

## Town of Northborough Department of Public Works

### Roadway Opening Specification

#### 1. General

- A. Applicability - Compliance with these specifications is mandatory for all excavation within the Town of Northborough right of ways, easements and Town owned property including sidewalks and driveway construction or repair within the right of way. Requests for waivers from any part of these specifications shall be made in writing to the Director of Public Works. Waivers will be considered on a per application basis only. A waiver may be granted if the contractor demonstrates to the Director of Public Works that the issuance of a waiver will not deviate from the intent of these specifications.

For the purpose of these specifications, the duties and authority of the Director of Public Works shall also be borne by his or her designee.

Permits are required for all work in any public right of ways, easements and Town owned property.

Town of Northborough standard construction details shall be part of these specifications.

- B. Roadway Opening Permit Application - An application for permit must be filed with the Town of Northborough DPW before a "Road Opening Permit" is issued. Permit Applications are available the DPW office at Town Hall, 63 Main Street, during office operating hours. Each application form shall be completely filled out, signed, and returned to the Department of Public Works.

An explanation of the application and plan of the proposed work shall be provided to the DPW. The plan shall be to scale and not exceed 1 inch equals 60 feet. Such plan may be hand drawn on the application or attached as a separate plan and shall depict the following:

1. Location of the work to be done in relation to the outstanding features of the road, such as property lines, intersections, pavement lines, sidewalks, curbing, trees, and utility poles by number;
2. Existing utilities located within and adjacent to the roadway;
3. All proposed utilities and limits of all excavations;
4. Type and extent of surface restoration both within the roadway and along roadside features;
5. Scale, orientation and location.

When applications are made for permits involving work of major scope, complete plans, including traffic management, construction details, and specifications must be submitted in duplicate with the application. Said documents shall be such that the exact location of the various parts of the work, the risk, or injury to road users, and probability of damage to trees, highway structures, and private property, can be ascertained. A major project shall be defined as one with longitudinal roadway trench excavation greater than two hundred (200) linear feet or greater than six (6) traverse roadway trenches.

- C. Fee Derivation – Permit fee shall be \$50 per property application. The Department of Public Works Director or his designee reserves the right to negotiate specific fee terms with Public Utilities.

The Department of Public Works shall provide inspection as it deems necessary. Should it be necessary to contract a consultant to provide inspection, it shall be negotiated with the applicant prior to permit issuance.

- D. Insurance - All grantees shall provide the Town upon application, as a minimum, certificate of insurance for liability, property damage and bodily injury in the amount of \$1,000,000 CSL. The Town of Northborough shall be named as an additional insured on all certificates. Evidence of statutory limits for worker's compensation shall be provided. Higher Limits may be required depending on project size and discretion of the Town of Northborough.
- E. Bond - Prior to issuance of the permit, the applicant shall provide a bond to be held by the Town for the duration of the warranty period. The bond shall be issued in such a manner, as it may not be cancelled without the written approval of the Director of Public Works.

A minimum \$5,000 performance bond shall be required for the year in the event of the failure of the contractor to complete the work or make required repairs to restoration for damages involving the work or encroachment authorized by the permit. This may be increased by the Director of Public Works should the proposed work be deemed in excess of \$5,000.

The bond shall be released to the contractor upon the expiration of the warranty period. The warranty period shall be for a period of two years following the completion of the work. During the warranty period, the contractor shall be responsible for the restoration, repair, and maintenance of his/her work.

Should the proposed work in an existing public way be integral to the construction of a subdivision approved by the Planning Board, the applicant may, with the permission of the Department of Public Works and the Planning Board, pursuant to MGL Chapter 40, Section 81U, bond the off-site work in conjunction with the on-site work. This agreement will also include full-time inspectional services while work is on-going in the existing public way.

- F. References – The following standards, including current editions and all addendums, are included in these specifications by references:
1. Massachusetts Department of Transportation (MassDOT), Standard Specifications for Highways and Bridges Divisions II and III in entirety. Appropriate sections and definitions of Division I are also herein included.
  2. MassDOT Construction Standard Details;
  3. Town of Northborough rules and regulations, permit applications, conditions, and references therein;
  4. Town of Northborough Department of Public Works Construction Details;
  5. Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD).

- G. Traffic and Safety - The contractor shall properly notify Dig Safe and shall also be responsible for notifying all non-participating utilities not covered by Dig Safe.

The contractor shall not render any road impassable without notifying the DPW, Police and Fire Department. It is the responsibility of the contractor to notify the Town of Northborough Police Department to determine if a police detail is necessary. Evidence of said determination by the Town of Northborough Police Department must be provided at the time of application. Failure to notify emergency services of an impassible road shall be grounds for the revocation of the permit.

