



6 Existing Road Openings

6.1 General

- A. Any contractor, corporation, public utility or person desiring to open a public way must comply with the City's Street Opening Permit (SOP) policy and the associated standard operating procedures. For further information, please refer to City of Framingham Web site link as follows: http://www.framinghamma.gov/public_works/sop/default.htm.
- B. All work in a public way shall be done in compliance with the minimum standards of the Framingham DPW as set forth herein.
- C. All trench repair work must be guaranteed and bonded as required in the City's Street Opening Permit (SOP) policy.
- D. All work shall be conducted in strict accordance with the latest OSHA regulations.
- E. No excavation shall remain open after working hours (7:30 a.m. to 4:30 p.m. or as specified in specific City requirements). All excavations shall be backfilled and paved, or covered with steel plates as approved by DPW at the end of work each day. Steel plate use requires approval by the DPW. Steel plates are generally not accepted.
- F. All trenches, whether on public or private property, that are at least 3 feet in depth and less than 15 feet in width, regardless of the length, shall be permitted throughout the City of Framingham as required by Massachusetts law.
- F. All pavements shall be cut before excavation is to begin.
- G. Length of Trench Opening:
 - 1. The maximum length of open trench permissible at any time shall be two hundred (200 feet) feet, and no greater length shall be opened for pavement removal excavation, construction, backfilling, repairing, or any other operation without the express written permission of the City.
- H. Workmanship:
 - 1. The Permittee shall furnish all materials and conduct the job in an orderly, timely, quality controlled manner.
 - 2. The Permittee shall keep a competent foreman and sufficient competent employees to carry on the work with proper speed and in accordance with the requirements of law and other public authorities and to the reasonable satisfaction of the DPW (DPW).
 - 3. The Permittee shall conduct the work in a manner that will not unreasonably interfere with other work being done by the City, by contract or otherwise. If deemed necessary by the DPW, the work done under these standards shall conform to the progress of said other work. The Permittee shall cooperate with the contractors or employees who may be doing work for the City, and with public service corporations affected by the work in arranging for storage places, temporary support for structures, repairs, etc.
 - 4. All temporary repairs shall be properly maintained by the Permittee to assure good rideability conditions until the end of the guarantee period or until permanent restoration has been made, whichever first occurs.
 - 5. Permanent pavement restoration accomplished by utility companies shall be properly maintained to assure good rideability conditions until acceptance by the DPW.



6. All existing roadway monumentation shall be inventoried and protected. Any and all impacts shall be brought to the attention of the Engineering Division immediately.
- I. Pavement markings shall conform to MassDOT Standard Section 860.

6.2 Traffic Management

- A. Contractor shall be responsible for all traffic management for the construction work zone, in compliance with the guidance set forth by the ATSSA Guide to Temporary Traffic Control, the MassDOT Work Zone Safety Guidelines, the MUTCD and all federal and state regulations.
- B. The DPW requires that a traffic management plan be prepared and submitted for review and approval. The plan shall show the routing of traffic during construction. The plan shall show the area and dimensions of the roadway pavement available for traffic during each stage of the work. The plan shall include all temporary barriers, signs, pavement markings, drums and other traffic control devices required to maintain traffic together with the limits of temporary pavement and necessary steel plates. The plan shall include all the requirements contained in the City of Framingham Policy on Street Opening Permits.

