

Special Provision to Item 110

Excavation



Item 110, "Excavation" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 110.2. Construction is supplemented with changes below.

Section 110.2.4. Blasting Requirements.

Section 110.2.4.1. General Requirements. Perform all geotechnical Construction work in conformance with the requirements of this Special Provision.

Section 110.2.4.2. Administrative Requirements. Perform all geotechnical Construction work in accordance with the standards, manuals, and guidelines listed in Table 110-1.

Table 110-1
Standards

No.	Agency	Name
1	TxDOT	Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, Item 110 – Excavation
2	TxDOT	Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, Item 7, Article 11 – Using Explosives
3	Office of the Federal Register	Code of Federal Regulations (CFR), Title 27 Bureau of Alcohol, Tobacco, Firearms and Explosives, Subchapter C Explosives, Part 555 – Commerce in Explosives
4	Office of the Federal Register	Code of Federal Regulations (CFR), Title 29 Labor, Part 1926, Subpart U - Blasting and the Use of Explosives
5	National Fire Protection Association (NFPA)	NFPA 495, Explosive Materials Code
6	FHWA	FHWA Soil Slope and Embankment Design and Construction - Reference Manual, FHWA-NHI-01-026, 2002
7	FHWA	FHWA Rock Slopes - Reference Manual, FHWA-NHI-99-007, 1998
8	AASHTO	AASHTO LRFD Bridge Design Specifications, 9 th Edition, 2020 and all current interims

Section 110.2.4.3. Construction Requirements.

Section 110.2.4.3.1. Blasting.

Section 110.2.4.3.1.1. General. Perform blasting operations, including the storage, handling, and use of explosives and blasting agents, in accordance with the applicable provisions of the TxDOT *Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges*, this Special Provision, and all other pertinent Federal, State, and local regulations. Whenever explosives are used, they must be of such character and in such amount as is permitted by the State and local laws and ordinances and all respective agencies with jurisdiction over explosives, including the Code of Federal Regulations, the NFPA 495, and the local fire department. Contractor is responsible for the effects, including damages, of the blasting operations on adjacent public or private property, including objects, structures, and utilities.

Control ground vibrations and air-blast when blasting near objects, structures, or utilities that may be susceptible to damage from blasting and use properly designed delay sequences and allowable charge weights per delay.

Perform in-depth pre- and post-construction surveys for all structures located within 1/2 mi. of the location of blasting and heavy ripping if any blasting or heavy ripping is planned for construction purposes. This documentation must include both photographic and video documentation.

Preventor remove deleterious drill hole traces, machine scars, and marks from machine scaling or other excavation equipment in the final roadway cutfaces. A deleterious condition is defined to include:

- individual drill holes whose remaining traces total more than 3 ft. aggregate length;
- any portion of any roadway cutbearing drill hole traces whose aggregate length totals more than 25% of the total length of controlled blast holes drilled to form that portion of the cut;
- machine scars traceable for more than 12 ft. which parallel the natural geologic structure, bedding, or principal fracture direction;
- machine scars traceable for more than 6 ft. which do not parallel the natural geologic structure, bedding or principal fracture direction; and,
- machine scars that are approximately parallel and repetitive (groups of 2 or more scars).

Scale all slopes for stability, regardless of excavation technique, or slope finish required.

Minimize blast damage behind the trim line. Blast damage is defined to include:

- widening and loosening of the existing joints, bedding planes, or foliation of the rock mass to remain;
- displacement of blocks of intact rock to remain; and,
- creation of new fractures on the slope to remain.

Section 110.2.4.3.1.2. Protection of Utilities. The Contractor is responsible for damage to utilities.

When blasting operations are within 1,000 ft. of electrical transmission line areas:

- do not use electric detonators within 500 ft. of any transmission line, unless the safety of their use is demonstrated and documented in the Blasting Plan, including measurements of stray and induced currents;
- provide written notification to Utility Owners a minimum of 10 business days before blasting within 1,000 ft. of any transmission line;
- once blasting operations have begun, proceed as continuously as practicable with blasting operations in that area; and,
- prevent fly rock when any portion of any blast is within 300 ft. of the outside phase of the closest transmission line to include prevention measures such as covering the entire shot with mats or soil.

Section 110.2.4.3.1.3. Control of Vibrations and Air-Blast. Locate seismographs between the blast area and the closest susceptible object, structure, or utility. Use seismographs whenever the blast is located within 500 ft. of an existing building, box culvert, retaining wall, bridge structure, pipeline, utility pole, or transmission tower.

Protect all existing facilities from damage from blasting vibrations and air-blast. Deploy and monitor an air-blast monitoring system between the main blasting area and the locations subject to blast damage or annoyance.

Section 110.2.4.3.1.4. Blast Monitoring Plan. Prepare a Blast Monitoring Plan that includes:

- types of instruments proposed for use, including seismographs and transducers for ground vibration, and sensors for air-blast;
- seismographs capable of recording ground motion particle velocity for three mutually perpendicular components of vibration in the frequency range generally found with controlled blasting; and,
- air-blast sensors specifically manufactured for the measuring of blasting noise and sound pressure.
- planned locations (distance and direction) of the monitoring instruments relative to blast locations;
- proposed methods of adjusting blast hole patterns, detonation systems, and/or stemming to prevent venting of blasts and to bring air-blast and noise levels produced by blasting operations within applicable limits;
- proposed methods of documenting occurrence of fly rock;
- qualifications and experience of the instrument operators; and,
- proposed methods to protect the public during blasting operations, including notifying the public, locations and types of signage, fencing, and look-outs.

