SECTION 02595

UTILITY CUTS, BACKFILL AND PAVEMENT PATCHING

PART 1 – GENERAL

1.1 DESCRIPTION

The Work covered by this section concerns the furnishing of all labor, equipment, supplies, and materials necessary for reconstruction and repair of utilities and improvements in existing streets, or other pavements, within the public right-of-way or public easements within the Town of Windsor or its Growth Management Area. The Work shall consist of cutting and carefully removing pavement wearing surfaces, excavation of sub-bases and materials to the necessary depth for reconstruction and/or repair, utility installation or repair, backfilling, compaction, and pavement replacement in accordance with these specifications and in conformance with the lines, grades, typical cross sections, and thickness as shown on the approved plans.

All infrastructure elements that undergo reconstruction and repair shall be restored to a condition equal to, or better than, the initial condition prior to repairs.

Utility cuts on State Highways is governed by State law and regulations, and these Standards where they may apply, and all utility work in State Highways shall be reviewed and approved by the Colorado Department of Transportation (CDOT) prior to any excavations.

1.2 QUALITY ASSURANCE

Quality Assurance shall be as specified in **Section 01010**, **Summary of Work**, Subsection 1.3.C., and as modified herein:

A. If the reconstruction and repair improvements occur in an existing Town roadway paved with asphalt pavement, Quality Assurance and construction processes shall be as specified in **Section 02575, Bituminous Paving – SuperPave Method**, and as modified herein.

B. If the reconstruction and repair improvements occur in an existing Town roadway paved with Portland Cement concrete pavement, Quality Assurance and construction processes shall be as specified in **Section 02585, Portland Cement Concrete Pavement**, and as modified herein.

C. Removal and replacement of unsatisfactory work shall be completed within fifteen (15) days of written notification from the Town Engineer of the deficiency unless the condition is deemed an emergency requiring immediate correction. In the event the replacement work is not completed within the specified time period, the Town Engineer may take action to complete the work and charge the Contractor/Owner for all related costs.

1.3 JOB CONDITIONS

Job Conditions shall be as specified in **Section 01010, Summary of Work**, Subsection 1.3.I., and as modified herein:

A. Verification of Existing Utilities.

1. Responsibility. The Contractor/Owner is responsible for field locating and verifying elevations of all existing sewer mains, storm mains, water mains, service lines, and other utilities at the points of connection shown on the plans, and at utility crossings prior to any reconstruction or repair.

2. Pot Holing. All excavations for utility locates, unless otherwise approved by the Town of Windsor Engineering Division, shall be made by the pot holing method. All pot holing locates shall meet the following requirements:

a. Locate potholes shall not be placed within the wheel track of a travel lane.

b. All locate potholes in the pavement section shall be cored with a circular coring saw with a maximum diameter of twelve (12") inches. The plug shall be carefully removed without causing damage.

c. Materials beneath the wearing surface shall be removed by methods approved by the Town Engineer that will not damage the utility or facility.

d. Excavations for potholes shall be backfilled with flowable fill and capped with non-shrink grout in conformance with **Section 02223**, Subsection 2.2. Native material removed shall not be used to backfill the pothole.

e. The caps on the backfilled potholes shall be five and a half (5½") inches thick in local streets, seven and a half (7½") inches thick in other streets, and shall be finished between one quarter (¼") inch and one half (½") inch below adjacent pavements. Alternate methods must be approved by the Town Engineer.

f. Initial locate potholes may be temporarily repaired, meeting all applicable safety requirements, for no more than thirty (30) days unless additional time is authorized by the Town in writing. Initial locate potholes may be reused during construction.

B. Design Alignment.

1. The utility alignment shall not vary greater than eighteen (18") inches plus one half (½) of the diameter of the proposed conduit from the approved design horizontal alignment or thirty six (36") inches plus one half (½) of the diameter of the proposed conduit from the approved design vertical alignment without prior Town approval.

2. If the designed alignment conflicts with other facilities not shown on the approved plans, or a design modification is required, the permittee shall submit an alignment modification request and the change shall be approved by the Town prior to proceeding.

3. All underground cables and wires, excluding electrical, shall be placed within a conduit sleeve, with a locator tracer.

4. All underground installations shall have a minimum of thirty (30") inches of cover below the roadway surface.

C. Traffic Control.

1. When it is necessary to obstruct roadways or pedestrian ways, the permittee shall submit traffic control plans, in compliance with the Manual on Uniform Traffic Control Devices (MUTCD), showing all work and including the following information:

a. Each lane closure scenario, including work zones for locate pothole work.

b. Lane configurations and access locations specific to the actual work zone.

c. Any upstream intersections within five hundred (500') feet of the work zone, showing all impacted inbound lanes to the intersection.

d. Pedestrian route detours showing the nearest crossing intersection at each end of the work zone.

e. Proposed hours of operation of each traffic control setup.

2. All traffic control plans shall be prepared under the supervision of a certified Work Site Traffic Control Supervisor. Documentation of certification shall be submitted with the traffic control plans(s).

3. Unless otherwise noted on the permit, lane closures shall be permitted only between the times shown below:

    a. For Arterial and Collector roadways: between 8:30 a.m. and 3:30 p.m. on weekdays, and, upon written approval of the Town Engineer, between 8:00 a.m. to 7:00 p.m. on Saturdays, and 10:00 a.m. to 7:00 p.m. on Sundays.

    b. For Local roadways: between 8:00 a.m. and 4:30 p.m. on weekdays, 8:00 a.m. to 7:00 p.m. on Saturdays, and 8:00 a.m. to 6:00 p.m. on Sundays.

4. When conditions warrant, in order to minimize impact to the motoring public, the Town may require that the permittee perform work between the hours of 7:00 p.m. and 6:00 a.m. or on weekends. Timing of reconstruction and repair work may be restricted by the Town Engineer to certain time periods to accommodate traffic and other public uses.

5. When planning construction phasing and developing traffic control plans, the permittee shall make every effort to minimize the impact to the motoring public and maintain the capacity of the roadway system. The Town may require that a traffic control plan be modified to comply with this requirement. The permittee shall make adequate provisions to assure that traffic and adjacent property owners experience a minimum of inconvenience.

6. All signs and devices shall conform to the Manual on Uniform Traffic Control Devices (MUTCD). The devices and signs shall be clean, legible, and properly mounted. All signs and devices used for the night operation shall meet the retro reflective requirements of CDOT Specifications Section 713.10.

7. For major installations, as defined by the Town Engineer, the Town may require that a permittee place Variable Message Boards five (5) working days in advance of the work to notify the travelling public of the upcoming construction impacts. All costs for this work shall be borne by the permittee.

8. If the closure of a street is required for completion of the work, the permittee shall provide all notifications to emergency agencies, government entities, school and bus districts, newspapers, adjacent businesses and homeowner's associations in a format approved by the Town.

9. No permittee shall block access to any private property, fire hydrant, fire station, utility structure, or any other emergency response equipment unless the permittee provides the Town with written approval from the affected agency and/or property owner.

10. When necessary for public safety and when required by the Town, the permittee shall employ flag persons to control traffic around or through the work site.

11. The permittee shall be responsible for maintaining all work area signing and barricading required throughout the duration of work. During non-work hours, all signs that are not appropriate shall be removed, covered or turned around so that they do not face traffic.

12. Any deficiencies noted by the Town shall be corrected immediately by the permittee. If the permittee is not available or cannot be found, the Town may make the required corrections and charge the cost thereof to the permittee.