6.3 Excavation

- A. Removal of asphalt pavement:
 1. All initial excavations into paved street surfaces shall be precut in a neat line with pavement breakers or saws. The initial cutting of the pavement shall be restricted to the area directly over the sidewalls of the proposed trench to be excavated, or as directed by the DPW.
 2. Heavy duty pavement breakers may be prohibited by the City when the use endangers existing substructures or other property.
 3. No irregular shapes will be allowed. No shape will be allowed that would prevent compaction equipment from adequately compacting all of the area. The shape of pavement cutouts shall be rectangular, or a combination of rectangular and square shapes unless otherwise agreed to by the City and Permittee.
 4. Pavement edges shall be trimmed to a neat vertical face free of loose materials and neatly aligned with the centerline of the trench.
 5. Unstable pavement shall be removed over cave outs and overbreaks and the subgrade shall be treated as the main trench.
 6. The Permittee shall make every effort to avoid damage to existing pavement to remain. Any damage shall be promptly repaired by the Permittee.
- B. Removal of concrete pavement:
 1. Saw cutting of reinforced Portland cement concrete is required with the depth of the cut being the full depth of the pavement unless otherwise directed by the DPW to retain reinforcement. Sawcutting may be required by the DPW outside of the limits of the excavation over cave-outs, overbreaks and small floating sections.
 2. Reinforced concrete pavement, to the extent possible, shall be removed without cutting the reinforcement. The bars or mesh, when cut, shall be severed as close to the center of the trench as practicable and bent back to permit accomplishment of the work. When the pavement is ready to be permanently replaced, the reinforcement shall be bent back into position and reinforced with other bars or mesh which shall overlap the ends of existing



reinforcement not less than twelve (12) inches and be securely wired together. Contact faces between new and existing concrete pavement shall be bonded using an approved epoxy binding agent installed and applied in accordance with the manufacturer's instructions, unless otherwise directed by the DPW.

- C. All material excavated from trenches and piled adjacent to the trench or in any street shall be piled and maintained in a manner that will not endanger those working in the trench, pedestrians or users of the streets, and so that as little inconvenience and obstruction as possible is caused to those using streets and adjoining property. The excavated material shall be hauled away from the site by the end of each working day.
- D. The Permittee shall secure the necessary permission and make all necessary arrangements for all required storage and disposal sites.
- E. When excavated material is laid along the side of the trench, it shall be kept trimmed. Whenever necessary in order to expedite the flow of traffic or to abate the dirt or dust nuisance, toe boards or bins may be required by the DPW to prevent the spreading of dirt into traffic lanes. If any portion of the excavated material is allowed to be used as backfill, it shall be stockpiled separately from all other materials.
- F. Sections of sidewalks and curbs shall be removed to the nearest real joint or scored line.
- G. Tunneling, boring or other methods may be required by the DPW to avoid or minimize pavement removal.

6.3.1 Backfill

- A. Before backfilling, the Permittee shall notify the DPW for inspection. Backfilling shall not occur without DPW approval.
- B. In unpaved areas, excavations shall be backfilled as directed by the DPW with approved material conforming to MassDOT Spec M1.02.0 Special Borrow thoroughly compacted in layers not to exceed twelve inches (12 inches) in thickness until flush with the surrounding ground surface. All backfill shall be rough graded and compacted to not less than 95 percent of the maximum dry density of the material as determined by the Standard AASHTO Test Designation T 99, Compaction Test Method C at optimum moisture content. If the backfilled material settles, additional approved materials shall be installed by the Permittee, as required, to keep the surface even. After settlement is completed, the excavated area shall be left by the Permittee in as good a condition as before the work was started.
- C. Temporary sheeting and bracing used to support the side walls shall be removed, unless otherwise directed by the DPW, as backfilling progresses. When backfilling has reached the bottom of a brace, the latter and its horizontal rafter shall be removed, and this procedure shall be repeated throughout the backfilling operation. The sheeting shall be pulled in short increments, care being taken to avoid significant lateral movements of the sides of the trench. During and after pulling the sheeting, the backfill in the space formerly occupied by the sheeting shall be compacted.
- D. Whenever water is found standing in the excavation area, the water shall be removed by pump or other means before backfilling operations may commence.
- E. Backfilling shall be performed as soon as practicable so that the least possible subsequent settling will occur. In most cases backfilling shall occur on the same day as the excavation was begun. If this is not feasible due to the complex nature of work, emergency, or unpreventable conditions, the Permittee shall notify the DPW that same day, if not sooner, and take appropriate measures to protect public safety and infrastructure until work commences again the following day.



