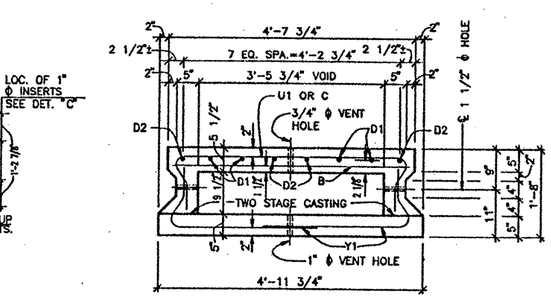
BEAM MARKS	5E20 -11	5E20 -12						REINFORCING STEEL SCHEDULE & DIMENSIONS											
BARS	NO. REQ'D	NO. REQ'D	NO. REQ'D	NO. REQ'D	NO. REQ'D	NO. REQ'D	NO. REQ'D	TOTAL	SIZE	LENGTH	A	B	C	D	E	F	G	H
U1	43	43						86	#4	6'-5"	4'-4 1/2"	6 1/8"	5 7/8"	2 3/4"	2 3/4"	3'-11"	1'-0"	1 7/8"R
Y1	86	86						172	#4	4'-4"	1'-2 1/2"	7 3/4"	6 3/4"	1 1/2"R	3'-0"	5"	—	
B	75	75						150	#4	4'-5"	—	—	—	STRAIGHT	—	—	—	
C	38	38						76	#4	5'-5"	4'-4 1/2"	7"	4'-0 3/4"	1 7/8"R	—	—	—	
D1	4	4						8	#6	42'-11"	38'-11"	1'-0"	2 1/2"R	—	—	—	—	
D2	4	4						8	#6	40'-11"	38'-11"	—	—	STRAIGHT	—	—	—	
N	8	8						16	#3	2'-5"	4"	1'-3 1/2"	6"	1 1/4"R	5"	—	—	
M1	2	2						4	#4	4'-6"	2 13/16"	3'-6 1/4"	2 13/16"	1 7/8"R	3"	0"	—	
E	4	4						8	#4	2'-0"	4 1/2"	3"	6 1/2"	1 1/2"R	7 1/8"	—	—	
SR	24	24						48	#4	2'-5 1/2"	—	—	—	STRAIGHT	—	—	—	
TR	64	64						128	#4	3'-1 1/2"	8"	2'-5 1/2"	1 1/2"R	—	—	—	—	
U	30	—						30	#3	1'-4"	2"	7"	—	—	—	—	—	

SP-71

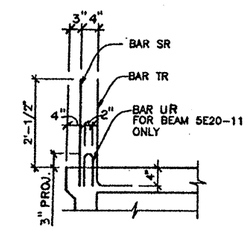
TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 8 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

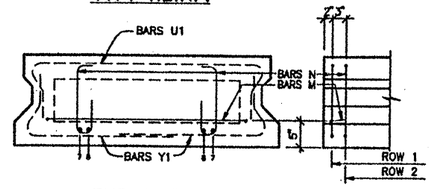


TYP. REINF.

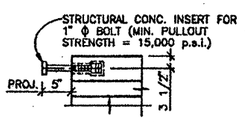


SECTION "B"

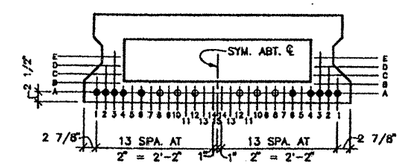
FOR APPROVAL
JAN 0 6 1994



END MAT REINF.



DETAIL "C"



STRAIGHT STRAND PATTERN

● STRANDS WITH NO BOND BROKEN ○ STRANDS WITH BOND BROKEN

CONCRETE		LO-LAX STRANDS		LOCATION OF STRANDS WITH BROKEN BOND (FROM EACH END OF BEAM)
RELEASE STRENGTH	4000 P.S.I.	TOTAL QUANTITY	16	A-10,A-12 @ 2'-0"
28 DAY STRENGTH	5000 P.S.I.	QUAN. BROKEN BOND	6	A-8 @ 4'-0"
CLASS	H	DIAMETER/TYPE	1/2"/270K	
		STRESS	28,900#	

TOTAL LINEAR FT. = 79.00'

BEAM MARK: 5E20-11,5E20-12

SAPSCO

CONTRACTOR : GILBERT TEXAS CONST. CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.	HWY. NO.
6	TEXAS	NH 90(191)M,ETC.	LP. 1604

STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023,etc.

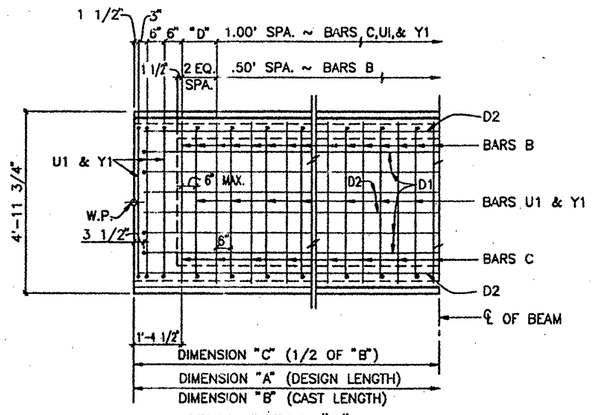
STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS, SAN ANTONIO, TEXAS

JOB NO.	DRAWN	CHECKED	DATE	SHEET NO.
93-667	R.P.C.	D.M.P.	1-6-94	F-6
SEA JOB NO. 93-170H	T.H.D. 5-20 BOX BEAM			
94-022H				

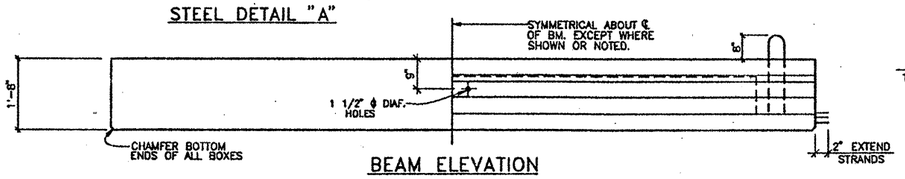
BOX BEAM SCHEDULE & DIMENSIONS

BEAM MARK	NO. REQ'D	BEAM LENGTHS (ALONG ℄ OF BEAM) A	B	C	D	INTERIOR DIAFRAMS CHAINED FROM MARKED END (ALONG ℄ OF BEAM) 1		2	3	4	PLAN TYPE	OPTIONAL DESIGN SHEET NUMBER
5E20-11	1	39.50'	39.54'	19.77'	.88'	19.75'	(19.77')	—	—	—	1	—
5E20-12	1	39.50'	39.54'	19.77'	.88'	19.75'	(19.77')	—	—	—	2	—
TOTAL	2											

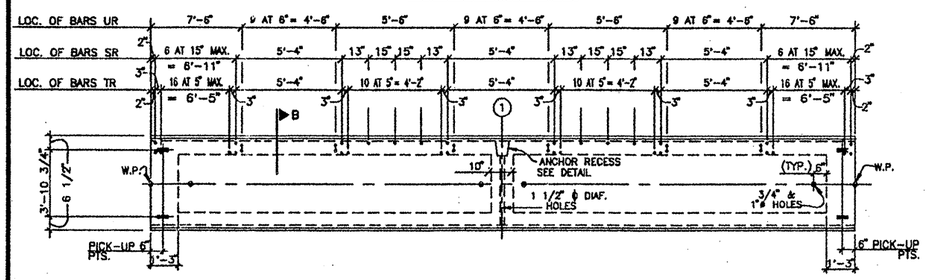
"( )"PARENTHESIS DENOTES CAST CORRECTION ADDED TO DIAFRAM DIMENSION



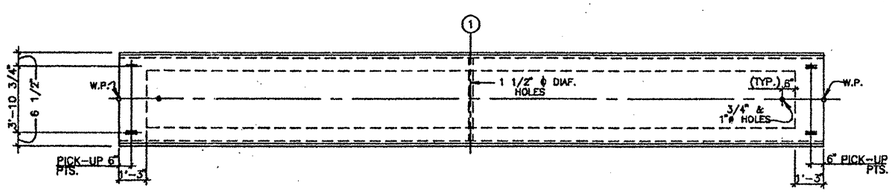
STEEL DETAIL "A"



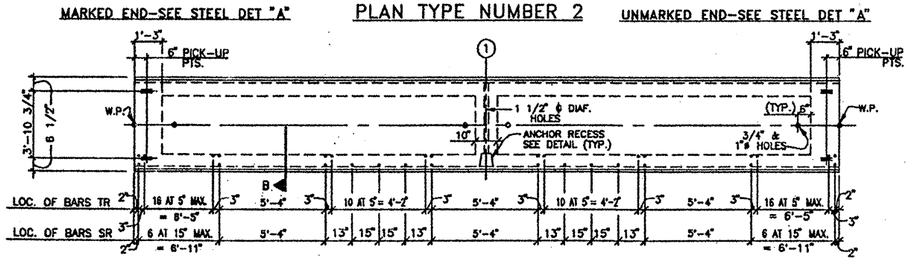
BEAM ELEVATION



MARKED END-SEE STEEL DET "A" PLAN TYPE NUMBER 1 UNMARKED END-SEE STEEL DET "A"



MARKED END-SEE STEEL DET "A" PLAN TYPE NUMBER 2 UNMARKED END-SEE STEEL DET "A"



MARKED END-SEE STEEL DET "A" PLAN TYPE NUMBER 3 UNMARKED END-SEE STEEL DET "A"

GENERAL NOTES

1.) TOPS OF ALL BOXES SHALL HAVE A ROUGH WOOD FLOAT FINISH.

2.) THE BOTTOM CORNERS OF ALL BOXES SHALL BE CHAMFERED 3/4".

3.) STRANDS WITH BOND BREAKAGE SHALL BE TIGHTLY WRAPPED WITH A WATERPROOF ADHESIVE TAPE OR PLASTIC TUBING MAY BE USED PROVIDED BOTH ENDS AND THE SEAM OF THE TUBE ARE SEALED WITH A WATERPROOF TAPE.

4.) BEAM MAY BE CURED BY STEAM OR WATER.

5.) ALL REINFORCING STEEL TO BE GRADE 60.

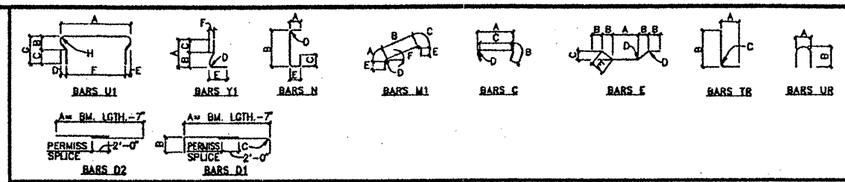
6.) IF CARDBOARD FORMS ARE USED FOR VOIDS, THEY SHALL BE WATERPROOFED.

7.) USE 2 ~BUNDLES OF 2 ~1/2"ϕ 270K STRANDS PER PICK-UP POINTS.

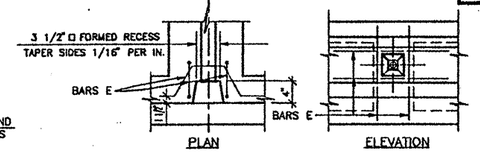
8.) BOX BEAMS MAY BE CASTED BY EITHER (1) ONE STAGE MONOLITHICALLY OR (2) TWO STAGE MONOLITHICALLY FOR WHICH ADDITIONAL RETARDATION MAY BE REQUIRED.

9.) TOP AND BOTTOM MATS MAY BE TACK WELDED AS PERMITTED ON PRESTRESSED CONCRETE BOX BEAM SUPPLEMENTARY REQUIREMENTS.

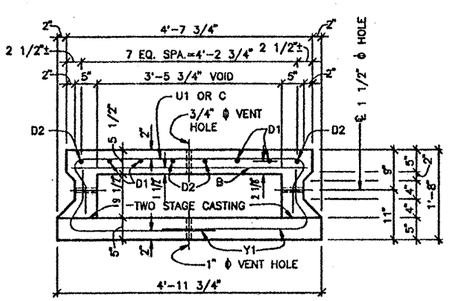
10.) VENT HOLES ARE NOT REQUIRED WHEN STYROFOAM VOIDS ARE USED.



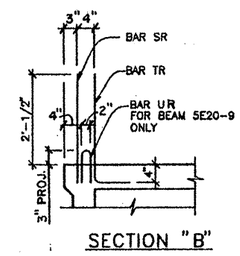
NOTE: IN LIEU OF USING FORMED RECESS, COMMERCIAL ANCHORAGE DEVICES FOR 1/2" STRANDS MAY BE CAST IN BEAM.



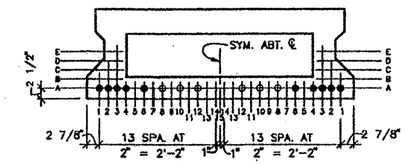
ANCHOR RECESS DETAIL



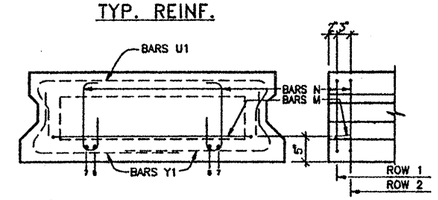
TYP. REINF.



SECTION "B"



STRAIGHT STRAND PATTERN



END MAT REINF.

BOX BEAM SCHEDULE & DIMENSIONS

BEAM MARK	NO. REQ'D	BEAM LENGTHS (ALONG ℄ OF BEAM) A	B	C	D	INTERIOR DIAFRAMS CHAINED FROM MARKED END (ALONG ℄ OF BEAM) 1		2	3	4	PLAN TYPE	OPTIONAL DESIGN SHEET NUMBER
5E20-9	1	39.50'	39.54'	19.77'	.88'	19.75'	(19.77')				1	
5I20-4	8	39.50'	39.54'	19.77'	.88'	19.75'	(19.77')				2	
5E20-10	1	39.50'	39.54'	19.77'	.88'	19.75'	(19.77')				3	
TOTAL	10											

"( )" PARENTHESIS DENOTES CAST CORRECTION ADDED TO DIAFRAM DIMENSION

REINFORCING STEEL SCHEDULE & DIMENSIONS

BEAM MARKS	5E20 -9	5I20 -4	5E20 -10														
BARS	NO. REQ'D	NO. REQ'D	NO. REQ'D	NO. REQ'D	NO. REQ'D	NO. REQ'D	TOTAL	SIZE	LENGTH	A	B	C	D	E	F	G	H
U1	43	43	43				430	#4	6'-5"	4'-4 1/2"	6 1/8"	5 7/8"	2 3/4"	2 3/4"	3'-11"	1'-0"	1 7/8"R
Y1	86	86	86				860	#4	4'-4"	1'-2 1/2"	7 3/4"	6 3/4"	1 1/2"R	3'-0"	5"	—	
B	75	75	75				750	#4	4'-5"	—	—	—	STRAIGHT	—	—	—	
C	38	38	38				380	#4	5'-5"	4'-4 1/2"	7"	4'-0 3/4"	1 7/8"R	—	—	—	
D1	4	4	4				40	#6	42'-11"	38'-11"	1'-0"	2 1/2"R	—	—	—	—	
D2	4	4	4				40	#6	40'-11"	38'-11"	—	—	STRAIGHT	—	—	—	
N	8	8	8				80	#3	2'-5"	4"	1'-3 1/2"	6"	1 1/4"R	5"	—	—	
M1	2	2	2				20	#4	4'-6"	2 13/16"	3'-6 1/4"	2 13/16"	1 7/8"R	3"	0"	—	
E	4	—	4				8	#4	2'-0"	4 1/2"	3"	6 1/2"	1 1/2"R	7 1/8"	—	—	
SR	24	—	24				48	#4	2'-5 1/2"	—	—	—	STRAIGHT	—	—	—	
TR	64	—	64				128	#4	3'-1 1/2"	8"	2'-5 1/2"	1 1/2"R	—	—	—	—	
U	30	—	—				30	#3	1'-4"	2"	7"	—	—	—	—	—	