The cost of all police details shall be the responsibility of the contractor. Prior to any road being rendered impassable, the contractor shall notify all Police, Fire, and Ambulance services that may be affected. It is also the responsibility of the contractor to coordinate with the school bus company for rendering a road impassable. The contractor shall sufficiently address the concerns of emergency personnel such that public safety is not compromised by the contractor's actions.

The Permittee shall, in general, maintain safe crossing for two lanes of vehicular traffic at all street intersections where possible, and safe crossings for pedestrians. Adequate crossings shall be maintained for vehicles and pedestrians when an excavation is made across any public road, way, or sidewalk. The Permittee shall take appropriate measures to assure that during the performance of the work, traffic conditions are as near normal as possible and shall be maintained at all times as to minimize inconvenience to the occupants of the adjoining properties and to the general public. When traffic conditions permit, the Department of Public Works or its designee, with the approval of the Police and Fire Departments of the Town, may, with written approval (or by verbal agreement in cases of emergency), permit the closings of streets and ways to all traffic for a period of time prescribed by him, if in its opinion, it is necessary. The written approval of the Department of Public Works or its designee may require that the Permittee give notification to various public agencies and the general public. In such cases, such written approval shall not be valid until such notice is given. In cases of emergency on weeknights, weekends, or holidays, the facility owner having such an emergency shall contact the DPW, Police and Fire Departments by phone before closing the street to traffic.

- H. Timeframe - Completed applications for permits will be reviewed only after receipt of all required bonds, insurance certificates, fees, and Dig Safe information. The approved road-opening permit shall be valid for a period not to exceed thirty (30) days unless otherwise stipulated by the Director of Public Works.

No work will be allowed in any road, way, place, alley, sidewalk, park, square, plaza, or any other similar public or private property owned or controlled by the Town and/or dedicated to public use between December 1 and April 1, except in the case of an emergency. Emergency work necessary for the protection of life or property may be conducted with the written approval of the Director of Public Works or his/her representative.

Upon the completion of work performed under the subject road opening permit, it shall be the responsibility of the recipient to maintain or replace all subsequent patching covered under subject permit as deemed necessary by the Department of Public Works or its designee for a period of one (1) year after final completion and acceptance of work.

Excavation will not be allowed in right of ways that have been newly surfaced or resurfaced for a period of five (5) years, except for emergency work. Extenuating circumstances may be approved by the Director of Public Works.

1. In the event an excavation is allowed during the 5-year moratorium, the contractor shall conduct his work as directed by the Director of Public Works. This includes possible special provisions to allow for proper stabilization and resurfacing to include but not be limited to the use of infrared technology on all pavement joints and temporary top course with future mill and overlay. The completed work shall provide a life expectancy comparable to the surrounding work.
  2. Applicable procedures and testing results may be required by the Director of Public Works. Said testing shall be conducted by a testing agent approved by the Director of Public Works.
  3. All work allowed must be bonded, guaranteed and maintained for a period of not less than the remainder of the duration of the moratorium on the road or one (1) year after final paving, whichever is greater.
- I. Emergencies - Work completed under the classification of Emergency, because of threat of personal injury or property damage, shall be allowed to commence prior to attaining the permit providing notification to the Town of Northborough Police Department has been achieved. The contractor shall contact the Department of Public Works within twenty-four (24) hours to apply for a permit. Should the Director of Public Works find that the situation surrounding the work does not constitute an emergency, the contractor shall be assessed a fine of \$1,000 and \$200 per day until such time as the work is complete and the permit fee paid.
- J. Waivers and Exemptions - The Town of Northborough reserves the right to waive any or all specifications in the best interest of the Town on a case by case basis. All waivers shall be approved in writing by the Department of Public Works or its designee.

The Town of Northborough Department of Public Works is exempt from the application process. Fees and bonds may be reduced or waived for other public agencies at the discretion of the Board of Selectmen. However, the application process and all construction specifications and warranty periods shall apply.

- K. Revocation of Permit - The Director of Public Works may revoke the permit at any time for failure to comply with these specifications. If a permit is revoked, the work will cease and the road shall be repaired as called for in these specifications. No work shall continue until the Director of Public Works is certain the situation that caused the revocation has been rectified.

If while the work is suspended, the work is left unattended, or becomes an unsafe condition, there shall be a fine of \$200 per day levied against the contractor and the Department of Public Works will complete the work. The Town may pull the contractor's bond, if the Director of Public Works believes that it is in the Town's best interest. All fines shall be paid in full before the contractor will be allowed to continue the work or perform any other work requiring permit issuance.