13. If a temporary patch is used and construction traffic control for the project is terminated, the appropriate contractor must obtain another Street Cut Permit, including the approval of a construction Traffic Control Plan, to provide for the final patch work. This is to insure proper approval of traffic control and schedule inspections. If this final patch work is completed within thirty (30) days of the temporary patch, no additional fees will be charged for the follow-up permit.

D. Equipment.

1. The use of trench digging equipment will be permitted only in places where its operation will not cause damage to existing structures or features, otherwise, hand methods shall be employed.

2. Backhoe equipment outriggers shall be fitted with rubber pads or other like protective material whenever outriggers are placed on any paved surface.

3. No tracked vehicles will be permitted on streets unless approved by the Town Engineer. When tracked vehicles are allowed, specific precautions shall be taken to protect the pavement surface and damaged facilities shall be restored to original condition at the Contractor's/Owner's expense.

4. Haul routes for equipment and materials may be restricted as a condition of the Permit.

5. All equipment and trucks tracking mud and debris into a public right-of-way shall be cleaned of mud and debris at the end of each day or as otherwise directed by the Town.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

Product Delivery, Storage and Handling shall be as specified in **Section 01010**, **Summary of Work**, Subsection 1.3.D., and as modified herein:

A. If the reconstruction and repair improvements occur in an existing Town roadway paved with asphalt pavement, Product Delivery, Storage and Handling and construction processes shall be as specified in **Section 02575, Bituminous Paving – SuperPave Method**, and as modified herein.

B. If the reconstruction and repair improvements occur in an existing Town roadway paved with Portland Cement concrete pavement, Product Delivery, Storage and Handling and construction processes shall be as specified in **Section 02585, Portland Cement Concrete Pavement**, and as modified herein.

PART 2 – MATERIALS

2.1 FLOWABLE BACKFILL

Flowable backfill meeting the requirements of **Section 02223**, **Structural Backfill**, Subsection 2.2, shall be used to backfill all open cuts in portions of the Public right-of-way beneath existing paving, curb, gutter, or sidewalk improvements. Alternate backfill methods for large excavations (greater than one hundred (100 cy) cubic yards) will be considered on an individual basis with the Town Engineer.

2.2 BASE COURSE

If the existing base course material is untreated, it shall normally be replaced with CDOT Class 5 or 6 aggregate base course material and compacted in lifts not to exceed six (6") inches in thickness. The resulting total compacted base thickness shall be the thickness of the removed base plus two (2") inches.

2.3 NATIVE BACKFILL

A. In cases where flowable backfill is not required and the Contractor wants to use the excavated onsite material, the material must be evaluated by a Geotechnical Engineer. The engineer must confirm in writing that the material meets structural fill requirements. A proctor curve for each different type of the material must accompany the letter from the engineer. Backfill of suitable material shall be placed in maximum eight (8") inch lifts and mechanically compacted. Density and moisture control shall be per CDOT Specifications Section 2.03.

B. The Contractor shall provide compaction testing for all backfill work per the requirements of Subsection 1.2, Quality Assurance, stated above. Compaction test requirements shall be at least one per one hundred fifty (150') lane foot, minimum of two (2) tests per lift. Each lift not tested in accordance with these requirements may be rejected by the Town Engineer.

2.4 STRUCTURAL BACKFILL

Structural backfill meeting the requirements of **Section 02223**, **Structural Backfill**, Subsection 2.1, may be used to backfill bridges, box culverts, or where otherwise specified, and permitted only upon approval of the Town Engineer.

2.5 BRIDGING PLATES

When required by the Town Engineer, substantial steel bridging, properly anchored and capable of carrying the legal limit loading, in addition to adequate trench bracing, may be used to bridge across trenches at street crossings where trench backfill and temporary patches have not been completed during regular working hours. Steel bridging plates shall meet the following minimum requirements:

A. Steel bridging plates shall typically be four (4') foot by eight (8') foot in width and length, one (1") inch thick minimum, and shall be secured to the pavement with anchored pins so that it does not slip. The bridging plate shall extend over supporting pavement by a minimum of one (1') foot on all sides. Asphalt material shall be placed at the edges of the plate to provide a ramp at a minimum 1:12 slope.

B. The Contractor's design engineer shall certify in writing the suitability of the plates for the specific use proposed. Typically, bridging plates shall be ASTM A709 Grade 50W steel and meet AASHTO M270 requirements.

C. The use of bridging plates shall not be allowed from October through April. Use of bridging plates shall only be allowed with the prior approval of the Town Engineer.

2.6 ASPHALT PATCHING

If the reconstruction and repair improvements occur in an existing Town roadway paved with asphalt pavement, materials for Street Pavement Patching shall be as specified in **Section 02575, Bituminous Paving – SuperPave Method**, Subsection 2.1 thru 2.8, and as modified herein:

A. Minimum requirements for temporary patching material shall be well-compacted surfacing material conforming to "Road Mixed Asphalt Surfacing Material" of the CDOT Specifications.

B. Patching material shall match flush with the existing pavement surface and shall have a thickness one (1") inch greater than the existing pavement and shall not be less than four (4") inches thick.

C. The mineral aggregate shall conform to the grading specified for three eights (3/8") inch maximum aggregate plus or minus five (± 5%) percent.

D. Bituminous binder to be mixed with the mineral aggregate shall be liquid asphalt, Grade MC-3000, and shall be an amount between five and a half (5½%) and six (6%) percent by weight of the dry mineral aggregate. Asphalt binder grading shall be PG 64-22 or PG 58-28.

2.7 PORTLAND CEMENT CONCRETE PATCHING

If the reconstruction and repair improvements occur in an existing Town roadway paved with Portland Cement concrete pavement, materials for Street Pavement Patching shall be as specified in **Section 02585, Portland Cement Concrete Pavement**, and as modified herein. Materials for the repair or reconstruction of concrete sidewalks, curbs, gutters, aprons, ramps, pedestrian crossing, etc. shall also meet these requirements.

A. Concrete Pavement. Patching material shall match flush with the existing concrete pavement surface and shall have a thickness one (1") inch greater than the existing pavement and shall not be less than eight (8") inches thick.

B. Concrete Sidewalks. Patching material shall match flush with the existing concrete sidewalk surface and shall have a thickness one (1") inch greater than the existing sidewalk and shall not be less than four (4") inches thick for sidewalks without vehicle access and are located behind vertical curb and gutter, and shall not be less than six (6") inches thick for sidewalks with drive over curb and gutter.

C. Concrete Flat Work. Patching material for all other flat work concrete surfaces shall match flush with the existing concrete surface and shall have a thickness one (1") inch greater than the existing flat work and shall not be less than six (6") inches thick.

D. Concrete Strength. All concrete repair material and placement shall be CDOT Class P, with four thousand two hundred (4,200 psi) pounds per square inch compressive strength at twenty eight (28) days. Mix design shall be performed in accordance with the provisions of CDOT Specifications 601.05.

E. Quick Curing Concrete. The use of quick curing concrete (3,000 psi strength within 48 hours) shall be used on all Arterial and Collector streets when repair areas are less than five hundred (500 ft^2) square feet or when temperatures are below forty (40°) degrees F. Mix design shall be performed in accordance with applicable CDOT Specifications.

2.8 AGGREGATE

When reconstruction and repair improvements occur in streets or alleys that have only a gravel surface, the Contractor shall replace such surfacing on a satisfactory compacted backfill with gravel aggregate conforming to CDOT Class 5 or Class 6 aggregate base course.

A. The thickness of gravel replacement shall be one (1") inch greater than the thickness of the original gravel surface, but shall not be less than four (4") inches. The surface shall conform to the original street grade.