SP-72

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 8 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

FOR APPROVAL
JAN 0 6 1994

● STRANDS WITH NO BOND BROKEN ○ STRANDS WITH BOND BROKEN

CONCRETE		LO-LAX STRANDS		LOCATION OF STRANDS WITH BROKEN BOND (FROM EACH END OF BEAM)
RELEASE STRENGTH	4000 P.S.I.	TOTAL QUANTITY	16	A-10,A-12 @ 2'-0"
28 DAY STRENGTH	5000 P.S.I.	QUAN. BROKEN BOND	6	A-8 @ 4'-0"
CLASS	H	DIAMETER/TYPE	1/2"/270K	
		STRESS	28,900#	

TOTAL LINEAR FT. = 395.00'

BEAM MARK: 5E20-9,5I20-4,5E20-10

SAPSCO

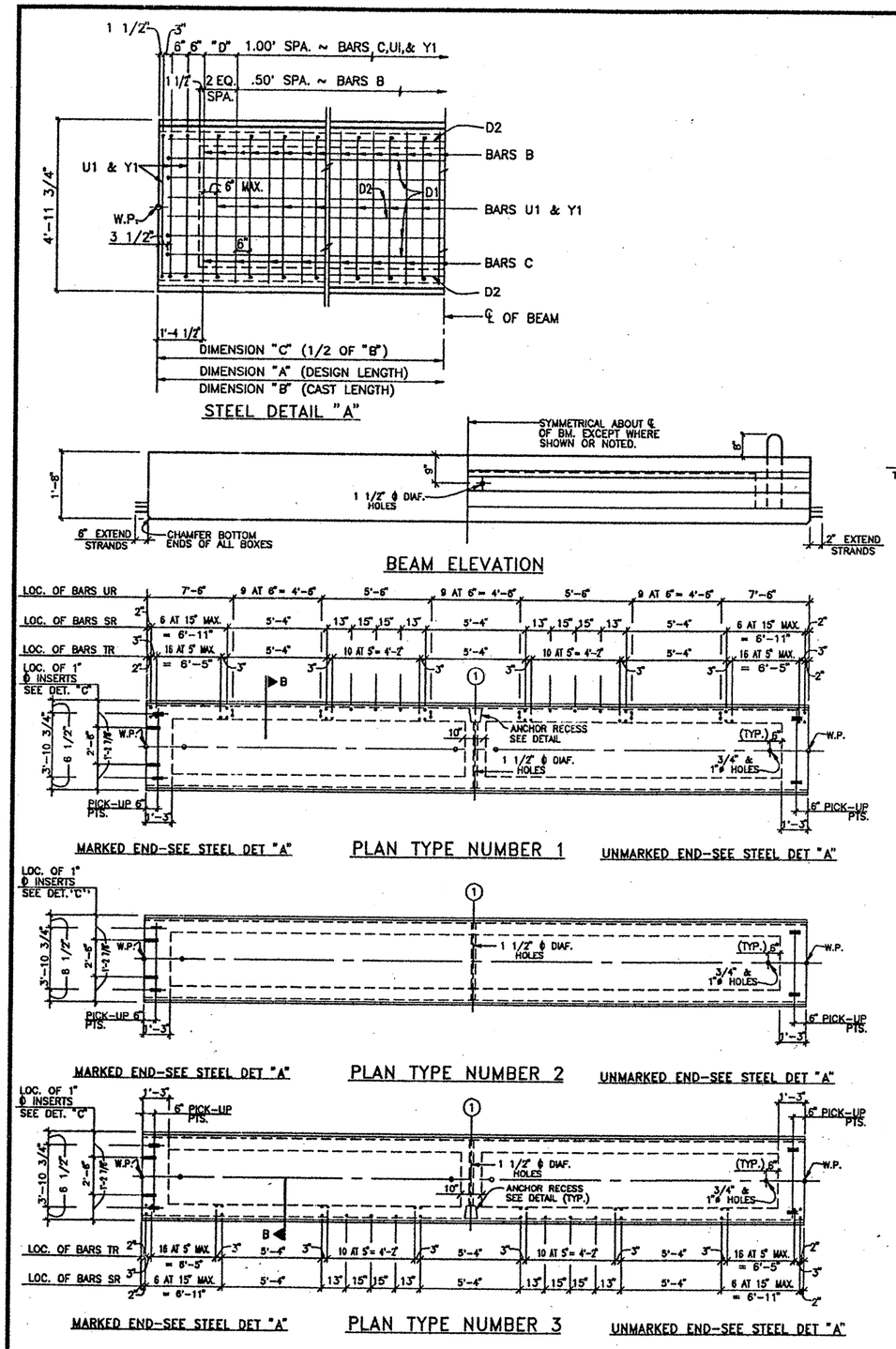
CONTRACTOR : GILBERT TEXAS CONST. CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.	HWY. NO.
6	TEXAS	NH 90(191)M,ETC.	LP. 1604

STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023,etc.

SEA STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS, SAN ANTONIO, TEXAS

JOB NO.	DRAWN	CHECKED	DATE	SHEET NO.
93-667	R.P.C.	D.M.P.	1-6-94	F-5
SEA JOB NO. 93-170H	T.H.D. 5-20 BOX BEAM			
94-022H				



GENERAL NOTES

1.) TOPS OF ALL BOXES SHALL HAVE A ROUGH WOOD FLOAT FINISH.

2.) THE BOTTOM CORNERS OF ALL BOXES SHALL BE CHAMFERED 3/4".

3.) STRANDS WITH BOND BREAKAGE SHALL BE TIGHTLY WRAPPED WITH A WATERPROOF ADHESIVE TAPE OR PLASTIC TUBING MAY BE USED PROVIDED BOTH ENDS AND THE SEAM OF THE TUBE ARE SEALED WITH A WATERPROOF TAPE.

4.) BEAM MAY BE CURED BY STEAM OR WATER.

5.) ALL REINFORCING STEEL TO BE GRADE 60.

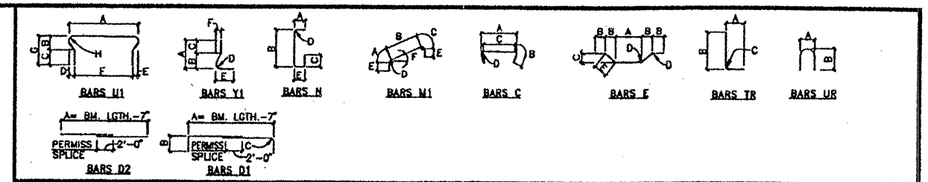
6.) IF CARDBOARD FORMS ARE USED FOR VOIDS, THEY SHALL BE WATERPROOFED.

7.) USE 2 ~BUNDLES OF 2 ~1/2"ϕ 270K STRANDS PER PICK-UP POINTS.

8.) BOX BEAMS MAY BE CASTED BY EITHER (1) ONE STAGE MONOLITHICALLY OR (2) TWO STAGE MONOLITHICALLY FOR WHICH ADDITIONAL RETARDATION MAY BE REQUIRED.

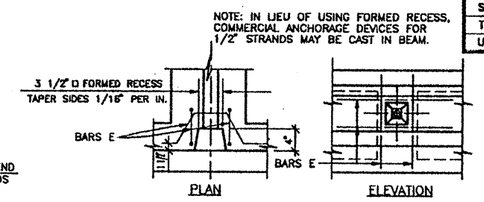
9.) TOP AND BOTTOM MATS MAY BE TACK WELDED AS PERMITTED ON PRESTRESSED CONCRETE BOX BEAM SUPPLEMENTARY REQUIREMENTS.

10.) VENT HOLES ARE NOT REQUIRED WHEN STYROFOAM VOIDS ARE USED.

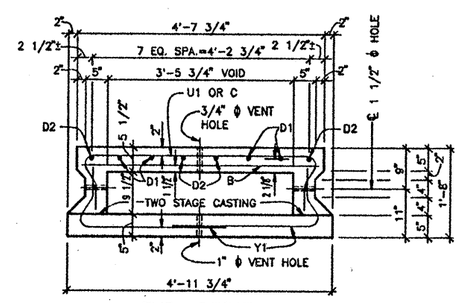


REINFORCING STEEL SCHEDULE & DIMENSIONS

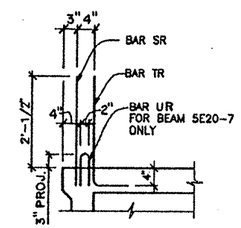
BEAM MARKS	5E20 -7	5120 -3	5E20 -8														
BARS	NO. REQ'D.	NO. REQ'D.	NO. REQ'D.	NO. REQ'D.	NO. REQ'D.	NO. REQ'D.	TOTAL	SIZE	LENGTH	A	B	C	D	E	F	G	H
U1	43	43	43				774	#4	6'-5"	4'-4 1/2"	6 1/8"	5 7/8"	2 3/4"	2 3/4"	3'-11"	1'-0"	1 7/8"R
Y1	86	86	86				1548	#4	4'-4"	1'-2 1/2"	7 3/4"	6 3/4"	1 1/2"R	3'-0"	5"	—	—
B	75	75	75				1350	#4	4'-5"	—		—	STRAIGHT	—	—	—	—
C	38	38	38				684	#4	5'-5"	4'-4 1/2"	7"	4'-0 3/4"	1 7/8"R	—	—	—	—
D1	4	4	4				72	#6	42'-11"	38'-11"	1'-0"	2 1/2"R	—	—	—	—	—
D2	4	4	4				72	#6	40'-11"	38'-11"	—	—	STRAIGHT	—	—	—	—
N	8	8	8				144	#3	2'-5"	4"	1'-3 1/2"	8"	1 1/4"R	5"	—	—	—
M1	2	2	2				36	#4	4'-6"	2 13/16"	3'-6 1/4"	2 13/16"	1 7/8"R	3"	0"	—	—
E	4	—	4				8	#4	2'-0"	4 1/2"	3"	6 1/2"	1 1/2"R	7 1/8"	—	—	—
SR	24	—	24				48	#4	2'-5 1/2"	—	—	—	STRAIGHT	—	—	—	—
TR	64	—	64				128	#4	3'-1 1/2"	8"	2'-5 1/2"	1 1/2"R	—	—	—	—	—
UR	30	—	—				30	#3	1'-4"	2"	7"	—	—	—	—	—	—



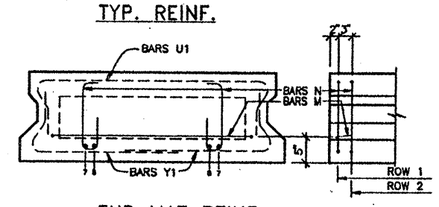
ANCHOR RECESS DETAIL



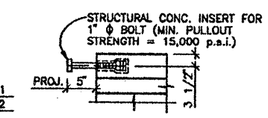
TYP. REINF.



SECTION "B"



END MAT REINF.

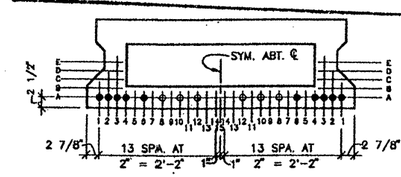


DETAIL "C"

SP-73

FOR APPROVAL
JAN 0 6 1994

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION
FEB 8 1994
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL.



STRAIGHT STRAND PATTERN

● STRANDS WITH NO BOND BROKEN ○ STRANDS WITH BOND BROKEN

CONCRETE		LO-LAX STRANDS		LOCATION OF STRANDS WITH BROKEN BOND (FROM EACH END OF BEAM)
RELEASE STRENGTH	4000 P.S.I.	TOTAL QUANTITY	16	A-10,A-12 @ 2'-0"
28 DAY STRENGTH	5000 P.S.I.	QUAN. BROKEN BOND	6	A-8 @ 4'-0"
CLASS	H	DIAMETER/TYPE	1/2"/270K	
		STRESS	28,900#	

TOTAL LINEAR FT. = 711.00'

BEAM MARK: 5E20-7,5120-3,5E20-8

BOX BEAM SCHEDULE & DIMENSIONS

BEAM MARK	NO. REQ'D	BEAM LENGTHS (ALONG ℄ OF BEAM) A	B	C	D	INTERIOR DIAFRAMS CHAINED FROM MARKED END (ALONG ℄ OF BEAM) 1	2	3	4	PLAN TYPE	OPTIONAL DESIGN SHEET NUMBER
5E20-7	1	39.50'	39.54'	19.77'	.88'	19.75' (19.77')	—	—	—	1	
5120-3	16	39.50'	39.54'	19.77'	.88'	19.75' (19.77')	—	—	—	2	
5E20-8	1	39.50'	39.54'	19.77'	.88'	19.75' (19.77')	—	—	—	3	
TOTAL	18										

"( )"PARENTHESIS DENOTES CAST CORRECTION ADDED TO DIAFRAM DIMENSION

SAPSCO

CONTRACTOR : GILBERT TEXAS CONST. CORP.

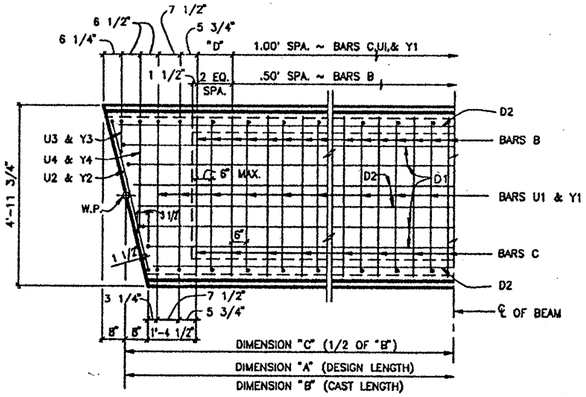
FED.RD. DIV.NO.	STATE	PROJECT NO.	HWY. NO.
6	TEXAS	NH 90(191)M,ETC.	LP. 1604

STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023,etc.

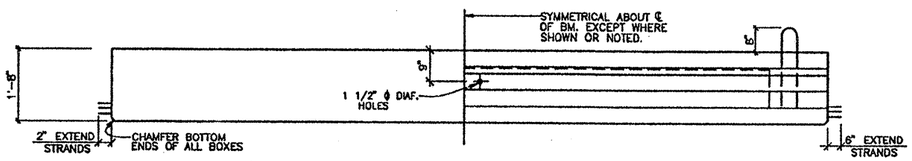
SEA STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS, SAN ANTONIO, TEXAS

JOB NO.	DRAWN	CHECKED	DATE	SHEET NO.
93-667	R.P.C.	D.M.P.	1-6-94	F-4
SEA JOB NO. 93-170H 94-022H	T.H.D. 5-20 BOX BEAM			

8-30840



STEEL DETAIL "A"



BEAM ELEVATION

GENERAL NOTES

1.) TOPS OF ALL BOXES SHALL HAVE A ROUGH WOOD FLOAT FINISH.

2.) THE BOTTOM CORNERS OF ALL BOXES SHALL BE CHAMFERED 3/4".

3.) STRANDS WITH BOND BREAKAGE SHALL BE TIGHTLY WRAPPED WITH A WATERPROOF ADHESIVE TAPE OR PLASTIC TUBING MAY BE USED PROVIDED BOTH ENDS AND THE SEAM OF THE TUBE ARE SEALED WITH A WATERPROOF TAPE.

4.) BEAM MAY BE CURED BY STEAM OR WATER.

5.) ALL REINFORCING STEEL TO BE GRADE 60.

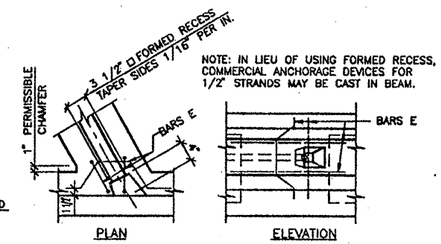
6.) IF CARDBOARD FORMS ARE USED FOR VOIDS, THEY SHALL BE WATERPROOFED.

7.) USE 2 ~BUNDLES OF 2 ~1/2"ϕ 270K STRANDS PER PICK-UP POINTS.