- L. Indemnification - The permittee certifies that they are familiar with 520 CMR 14.00 (Trench Safety Regulation) and all other laws and regulations applicable to the proposed work. The

permittee also agrees, as a condition governing the issuance of a permit, that s/he will hold harmless the Town of Northborough, the Department of Public Works, and its agents and employees from any and all claims and actions whatsoever arising from the issuance of said permit.

## 2. Materials

- A. Soils – Comply with the application sections of MassDOT Standard Specifications for pipe bedding, trench back fill, loam, and gravel borrow type M1.03.0 b.

All backfill material shall be of suitable material containing no organic material or rocks larger than three (3) inches within twenty-four (24) inches of the surface or within two (2) feet above any pipe or within structure backfill.

- B. Drainage Pipe – Class III reinforced concrete pipe with gasket connections where a minimum of twenty four (24) inches of cover is provided from bottom of binder.

Class V reinforced concrete pipe with gasket connections where a minimum of twelve (12) inches of cover is provided bottom of binder.

Permittee may submit high density polyethylene (HDPE) pipe as an alternate material. Approval of this alternate material will be at the sole discretion of the DPW Director or his designee.

- C. Catch Basin – MassDOT Standard Detail E.201.4.0 with exterior bituminous dampproofing.

- D. Drainage Manhole - MassDOT Standard Detail E.202.4.0 with exterior bituminous dampproofing.

- E. Frame and Cover – Frame and cover shall be MassDOT Standard Detail E.202.6.0.R.

- F. Frame and Grate - Catch basin frame shall have minimum height of seven (7) inches and a minimum square opening dimension of twenty two (22) inches. Grates shall be square opening with a minimum edge thickness of one and one half (1 ½) inches and be HS-25 load capable.

- G. Cast-in-Place Cement Concrete – MassDOT Standard Specification M4.02.00, 5000psi.

- H. Reinforcing Steel – MassDOT Standard Specification M8.01.0 and M8.01.2

- I. Asphalt Pavement - MassDOT Standard Specification M3.11.0.

- J. Curbing – Bituminous concrete curb shall comply with MassDOT Standard Specification M3.12.0; granite curb shall comply with M9.04.1 type VA5 with a minimum depth of eighteen (18) inches.

- K. Pavement Markings – Striping color and material shall match that of adjoining surfaces and shall comply with the applicable portions of MassDOT Standard Specifications M7.01.03 and M7.01.04 for thermoplastic reflectorized and M7.01.03 and M7.01.04 for fast drying water-borne.

- L. Incidentals – All incidental items of work including but not limited to coatings, fittings, fasteners, sealants, turf restoration, and the like shall comply with the applicable sections of MassDOT Standard Specifications and Construction Standard Details.

### 3. Execution

- A. Preparation – All pavements, roadway and sidewalk, shall be saw cut to provide a neat, straight vertical edge. Demolition debris shall be the property of the contractor and be properly disposed of off-site.

Existing granite curbing shall be removed and stacked for resetting. Surplus curbing shall be the property of the Town and delivered to the Highway Department.

- B. Excavation – Excavation shall proceed in accordance with MassDOT Standard Specification sections 120.60 and 140.60, OSHA standards, and 520 CMR 14.00.
- C. Structures – Set on minimum eight (8) inch compacted gravel base. Limit of excavation shall extend minimum of two (2) feet beyond limit of structure in all directions to allow for proper compaction. All pre-cast joints shall have a single continuous butyl rubber sealant.
- D. Backfill - All backfill material shall be compacted in a workmanlike manner in loose lift thickness of eight (8) to twelve (12) inches by mechanical compactors. The twelve (12) inches immediately below the paved surface shall consist of only new select gravel conforming to M1.03.0 Type b. No trench shall be backfilled until it has been inspected by an authorized representative of the Department of Public Works.

All soils used for backfilling shall be within the acceptable range for optimum moisture content to allow for proper compaction. Soils above optimum moisture content must be stockpiled and dried out; or, removed and replaced with suitable soils. All backfill shall be compacted to within 95% of the Maximum Standard Proctor Value.

The Town may require soil tests to be furnished by a recognized soil testing laboratory or registered professional engineer specializing in soil mechanics, when in its opinion, backfill for any excavation is not being adequately compacted. Such test must show that backfill materials meet the minimum requirements as prescribed by the Town and are to include test for sieve, proctor and density. All expense for the test(s) shall be borne entirely by the permittee. The Department of Public Works or its designee will approve the testing laboratory prior to placement of any material.