B. Where the completed surface settles, additional gravel material shall be placed and compacted by the Contractor immediately after being notified by the Town Engineer, to restore the roadbed surface to finished grade.

C. Where existing graveled streets or alleys may have been previously treated with a special surface treatment to control dust and/or bind the aggregates together, the Contractor is responsible for installing the gravel surface in the same manner. Such surface treatments shall be of the same chemical composition as what existed prior to the excavation work.

2.9 BORING AND CASING

Utility crossings under sidewalks, curbs, roadways, etc., may be made by boring and casing and then installing the utility; however, boring and casing will not be allowed where existing PVC conduits are available. Materials shall meet the following requirements:

A. Casing Pipe. The casing pipe shall be fabricated steel having a minimum yield strength of thirty five thousand (35,000 psi) pounds per square inch. The minimum wall thickness shall be as shown in **Table 02595-1**, below, or as otherwise noted on the approved drawings:

Table 02595-1
Casing Wall Thicknesses

Casing Pipe Diameter	Minimum Wall Thickness
36" and smaller	3/8 inch
42" and smaller	5/8 inch

Casing pipe placed by boring may be bare steel pipe unless otherwise noted on the plans. Cathodic protection shall be as recommended by the manufacturer, but at a minimum shall consist of a five (5 lb) pound anode bag placed at and connected to each end of the steel casing pipe. A locator tracer wire or tape shall be installed above the casing pipe.

B. Carrier Pipe. The carrier pipe shall be approved PVC pipe, ductile iron pipe, reinforced concrete pipe, vitrified clay pipe or other materials approved by the Town Engineer or specific utility. Carrier pipes

shall be installed with a minimum of four (4) polymer skids, CCI Pipeline System type or approved equal, banded to the pipe with stainless steel clamps per manufacturer's specifications. Restrained casing spacers, if required, shall be installed as directed. A rubberized casing seal, specifically manufactured for the casing and carrier pipe diameters proposed, shall be installed on both ends of the bore and clamped with two (2) stainless steel adjustable clamps each end.

PART 3 – EXECUTION

3.1 WEATHER LIMITATIONS

A. Bituminous Materials. Bituminous material shall not be applied when the weather conditions would inhibit the desired function. No bituminous material shall be applied to any surface that is wet, frozen, or in any other condition that the Town Engineer or his authorized representative shall consider unsuitable.

1. Placement Temperatures. Hot, bituminous asphalt materials shall be placed only when both air and surface temperatures equal or exceed the temperatures specified in **Table 02575-17, Placement Temperature Limitations**.

2. Temporary Patching. The Work shall be scheduled so that no unpatched surface is left without surfacing for more than ten (10) calendar days from October 1st to March 1st. Temporary patches shall be installed in compliance with **Section 02575**, Subsection 3.1.B, "Weather Limitations, Temporary Pavement Layer".

B. Portland Cement Concrete Materials. All concrete patching installations shall be done in compliance with **Section 02585**, Subsection 3.1.A & B, "Weather Limitations".

3.2 PLANNING AND PREPARATION

A. Permits Required. All Contractors, public utility agencies, and private property owners performing reconstruction and repair improvements, installing public or private improvements, or storing materials or equipment, within any public right-of-way or easement, must obtain the required permit prior to the commencement of the Work.

1. Applications for Excavation Permits are available at the public counter of the office of the Town Engineer. The application form must be completed and submitted to the Town Engineer along with the required items stated on the permit application.

2. The application will be reviewed by the Town Engineer. If additional information is required, the Applicant will be contacted at the provided phone number and/or address. The Town will check to make certain that the Applicant has provided the required bond and, when applicable, the license and insurance certificates. Once the permit application and all required submittals have been reviewed and found to be complete, the Permit may be issued by the Town.

3. The Applicant shall pay all required fees, provide specified insurance and surety (if required), and supply appropriate plans, drawings, traffic control schedules, and other supporting documents if necessary.

4. The Applicant shall be responsible for coordinating any utility work including relocation of utilities, obtaining separate permits or permission including easements.

5. Application for required permits shall be submitted at least five (5) working days prior to commencement of construction.

B. Locates. The Permittee shall at all times take proper precautions for the protection of existing utilities, the presence of which are known or can be determined by field locations of the utility companies. The Permittee shall contact the UNCC (One Call) at 1-800-922-1987 for utility locates, a minimum of two (2) working days prior to proposed start of work. Other unregistered utility entities (such as irrigation ditch

companies) shall be contacted individually to arrange locating their utilities. Utility service laterals shall be located prior to beginning excavation or grading.

1. Utility markings shall be limited to the boundaries of the construction area. Flagging and other protrusions shall be removed within forty five (45) days of the completion of work. The Town may require the removal of paint markings.

2. Permittee shall advise the Town at least forty eight (48) hours in advance of the date work will be started and shall notify the Town at least twenty four (24) hours in advance if this date is changed or cancelled.

C. Worksite Maintenance. Each Permittee shall maintain its work site so that:

1. Trash and construction materials are contained and not blown off the work site.

2. Trash is removed from a work site often enough so that it does not become a health, fire, or safety hazard.

3. Trash dumpsters and storage or construction trailers shall not be placed in the street.

4. As the work progresses, all public rights-of-way and other property shall be cleaned of all rubbish, excess dirt, rock, and other debris, at the sole expense of the Permittee.

5. Utilize best efforts to eliminate the tracking of mud or debris upon any street or sidewalk. Streets and sidewalks shall be cleaned of mud and debris at the end of each day.

6. Utilize erosion control measures to prevent erosion and degradation of water quality.

7. Provide employee and construction vehicle parking so that there is no parking in the neighborhood adjacent to the work site. There shall be no unauthorized parking on sidewalks.

8. Provide necessary sanitary facilities for workers, the location of which shall be approved by the Town Engineer and set forth in the permit.

9. Violation of any of these provisions shall be sufficient reason for a stop work order or revocation of permit or both.

D. Existing Improvements. The permittee shall at all times take proper precautions and be responsible for the protection of existing street and alley surfaces, driveway culverts, street intersection culverts or aprons, irrigation systems, mail boxes, driveway approaches, curb, gutter and sidewalks and all other identifiable installations that may be encountered during construction.

1. Existing improvements to adjacent property such as landscaping, fencing, utility services, driveway surfaces, etc., that are not to be removed, shall be protected from injury or damage resulting from the Contractor's operations.

2. The Permittee shall at all times take proper precautions for the protection and preservation of all surface monuments and accessories, property pins/corners, survey control monuments, property marks or survey hubs and points encountered during construction. Any damaged or disturbed survey monument, hub or point shall be replaced by a Colorado Registered Land Surveyor at the Permittee's sole expense and shall include updating the records of and informing the appropriate government agency.

E. Miscellaneous.

1. The Town may restrict any work that causes pavement disturbance from November 1st to April 1st.

2. For major installations, as defined by the Town Engineer, the Permittee shall locate all parallel dry facilities within forty two (42") inches plus one half (½) of the diameter of the proposed conduit and all parallel wet facilities within seventy eight (78") inches plus one half (½) of the diameter of the proposed conduit. The location of parallel facilities shall be field verified by locate potholes, unless the locate potholing causes pavement disturbance in an adjacent travel lane that otherwise would be undisturbed. The location of existing facilities, including lateral crossings, which may affect the proposed facility alignment shall also be field verified by locate potholes. Wet facilities include water, sewer, and gas; all other facilities shall be considered dry facilities.

3. Completion of the utility cut including pavement replacement and cleanup shall normally be accomplished within two (2) days after the activity involving the cut is completed.