- F. Backfill in paved areas shall be granular gravel borrow, processed gravel, sand or crushed stone material. At the City's discretion, in-situ material conforming to MassDOT Spec M1.02.0, Special Borrow may be used for trench backfill above the pipe bedding material and below the roadway foundation materials. The backfill shall be spread in layers not exceeding eight inches (8 inches) in loose depth and thoroughly compacted, up to the pavement subgrade surface. All backfill shall be rough graded and compacted to not less than 95 percent of the maximum dry density of the material as determined by the Standard AASHTO Test Designation T 99, Compaction Test Method C at optimum moisture content.
- G. Broken pavement, large stones, roots and other debris shall not be used in backfill. Unused excavated material shall be removed from the jobsite and disposed of in a manner that will minimize interference and obstruction with pedestrian and vehicular traffic. No material shall be left within the right-of-way once the repair and/or installation is complete.
- H. Backfill material shall be in conformance with 6.2.4.
- The City will allow, and may in some cases require under certain conditions, as an alternate, Controlled Density Fill (CDF) under the following conditions:
1. Only Type IE, Excavatable, Fill will be allowed.
 2. This material shall not be used for bedding material or in situations that will cause floating of the utility lines, or in the presence of cast iron or steel pipes.
 3. CDF placement in trenches shall be fully barricaded or police protected for a minimum of three (3) hours after the pour or until a set is reached that will prevent a hazard to animals or humans.
 4. CDF shall be placed up to the pavement subgrade surface.
 5. CDF shall be separated from gas lines with a minimum of six (6) inches of sand cover over the lines.

6.3.2 Temporary Pavement

- A. Upon the completion of proper backfilling, the Permittee shall install temporary pavement. The Permittee shall take all reasonable measures to complete temporary pavement on the same day excavation work was begun. If same day paving is not achievable due to complexity of work, emergency, or unpreventable conditions, the Permittee must notify the DPW as soon as practicable that same day, if not sooner, and take appropriate measures to protect the public safety and infrastructure until work commences again the following day. The most stringent measures will be required on primary streets. Same day paving will typically be required if work is not expected to be continued the next day, regardless of location.
- B. The Permittee shall notify the DPW 48 hours prior to beginning paving operations for inspection. All hot mixed asphalt paving must first be approved by the DPW or designee as to depth and materials; *this applies to both temporary and permanent paving activities.*
1. Notification of the anticipated timing of all paving activity must be acknowledged by the DPW. Any notification delivered by facsimile machine must be preceded or followed up by a telephone conversation to assure its proper and timely receipt.
 2. Permittees shall endeavor to make a follow-up notification by 9:00 a.m. of each workday that paving is still anticipated. In the event of schedule changes or emergencies, the Permittee shall provide a minimum of one-hour notification to assure inspection availability.