- E. Castings – All surface castings shall be temporarily set at binder course elevation at time of placement. One day prior to placement of pavement top course, binder shall be saw cut square around casting, casting shall be raised to finish elevation and set with cement concrete collar. Said collar shall extend completely to binder elevation.
- F. Roadway Patch - Upon completion of the work and only after the required backfilling and compaction has been achieved as defined herein, shall road patching operations begin. In no event

will openings be allowed to be left un-patched for more than forty-eight (48) hours or over a weekend without the expressed written approval of the Department of Public Works Director or his designee.

1. All road patches shall be placed perpendicular or parallel to traffic flow. Angular patches across the roadway shall only be permitted with the approval of the Department of Public Works Director or his designee. All pavement shall be saw-cut a minimum of one (1) foot back from the limit of trench excavation into sound pavement to provide a vertical joint for patching. In locations where adjacent pavement was damaged due to contractor operations saw cut and patch limits shall be extended to encompass the damaged pavement. These limits shall be reviewed and approved by the DPW Director or his designee prior to removal.
2. Hot patch shall be used at all times except when seasonal conditions warrant the use of a temporary cold patch.
3. All patches shall be a minimum four (4) inches thick or the thickness of the existing pavement, whichever is greater with all perimeter joints treated with asphaltic sealant.
4. Patches shall be rolled and compacted to match the existing surface in a good workmanlike manner and all abutting surfaces sealed with an asphaltic sealant.
5. Patches will be maintained by the permittee for a period of six (6) months at which time the patch will be finalized in one of the following two manners the decision of which method shall be made by the Department of Public Works Director or his designee after assessment of settlement:
  - a. Asphalt shall be cut back a minimum of one (1) foot beyond all sides and square around a five (5) foot radius from the entire structure casting, then removed along with the temporary patch. Subbase shall be graded and recompactd by mechanical means before permanent patch is applied.

Permanent patch shall have a 4" thickness or equal that of the existing pavement, whichever is greater. Binder shall be placed in lifts not to exceed 2 ½" thickness and overlaid with 1 ½" top course, all of which shall be compacted to 95% modified proctor.
  - b. If permitted by the Director of Public works, asphalt patch may be excavated to a depth of one and one half (1 ½) inches by means of cold planning. The surface shall then be swept, treated with tack coat and overlaid with pavement top course. All perimeter joints shall be treated with asphaltic sealant.
6. All materials and construction methods must meet The Commonwealth of Massachusetts Department of Public Works Standard Specifications for Highways and Bridges (1995), including all supplemental specifications.
7. The repainting of traffic pavement markings shall be the responsibility of the permittee. The Department of Public Works or its designee shall be notified prior to the painting of the new traffic pavement markings.
8. Work occurring on roadways within the 5 year moratorium or work occurring on State numbered routes shall have all surface pavement joints finished by Infra-Red method.

- G. Blasting - Should blasting be required, it must meet the approval of the Director of Public Works. All of the necessary permits for the use of explosives shall be obtained from the Fire Chief.
- H. Multiple Trenches - Where the Applicant proposes to excavate more than one trench within a roadway the following shall apply:
1. Traverse trenches with limits within ten (10) horizontal feet of each other shall have single patch which encompasses the lateral limit of each trench including the area between the trenches. The traverse limit shall be two (2) feet beyond the limit of the longest trench.
  2. Longitudinal trenches located within the same travel lane shall have the entire travel lane a single patch for a longitudinal limit two (2) feet beyond each end of the longest trench.
  3. Longitudinal trenches located a minimum of ten (10) feet apart and within different travel lanes shall be treated as independent trenches.
- I. Major Projects – The extent of surface repair for major projects will be determined on a per application basis and may include curb to curb mill and overlay for projects where several traverse trenches are constructed across travel lanes. The Department of Public Works Director or his designee shall inspect the project limits with the applicant to define these limits and conditions. This decision is up to the sole discretion of the Department of Public Works.

END OF SPECIFICATION

LEBARON LF-248-2 OR EQUAL  
24" SQ. CAST IRON FRAME &  
GRATE, 8" FRAME HEIGHT

CURB, BERM, OR  
GRANITE INLET STONE  
(SEE DETAIL ST-4)

1-1/2" TOP COURSE  
2-1/2" BINDER COURSE

SET FRAME IN FULL BED  
OF MORTAR (TYP.)