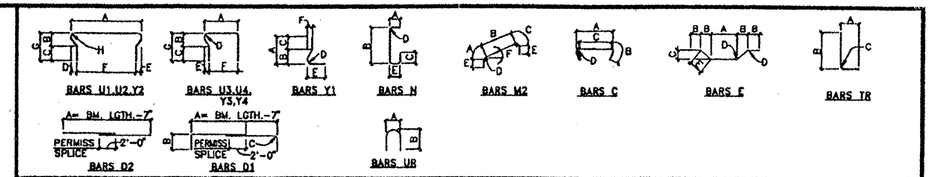
8.) BOX BEAMS MAY BE CASTED BY EITHER (1) ONE STAGE MONOLITHICALLY OR (2) TWO STAGE MONOLITHICALLY FOR WHICH ADDITIONAL RETARDATION MAY BE REQUIRED.

9.) TOP AND BOTTOM MATS MAY BE TACK WELDED AS PERMITTED ON PRESTRESSED CONCRETE BOX BEAM SUPPLEMENTARY REQUIREMENTS.

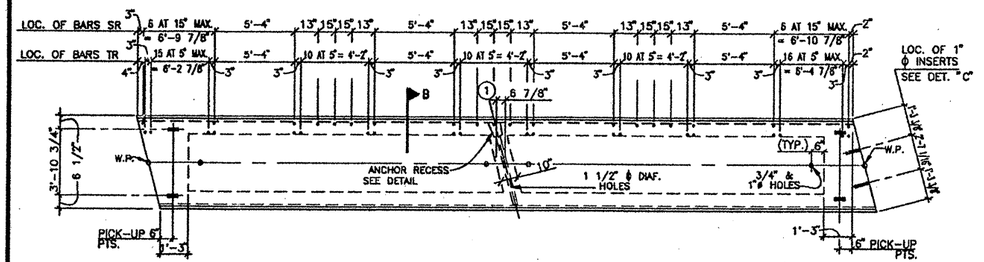
10.) VENT HOLES ARE NOT REQUIRED WHEN STYROFOAM VOIDS ARE USED.



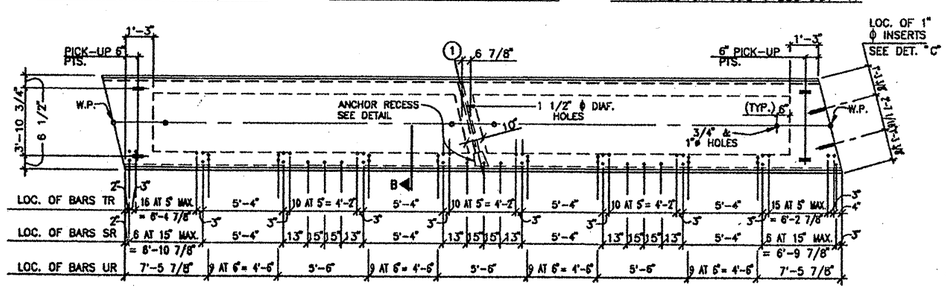
ANCHOR RECESS DETAIL



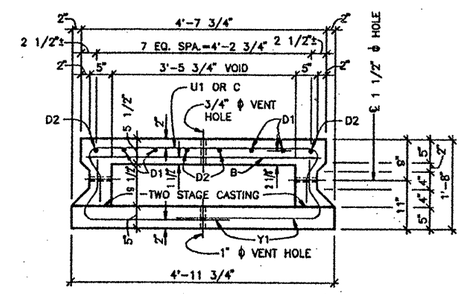
BEAM MARKS	5E20 -5	5E20 -6					REINFORCING STEEL SCHEDULE & DIMENSIONS										
BARS	NO. REQ'D	NO. REQ'D	NO. REQ'D	NO. REQ'D	NO. REQ'D	NO. REQ'D	TOTAL	SIZE	LENGTH	A	B	C	D	E	F	G	H
U1	50	50					100	#4	6'-5"	4'-4 1/2"	6 1/8"	5 7/8"	2 3/4"	2 3/4"	3'-11"	1'-0"	1 7/8"R
Y1	100	100					200	#4	4'-4"	1'-2 1/2"	7 3/4"	6 3/4"	1 1/2"R	3'-0"	5"	—	
B	93	93					186	#4	4'-5"	—	—	—	STRAIGHT	—	—	—	
C	47	47					94	#4	5'-5"	4'-4 1/2"	7"	4'-0 3/4"	1 7/8"R	—	—	—	
D1	4	4					8	#6	52'-11"	48'-11"	1'-0"	2 1/2"R	—	—	—	—	
D2	4	4					8	#6	50'-11"	48'-11"	—	—	STRAIGHT	—	—	—	
N	12	12					24	#4	2'-5"	4"	1'-3 1/2"	8"	1 1/4"R	5"	—	—	
M2	10	10					20	#4	4'-7"	2 5/16"	3'-7 3/4"	3 1/4"	1 7/8"R	3"	15"	—	
E	4	4					8	#4	2'-0"	4 1/2"	3"	6 1/2"	1 1/2"R	7 1/8"	—	—	
U2	2	2					4	#4	6'-7"	4'-6"	6 1/8"	5 7/8"	2 3/4"	2 3/4"	4'-0 1/2"	1'-0"	1 7/8"R
U3	2	2					4	#4	2'-10"	10 1/8"	6 1/8"	5 7/8"	1 7/8"R	2 3/4"	7 3/4"	1'-0"	—
U4	2	2					4	#4	4'-10"	2'-10 1/2"	6 1/8"	5 7/8"	1 7/8"R	2 3/4"	2'-7 3/4"	1'-0"	—
Y2	2	2					4	#4	7'-7"	4'-11"	7 3/4"	6 3/4"	5 1/4"	5 1/4"	4'-0 1/2"	1'-2 1/2"	1 1/2"R
Y3	2	2					4	#4	3'-6"	1'-0 3/4"	7 3/4"	6 3/4"	1 1/2"R	5"	7 3/4"	1'-2 1/2"	—
Y4	2	2					4	#4	5'-6"	3'-0 3/4"	7 3/4"	6 3/4"	1 1/2"R	5"	2'-7 3/4"	1'-2 1/2"	—
SR	29	29					58	#4	2'-5 1/2"	—	—	—	STRAIGHT	—	—	—	
TR	76	76					152	#4	3'-1 1/2"	8"	2'-5 1/2"	—	STRAIGHT	—	—	—	
UR	—	40					40	#3	1'-4"	2"	7"	—	—	—	—	—	



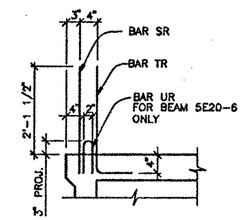
MARKED END-SEE STEEL DET "A" PLAN TYPE NUMBER 1 UNMARKED END-SEE STEEL DET "A"



MARKED END-SEE STEEL DET "A" PLAN TYPE NUMBER 2 UNMARKED END-SEE STEEL DET "A"

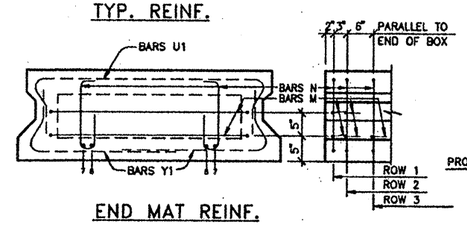


TYP. REINF.

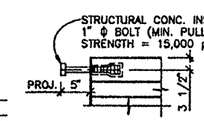


SECTION "B"

FOR APPROVAL
JAN 0 6 1994

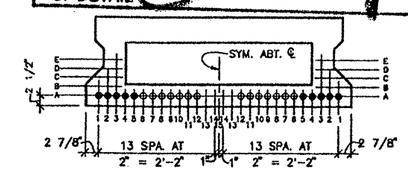


END MAT REINF.



DETAIL "C"

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION
FEB 8 1994
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL.



STRAIGHT STRAND PATTERN

● STRANDS WITH NO BOND BROKEN ○ STRANDS WITH BOND BROKEN

CONCRETE		LO-LAX STRANDS		LOCATION OF STRANDS WITH BROKEN BOND (FROM EACH END OF BEAM)
RELEASE STRENGTH	4000 P.S.I.	TOTAL QUANTITY	24	A-10,A-11,A-12 ● 2'-0"
28 DAY STRENGTH	5000 P.S.I.	QUAN. BROKEN BOND	14	A-6,A-7,A-8,A-9 ● 4'-0"
CLASS	H	DIAMETER/TYPE	1/2"/270K	
		STRESS	28,900#	

TOTAL LINEAR FT. = 98.96'

BEAM MARK: 5E20-5, 5E20-6

SAPSCO

CONTRACTOR : GILBERT TEXAS CONST. CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M,ETC.		LP. 1604

STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023,ETC.

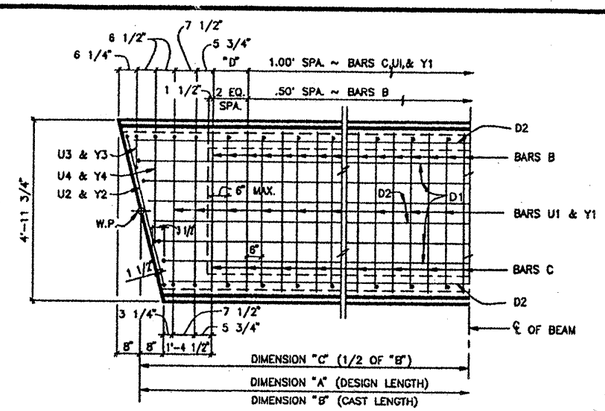
BOX BEAM SCHEDULE & DIMENSIONS

BEAM MARK	NO. REQ'D	BEAM LENGTHS (ALONG ℄ OF BEAM) A	B	C	D	INTERIOR DIAFRAMS CHAINED FROM MARKED END (ALONG ℄ OF BEAM) 1	2	3	4	PLAN TYPE	GENERAL DESIGN SHEET NUMBER
5E20-5	1	49.48'	49.53'	24.77'	.70'	24.74' (24.76')	—	—	—	1	—
5120-6	1	49.48'	49.53'	24.77'	.70'	24.74' (24.76')	—	—	—	2	—
TOTAL	2										

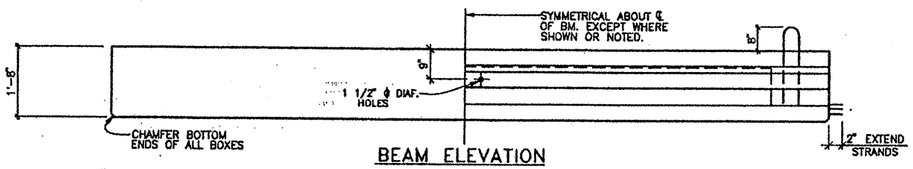
"( )" PARENTHESIS DENOTES CAST CORRECTION ADDED TO DIAFRAM DIMENSION

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS, SAN ANTONIO, TEXAS

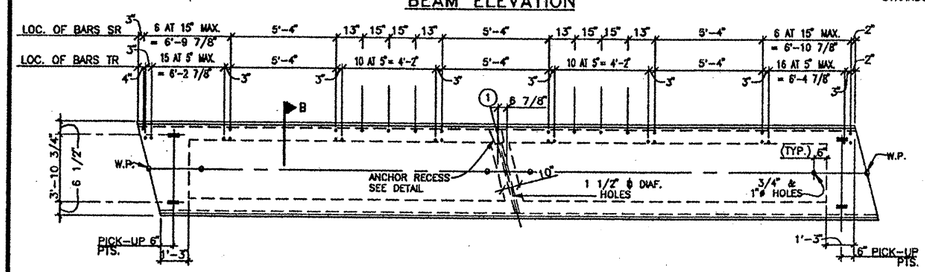
JOB NO.	DRAWN	CHECKED	DATE	SHEET NO.
93-667	R.P.C.	D.M.P.	1-6-94	F-3
SEA JOB NO. 93-170H	T.H.D. 5-20 BOX BEAM			
94-022H				



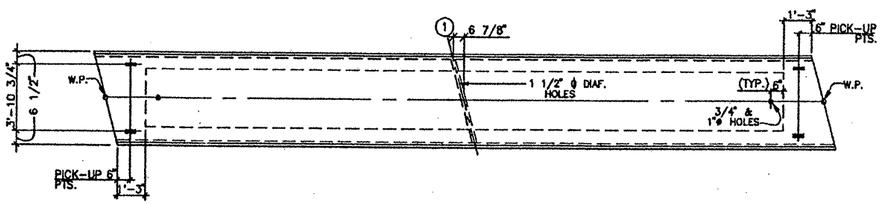
STEEL DETAIL "A"



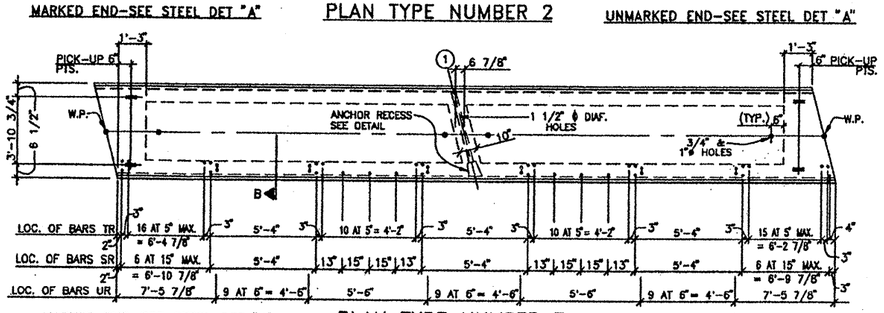
BEAM ELEVATION



MARKED END-SEE STEEL DET "A" PLAN TYPE NUMBER 1 UNMARKED END-SEE STEEL DET "A"



MARKED END-SEE STEEL DET "A" PLAN TYPE NUMBER 2 UNMARKED END-SEE STEEL DET "A"



MARKED END-SEE STEEL DET "A" PLAN TYPE NUMBER 3 UNMARKED END-SEE STEEL DET "A"

GENERAL NOTES

1.) TOPS OF ALL BOXES SHALL HAVE A ROUGH WOOD FLOAT FINISH.

2.) THE BOTTOM CORNERS OF ALL BOXES SHALL BE CHAMFERED 3/4".

3.) STRANDS WITH BOND BREAKAGE SHALL BE TIGHTLY WRAPPED WITH A WATERPROOF ADHESIVE TAPE OR PLASTIC TUBING MAY BE USED PROVIDED BOTH ENDS AND THE SEAM OF THE TUBE ARE SEALED WITH A WATERPROOF TAPE.

4.) BEAM MAY BE CURED BY STEAM OR WATER.

5.) ALL REINFORCING STEEL TO BE GRADE 60.

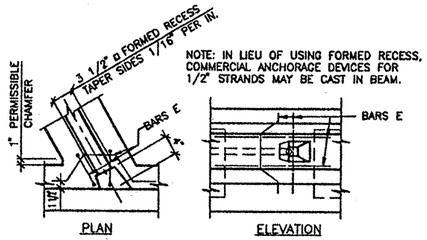
6.) IF CARDBOARD FORMS ARE USED FOR VOIDS, THEY SHALL BE WATERPROOFED.

7.) USE 2 ~BUNDLES OF 2 ~1/2"ϕ 270K STRANDS PER PICK-UP POINTS.

8.) BOX BEAMS MAY BE CASTED BY EITHER (1) ONE STAGE MONOLITHICALLY OR (2) TWO STAGE MONOLITHICALLY FOR WHICH ADDITIONAL RETARDATION MAY BE REQUIRED.

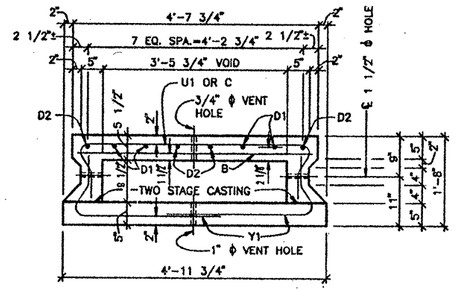
9.) TOP AND BOTTOM MATS MAY BE TACK WELDED AS PERMITTED ON PRESTRESSED CONCRETE BOX BEAM SUPPLEMENTARY REQUIREMENTS.