3. If a City inspector is not able to be on site within 24 hours of the acknowledged anticipated start time of paving activity, the Permittee may be allowed to commence paving. Inspector may sample in-place material for specification compliance.
 4. Permittees who do not provide proper notification of paving activities may be subject to required removal and replacement of pavement for the purpose of inspection.
- C. All temporary pavement shall be hot mixed asphalt, conforming to MassDOT Standard Section 460, placed in two (2) inch compacted courses to a total depth of four (4) inches. If existing pavement depth is greater than eight (8) inches, temporary pavement shall be placed in two (2) inch compacted courses to a total depth of six (6) inches. If a layer of concrete, cobblestone, granite pavers, or other supporting material also exists, the Permittee shall install concrete to match that depth prior to installing temporary pavement.
- D. If excavation (or pavement damage) occurs at or within twenty four (24) inches of the edge of trench, the Permittee shall place temporary pavement to the edge of existing sound pavement.
- E. Hot mixed asphalt paving of trenches deemed by the DPW to be major excavation shall be paver applied, unless otherwise authorized by the DPW.
- F. The Permittee shall maintain the temporary pavement and shall keep the temporary pavement in acceptable condition until the end of the guarantee period, or until permanent pavement is installed.
- G. The Permittee shall perform the necessary restoration beyond the limits of the street pavement, including lawns, esplanades, shrubs, gardens, curbing, sidewalks, underdrains, separations fabrics, fences, walls, etc. Upon completion of the permanent repairs outside the limits of the street pavement, the Permittee shall notify the DPW in writing that the permanent repairs and/or replacements have been completed, setting forth the date of completion. The Permittee shall maintain the repaired area outside of the pavement for a period of three (3) years after completion, with the exception that once proper horticultural growth has been established, no further horticultural maintenance will be required.
- H. Refilling of bar holes made in the street or sidewalk shall immediately, upon completion of the work, be filled with compacted, granular material up to three (3) inches below the paved surface and the remaining three (3) inches filled with an approved asphalt plug.
- I. All traffic control signs (i.e. STOP, YIELD, DO NOT ENTER, ONE WAY, NO PARKING, SPEED LIMIT, CURVE WARNINGS, etc.) approved by the DPW for removal, relocation, replacement, etc. shall be immediately replaced by the Permittee, unless otherwise directed by the City's Traffic Engineer. No such traffic control sign shall be removed, relocated or replaced without the express approval of the DPW.
- J. All traffic devices, signs, pavement markings or traffic loops disturbed, damaged, altered or removed by the Permittee shall be promptly replaced by the Permittee, unless otherwise directed by the DPW, in accordance with City and State of Massachusetts rules and regulations at the expense of the Permittee. The Permittee shall promptly repair all other damage caused by the work or activities. Street markings (centerlines, crosswalks, stop bars, lane markings, etc.) and traffic loops shall be replaced no later than thirty (30) days after completion of work or as may be directed by the City's Traffic Engineer. If work disturbs centerlines or lane markings on primary streets, the Permittee shall place temporary reflective markers immediately after the pavement is placed. Traffic markings must be restored by end of day, either after removal or paving. Temporary markings are allowed.



- K. The total thickness of the gravel base material and temporary pavement shall be of an adequate thickness to allow for the proper permanent roadway cross section. Extra gravel base may need to be installed.

6.3.3 Permanent Pavement

- A. The existing pavement shall be saw cut a minimum of six (6) inches beyond the initial excavation limits to expose a six (6) inch width of undisturbed soil.
- B. The temporary pavement, backfill and undisturbed soil shall be removed to the depth of the proposed pavement and disposed of off the site.
- C. The permanent pavement shall be:
 - 1. Local Streets: 1.5 inches of Top Course material placed on 2.5 inches of Binder Course material founded on 4 inches of Dense Graded Crushed Stone on 8 inches of Processed Gravel or Dense Graded Crushed Stone. This pavement structure shall be placed on the backfill.
 - 2. Collector Streets: 2 inches of Top Course material placed on 4 inches of Binder Course material placed in two equal courses founded on 4 inches of Dense Graded Crushed Stone on 8 inches of Processed Gravel or Dense Graded Crushed Stone.
 - 3. Arterial Streets: 3 inches Modified Top Course material placed in two courses on 5-inches of Binder Course material placed in two equal courses founded on 4 inches of Dense Graded Crushed Stone on 8 inches of Processed Gravel or Dense Graded Crushed Stone.
- D. Trench backfill and roadway foundation materials shall be checked for compliance with 95 percent compaction requirement. If compaction is found to be less than 95 percent, trench shall be re-compacted before paving will be allowed.
- E. Permanent pavement restorations shall not be allowed to commence until at least one hundred twenty (120) days have passed since the installation of approved temporary hot-mixed asphalt pavement.
- F. In cases where the existing pavement adjoining a proposed excavation is in need of rehabilitation, the City and Permittee may enter into a mutual agreement such that the Permittee undertakes the pavement rehabilitation as part of their pavement restoration.
- G. The Permittee will not be required to repair or replace damaged pavement existing prior to commencement of the work unless excavation operations result in small, unstable sections. These shall be removed and replaced as part of the work.
- H. Each course of hot-mixed asphalt shall be compacted separately, meeting the requirement of 92 percent minimum compaction of standard laboratory maximum theoretical density for the specific material.
- I. Mechanical compactors will be permitted for repairs less than 10 square yards. Repairs exceeding 10 square yards shall be rolled with an appropriately sized, power-driven, steel-wheeled roller to obtain specification density.
- J. Hot-mixed asphalt materials shall be laid upon an approved clean, dry, compacted surface, spread and struck off to the established grade and elevation, giving regard to the loss in depth between loose and compacted mixtures. Immediately after the hot mix asphalt mixture has been spread, struck off, and surface irregularities adjusted, it shall be thoroughly and uniformly compacted.