4. For major installations, the Permittee shall provide "as-built" information to the Town Engineer on a daily basis or upon completion of every five hundred (500') feet of work, whichever is less frequent. It shall be the Permittee's responsibility to immediately notify the Town of any variance from the approved alignment.

3.3 UTILITY EXCAVATION

A. Types of Utility Excavation. The construction of any repair activity within the any street or alley right-of-way shall be accomplished by open cut excavation, jacking, boring, tunneling or a combination of these methods, as approved by the Excavation Permit. The Town Engineer must approve any variation from the approved permit. Crossings under sidewalks or curbs may be made by tunneling only when approved by the Town Engineer.

B. Asphalt Pavement Removal.

1. All asphalt pavement cuts shall be in straight lines. Irregular shaped cuts with more than four (4) sides, or cuts within existing patches shall not be allowed. All cuts shall be rectangular in shape, and edges shall be parallel or perpendicular to the flow of traffic and at least one (1') foot beyond the trench side wall.

2. All pavement cuts parallel to the direction of travel shall be placed on the lane line or at the center of the aligned travel lane. For bicycle lanes, the cut shall be at the line or the edge of the gutter. Longitudinal joints are not allowed in the wheel track.

3. In order to provide straight edges, all asphalt pavement cuts shall be cut by saw cutting, rotomilling, or another approved method which assures a straight edge for the required depth of the cut. The edge for removal shall be in a straight line set by a string line, chalk line, or other means to ensure a straight removal line.

4. Pavement designated for removal shall be cut vertically with square edges and shall be done in such a way that damage to the adjoining mat is minimized. Any over-break, separation, gouging, or other damage to the existing asphalt mat outside of the designated removal limits shall be repaired at the cost of the Permittee.

C. Concrete Pavement Removal.

1. Concrete pavement shall be removed and replaced from existing panel joints only. Concrete pavement shall be removed to full depth.

2. Concrete removed adjacent to asphalt pavements shall be saw cut along the abutting edge prior to removal in order to remove without damage to the pavement. The saw cut edge shall be protected and used as a form for the new concrete pavement.

3. Concrete that is to remain shall be cut in a straight, true line with a vertical face. Concrete shall be cut with a saw in accordance with CDOT Specifications Section 202.02. Concrete that will be required to be dowelled shall be sawed to the full depth of the concrete.

4. If the removed portion falls within three (3') feet of a construction joint, cold joint, expansion joint, or edge, the concrete shall be removed to the joint or edge.

5. The Permittee shall be responsible for the cost of removal and replacement of all over-breaks. In the case of damaged concrete, the limits of removal should be identified in the field by the Town Engineer.

D. Excavation.

1. All trench excavation shall be made by open cut to the depth required to construct the facility. Adequate bracing of trench walls shall be provided. All excavation, trenching, shoring, and stockpiling of excavated materials shall be in strict compliance with the applicable Occupational Safety and Health Administration (OSHA) rules and regulations. The Permittee/Contractor shall furnish, place, and maintain all supports and shoring required for the sides of the excavation, so as to prevent damage to the work or adjoining property. If the Permittee/Contractor is not expected to fully complete the work within any excavated area in a reasonable length of time as determined by the Town Engineer, the Town may require the Permittee/Contractor to backfill the excavation and re-excavate when the work can be completed expeditiously.

2. The Permittee/Contractor shall proceed with caution in the excavation of the trench, so that the exact location of underground structures, both known and unknown, may be determined. The Permittee/Contractor shall locate all existing underground utilities, by non-destructive means, before trench excavation. Excavation and visual verification of the utility location shall be performed by the Permittee/Contractor when required by the Town Engineer or the utility owner.

3. The length of an open trench shall be limited to the amount of pipe or conduit that can be placed and backfilled in a single day. Once trenches are excavated, the Permittee/Contractor shall proceed diligently towards completion of the work and completion of the backfill. However, in no case shall the length of the open trench exceed three hundred (300') feet unless otherwise approved by the Town Engineer. No open trench shall be left unprotected overnight.

4. A maximum of two (2) excavations shall be open at any time for access structure installation and conduit splicing, unless otherwise approved by the Town.

5. Only material that will be hauled or backfilled within one (1) day shall be stockpiled in the public right-of-way. The Town shall approve all proposed construction staging areas.

6. All open excavations shall be properly barricaded to protect vehicles and pedestrians.

7. Current field moisture and density test results (taken within forty eight (48) hours of the scheduled construction date) for top one (1') foot of subgrade shall be provided to the Town prior to proceeding with the next phase of construction. If any lift of the top one (1') foot of subgrade does not meet moisture or density requirements, then the material shall be scarified, wetted and re-compacted accordingly. If subgrade requires stabilization, the method shall be approved by the Town prior to proceeding.

8. Failure by the Permittee/Contractor to comply with these requirements may result in an order to stop the excavation in progress until compliance has been achieved.

E. Concrete Structures Removal.

1. Structural Concrete.

a. When removing structures or portions of structures, care shall be taken to protect surrounding improvements.

b. Where portions of structures are to be removed, remaining portions shall be prepared to fit the new work. Reinforcing steel projecting from the remaining structure shall be cleaned and aligned to join with the new construction. Dowels required by plans shall be secure within drilled holes, set in an approved grout.

c. The substructures of existing structures (such as bridges, culverts, drainage inlets, etc.) shall be removed according to CDOT Specifications Section 202.08. Steel, pre-cast concrete, and wood bridges as specified, shall be carefully dismantled without unnecessary damage.

d. All pipe, flared-end sections, box culverts, and other appurtenances designated for removal and reuse within the project shall be carefully removed, cleaned, and care taken to prevent damage to them.

e. When removing manholes, catch basins, and inlets, any active drainage or sanitary sewers shall be properly bypassed in order to maintain service during the repair operation.

2. Non-Structural Concrete.

a. Concrete shall be removed to edges that are neatly sawed to full depth of the existing concrete thickness. Sidewalks and driveways shall be saw cut in straight lines either parallel to the curb or perpendicular to the alignment of the sidewalk or curb.

b. No concrete section to be replaced shall be less than five (5') feet in either width or length for a driveway or crosspan, and five (5') feet in length, for sidewalk, curb, and gutter.

c. If a proposed saw cut falls within five (5') feet of a construction joint, expansion joint, or edge, the concrete shall be removed to the joint or edge.

d. During adjacent construction, any damaged concrete pavement shall be removed and replaced as a full panel section with dowels set into adjacent panels in compliance with CDOT M&S Standards.

e. During adjacent construction, any damaged flatwork and/or curb and gutter shall be replaced in full sections from existing construction joints. Partial section replacement shall not be permitted.

f. Whenever construction, alteration, or repair to an existing street affects any part of the apron, radius, ramp area, or pedestrian crossing area, the entire apron, radius, ramp area, or pedestrian crossing area shall be removed and replaced with a pedestrian ramp. Work shall be done in accordance with these standards and as required by the Americans With Disabilities Act guidelines, Section 14, Public Rights of Way, as amended.

F. Boring and Casing.

1. To minimize the impact to traffic and the right-of-way infrastructure, the Town encourages boring rather than open trenching.

2. Boring pits shall be kept to the minimum size required and shall be properly shored, braced and bulked. Dewatering of the pit shall be maintained along with a firm, graveled working surface for the boring machine. Adequate access to and from the pit which meets OSHA requirements shall always be available.