10.) VENT HOLES ARE NOT REQUIRED WHEN STYROFOAM VOIDS ARE USED.

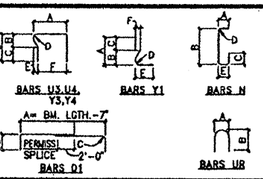


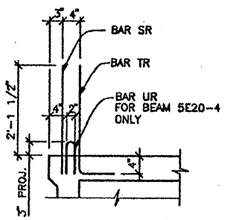
NOTE: IN LIEU OF USING FORMED RECESS, COMMERCIAL ANCHORAGE DEVICES FOR 1/2" STRANDS MAY BE CAST IN BEAM.

ANCHOR RECESS DETAIL

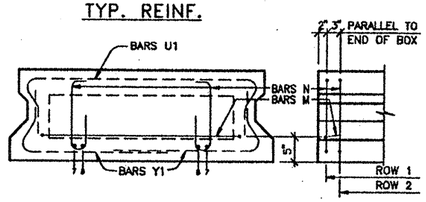


TYP. REINF.





SECTION "B"



END MAT REINF.

REINFORCING STEEL SCHEDULE & DIMENSIONS

BARS	BEAM MARKS 5E20-3 NO. REQ'D.	5120-2 NO. REQ'D.	5E20-4 NO. REQ'D.	NO. REQ'D.	NO. REQ'D.	NO. REQ'D.	TOTAL	SIZE	LENGTH	A	B	C	D	E	F	G	H
U1	40	40	40				400	#4	6'-5"	4'-4 1/2"	6 1/8"	5 7/8"	2 3/4"	2 3/4"	3'-11"	1'-0"	1 7/8"R
Y1	80	80	80				800	#4	4'-4"	1'-2 1/2"	7 3/4"	6 3/4"	1 1/2"R	3'-0"	5"	—	—
B	73	73	73				730	#4	4'-5"	—	—	—	STRAIGHT	—	—	—	—
C	37	37	37				370	#4	5'-5"	4'-4 1/2"	7"	4'-0 3/4"	1 7/8"R	—	—	—	—
D1	4	4	4				40	#6	42'-11"	38'-11"	1'-0"	2 1/2"R	—	—	—	—	—
D2	4	4	4				40	#6	40'-11"	38'-11"	—	—	STRAIGHT	—	—	—	—
N	8	8	8				80	#3	2'-5"	4"	1'-3 1/2"	6"	1 1/4"R	5"	—	—	—
M2	2	2	2				20	#4	4'-7"	2 5/16"	3'-7 3/4"	3 1/4"	1 7/8"R	3"	15'	—	—
E	4	—	4				8	#4	2'-0"	4 1/2"	3"	6 1/2"	1 1/2"R	7 1/8"	—	—	—
U2	2	2	2				20	#4	6'-7"	4'-6"	6 1/8"	5 7/8"	2 3/4"	2 3/4"	4'-0 1/2"	1'-0"	1 7/8"R
U3	2	2	2				20	#4	2'-10"	10 1/8"	6 1/8"	5 7/8"	1 7/8"R	2 3/4"	7 3/4"	1'-0"	—
U4	2	2	2				20	#4	4'-10"	2'-10 1/2"	6 1/8"	5 7/8"	1 7/8"R	2 3/4"	2'-7 3/4"	1'-0"	—
Y2	2	2	2				20	#4	7'-7"	4'-11"	7 3/4"	6 3/4"	5 1/4"	5 1/4"	4'-0 1/2"	1'-2 1/2"	1 1/2"R
Y3	2	2	2				20	#4	3'-6"	1'-0 3/4"	7 3/4"	6 3/4"	1 1/2"R	5"	7 3/4"	1'-2 1/2"	—
Y4	2	2	2				20	#4	5'-6"	3'-0 3/4"	7 3/4"	6 3/4"	1 1/2"R	5"	2'-7 3/4"	1'-2 1/2"	—
SR	24	—	24				48	#4	2'-5 1/2"	—	—	—	STRAIGHT	—	—	—	—
TR	63	—	63				126	#4	3'-1 1/2"	8"	2'-5 1/2"	6"	1 1/2"R	—	—	—	—
UR	—	—	30				30	#3	1'-4"	2"	7"	—	—	—	—	—	—

BOX BEAM SCHEDULE & DIMENSIONS

BEAM MARK	NO. REQ'D	BEAM LENGTHS (ALONG ℄ OF BEAM) A	B	C	D	INTERIOR DIAFRAMS CHAINED FROM MARKED END (ALONG ℄ OF BEAM) 1		2	3	4	PLAN TYPE	OPTIONAL SCHEM. SHEET NUMBER
5E20-3	1	39.48'	39.52'	19.76'	.70'	19.74'	(19.76')				1	—
5120-2	8	39.48'	39.52'	19.76'	.70'	19.74'	(19.76')				2	—
5E20-4	1	39.48'	39.52'	19.76'	.70'	19.74'	(19.76')				3	—
TOTAL	10											

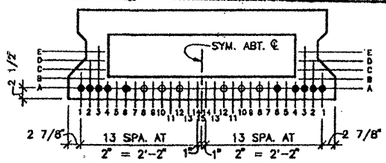
"( )"PARENTHESIS DENOTES CAST CORRECTION ADDED TO DIAFRAM DIMENSION

TEXAS DEPARTMENT OF TRANSPORTATION

APPROVED
DESIGN DIVISION

FEB 8 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL



STRAIGHT STRAND PATTERN

● STRANDS WITH NO BOND BROKEN ○ STRANDS WITH BOND BROKEN

CONCRETE		LO-LAX STRANDS		LOCATION OF STRANDS WITH BROKEN BOND (FROM EACH END OF BEAM)
RELEASE STRENGTH	4000 P.S.I.	TOTAL QUANTITY	16	A-10,A-12 @ 2'-0"
28 DAY STRENGTH	5000 P.S.I.	QUAN. BROKEN BOND	8	A-8 @ 4'-0"
CLASS	H	DIAMETER/TYPE	1/2"/270K	
		STRESS	28,900#	

TOTAL LINEAR FT. = 394.80'

BEAM MARK: 5E20-3, 5E20-4, 5120-2

FOR APPROVAL
JAN 0 6 1994

SAPSCO

CONTRACTOR : GILBERT TEXAS CONST. CORP.

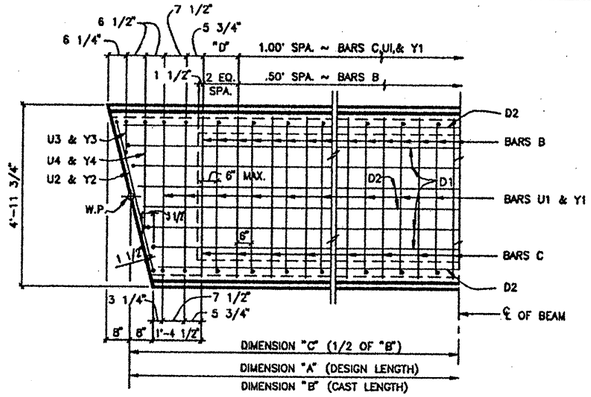
FED.RD. DIV.NO.	STATE	PROJECT NO.	HWY. NO.
6	TEXAS	NH 90(191)M,ETC.	LP. 1604

STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023,ETC.

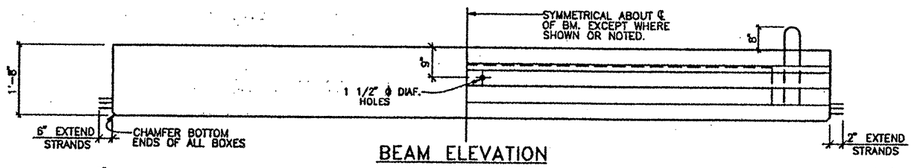
STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS, SAN ANTONIO, TEXAS

JOB NO.	DRAWN	CHECKED	DATE	SHEET NO.
93-667	R.P.C.	D.M.P.	1-6-94	F-2
SEA JOB NO. 93-170H	T.H.D. 5-20 BOX BEAM			
94-022H				

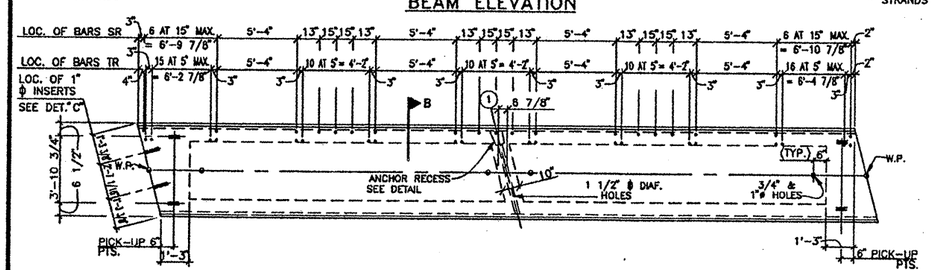
1-35813



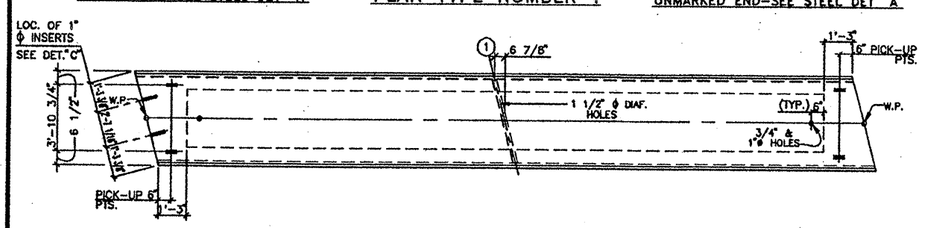
STEEL DETAIL "A"



BEAM ELEVATION



MARKED END-SEE STEEL DET "A" PLAN TYPE NUMBER 1 UNMARKED END-SEE STEEL DET "A"



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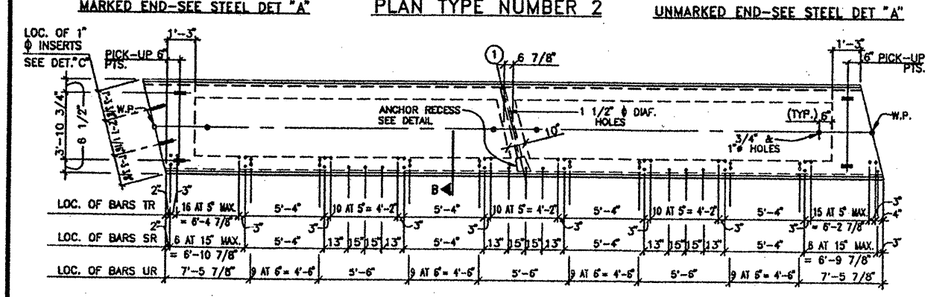


MARKED END-SEE STEEL DET "A" PLAN TYPE NUMBER 3 UNMARKED END-SEE STEEL DET "A"

GENERAL NOTES

1.) TOPS OF ALL BOXES SHALL HAVE A ROUGH WOOD FLOAT FINISH.

2.) THE BOTTOM CORNERS OF ALL BOXES SHALL BE CHAMFERED 3/4".

3.) STRANDS WITH BOND BREAKAGE SHALL BE TIGHTLY WRAPPED WITH A WATERPROOF ADHESIVE TAPE OR PLASTIC TUBING MAY BE USED PROVIDED BOTH ENDS AND THE SEAM OF THE TUBE ARE SEALED WITH A WATERPROOF TAPE.

4.) BEAM MAY BE CURED BY STEAM OR WATER.

5.) ALL REINFORCING STEEL TO BE GRADE 60.

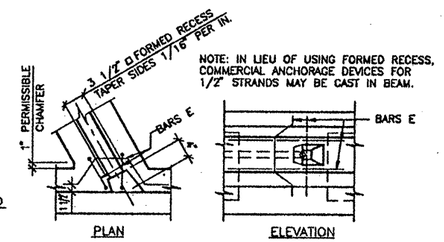
6.) IF CARDBOARD FORMS ARE USED FOR VOIDS, THEY SHALL BE WATERPROOFED.

7.) USE 2 ~BUNDLES OF 2 ~1/2"ϕ 270K STRANDS PER PICK-UP POINTS.

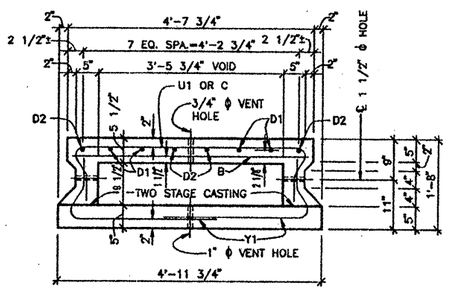
8.) BOX BEAMS MAY BE CASTED BY EITHER (1) ONE STAGE MONOLITHICALLY OR (2) TWO STAGE MONOLITHICALLY FOR WHICH ADDITIONAL RETARDATION MAY BE REQUIRED.

9.) TOP AND BOTTOM MATS MAY BE TACK WELDED AS PERMITTED ON PRESTRESSED CONCRETE BOX BEAM SUPPLEMENTARY REQUIREMENTS.

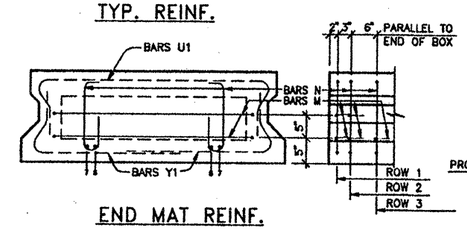
10.) VENT HOLES ARE NOT REQUIRED WHEN STYROFOAM VOIDS ARE USED.



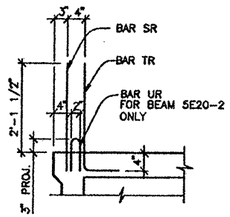
ANCHOR RECESS DETAIL



TYP. REINF.



END MAT REINF.