- K. All saw cut vertical faces of existing pavement shall be neat, free of loose materials, and tack coated with an approved asphalt emulsion by applying the emulsion material in conformance with MassDOT Standard Specifications Section 460.62, to fully cover the surfaces prior to pavement installation.
- L. A tack coat shall be applied to the sub-base surface, or previous course surface.
- M. If two or more excavations are made for the same utility or client in the same construction season and are within six (6) feet of each other, edge to edge, they shall be permanently restored as one trench, including the pavement between excavations.
- N. Same requirement shall apply, if in a future season, an excavation for the same utility or client occurs within six (6) feet and the first has not yet been permanently restored.
- O. If an excavation for the same utility or client falls within six (6) feet of another excavation already permanently restored, the permanent pavement of the second excavation shall include all surface pavement between both excavations.

6.3.4 Material Specification – Trenches

- A. Special borrow shall conform to MassDOT Spec. M1.02.0.
- B. Granular gravel borrow and processed gravel material backfill shall conform to MassDOT Spec. M1.03.0, Gravel Borrow Type (b) and MassDOT Spec. M1.03.01, respectively.
- C. Sand borrow shall conform to MassDOT Spec. M1.04.0.
- D. Controlled Density Fill (CDF) Type IE Excavatable shall conform to MassDOT Spec. M4.08.0.
- E. Pavement structure subbase material shall be either MassDOT M1.03.1 Processed Gravel for Subbase or MassDOT M2.01.7 Dense Graded Crushed Stone for Subbase. The material shall be spread in layers not exceeding eight (8) inches in loose depth and compacted to no less than 95 percent of the maximum dry density of the material, ASTM D1557.
- F. Temporary pavement shall be hot-mixed asphalt MassDOT Type I top course material conforming to MassDOT M3.01.0 and M3.11.07.
- G. Steel Plates. Steel plates shall not be used without DPW's approval. See Section 6.3, Special Conditions, for design and construction requirements.
 - 1. Plates and supporting members shall be steel, either new or used.
 - a. All materials shall be sound and free of damage or deterioration that would adversely affect functions.
 - b. Load and deflection calculations shall be used on ASTM A36 / A36M steel unless Contractor provides evidence that all steel used for the plate systems will be a higher strength grade.
 - 2. Steel plates in vehicular and pedestrian traffic areas shall be coated with an approved skid-resistant coating. Preparation of the surface and application of the coating shall be in accordance with all of the manufacturer's guidelines. Coatings shall be maintained on 100 percent of the surface of plates carrying vehicular and pedestrian traffic. Repairs shall be made to worn or deficient areas.
- H. Permanent pavement materials shall conform to the same MassDOT Standard Specifications as required for temporary pavement.



- I. Portland Cement Concrete shall conform to the requirements of Section M4 of the MassDOT Standard Specifications.
- J. Reinforcing shall be FIBERMESH fibers (100 percent virgin polypropylene, collated, fibrillated fibers) at a rate of 1.5 lbs. per cubic yard of concrete will be allowed for non-structural reinforcement. Installation shall be per manufacturer's recommendations.
- K. Loam shall conform to MassDOT Standard Specification Section 1.05, Loam Borrow. Loam shall have a finished depth of six (6) inches (minimum).
- L. Seeding shall conform to MassDOT Specification Section M6.03. Permittees shall be required to continually seed and water areas of loam until a satisfactory growth of grass is established.
- M. Filter fabric for underdrain shall be equivalent to Mirafi 140 by Fiber Industries.