3. Casing shall be kept on line and grade as required by the approved plans. Joints in casing shall be field welded and watertight. Welds shall be of a size and quality to develop the full strength of the pipe materials. After welding, the joints of coated and wrapped pipe shall be primed and tarred.

4. Upon completion of the casing installation, the utility (carrier) pipe shall be installed in the casing pipe at the design grade and elevations. The utility pipe shall be installed by pushing the pipe into

the casing on “skids” and subsequently supporting the pipe by placing a sandbed under the pipe and around the ‘skids”.

5. Joint restraints shall be installed at each pipe joint on carrier pipe installations when the utility pipe carries pressurized fluids or where recommended by the specific utility.

6. Upon completion of the carrier pipe installation, the void area between the casing and carrier pipes shall be filled with sand or flowable fill. In lieu of filling the void area, rubberized boots may be installed at each end that effectually couples the pipes and eliminates intrusion of water or other foreign material.

7. Where steel casing pipe is used, cathodic protection shall be installed at each end of the bore. The design and installation shall be per manufacturer’s recommendations.

8. Upon completion of the boring operation, the Permittee/Contractor shall certify that all storm and sanitary sewer service lines to adjacent properties have not been damaged by the boring operation in a signed affidavit in a form acceptable to the Town.

9. If the Permittee/Contractor’s boring results in disturbance to other utilities or facilities in the public right-of-way, the Permittee/Contractor shall immediately contact the owner of the damaged utility or facility so that the owner may make any necessary arrangements for repair. The Permittee/Contractor shall provide the Town written notice that the owner of the damaged utility or facility has been informed and provide proof to the Town that the affected utility installation has been repaired or replaced to a form acceptable to the affected utility organization.

10. In cases where the bore hole is larger than the casing pipe, high pressure grout shall be placed around the outside of the casing pipe to completely fill all voids between the casing and the bore.

11. Waste material from boring operations shall be contained within the work site and shall not be allowed to discharge onto private property, the curb and gutter, or the roadway.

3.4 UTILITY INSTALLATION

The use of existing conduit sleeves for method of installation shall be the first priority when installing utilities under existing sidewalks, curbs and pavement. Tunneling is discouraged in major intersections and will not be allowed if existing PVC conduits are available, and is only permissible upon approval of the Town Engineer. If existing conduits are not available and boring is not the chosen method, then open cut excavation may be used. Once the existing pavement has been properly saw cut and removed and the excavation has been performed, as directed above, the necessary utility installation, reconstruction, or repair may proceed as shown on the approved plans and/or as directed by the appropriate utility company.

3.5 BACKFILLING OF EXCAVATIONS

A. Flowable backfill meeting the requirements specified herein shall be used to backfill all open cuts in portions of the Public right-of-way beneath existing paving, curb, gutter, sidewalk, crosspan, ramps, driveways, or other flat work improvements. Alternate backfill methods for large excavations (greater than one hundred (100cy) cubic yards) will be considered on an individual basis with the Town Engineer.

B. Flowable backfill shall be required in all voids and openings created by jetting, pumping, and pneumatic removal of the soil and where compaction equipment is unsuitable.

C. Excavation and backfill shall be accomplished on the same day in order to minimize impact to the public right-of-way. In instances where the Town determines that this cannot be accomplished, the Permittee/Contractor shall submit a plan for Town approval showing how traffic will be handled around the work zone.

D. If the existing base course is untreated, it shall normally be replaced with CDOT Class 5 or Class 6 aggregate base course material and compacted in layers that do not exceed six (6") inches in depth. The

resulting total compacted base thickness shall be at least the thickness of the removed base plus two (2") inches.

E. Aggregate base course shall be required for any areas that have been opened up during inclement weather (rain, snow, hail, etc.) and shall be replaced at the expense of the Permittee/Contractor. The Contractor shall protect all excavated areas from water infiltration of any type and will be responsible for any dewatering or subgrade stabilization.

F. The excessive use of water during backfilling operations will not be permitted.

G. Compaction equipment or methods that produce horizontal or vertical earth pressures, which may cause excessive displacement or overturning, or may damage structures, shall not be used.

H. Compaction of flowable backfill will not be required. Compaction of alternative backfill material will be as directed elsewhere herein.

I. The maximum layer or lift thickness for flowable backfill shall be five (5') feet. Additional layers shall not be placed until the flowable fill has lost sufficient moisture to be walked on without indenting more than two (2") inches. Damage resulting from placing flowable fill in layers that are too thick or from not allowing sufficient time between placements of layers shall be repaired at the Permittee's expense.

J. Unless otherwise indicated in the drawings or as directed by the Town Engineer, all sheeting, shoring, and bracing used in excavations shall be removed by the Permittee/Contractor prior to backfilling.

3.6 TEMPORARY PATCHING

A. When it becomes necessary to remove any existing pavement or surfacing within a roadway for reconstruction and repair as specified herein, the travelled way shall be properly barricaded and traffic control measures implemented in accordance with the Traffic Control Plan approved through the permit process. However, unless specifically approved in the Permit or by the Town Engineer, after each days work, all trenches across traffic lanes shall be repaired to enable vehicular travel, as detailed herewith.

B. Whenever permanent patches are not constructed immediately following properly compacted trench backfilling operations, temporary pavement patches must be utilized to provide the required number of paved travel lanes.

C. Upon receiving approval of the Town Engineer, temporary pavement patches shall consist of any one of the following or a combination thereof:

1. The temporary surface may consist of a minimum of four (4") inches of either a hot mix or cold mix asphaltic paving material. Temporary surfaces shall be compacted, rolled smooth, and sealed to prevent degradation of the repair and existing structures during the temporary period. Cold mix asphaltic material may only be used as a temporary patch and the cold mix material shall be approved by the Town Engineer.

2. Steel bridging plates may be used to bridge across trenches provided they are properly anchored and capable of carrying the legal limit loading and meet all of the specific requirements contained in this **Section 02595**, subsection 2.5. Steel plates shall be placed such that traffic will not cause them to move and may only be left in place for the duration specified by the Town Engineer.

3. For Local roadways and alleys, a temporary patch of gravel material flush with the surface may be acceptable for a period not to exceed one (1) day.

D. The surface of the temporary patch shall provide a smooth driving surface.

E. If approved by the Town, good quality asphalt milling material may be used as a temporary patch on low volume streets.

F. The Permittee/Contractor shall monitor temporary patches on a daily basis and temporary patches exhibiting ruts, humps, deflections, movements, or depressions shall be repaired or replaced immediately. The temporary surface installation and daily maintenance shall be the responsibility of the Permittee/Contractor until the permanent surface is completed and accepted.

G. The Permittee/Contractor is responsible for maintaining temporary patches. In case of an emergency the Town of Windsor may elect to repair the temporary patch and charge the Permittee/Contractor for all costs associated with the repairs.

H. Permanent patching shall occur within two (2) weeks unless approved in advance by the Town Engineer. The temporary patch shall be completely removed prior to placement of the permanent patch. Refer to subsection 3.7 below for permanent patching.

I. Temporary Pavement Layer. All work shall be scheduled so that no planed or recycled surface is left without resurfacing for more than ten (10) calendar days between October 1st and March 1st.

1. Within ten (10) calendar days after being planed or recycled, the Contractor/Owner shall immediately place a temporary hot bituminous pavement layer on any surface that has been planed or recycled and cannot be resurfaced in accordance with the specified temperature requirements contained elsewhere in these Specifications.

2. The minimum thickness of the temporary hot bituminous pavement layer shall be two (2") inches.

3. The Contractor/Owner shall perform the quality control required to assure adequate quality of the hot bituminous pavement used in the temporary layer. All applicable pavement markings shall be applied to the temporary layer surface.