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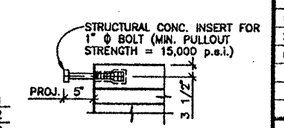
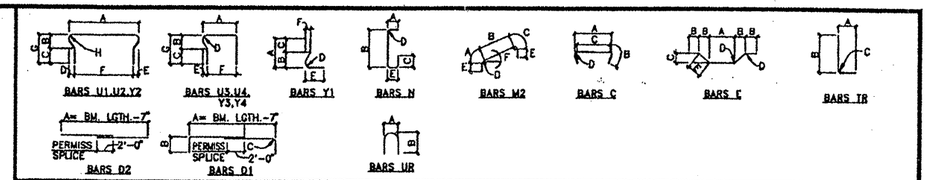


DETAIL "C"

FOR APPROVAL
JAN 0 6 1994



REINFORCING STEEL SCHEDULE & DIMENSIONS

BEAM MARKS	5E20 -1	5I20 -1	5E20 -2													
BARS	NO. REQ'D.	NO. REQ'D.	NO. REQ'D.	NO. REQ'D.	NO. REQ'D.	NO. REQ'D.	TOTAL	SIZE	LENGTH	A	B	C	D	E	F	G	H
U1	50	50	50				900	#4	6'-5"	4'-4 1/2"	6 1/8"	5 7/8"	2 3/4"	2 3/4"	3'-11"	1'-0"	1 7/8"R
Y1	100	100	100				1800	#4	4'-4"	1'-2 1/2"	7 3/4"	6 3/4"	1 1/2"R	3'-0"	5"	—	—
B	93	93	93				1674	#4	4'-5"	—	—	—	STRAIGHT	—	—	—	—
C	47	47	47				846	#4	5'-5"	4'-4 1/2"	7"	4'-0 3/4"	1 7/8"R	—	—	—	—
D1	4	4	4				72	#6	52'-11"	48'-11"	1'-0"	2 1/2"R	—	—	—	—	—
D2	4	4	4				72	#6	50'-11"	48'-11"	—	—	STRAIGHT	—	—	—	—
N	12	12	12				216	#4	2'-5"	4"	1'-3 1/2"	6"	1 1/4"R	5"	—	—	—
M2	10	10	10				180	#4	4'-7"	2 5/16"	3'-7 3/4"	3 1/4"	1 7/8"R	3"	15"	—	—
E	4	—	4				8	#4	2'-0"	4 1/2"	3"	6 1/2"	1 1/2"R	7 1/8"	—	—	—
U2	2	2	2				36	#4	6'-7"	4'-6"	6 1/8"	5 7/8"	2 3/4"	2 3/4"	4'-0 1/2"	1'-0"	1 7/8"R
U3	2	2	2				36	#4	2'-10"	10 1/8"	6 1/8"	5 7/8"	1 7/8"R	2 3/4"	7 3/4"	1'-0"	—
U4	2	2	2				36	#4	4'-10"	2'-10 1/2"	6 1/8"	5 7/8"	1 7/8"R	2 3/4"	2'-7 3/4"	1'-0"	—
Y2	2	2	2				36	#4	7'-7"	4'-11"	7 3/4"	6 3/4"	5 1/4"	5 1/4"	4'-0 1/2"	1'-2 1/2"	1 1/2"R
Y3	2	2	2				36	#4	3'-6"	1'-0 3/4"	7 3/4"	6 3/4"	1 1/2"R	5"	7 3/4"	1'-2 1/2"	—
Y4	2	2	2				36	#4	5'-6"	3'-0 3/4"	7 3/4"	6 3/4"	1 1/2"R	5"	2'-7 3/4"	1'-2 1/2"	—
SR	29	—	29				58	#4	2'-5 1/2"	—	—	—	STRAIGHT	—	—	—	—
TR	76	—	76				152	#4	3'-1 1/2"	8"	2'-5 1/2"	6 1/8"	1 1/2"R	5"	7 3/4"	1'-2 1/2"	—
UR	—	—	40				40	#3	1'-4"	2"	7"	—	—	—	—	—	—

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION
FEB 8 1994
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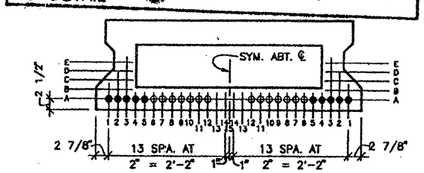
BOX BEAM SCHEDULE & DIMENSIONS

BEAM MARK	NO. REQ'D	BEAM LENGTHS (ALONG ℄ OF BEAM) A	B	C	D	INTERIOR DIAFRAMS CHAINED FROM MARKED END (ALONG ℄ OF BEAM) 1	2	3	4	PLAN TYPE	OPTIONAL DESIGN SHEET NUMBER
5E20-1	1	49.48'	49.53'	24.77'	.70'	24.74' (24.76')	—	—	—	1	—
5I20-1	16	49.48'	49.53'	24.77'	.70'	24.74' (24.76')	—	—	—	2	—
5E20-2	1	49.48'	49.53'	24.77'	.70'	24.74' (24.76')	—	—	—	3	—
TOTAL	18										

"( )"PARENTHESIS DENOTES CAST CORRECTION ADDED TO DIAFRAM DIMENSION



STRAIGHT STRAND PATTERN

● STRANDS WITH NO BOND BROKEN ○ STRANDS WITH BOND BROKEN

CONCRETE		LO-LAX STRANDS		LOCATION OF STRANDS WITH BROKEN BOND (FROM EACH END OF BEAM)
RELEASE STRENGTH	4000 P.S.I.	TOTAL QUANTITY	24	A-10,A-11,A-12 ● 2'-0"
28 DAY STRENGTH	5000 P.S.I.	QUAN. BROKEN BOND	14	A-6,A-7,A-8,A-9 ● 4'-0"
CLASS	H	DIAMETER/TYPE	1/2"/270K	
		STRESS	28,900#	

TOTAL LINEAR FT. = 890.64'

BEAM MARK: 5E20-1, 5E20-2, 5I20-1

SAPSCO

CONTRACTOR : GILBERT TEXAS CONST. CORP.

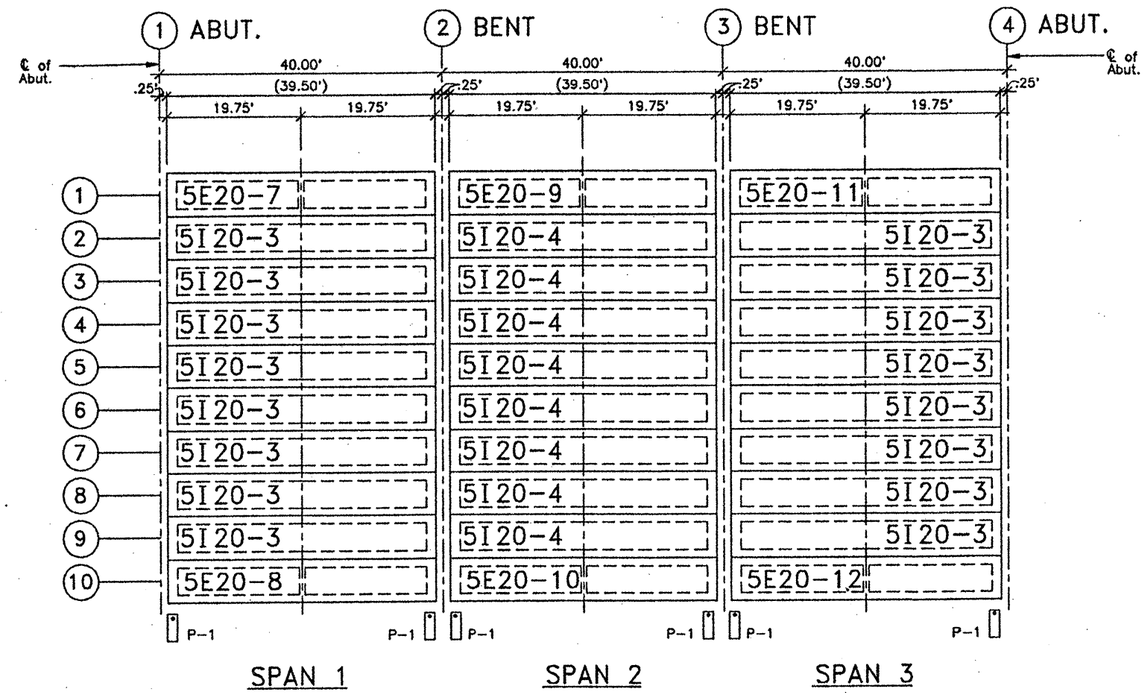
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M,ETC.		LP. 1604

STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023,ETC.

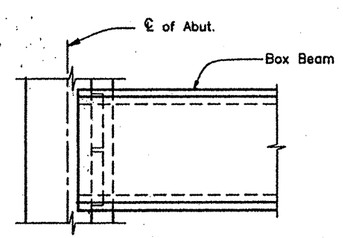
STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS, SAN ANTONIO, TEXAS

JOB NO.	DRAWN	CHECKED	DATE	SHEET NO.
93-667	R.P.C.	D.M.P.	12- -93	F-1
SEA JOB NO. 93-170H	T.H.D. 5-20 BOX BEAM			
94-022H				

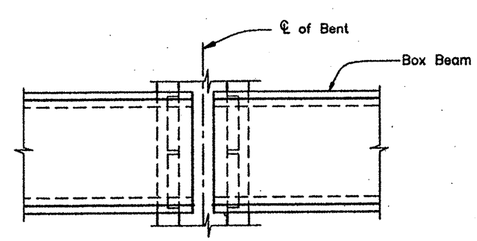
S-85819



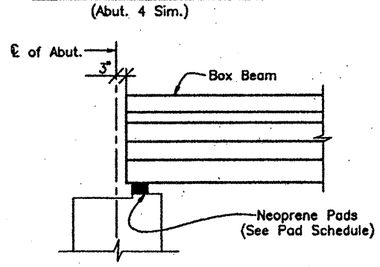
SP-77



PLAN AT ABUT. 1
(Abut. 4 Sim.)



PLAN AT BENTS 2 & 3



ELEV. AT ABUT. 1
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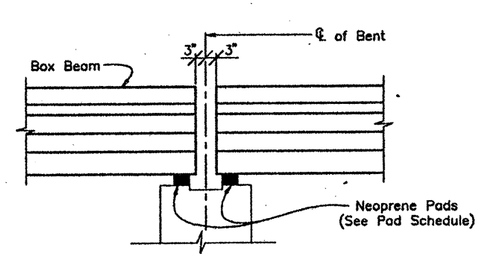


ELEV. AT BENTS 2 & 3

LOOP 1604 WESTBOUND FRTG. ROAD AT HUESTA CREEK

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

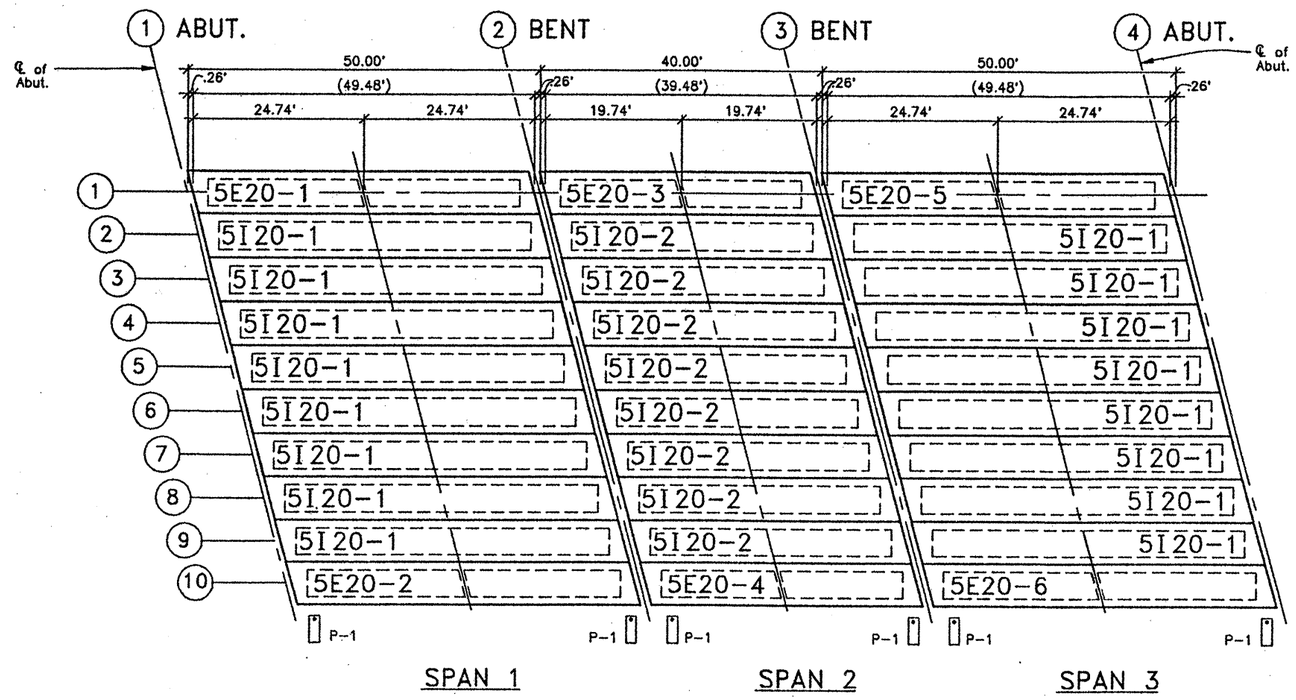
FEB 8 1994

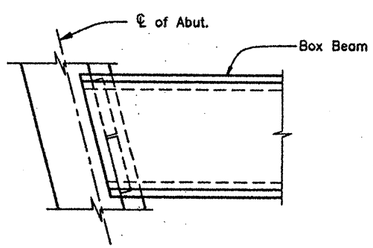
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

FOR APPROVAL
JAN 0 6 1994

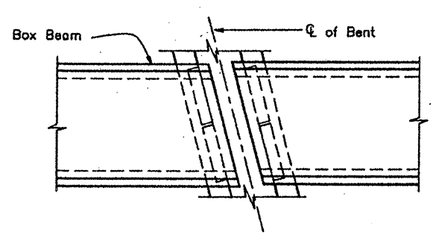
( ) INDICATES BEAM LENGTH

SAPSCO				
CONTRACTOR : GILBERT TEXAS CONST. CORP.				
CONTRACTORS OPTIONS	END DIAFRAM : N/A			SLAB : N/A
	INTERIOR DIAFRAM : N/A			
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M,ETC.		LP. 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023,etc.
ΣΕΛ STRUCTURAL ENGINEERING ASSOCIATES, INC. CONSULTING ENGINEERS, SAN ANTONIO, TEXAS				
JOB NO. 93-667	DRAWN R.P.C.	CHECKED D.M.P.	DATE 1-6-94	SHEET NO.
SEA JOB NO. 93-170H	ERECTION SHEET			E-2
94-022H				

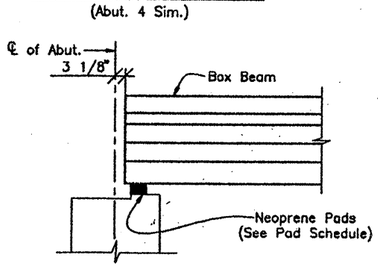




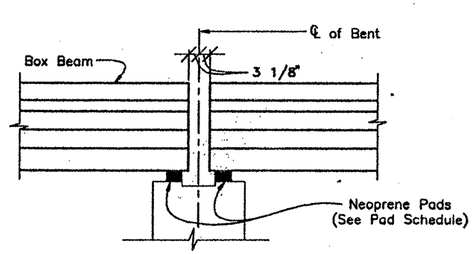
PLAN AT ABUT. 1
(Abut. 4 Sim.)



PLAN AT BENTS 2 & 3



ELEV. AT ABUT. 1
(Abut. 4 Sim.)