At least 120 days before the first test blast, submit the Blast Monitoring Plan to the Department for review and approval.

Section 110.24.3.1.5. Blast Information Report. Prepare a Blasting Information Report that includes:

- name and experience of person responsible for blasting;
- methods for and locations of explosives storage, delivery, and handling including a scaled drawing of the location of any magazine to be located within 5 mi. of the worksite, the name and contact information for contact person responsible for assuring the security of blasting materials and supplies stored for use on the Project;
- name, address, and telephone number of all explosives suppliers and identification of all explosives delivery vehicles and operators;
- manufacturers' safety data sheets (and cut sheets) for all explosives, primers, and initiators to be employed;
- methods to be employed for traffic control and other public safety precautions in the use, storage, and transportation of explosives;
- materials, equipment, and excavation and blasting methods that the Contractor proposes to use to build stable finished rock cut slopes to include general methods and approach to blasting which account for the full range of geologic settings and physical conditions present on the project and a description of how the method and approach accounts for various cut geometries, rock types, access problems, categories of fracturing and faulting, and required face contours;
- equipment intended to be used in or in support of blasting operations;
- methods to prevent fly rock;
- methods for preventing rock material from escaping the construction limits and contingency measures for unanticipated rock-fall;
- method of vibration control, vibration monitoring instrumentation, and the identity of the person or persons collecting and analyzing the data; and,
- proposed sequence of excavation of the various major elements of the project

At least 120 days before commencing drilling and blasting operations, submit the Blasting Information Report to the Department for review and approval.

Section 110.24.3.1.6. Test Blasting. Perform a minimum of 1 test blast at each cut location where blasting is proposed, to demonstrate the adequacy of the proposed Blast Monitoring Plan and the effectiveness of the proposed fly rock control measures. Prepare a test blast report for each test blast. The report must include:

- details of the test blast;
- locations and details of blast monitoring;
- fly rock control measures;
- results of ground vibration and air-blast monitoring;
- documentation of fly rock, including particle sizes and travel distances; and,
- Contractor's proposed fly rock control measures based on the test blast results.

Section 110.24.3.1.7. Blasting Plan. Prepare a Blasting Plan for each production blast that includes:

- proposed excavation sequence for the cut;
- station limits of each proposed shot;
- elevations of the tops and bottoms of each lift;
- for each shot, scaled drawings showing plan and section views of all variations of the proposed drill pattern, including clearing limits, free face, burden, blast hole spacing, drill hole location, sub-drill depths, lift height, blast hole diameters, and blast hole angles;
- for each shot, a loading diagram showing powder factor, type and number of explosives, primers, initiators, and locations and heights of stemming for all substantial variations within the pattern;
- for each shot, the initiation method and sequence of blast holes, including delay times and delay system;
- fly rock control measures to be used on each shot;
- estimated quantities of volume of rock in-place and length of both production and controlled blast drill hole;
- location and attitude of significant fracturing, rock type changes, faulting, and special circumstances to be accounted for in the shot design; and,
- vibration criteria, predicted ground motions at sensors, and sensor locations.

Section 110.2.4.3.1.8. Blasting Reports. Prepare a Blasting Report for all production blasts that includes:

- the start and finish of drilling and loading, along with a log of actual explosive loading and any changes in pattern;
- a copy of the blasting shop drawings;
- approximate average drilling rate, soft seams or faults, and any occurrences of water, lost circulation, voids, stuck drill steel, or other complications to drilling;
- depth measurements of all production and control holes;
- name of blasting foreman and date and time of blast; and,
- vibration and air blast records (original printout).

Section 110.2.4.3.2. Slope Stability & Protection. The Contractor is responsible for slope stability throughout the project, both within and adjacent to the project right of way. If any slope instability develops during construction, cease all work in the immediate area within and around the unstable ground until the situation is fully assessed by the Department. Implement temporary slope stabilization measures to ensure the safety of the public and Contractor's personnel before returning to work in the area of unstable ground.

All permanent slope stabilization measures must comply with the minimum global slope stability safety factors in accordance with the *AASHTO LRFD Bridge Design Specifications*, the *FHWA Soil Slope and Embankment Design and Construction - Reference Manual (FHWA-NHI-01-026, 2002)* and the *FHWA Rock Slopes - Reference Manual (FHWA-NHI-99-007, 1998)*.

Section 110.2.4.3.3. Submittals. Table 110-2 reflects a nonexclusive list of Submittals identified in this Special Provision and is not intended to be an all-inclusive or exhaustive listing of Submittals. Determine and submit all Submittals as required by the contract documents, governmental approvals, and governmental entities.

**Table 110-2
Nonexclusive Submittals List**

Submittal	Level of Review *	Number of Electronic Copies	Submittal Schedule	Section Reference
Blast Monitoring Report	2	1	At least 120 days before the first test blast.	110.2.4.3.1.4
Blast Information Report	1	1	At least 120 Days before commencing drilling and blasting operations.	110.2.4.3.1.5
Test Blast Report	1	1	5 business days after completion of each blast test.	110.2.4.3.1.6
Blasting Plan	2	1	At least 5 business days before commencing drilling and blasting operations for each production blast.	110.2.4.3.1.7
Blasting Report(s)	1	1	Within 5 business days after each production blast.	110.2.4.3.1.8

*Levels of review

1. Submit or receive and file.
2. Review, comment and accept.