4. The Contractor/Owner shall maintain the temporary layer for the entire period that it is open to traffic. Distress that affects the ride, safety, or serviceability of the temporary layer shall be immediately corrected to the satisfaction of the Town Engineer. The temporary hot bituminous pavement layer shall be removed when work resumes.

3.7 PERMANENT PATCHING

A. General.

1. Prior to placing the permanent patch, the existing pavement shall be removed to clean, straight lines parallel or perpendicular to the flow of traffic. Patches shall not be constructed with angled sides or irregular shaped edges. If pavement adjoining the original pavement saw cut is damaged during construction, additional pavement shall be removed with cuts parallel with the original cuts. The additional pavement damaged due to construction shall be repaired at the Permittee/Contractor's expense.

2. When the excavation and patch falls within three (3') feet of a section of failed pavement, the failed area shall be removed up to sound pavement and patched. Scarring, gouging, or other damaged pavement adjacent to a patch shall be removed and the pavement repaired.

3. Patches within existing patches are to be avoided. Where this does occur, boundaries of the new patch shall match or exceed the existing patch.

4. Strips of pavement greater than six (6') feet in width from the edge of the new patch to the edge of an existing patch or the lip of the gutter may remain.

5. Trenches shall be patched for the entire lane width for a distance of one (1') foot minimum on all sides of the trench. Transverse patch lengths shall extend across the full width of the travel lane. Minimum width of transverse patches shall be as listed in **Table 02595-2**, **Minimum Patch Requirements**. The width of patches shall be consistent to simplify future maintenance.

6. Edges of patches shall not fall in existing wheel paths or tracks. The edges of patches parallel to the direction of traffic shall be limited to the boundaries of lanes or to the centerline of travel lanes.

7. Patches should have a smooth longitudinal grade consistent with the existing roadway. Patches should also have a cross slope or cross section consistent with the existing roadway.

8. In most cases, and particularly in the cases of extensive excavation and repairs, it is desirable to survey the existing pavement condition with the Town Engineer prior to the work. After completion of the work, the pavement condition again shall be surveyed to verify that the pavement condition has been maintained or improved.

    a. Minor Repairs. In the case of minor repairs, pavement surveys can be made by visual observation.
    b. Major Repairs. In the case of major projects that involve excessive haul of materials or unusually heavy construction equipment or activity, nondestructive testing of the pavement condition before and after construction may be required.

B. Bituminous Asphaltic Pavements.

1. Prior to placing the permanent bituminous asphalt patch, the existing pavement shall be removed to clean, straight lines parallel or perpendicular to the flow of traffic as detailed in subsection 3.3.B, above, and a tack coat shall be applied to all edges of the existing pavement.

2. The Contractor/Owner shall provide the necessary equipment for heating and applying the bituminous material. The equipment shall be capable of applying the materials in a uniform manner for the specified rates of application.

3. The surface upon which the bituminous tack and/or prime coat is to be placed shall conform to the established lines. Grades shall be smooth and uniform and shall be compacted to the required density. If the required density deteriorates between the time the gravel course was originally compacted and the time the prime coat is placed, for any reason whatsoever, the surface shall be recompacted to the required density at the Contractor/Owner's expense.

4. The edge of existing asphalt pavements shall be painted with a tack coat prior to placing the new pavement. The tack coat shall be applied sufficiently in advance so that a tacky surface exists at the time the asphalt surface mix is placed. The time interval between application of the tack coat and placement of the asphalt mix will be regulated by the Town Engineer.

5. A prime coat application to the sub-base, where required by the Town Engineer, shall be made less than twelve (12) hours prior to placing the asphalt base course and shall be pressure sprayed at the rate of two tenths (0.2) to five tenths (0.5) gallon per square yard. Application methods and equipment shall be approved in advance by the Town Engineer. The primed surface shall be maintained by removing all loose sand prior to placing any pavement or surfacing material thereon. Immediately before placing pavement, additional prime coat shall be applied as directed to areas where the prime coat has been damaged. Loose or extraneous material shall be removed.

6. The thickness of asphalt patches in asphalt streets shall be the thickness of the existing asphalt plus one (1") inch with minimum widths as specified in **Table 02595-2**, **Minimum Patch Requirements** as given below, or as specified by the Town Engineer:

Table 02595-2
Minimum Patch Requirements

Min. Asphalt Thickness (for full depth pavement)	Required Grading	Minimum Widths (Transverse Patches)
Residential – six (6") inches	2" grading S on 4" grading SG	Residential – five (5') feet
Collector – eight (8") inches	2" grading S on 6" grading SG	Collector – eight (8') feet
Arterial – ten (10") inches	3" grading S on 7" grading SG	Arterial – ten (10') feet

7. Wherever the existing asphalt pavement is greater than these minimum depths, the hot bituminous patches shall be placed in maximum three (3") inch compacted lifts to a depth of the existing pavement plus one (1") inch.

8. Patch back areas greater than one hundred twenty (120 ft²) square feet shall require the submittal and approval of a mix design to the Town prior to placement.

9. In all cases, the pavement wearing course must match the grading of the surrounding pavement. The hot bituminous pavement must be placed with a self-propelled paver if patching widths are greater than eight (8') feet. For patch widths greater than four (4') feet and up to eight (8') feet, the mixture must be placed with either a self-propelled paver or a box spreader. These machines may be used to patch areas wider than eight (8') feet with the use of a screed extension that will extend beyond the width of the proposed patch. Patches paved with a self-propelled paver shall conform with the requirements specified in CDOT Specifications Section 401.10. Rollers shall move at a uniform speed with the drive roll or wheels nearest the paver. Steel-wheeled rollers shall operate at a maximum speed of three (3 mph) miles per hour. The use of plate type compactors will not be permitted except in areas not accessible to the roller. Areas wider than the machine screed may be patched with a box spreader only if the length of the patch is less than fifty (50') feet. Areas as wide as the street or longer than fifty (50') feet, shall be patched with an asphalt lay down machine.

10. Where irregularities, unavoidable obstacles, or patch widths of less than four (4') feet make the use of mechanical spreading and finishing equipment impractical, the mixture shall be spread, raked, and luted by hand tools. For such areas, the mixture shall be dumped, spread, and screeded to give the required compacted thickness. New hot bituminous pavement shall be added in compacted layers, until the patch thickness meets these requirements. Compaction equipment shall be capable of compacting corners and edges of all patches.

11. The asphalt patch area for street excavations that fall within the wheel path of the vehicular travel lane shall be increased in size to the center of the lane or adjacent lane.

12. Where three (3) or more pavement cuts are proposed within a seventy five (75') foot long roadway section, the pavement between the patches shall be milled and inlaid with new pavement over the entire work area. In cases where the existing pavement is in poor condition and may require overlay within the next few years, this requirement may be modified or waived by the Town Engineer. A series of patches may also be repaired with an overlay:

    a. In streets where more than one (1) cut is made within a seventy five (75') foot long roadway segment, an overlay of the entire street width, including the patched area may be required. The determination of need for a complete overlay shall be made by the Town Engineer.

    b. All overlay work shall be coordinated with adjacent landowners such that future projects do not cut the new asphalt overlay work.

    c. All proposed overlay work shall be scheduled such that all roadway pavement placed prior to the time paving operations end for the year shall be completed to the full thickness required by the plans.

    d. There shall be no feathered edges on any type of street. When edge of existing pavement adjoins gutter, overlays should be placed by first removing the edge of existing pavement to the desired depth by grinding and then replacing the pavement with an asphalt lay down machine. Grinding shall be to a depth such that the top of overlay is no more than one quarter (¼") inch from the top of the gutter lip.

    e. Particular care must be taken in constructing joints to provide smooth transitions, and to avoid problems with drainage or access at the edges of gutter pans.

f. All asphalt surfaces to receive an overlay shall be given a tack coat prior to placing the new pavement, and as specified above.

g. Overlaying layers of hot bituminous pavement shall not be placed until the lower layer has cooled sufficiently to provide a stable material that will support the equipment without rutting, shoving, or moving in any manner. The temperature of the first asphalt layer shall be less than one hundred fifty (150°) degrees F before applying the second asphalt layer. All paving on each street shall be completed in one (1) continuous operation, weather permitting, unless otherwise approved in writing by the Town Engineer.