ELEV. AT BENTS 2 & 3

SP-78

LOOP 1604 EASTBOUND FRTG. ROAD AT HUESTA CREEK

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 8 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

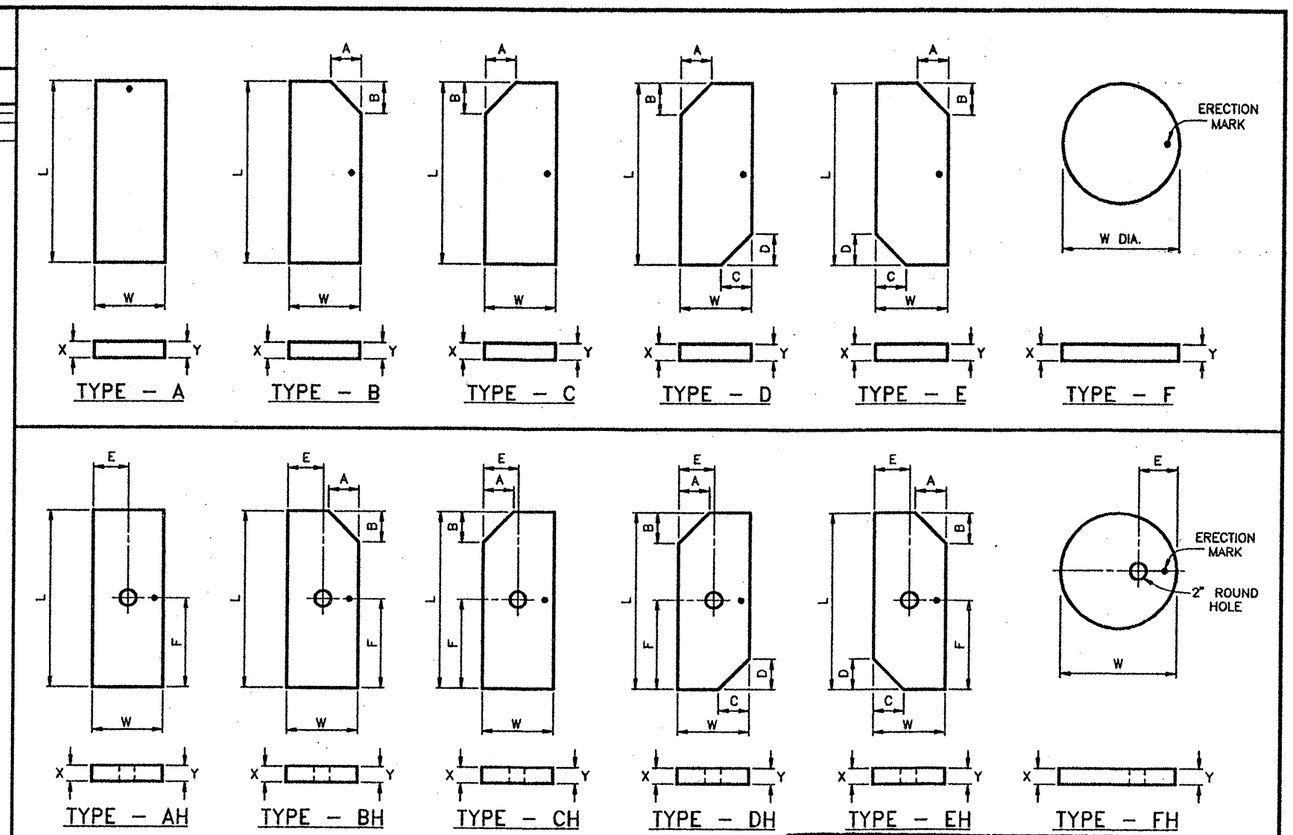
FOR APPROVAL
JAN 0 6 1994

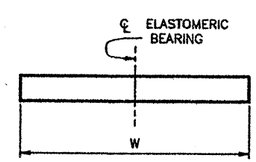
( ) INDICATES BEAM LENGTH

SAPSCO				
CONTRACTOR : GILBERT TEXAS CONST. CORP.				
CONTRACTORS OPTIONS	END DIAFRAM : N/A INTERIOR DIAFRAM : N/A			SLAB : N/A
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M,ETC.		LP. 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023,etc.
SEA STRUCTURAL ENGINEERING ASSOCIATES, INC. *CONSULTING ENGINEERS*, SAN ANTONIO, TEXAS				
JOB NO. 93-667	DRAWN R.P.C.	CHECKED D.M.P.	DATE 1-6-94	SHEET NO.
SEA JOB NO. 93-170H	ERECTION SHEET			E-1
94-022H				

ELASTOMERIC BEARING PADS SCHEDULE

MARK	TYPE	DURO.	QUANT.	X	Y	L	W	A	B	C	D	E	F
P-1	A	50	240	1"	1"	2'-4 1/2"	2"	—	—	—	—	—	—





50 DUROMETER
PLAIN BEARING

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 8 1994

SB 79

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL.

○ DENOTES 2" ROUND HOLE

• DENOTES ERECTION MARK

FOR APPROVAL
JAN 0 6 1994

SAPSCO				
CONTRACTOR : GILBERT TEXAS CONST. CORP.				
FED.RD. DIV.NO.	STATE	PROJECT NO.		HWY. NO.
6	TEXAS	NH 90(191)M,ETC.		LOOP 1604
STATE DIST.NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR	2452	02	023, ETC.

SEA STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS, SAN ANTONIO, TEXAS

JOB NO.	DRAWN	CHECKED	DATE	SHEET NO.
93-667	R.P.C.	D.M.P.	1-6-94	NP-1
SEA JOB NO. 93-170H	NEOPRENE PADS			
94-022H				

INDEX

STRUCTURE		BEAM		LENGTH			1/2" ø-270k LO-LAX STRANDS					CONCRETE		ENDS		BEAM DETAIL SHEET NO.	DESIGN REFERENCE NO.	REMARKS
DESIG-NATION	SPAN NO.	TYPE & MARK NO.	QUANTITY	I.D.T.S. ADDED	DESIGN (A)	CAST (B)	TOTAL QUANTITY	"e" AT ℄	"e" AT END	DEPRESSED QUAN.	DEPRESSED AT	MINIMUM RELEASE	MIN. COMP. 28 DAY STRENGTH	SKEW (DEG.)	BATTER (INCHES)			
LOOP 1604 EASTBOUND FRTG. ROAD AT HUESTA CREEK	1	5E20-1	1	NONE	49.48'	49.53'	24	N/A	N/A	STRAIGHT		4000	5000	15'	NONE	F-1	PB-D-5-20	NONE
	1	5E20-2	1	NONE	49.48'	49.53'	24	N/A	N/A	STRAIGHT		4000	5000	15'	NONE	F-1	PB-D-5-20	NONE
	2	5E20-3	1	NONE	39.48'	39.52'	16	N/A	N/A	STRAIGHT		4000	5000	15'	NONE	F-2	PB-D-5-20	NONE
	2	5E20-4	1	NONE	39.48'	39.52'	16	N/A	N/A	STRAIGHT		4000	5000	15'	NONE	F-2	PB-D-5-20	NONE
	3	5E20-5	1	NONE	49.48'	49.53'	24	N/A	N/A	STRAIGHT		4000	5000	15'	NONE	F-3	PB-D-5-20	NONE
	3	5E20-6	1	NONE	49.48'	49.53'	24	N/A	N/A	STRAIGHT		4000	5000	15'	NONE	F-3	PB-D-5-20	NONE
	1 & 3	5I20-1	16	NONE	49.48'	49.53'	24	N/A	N/A	STRAIGHT		4000	5000	15'	NONE	F-1	PB-D-5-20	NONE
	2	5I20-2	8	NONE	39.48'	39.52'	16	N/A	N/A	STRAIGHT		4000	5000	15'	NONE	F-2	PB-D-5-20	NONE
LOOP 1604 WESTBOUND FRTG. ROAD AT HUESTA CREEK	1	5E20-7	1	NONE	39.50'	39.54'	16	N/A	N/A	STRAIGHT		4000	5000	NONE	NONE	F-4	PB-D-5-20	NONE
	1	5E20-8	1	NONE	39.50'	39.54'	16	N/A	N/A	STRAIGHT		4000	5000	NONE	NONE	F-4	PB-D-5-20	NONE
	2	5E20-9	1	NONE	39.50'	39.54'	16	N/A	N/A	STRAIGHT		4000	5000	NONE	NONE	F-5	PB-D-5-20	NONE
	2	5E20-10	1	NONE	39.50'	39.54'	16	N/A	N/A	STRAIGHT		4000	5000	NONE	NONE	F-5	PB-D-5-20	NONE
	3	5E20-11	1	NONE	39.50'	39.54'	16	N/A	N/A	STRAIGHT		4000	5000	NONE	NONE	F-6	PB-D-5-20	NONE
	3	5E20-12	1	NONE	39.50'	39.54'	16	N/A	N/A	STRAIGHT		4000	5000	NONE	NONE	F-6	PB-D-5-20	NONE
	1 & 3	5I20-3	16	NONE	39.50'	39.54'	16	N/A	N/A	STRAIGHT		4000	5000	NONE	NONE	F-4	PB-D-5-20	NONE
	2	5I20-4	8	NONE	39.50'	39.54'	16	N/A	N/A	STRAIGHT		4000	5000	NONE	NONE	F-5	PB-D-5-20	NONE

SP-80

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED
DESIGN DIVISION

FEB 8 1994

APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

RECEIVED

JAN 07 1994

BRIDGE DIVISION

FOR APPROVAL
JAN 06 1994

TOTAL LINEAR FEET OF THIS PROJECT : 2,569.40'

SAPSCO

CONTRACTOR : GILBERT TEXAS CONST. CORP.

FED.RD. DIV.NO.	STATE	PROJECT NO.			HWY. NO.
6	TEXAS	NH 90(191)M,ETC.			LOOP 1604
STATE DIST.NO.	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.
15	BEXAR		2452	02	023, ETC.

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS, SAN ANTONIO, TEXAS

JOB NO.	DRAWN	CHECKED	DATE	SHEET NO.
93-667	R.P.C.	D.M.P.	1-6-94	I-1
SEA JOB NO. 93-170H	INDEX SHEET			
94-022H				

7209 10/93

LETTER OF TRANSMITTAL

CAPITOL CITY STEEL
COMPANY INC.
REINFORCING & STRUCTURAL STEEL FABRICATORS
P.O. Box 3195 Austin, Texas 78764 512·282·8820 / 512·658·1132

DATE 2-18-94	JOB NO. 94-821
ATTENTION ROBERT L. WILSON	
RE PROJ: HH 90 (191) M, ETC	
CSJ: 2452-01-028	
BEXAR COUNTY	
LOOP 1604 DIST 15	

TO Director Of Bridges and Structures
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483

GENTLEMEN:

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☒ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
7	2/18/94	E1	SEJ-S(1) PLACEMENT LAYOUT
		1	SHOP DETAILS

THESE ARE TRANSMITTED as checked below:

☒ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☒ Return ONE corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED EXCEPT AS NOTED
DESIGN DIVISION
MAR 25 1994
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

RECEIVED
FEB 24 1994
DESIGN DIVISION

THANKING YOU
CAPITOL CITY STEEL CO., INC.

COPY TO

SIGNED: Pat Coronado

Texas Department of Transportation

DEWITT C. GREER STATE HIGHWAY BLDG. • 125 E. 11TH STREET • AUSTIN, TEXAS 78701-2483 • (512) 463-8585

March 25, 1994

County: Bexar
Control: 2452-02-023
Project: NH 90(19)M
Highway: LP 1604
Structure: Loop 1604 Overpass

Shop Plan File: 7209
Your Order: 94-821

Capitol City Steel Co., Inc.
P. O. Box 3195
Austin, TX 78764

Attention: Mrs. Pat Coronado

Dear Mrs. Coronado:

We have reviewed your shop drawings, sheets E-1 & 1, covering sealed expansion joints on the above project. The drawings are approved for fabrication and are enclosed.

Any corrections noted in red must be incorporated into the work. Revised prints for these corrections will not be necessary.

One set of any erection drawings, included herein, has been sent to the Contractor.

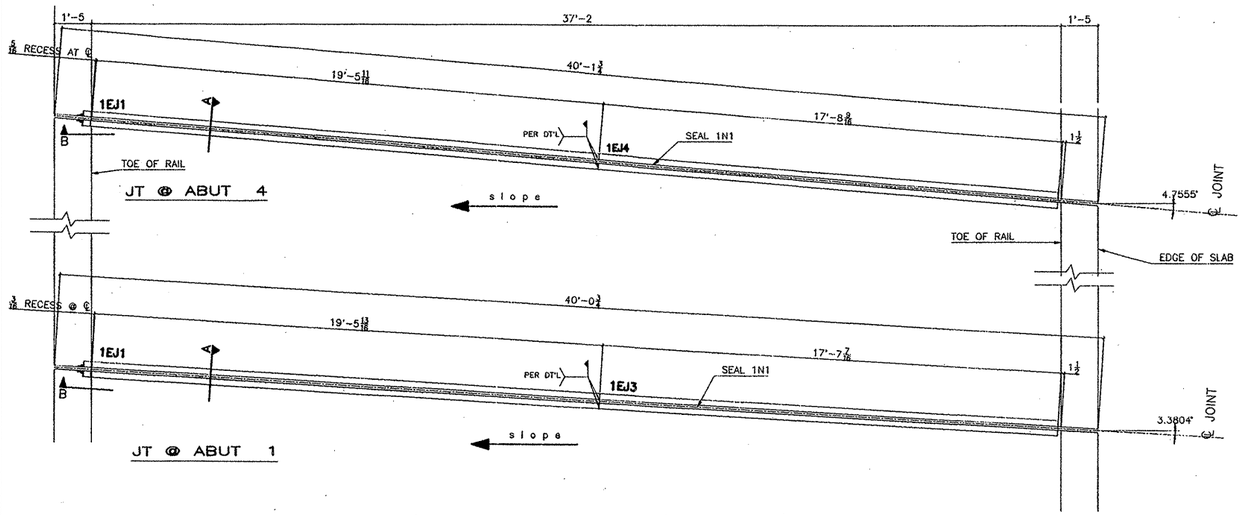
Sincerely,

Original Signed for
Robert L. Wilson, P.E.
Robert L. Wilson, P.E.
Director, Design Division

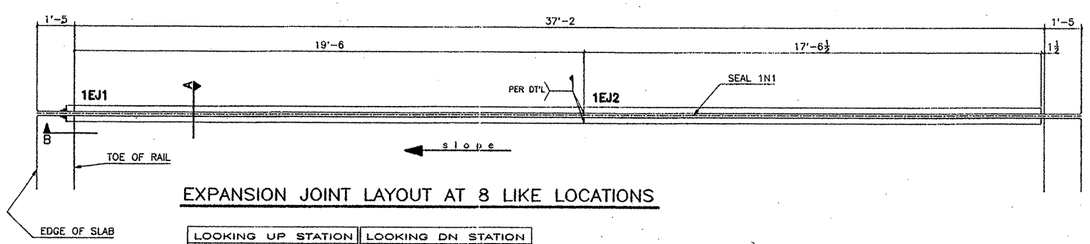
MAB MAB:ew
Encl.

cc: San Antonio District
Materials & Tests Division
Gilbert Texas Construction Corp.

SP-81

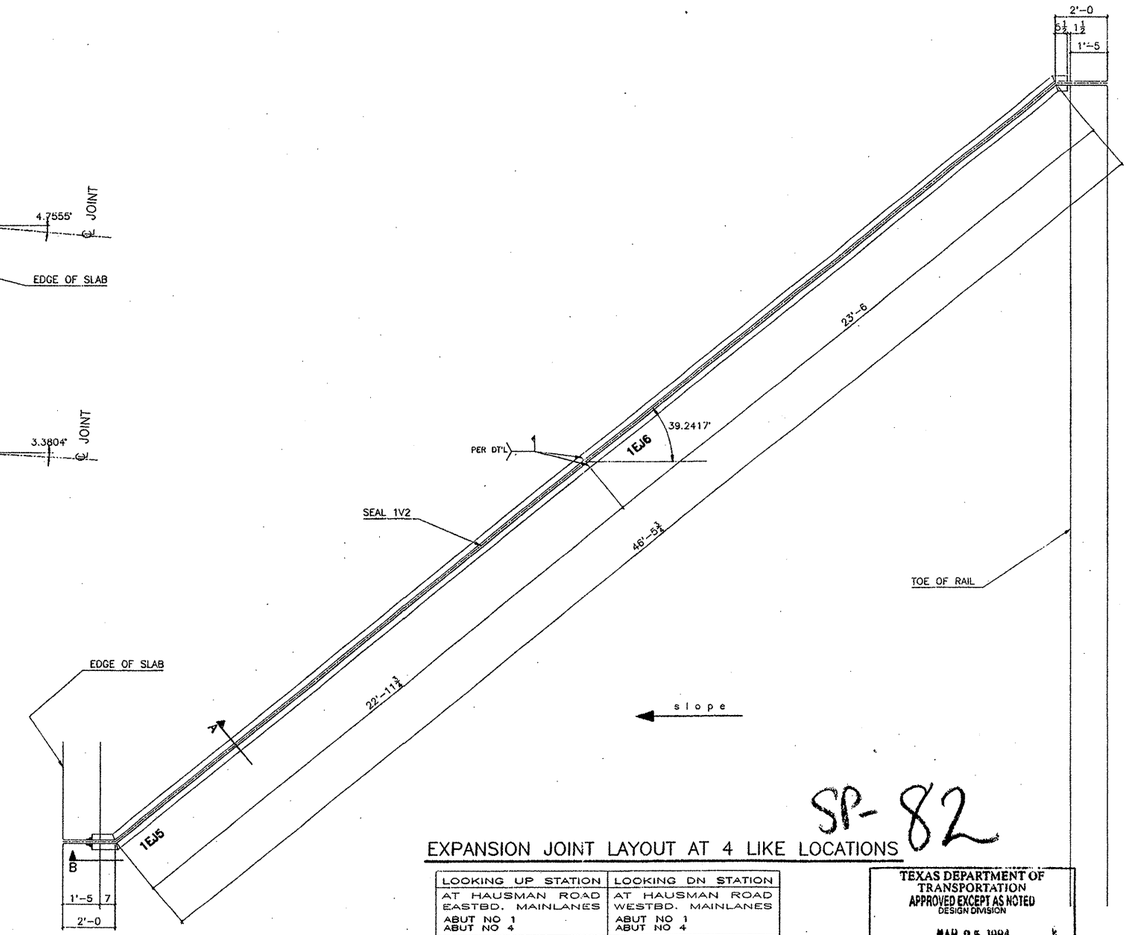


EXPANSION JOINT LAYOUT AT S.H. 16 (Bandera Rd.) WESTBD. MAINLANES



EXPANSION JOINT LAYOUT AT 8 LIKE LOCATIONS

LOOKING UP STATION	LOOKING DN STATION
AT KYLE SEALE PKWY EASTBD. MAINLANES ABUT NO 1 ABUT NO 4	AT KYLE SEALE PKWY WESTBD. MAINLANES ABUT NO 1 ABUT NO 4
AT HUESTA CREEK EASTBD. MAINLANES ABUT NO 1 ABUT NO 4	AT HUESTA CREEK WESTBD. MAINLANES ABUT NO 1 ABUT NO 4