6.4 Special Condition(s)

- A. Disposal of removed pavement, concrete, soil, or other material shall comply with the DPW's Waste Management and Soil Management specifications. The disposal location and management plan shall be pre-approved by the DPW, prior to the start of any work.

Steel Plates

- 1. Design Requirements:
 - a. The Permittee shall select and design the temporary steel plate and supporting system. The design calculations and Drawings shall be prepared, signed, and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts experienced in design of temporary traffic decking.
 - b. Design shall be in accordance with Loads and Design Criteria standard to the industry for this type of work, and with the following requirements:
 - (i) For vehicular ramps, limit maximum grade to 5 percent.
 - (ii) For pedestrian ramps, limit maximum grade to 8 percent.
 - (iii) Conform with Americans with Disabilities Act Accessibility Guidelines (ADAAG) at all pedestrian traffic locations.
 - (iv) Design of support members shall allow clearances for existing and relocated utilities.
 - (v) Provide access to utilities, fire hydrants, and other facilities requiring unique access. Requirements at each site shall be obtained from the respective agencies affected.
 - (vi) Plates shall overlap the trench width by at least 2 feet on each side.
- 2. Construction Methods:
 - a. Install and maintain the temporary steel plate systems only with express DPW approval.
 - b. Not more than two (2) steel plates shall be used at any time.
 - c. Steel plates shall not be used between November 15 and April 1 or at any time when snow is forecasted.
 - d. Place 48" x 48" orange and black construction sign, stating "Steel Plates 100 feet" to provide drivers with advanced notice.
 - e. Provide wood wedges under plate edges at uneven surfaces to minimize movement.



- f. Pin plates to existing asphalt as shown in the details provided in the Street Opening Permit “Steel Plate Detail 2009” available at <http://www.framinghamma.gov/index.asp?nid=207>.
3. Illumination:
 - a. Provide illumination in plated areas that will carry pedestrian traffic.
4. Maintenance:
 - a. Inspect the condition of temporary steel plates at least once a day. Continuously maintain plates to conform to design requirements and construction requirements. Immediately repair defects such as broken, bent, or loose plate members, and protruding fasteners. Patch adjacent paving as potholes develop, and immediately re-secure and bed loose transition members, plates, and ramps to the existing pavement.
 - b. Maintain steel plates free of accumulations of snow, ice, water, mud, and debris.
 - c. Perform maintenance, repair, or replacement whenever there is noticeable deterioration of any material or component from its original conditions.

6.5 References

All materials and execution shall conform to the highest applicable standards. If there is a conflict between other standards, or between other standards and these Design standards, then the most stringent criteria shall be used.

These standards draw and refer to the *Commonwealth of Massachusetts - Massachusetts Highway Department: Standard Specifications for Highways and Bridges* (1995 et seq.) and the *Commonwealth of Massachusetts - Massachusetts Highway Department: Construction and Traffic Standard Details* (1996 et seq.). These two documents are referred to collectively as the MassDOT Standards. In addition to the MassDOT Standards, the City references AASHTO, and ASTM as guidance for the materials and execution of work performed on the City Roadway Infrastructure. The following summarizes select standards applicable to the sections in these Design Standards. This list is not exclusive; other standards may apply. The latest revision of each standard shall be referenced.

Standard	Title/Subject
ATSSA	Guide to Temporary Traffic Control in Work Zones
MassDOT	Work Zone Safety Guidelines for Massachusetts Municipalities and Contractors
MassDOT Standards	Massachusetts Department of Transportation: Standard Specifications for Highways and Bridges
MassDOT Standards	Massachusetts Department of Transportation: Construction and Traffic Standard Details (1996 et seq.)
ADAAG	Americans with Disabilities Act Accessibility Guidelines
ASTM A36 / A36M	Standard Specification for Carbon Structural Steel
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³)
US DOT	Manual on Uniform Traffic Control Devices
US DOT	Manual on Uniform Traffic Control Devices