13. Infrared patching may be allowed only where approved by the Town Engineer:

a. The infrared heating unit must be equipped with adjustable height controls and heating chambers capable of heating the existing bituminous pavement to a workable temperature without oxidizing or burning the oils. There shall be no flame in direct contact with the existing pavement surface. The infrared heating unit must be capable of heating an area that extends a minimum of twelve (12") inches beyond the edge of the patch area.

b. Heat shall be continuously applied to the patch area until the existing pavement material can be manually raked and shaped to a depth of two (2") inches below the existing surface and replaced with new material. A minimum depth of one and one half (1½") inches of new pavement shall be provided at the joint line.

c. Prior to placement of new material, the patch area will be raked, compacted, and tacked. Mechanized compaction equipment shall be used to compact bottom lifts of the patch, then self-propelled, vibratory roller shall be used to provide complete compaction of the patch area. The tack agent shall be applied at the rate of two tenths (0.20 gal/yd²) gallons per square yard. Excess material shall be disposed or used in the bottom layer of the patch.

14. Manhole frames, covers and valve boxes shall be adjusted using the criteria given in **Section 02610**, **Manhole and Valve Box Adjustment**, with concrete surrounding the object at least one (1') foot from the object in all directions.

15. Removal and replacement of unsatisfactory or failed pavement patches shall be completed within thirty (30) days of written notification of deficiency. Failure to comply may result in the Town of Windsor taking action upon the Contractor's performance bond.

16. After placing the new asphalt, all seams (joints) between the new and existing pavements shall be sealed with a hot melt asphalt or rubberized asphalt sealant. Particular care must be taken in constructing joints to provide smooth transitions, and to avoid problems with drainage or access at the edges of gutter pans.

17. The Contractor shall at all times protect the asphalt (both existing and new) from solvents and oils. Any piece of equipment leaking any fluid shall be removed from the work site immediately and shall not return to the work site until all leaks are repaired. If any piece of equipment leaks any fluid a second time, it shall be removed from the work site immediately and shall not be allowed on the work site again for the remainder of the project. The Contractor shall not use diesel or other solvents to remove or prevent the sticking of asphalt to the wheels of rubber-tired rollers or other equipment used on the asphalt. Remove and replace any asphalt damaged by solvents or oils.

C. Portland Cement Concrete Pavements.

1. Prior to placing the permanent Portland Cement concrete patch, the existing pavement shall be removed to clean, straight lines parallel or perpendicular to the flow of traffic as detailed in subsection 3.3.C of this Section.

2. When pavement has been identified to require reconstruction, the pavement shall be removed and replaced in sections from joint to joint. Replaced sections will require doweling connections.

3. The surface upon which the Portland Clement concrete patch is to be placed shall conform to the established lines. Subgrade elevation shall be brought up to plus or minus one tenth (± 0.1') foot with approved materials prior to placing concrete. Grades shall be smooth and uniform and shall be compacted to the required density. If the required density deteriorates between the time the gravel course was originally compacted and the time the concrete patch is to be placed, for any reason whatsoever, the surface shall be recompacted to the required density at the Contractor/Owner's expense.

4. Weather protection shall be provided as detailed in **Section 02585**, subsection 3.1.A & B, "Weather Limitations".

5. Concrete pavement patching material shall match flush with the existing concrete pavement surface and shall have a thickness one (1") inch greater than the existing pavement and shall not be less than eight (8") inches thick. The work shall be accomplished so that no abrupt change in grade between the old and new work results.

6. When making concrete repair patches, the removal perimeter shall be saw cut and dowels inserted into the existing surrounding concrete pavement in conformance with requirements by the Town. Refer to CDOT M-Standards for details.

7. Patch back areas greater than one hundred twenty (120 ft²) square feet shall require the submittal and approval of a concrete mix design to the Town prior to placement.

8. No water shall be placed on the new concrete surface to assist finishing.

9. Concrete placed for patching shall be coated and sealed with a uniform application of membrane curing compound applied in accordance with manufacturer's recommendations. Refer to **Section 02585, Portland Cement Concrete Pavement**, for additional curing information. Completely coat all exposed concrete surfaces.

10. Quick curing concrete repairs may be opened to traffic within two (2) days or when the concrete has achieved a minimum strength equaling eighty (80%) percent of the twenty eight (28) day design strength. Concrete cylinders shall be taken and broken for verification. The mix design shall be in accordance with CDOT specifications.

11. Where existing cracks or damage are adjacent to the area being repaired, the repair area shall include the cracked or damaged concrete. Pavement repairs shall include all areas of damage, including leak test holes, potholes, equipment, and/or material scarring of the existing surface.

12. Expansion joint material shall be installed between new structure slabs and existing structure slabs. Joints shall be thoroughly cleaned of all foreign material, then filled with a hot-poured elastic type joint filler. Silicone sealants or other materials may be approved by the Town Engineer. Joint material shall be filled to within one half (½") inch of the surface. Excess material shall be scraped off to provide a smooth riding surface.

13. Manhole frames, covers, and valve boxes shall be adjusted and patched as follows: The concrete edges will be a full depth saw cut and shall be a minimum of one (1') foot from the manhole frame or valve box. Backfill around manholes, water valves and inlets shall be installed in eight (8") inch lifts and compaction tests taken on each side of the structure at each eight (8") inch lift interval. The adjacent concrete slab shall be drilled eight (8") inches deep and a sixteen (16") inch number four (#4) rebar grouted in place at twelve (12") inch on center. Concrete pavement shall be replaced to the existing depth or a minimum of eight (8") inches, whichever is greater, with a minimum mix design of six (6) sacks of cement and a minimum twenty eight (28) day compressive strength of four thousand two hundred (4,200 psi) pounds per square inch. The concrete shall be protected from weather and rapid loss of moisture and protected from vehicular traffic for a period not less than seven (7) days (three (3) days with High/Early concrete). Compressive strength of concrete shall

reach three thousand (3,000 psi) pounds per square inch prior to any traffic loading. Concrete patches shall be a minimum of nine (9 ft^2) square feet.

3.8 QUALITY OF REPAIRS

A. General. Every street and street repair situation is unique. Design criteria and construction specifications cannot address every situation. In order to maintain some form of consistency, these standards have been developed. In most cases, they provide the minimum acceptable standards for construction or repair. Consequently, when strictly applied, they will provide the minimum acceptable product. Therefore, this criteria has been developed to maintain the same integrity of the street pavement and subsurface condition as existed prior to its being cut for utility installations or repairs.

To achieve the goal of "Quality" or "Excellence" in street repairs, these criteria shall be viewed as guidelines when used in conjunction with good planning and judgment. This will restore the street to an acceptable condition with minimal patching failures. In many cases, it will be necessary to exceed the minimum standards to achieve a quality repair.