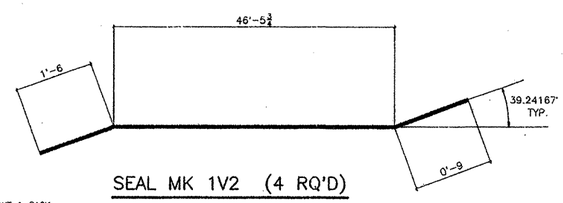


EXPANSION JOINT LAYOUT AT 4 LIKE LOCATIONS

SP-82

LOOKING UP STATION	LOOKING DN STATION
AT HAUSMAN ROAD EASTBD. MAINLANES ABUT NO 1 ABUT NO 4	AT HAUSMAN ROAD WESTBD. MAINLANES ABUT NO 1 ABUT NO 4

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED EXCEPT AS NOTED
DESIGN DIVISION
MAR 25 1994
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL



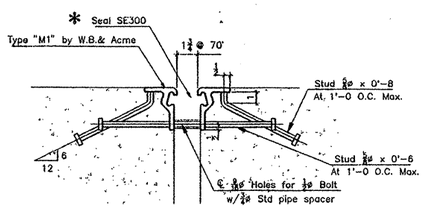
SEAL MK 1V2 (4 RQ'D)

GENERAL NOTES:

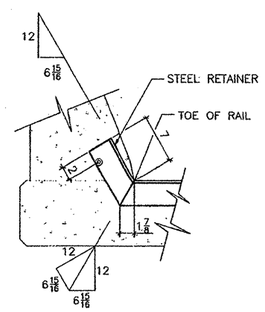
1– Studs are to be elec. arc welded with complete fusion.
2– All steel to be A36 and DOMESTIC.
3– Material for studs shall conform to ASTM–A108, grades 1015, 1018, or 1020.
4– One shop splice will be permitted in each shipping length provided no piece is less than 2'–0 in length and sufficient studs are added to limit the stud to shop splice distance to 2" min. & 4" max.
5– Shop and field splices shall be made by butt welding with areas in contact with preformed joint sealer to be ground smooth.
6– Corresponding sections shall be match marked and bolted together for shipment.
7– Painting of System II will cover only surfaces not embeded in concrete.

FOR APPROVAL ONLY
Capitol City Steel Co., Inc.

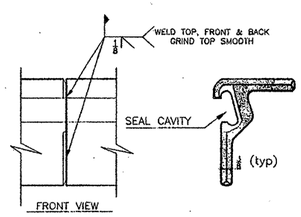
* = BY W.B. & Acme



SECTION A



SECTION B



FIELD WELD

REMOVE ALL BURRS WHICH WILL BE IN CONTACT WITH SEAL

APPROVAL/REVIEW AUTHORITY: PLEASE REVIEW THIS DRAWING CAREFULLY
This drawing represents the Seller's interpretation of the intent of the contract documents. However, the Seller assumes no responsibility for the design of the information shown on this drawing. This is the responsibility of the Buyer upon the drawing.
Unless noted to the contrary, shop drawings returned from approval, it will be assumed that all information shown thereon has the affirmation of the Buyer.
After the first submission, changes to information shown on this drawing will be considered as contract changes.

OKT

BACKCHARGES:
Back charges of any nature for corrective work or replacement material will not be accepted unless authorized by Seller. Costs that are incurred without the Seller's prior approval will be for the Buyer's account.

Rev.	Date	Description
1		
2		
3		
4		

Print Record

#	To	Date
7	Appv	02/18/94
	Appv	
	Appv	
	Check	
	Back ✓	
	Shop	
	Shop	
1	Purch	02/18/94
	Purch	
	Const	
	Const	
	Plotted	

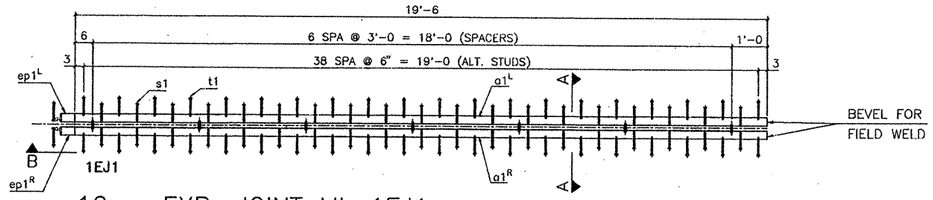
Feb 17, 1994 – 15:27:23

CAPITOL CITY STEEL
COMPANY INC.
REINFORCING & STRUCTURAL STEEL FABRICATORS
SUPPLIER OF CONSTRUCTION MATERIALS
P.O. BOX 3195 AUSTIN TX 78764 512-282-8820
FAX: 512-295-2500

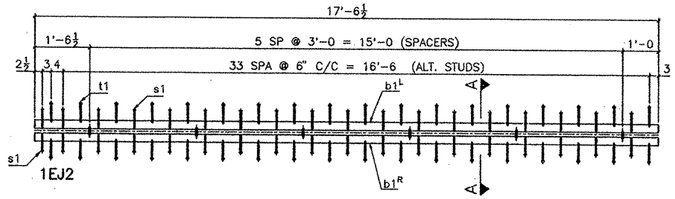
CRSI
AISC
AISC SSI

CUSTOMER: GILBERT TEXAS	JOB # 94-821
PROJECT: NH 90(191)M, ETC. CSJ# 2452-02-023	DATE: 01-21-94
LOCATION: LP 1604 DIST 15 BEXAR County	DWN: PC CHK: EM
ARCH/ENG: Texas DOT SHOP PLAN #:	SHEET # E1 of 1

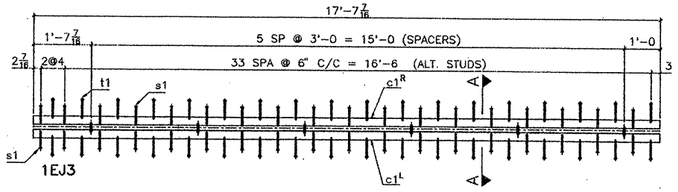
SEJ–S(1) PLAN @ LOOP 1604 OVERPASS



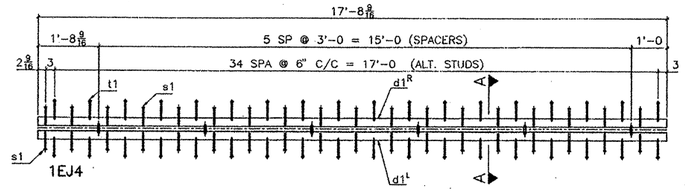
10 – EXP. JOINT Mk 1EJ1



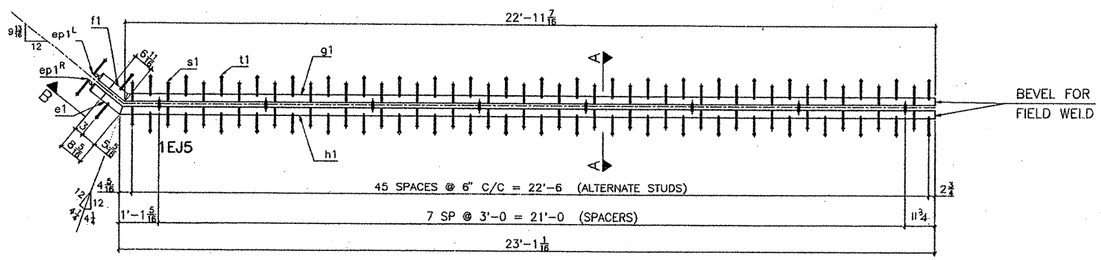
8 – EXP. JOINT Mk 1EJ2



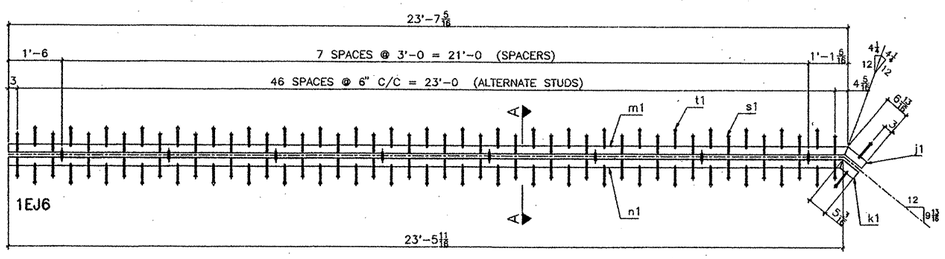
ONE – EXP. JOINT Mk 1EJ3



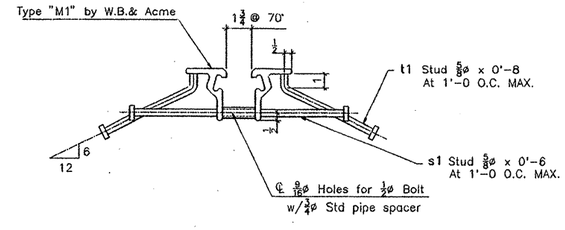
ONE – EXP. JOINT Mk 1EJ4



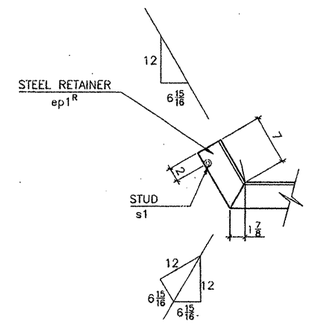
4 – EXP. JOINT Mk 1EJ5



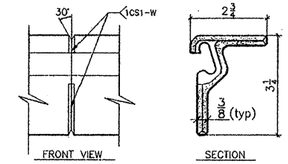
4 – EXP. JOINT Mk 1EJ6



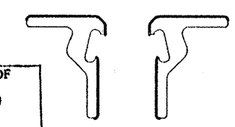
SECTION A–A



V I E W B



SHOP WELD DETAIL



PAINT LIMITS

PAINT DARKENED AREAS. DO NOT PAINT SEAL CAVITY

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED EXCEPT AS NOTED
DESIGN DIVISION
MAR 25 1994
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

SP-83

Bill of Material

Detail Mark	#	SECTION	LENGTH	SHIPPING #	SHIPPING Mark	REMARKS	
	3"	SEALED EXP JOINT	20'-1	10	1EJ1	20.08'	95
$a1^{LR}$	20	TYPE M1 EXT.	19'-7 7/8			* 10^{L} & 10^{R}	72
$ep1^{LR}$	20	TYPE M1 EXT.	0'-8 7/8			* 10^{L} & 10^{R}	72
s1	400	5/8ø HD STUD	0'-6				72
t1	400	5/8ø HD STUD	0'-8			BENT	72
	3"	SEALED EXP JOINT	17'-6½	8	1EJ2	17.54'	95
$b1^{RL}$	16	TYPE M1 EXT.	19'-6			* 8^{L} & 8^{R}	72
s1	288	5/8ø HD STUD	0'-6				72
p1	288	5/8ø HD STUD	0'-8			BENT	72
	3"	SEALED EXP JOINT	17'-7 7/16	1	1EJ3	17.62'	95
$c1^{RL}$	2	TYPE M1 EXT.	17'-7 7/16			* 1^{L} & 1^{R}	72
s1	36	5/8ø HD STUD	0'-6				72
p1	36	5/8ø HD STUD	0'-8			BENT	72
	3"	SEALED EXP JOINT	17'-8 9/16	1	1EJ4	17.71'	95
$d1^{RL}$	2	TYPE M1 EXT.	17'-8 9/16			* 1^{L} & 1^{R}	72
s1	36	5/8ø HD STUD	0'-6				72
p1	36	5/8ø HD STUD	0'-8			BENT	72
	3"	SEALED EXP JOINT	24'-1¾	4	1EJ5	24.15'	95
e1	4	TYPE M1 EXT.	0'-10 3/16			*	72
f1	4	TYPE M1 EXT.	0'-8 9/16			*	72
g1	4	TYPE M1 EXT.	22'-11 7/16			*	72
h1	4	TYPE M1 EXT.	23'-1 1/16			*	72
$ep1^{LR}$	8	TYPE M1 EXT.	0'-8 7/8			* 4^{L}&4^{R}	72
s1	192	5/8ø HD STUD	0'-6				72
p1	192	5/8ø HD STUD	0'-8			BENT	72
	3"	SEALED EXP JOINT	24'-1	4	1EJ5	24.08'	95
j1	4	TYPE M1 EXT.	0'-6 13/16			*	72
k1	4	TYPE M1 EXT.	0'-5 3/16			*	72
m1	4	TYPE M1 EXT.	23'-7 5/16			*	72
n1	4	TYPE M1 EXT.	23'-5 11/16			*	72
s1	192	5/8ø HD STUD	0'-6				72
p1	192	5/8ø HD STUD	0'-8			BENT	72
za1	194	½ø BOLT	0'-3¾			FOR SPACER	72
zb1	194	½ø NUT				FOR SPACER	72
zc1	194	¾ø PIPE	0'-2¼			SPACER	72
		NEOPRENE SEAL					
		TYPE SE300	38'-0	10	1N1	*	
		TYPE SE300	48'-8¾	4	1V2	* SEE SHT E1	

GENERAL NOTES:

1– Studs are to be elec. arc welded with complete fusion.
2– All steel to be A36 and DOMESTIC.
3– Material for studs shall conform to ASTM–A108, grades 1015, 1018, or 1020.
4– One shop splice will be permitted in each shipping length provided no piece is less than 2'-0 in length and sufficient studs are added to limit the stud to shop splice distance to 2' minimum 4' maximum.
5– Shop and field splices shall be made by butt welding with areas in contact with preformed joint sealer to be ground smooth.
6– Corresponding sections shall be match marked and bolted together for shipment.
7– Painting of System II will cover only surfaces not embeded in concrete.

FOR APPROVAL ONLY
Capitol City Steel Co., Inc.

* – BY WATSON BOWMAN & ACME HOLES (U.N.)/ 9/16ø SHOP PAINT/ SYS II

APPROVAL/REVIEW AUTHORITY: PLEASE REVIEW THIS DRAWING CAREFULLY
This drawing represents the Seller's interpretation of the intent of the contract documents. However, Seller assumes no responsibility for the design or the information shown on this drawing. This is the responsibility of the Buyer.
Unless noted to the contrary upon the drawings returned from approval, it will be assumed that all information shown hereon has the affirmation of the Buyer.
After the first submission changes to information shown on this drawing will be considered as contract changes.

ERECTION NOTES:
All dimensions & elevations must be strictly adhered to or steel will not fit. Report any discrepancies to Seller immediately.

BACKCHARGES:
Back charges of any nature for corrective work or replacement material will not be accepted unless authorized by Seller. Costs that are incurred without the STRICT prior approval will be for the Buyer's account.

Rev.	Date	Description
1		
2		
3		
4		

Print Record

#	To	Date
7	Appv	2/18/94
	Appv	
	Appv	
	Check	
	Back ✓	
	Shop	
	Shop	
1	Purch	2/18/94
	Purch	
	Const	
	Const	
	PLOTTED	

Feb 17, 1994 – 15:49:04

CAPITOL CITY STEEL
COMPANY INC.
REINFORCING & STRUCTURAL STEEL FABRICATORS
SUPPLIER OF CONSTRUCTION MATERIALS
P.O. BOX 3195 AUSTIN TX 78764 512-282-6620
FAX: 512-295-2500

CRSI

CUSTOMER: GILBERT TEXAS	JOB # 94-821
PROJECT: NH 90(191)M, Etc CSJ# 2452-02-023	DATE: 2-07-94
LOCATION: LP 1604 DIST 15 BEXAR County	DWN: PC CHK: EM
ARCH/ENG: TEXAS DOT SHOP PLAN #:	SHEET # 1

SEJ--S(1) @ AT LOOP 1604 OVERPASS DETAILS

7209 GRK
10/93

Brookfield Fabricating Corp.

P.O. Box 406
Brookfield, Missouri 64628
(816) 258-2214
FAX 816-258-2021

December 20, 1993

Mr. Bill Burnett, Exec. Dir.
Texas Dept. of Trans.
125 E. 11th Street
Austin, Tx 78701
Attn: Design Division

Attn: Richard Wilkinson
Bridge Engr.

Re: Project #NH 90 (191) M
Bexar Co., Tx
TX-4351

We are transmitting for approval seven (7) copies of our shop drawings #1 thru 2 covering bridge - channel diafram details.

Please return one (1) copy of approved or corrected drawings for our files.

RECEIVED
DEC 28 1993
BRIDGE DIVISION

Yours very truly,

BROOKFIELD FABRICATING CORP

Stan Watson
STANLEY B. WATSON

SBW/ph

Texas Department of Transportation

DEWITT C. GREER STATE HIGHWAY BLDG. • 125 E. 11TH STREET • AUSTIN, TEXAS 78701-2483 • (512) 463-8585

January 27, 1994

Shop Plan File: 7209
Your Order: TX-4351

County: Bexar
Control: 2452-02-023
Project: NH 90(191)M
Highway: Lp 1604
Structure: Lp 1604 O'Pass at Kyle Seale Pkwy. EB & WB Mnlanes
Lp 1604 at Huesta Creek EB & WB Mainlanes
Lp 1604 O'Pass at Hausman Road EB & WB Mnlanes
Lp 1604 O'Pass at SH 16 (Bandera Road) WB Mainlanes Only

Brookfield Fabricating Corp.
P. O. Box 406
Brookfield, Missouri 64628

Attention: Mr. Stanley B. Watson

Gentlemen:

We have reviewed your shop drawings, sheets 1 & 2, covering steel diaframs on the above project. The drawings are approved for fabrication and are enclosed.

Any corrections noted in red must be incorporated into the work. Revised prints for these corrections will not be necessary.

One set of any erection drawings, included herein, has been sent to the Contractor.

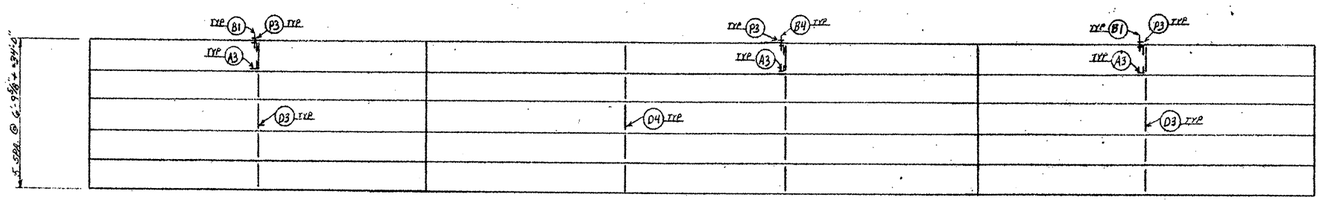
Sincerely,

Original Signed for
Robert L. Wilson, P.E.
Robert L. Wilson, P.E.
Director, Design Division

MAB:ew
Encl.

cc: San Antonio District
Materials & Tests Division
Gilbert Texas Const. Corp.

SP-84

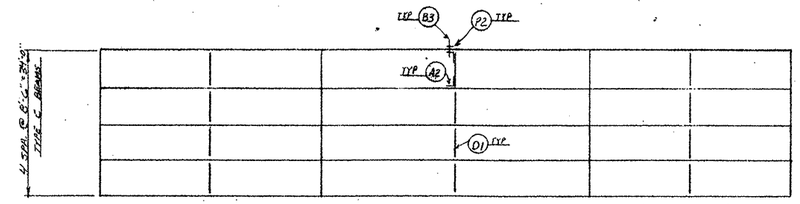


SPAN 1
TYPE 54 BEAMS

SPAN 2
TYPE IV BEAMS

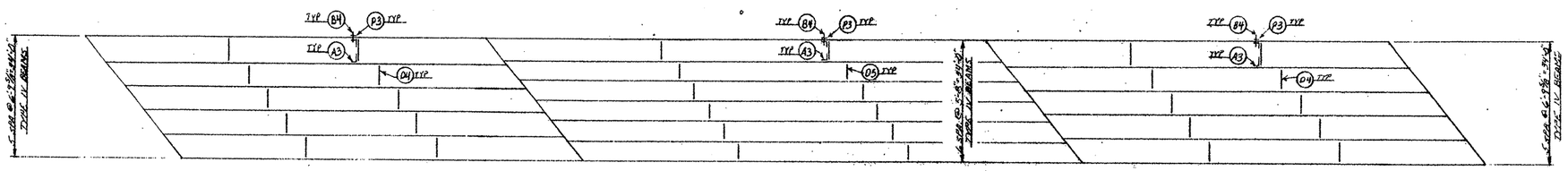
SPAN 3
TYPE 54 BEAMS

PLAN
LOOP 1604 OVERPASS AT KYLE SEALE PARKWAY
EASTBOUND & WESTBOUND MAINLINES TYPICAL



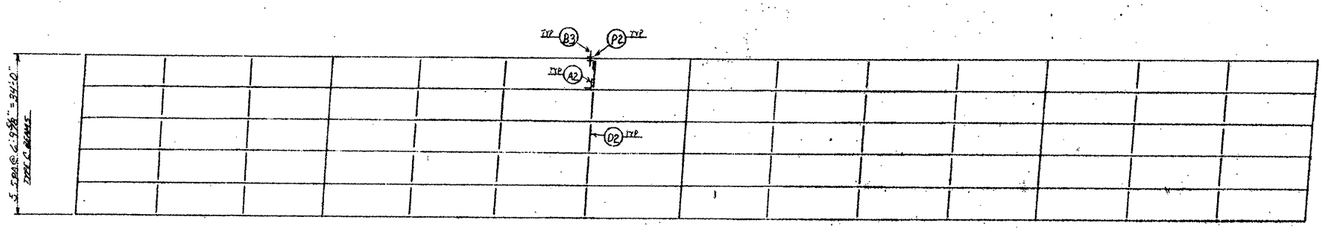
SPAN 1
SPAN 2
SPAN 3

PLAN
LOOP 1604 AT HUESTA CREEK
EASTBOUND & WESTBOUND MAINLINES TYPICAL



SPAN 1
SPAN 2
SPAN 3

PLAN
LOOP 1604 OVERPASS AT HAUSMAN ROAD
EASTBOUND & WESTBOUND MAINLINE TYPICAL



SPAN 1
SPAN 2
SPAN 3
SPAN 4

PLAN
LOOP 1604 OVERPASS AT S.H. 16 (BANDERA RD.)
WESTBOUND MAINLINE ONLY

SP-85

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED EXCEPT AS NOTED
DESIGN DIVISION
JAN 2 • 1994
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

RECEIVED
DEC 28 1993
BRIDGE DIVISION

PRINTS ISSUED						REVISIONS		
FOR	NO.	DATE	FOR	NO.	DATE	NO.	DATE	DESCRIPTION
Approval	7	12-17-93						

Brookfield Fabricating Corp.
P.O. Box 406
Brookfield, Missouri 64628
(816) 258-2016

CUSTOMER: STRUCTURAL & STEEL PRODUCTS, INC.
SHIP TO: GILBERT TEXAS CONSTR. CORP.

PROJECT: WIN 90 (IH) M
BEXAR CO., TX

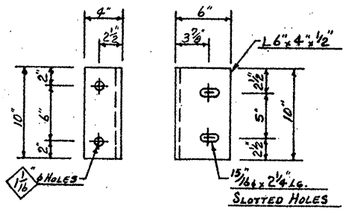
CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY	STATE DISTRICT	FEDERAL REGION
2452	02	023	LP 1604	15	6

DESCRIPTION: LAYOUT PLAN DETAILS OF STEEL CHANNEL DIAPHRAMS FOR VARIOUS BRIDGES.

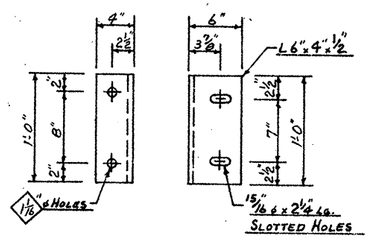
SH. # 1 of 2

PRINTED FOR	DRAWN BY	DATE	CHECKED BY	DATE	JOB NO.	REV.
TEXAS	[illegible]	12-13-93	SW	12-17-93	7a-4361	

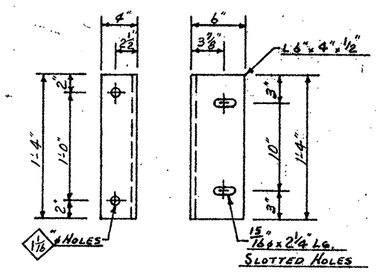
BRUNING 65773



ANGLE MK.- "A1"
0 ~ REQ'D.



ANGLE MK.- "A2"
148 ~ REQ'D.



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208 ~ REQ'D.

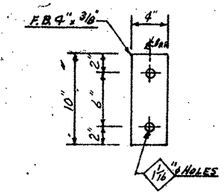

PLATE MK.- "P1"
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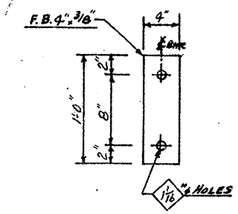


PLATE MK.- "P2"
32 ~ REQ'D.

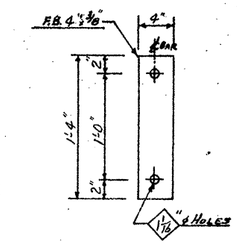
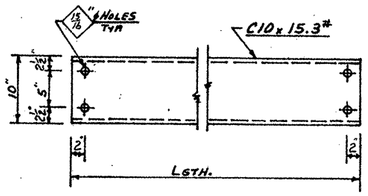
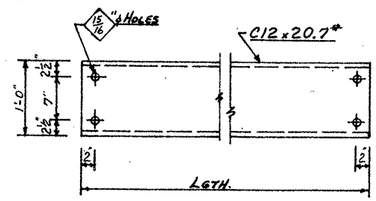


PLATE MK.- "P3"
144 ~ REQ'D.



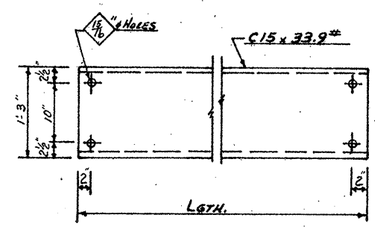
QUAN.	MK.	LGTH.

QUAN.	MK.	LGTH.



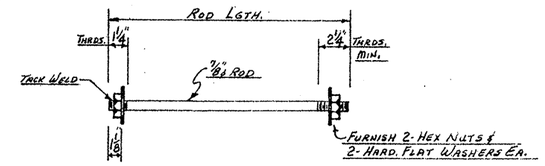
QUAN.	MK.	LGTH.
24	D1	7'-7¼"
50	D2	5'-10⅞"

QUAN.	MK.	LGTH.



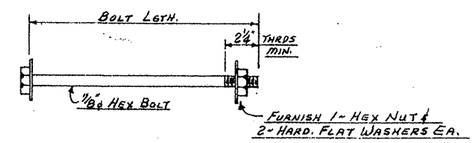
QUAN.	MK.	LGTH.
20	D3	5'-11⅞"
60	D4	5'-9⅞"
24	D5	4'-8¼"

QUAN.	MK.	LGTH.



BEAM WEB CONN. BOLT
ALT. # 1

QUAN.	MK.	ROD LGTH.	WEB THICKNESS
	R1	10"	6"
	R2	10½"	6½"
	R3	11"	7"
	R4	1'-0"	8"



BEAM WEB CONN. BOLT
ALT. # 2

QUAN.	MK.	BOLT LGTH.	WEB THICKNESS	
48	B1	9"	6"	TYPE SH BMS
0	B2	9½"	6½"	
180	B3	10"	7"	TYPE C BMS
304	B4	11"	8"	TYPE IV BMS

BILL OF MATERIAL

QUAN.	MK.	DESCRIPTION	LENGTH	REMARKS
24	D1	C 12 x 20.7#	7'-7¼"	
50	D2	do	5'-10⅞"	
20	D3	C 15 x 33.9#	5'-11⅞"	
60	D4	do	5'-9⅞"	
24	D5	do	4'-8¼"	
148	A2	L 6" x 4" x ½"	1'-0"	
208	A3	do	1'-4"	
32	P2	F.B. 4" x ⅜"	1'-0"	
144	P3	do	1'-4"	
48	B1	⅞" x 9" HS HEX BOLT & NUT ½" FLAT WA		A-325 GALV
180	B3	⅞" ϕ x 10" HS HEX BOLT & NUT ½" FLAT WA		do
304	B4	⅞" ϕ x 11" HS HEX BOLT & NUT ½" FLAT WA		do
216	CONN. BOLTS	¾" ϕ x 2½" HS HEX BOLT & NUT ½" FLAT WA		A-325 GALV
712		¾" ϕ STD. FLAT WA (2" MIN O.D.)		A-307 GALV

TEXAS DEPARTMENT OF TRANSPORTATION
APPROVED EXCEPT AS NOTED
DESIGN DIVISION
JAN 27 1994
APPROVAL OF THIS DRAWING DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE CORRECTNESS OF DETAIL

MATERIAL SPEC.

STRUCTURAL STEEL & PLATE TO BE A.S.T.M. A36.
GALVANIZE ALL STEEL AFTER FABRICATION PER A.S.T.M. A123.
BEAM WEB CONN. BOLT ALT. #1 -
ROD - A.S.T.M. A321 GALV. PER A.S.T.M. A153.
NUTS & WASHERS - A.S.T.M. A325, GALV. PER A.S.T.M. A153.
BEAM WEB CONN. BOLT ALT. #2
HEX BOLT, NUT & WASHERS - A.S.T.M. A325, GALV. PER A.S.T.M. A153.
CHANNEL CONN. BOLTS
HEX BOLT, NUT & WASHERS - A.S.T.M. A325, GALV. PER A.S.T.M. A153.

8/24/04

SP-86

PRINTS ISSUED						REVISIONS		
FOR	NO	DATE	FOR	NO	DATE	NO.	DATE	DESCRIPTION

Brookfield Fabricating Corp.
P.O. Box 408
Brookfield, Missouri 64628
(816) 258-2316

CUSTOMER STRUCTURAL & STEEL PRODUCTS, INC.
SHIP TO: GILBERT TEXAS CONSTR. CORP.
PROJECT NH 90 (941) M
BEXAR CO., TX
CONTROL NO. 2452 SECTION NO. 02 JOB NO. 023 HIGHWAY LP 1604 STATE DISTRICT 15 FEDERAL REGION 6
DESCRIPTION ~~FABRICATION AND~~ FABRICATION DETAILS OF INTERIOR DIAFRAMS

PRINTED FOR	DRAWN BY	DATE	CHECKED BY	DATE	JOB NO	REV
Texas	[illegible]	12-12-02	[illegible]	12-17-02	SC-1221	

SH - 2 of 2

PRINTING 65773