Issues that shall be considered in a quality approach to street repairs are as follows (these criteria must all be balanced against the long-term maintenance needs of the utility):

B. Appearance. Does the final appearance of the street pavement suggest the repairs were planned, or that they happened by accident?

1. Public Perception. Consciously or not, the driving public "rates" the appearance of the street system, including street repairs, every day. Street repairs which are satisfactory from a functional point of view may produce a negative reaction from the public if they give the appearance of being poorly planned or executed.

2. Appearance Guidelines. The public's perception of the street repairs is based primarily on shape, size, and orientation – the geometry of a patch. The following are some guidelines for the geometry of a quality patch:

   a. Existing pavements should be removed to clean, straight lines parallel and perpendicular to the flow of traffic. Do not construct patches with angled sides and irregular shapes. Avoid patches within existing patches. If this cannot be avoided, make the boundaries of the patches coincide.

   b. Do not leave strips of pavement less than one half lane in width from the edge of the new patch to the edge of an existing patch or the lip of the gutter.

   c. Asphalt and concrete pavement should be removed by saw cutting or grinding. Avoid breaking away the edges of the existing pavement or damaging the remaining pavement with heavy construction equipment.

   d. In concrete pavements, sidewalks, and other public use areas where the surface is in good repair, remove sections to existing joints. In damaged concrete, the limits of removal should be determined in the field by a representative of the Town Engineer.

   e. In the case of a series of patches or patches for service lines off a main trench, repair of the pavement over the patches by overlay method shall be required when the spacing between the patches is less than seventy five (75') feet.

C. Guidelines for Rideability. Completed street repairs shall have a rideablitiy at least as good as, or better than, the pavement prior to the repairs being made. Street repairs may be visible but should not be "felt" when driving over them.

1. Do not construct asphalt overlays in such a manner that create a bump to the motoring public. If the leading edge of an overlay is substantially noticeable to a car it is likely to be significant to the snow plow trucks. The Town Engineer shall determine whether or not the rideablitiy of the overlay is

acceptable. If the transition is not smooth the Contractor shall remove and replace the pavement to provide a smooth leading edge to the satisfaction of the Town Engineer.

2. Surface tolerances for street repairs should meet the standard for new construction. That is, the finished surface of the street repair, when tested with a ten (10') foot straightedge parallel to the centerline or perpendicular across joints, will show variation measured from the testing face of the straightedge to the surface of the street repair which do not exceed three sixteenths (3/16") inch.

D. Pavement Management Guidelines. Street repairs should leave a pavement in a condition at least as good as, if not better than, the condition prior to the repairs.

1. In most cases, and particularly in the cases of extensive excavation and repairs, it is desirable to survey the existing pavement condition with a representative of the Town Engineer prior to the work. After completion of the work, survey the pavement condition again to verify that the pavement condition has been maintained or improved.

2. In the case of minor repairs, these pavement surveys can be made by visual observation. However, in the case of major projects that involve excessive haul of materials or unusually heavy construction equipment or activity, non-destructive testing of the pavement condition before and after construction is required.

3. Consideration of pavement management issues may also identify opportunities for joint efforts between the utilities and the Town such as splitting the cost on a street in need of an overlay that will need to be patched. Coordination for these types of cooperative repairs should occur as far in advance of actual construction as possible.

E. Future Maintenance Guidelines. Excavations and street repairs, even well constructed street repairs, shorten a pavement's life. Several types of street distress, settlement, alligator cracking, and potholes, often show up around patches. Quality street repairs should attempt to include adjacent minor damage and reduce the chances of associated growth out to these types of distress.

1. Avoid weakening or destroying the existing pavement around an excavation with heavy construction equipment, stockpiling, or delivery of materials, etc. When damage does occur, remove the damaged pavement, extending the limits of the street repair, before replacing the pavement. No stockpiling of backfill or road building materials is permitted on the pavement.

2. When the proposed excavation falls within three (3') feet of a section of failed pavement, the failed area shall be removed to sound pavement and patched. Scarring, gouging, or other damaged pavement adjacent to a patch shall be removed and the pavement repaired.

3. With older pavement where the likelihood of cracking and potholes next to the patch is greater, it shall be necessary to extend the "shoulders" of the patch beyond the one (1') foot minimum. When adjacent deterioration is less than three (3') feet away, reinforce this area with a geotextile fabric.

4. Avoid frequent changes in width of patches. For future maintenance this simplifies removal of adjacent pavement failures.

3.9 FIELD QUALITY CONTROL

A. Testing Frequency. Testing shall be performed by an independent testing company acceptable to the Town and results shall be provide to the Town Engineer within two (2) working days of completion of testing and prior to the next phase of construction. Testing shall be performed according to the schedule given in **Table 02595-3, Minimum Testing Frequency**, given below:

Table 02595-3
Minimum Testing Frequency

ITEM	TYPE OF TEST	MINIMUM FREQUENCY
All Excavation Backfill		
Backfill	Moisture/Density (Compaction Test)	1 per 150 lineal feet, per vertical foot of fill, min, 2 tests per lift.
Inlets/Structures		
Soil Testing	Moisture/Density (Compaction)	1 test per vert. foot, min. 2 per lift
Concrete Testing	Air and Slump	1st 3 loads, every 5th load thereafter
	Cylinders	1 set of 4 per 100 cy, or fraction of.
Sidewalk, Curb & Gutter		
Soil Testing	Moisture/Density (Compaction)	1 per 150 lf, per 2 vert. feet of fill Min. 2 tests per lift
Concrete Testing	Proof-roll	All subgrade
	Air and Slump	1 per day min. – machine placed 2 per day min. – hand placed Plus 1 per 500 sy.
	Cylinders	1 set of 4 per 100 cy, or fraction of.
Roadways		
Subgrade Testing	Moisture/Density (Compaction)	1 per 300 lane ft, min 2 tests per lift
	Proof-roll	All subgrade
Base Course Testing	Moisture/Density (Compaction)	1 per 300 lane ft, min 2 tests per lift
	Gradation/Atterberg limits	1 per 500 tons
	Proof-roll	All base course
Concrete Testing	Air and Slump	1st 3 loads, if pass, 1 per 100 cy
	Slump	Every load
	Cylinders	1 set of 4 per 100 cy, or fraction of.
Asphalt Testing	Density	1 per 300 lane ft, min 2 tests per lift
	Extraction/Gradation, Marshall	1 per 500 tons

B. Asphalt Patching.

1. Compaction of hot bituminous asphalt pavement patches shall be between ninety two (92%) percent and ninety six (96%) percent of AASHTO T209. Average compaction of less than ninety two (92%) percent of AASHTO T209 shall be cause for rejection.

2. Upon completion of the permanent asphalt patch, the surface shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, or irregularities. When a straightedge ten (10') feet in length is laid across the permanent patch parallel to the centerline of the street and in a direction transverse to the centerline, the surface shall not vary more than three sixteenths (3/16") inch from the lower edge of the straight edge. Patches exhibiting deviations more than three sixteenths (3/16") inch shall be replaced prior to acceptance of the patch. If the existing street exceeds the above tolerances, then the patch shall be equal or better than the condition of the surrounding pavement.

C. Concrete Patching. Variations of concrete surface shall not exceed one eighth (1/8") inch in ten (10') feet.

3.10 OPENING TO TRAFFIC

The Town Engineer shall determine when the patched roadway shall be opened to traffic, unless specifically indicated previously herein. Prior to opening the pavement to traffic, the roadway shall be cleaned, striped, signed, and otherwise prepared as specified within these Specifications.

END OF SECTION

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