8" REINFORCED PRE-CAST SLAB  
TOP TO MEET H-20 LOADING

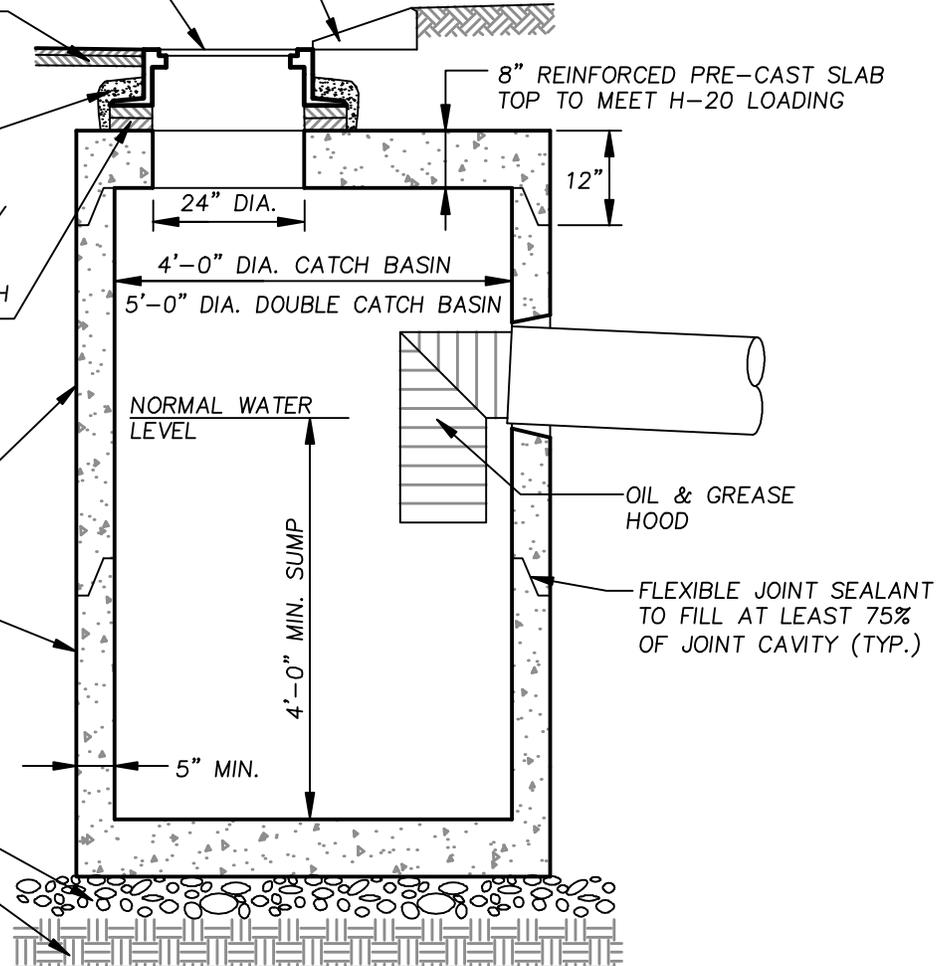
ADJUST TO REQUIRED GRADE W/  
MIN. OF 2 OR MAX. OF 5  
COURSES OF RED SEWER BRICK  
OR EQUIVALENT DIMENSION WITH  
REINFORCED CONCRETE COLLAR

PRECAST CONCRETE RISER  
SECTION, HEIGHT MAY VARY  
FROM 1' TO 4' (TYP.)

PRECAST CONCRETE BASE  
SECTION (TYP.)

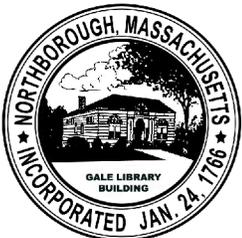
12" OF 3/4" WASHED  
CRUSHED STONE

COMPACTED SUBGRADE



NOTES:

1. CONCRETE TO BE 4,000 PSI AT 28 DAYS.
2. MANUFACTURER TO CERTIFY STRUCTURE TO BE CAPABLE OF AASHTO HS-20-44 LOADING & ASTM C478 SPEC. FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
3. SEAL OUTSIDE OF STRUCTURE WITH BITUMEN OR APPROVED SEALANT. ALL STRUCTURES TO BE WATER-TIGHT IN-PLACE.



TOWN OF NORTHBOROUGH  
DEPARTMENT OF PUBLIC WORKS  
CONSTRUCTION DETAILS

STANDARD CATCHBASIN DETAIL

SCALE: DATE:  
NTS 3-21-14

REVISED:

DETAIL NO.:  
DR-1

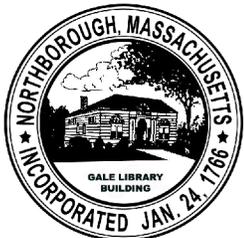
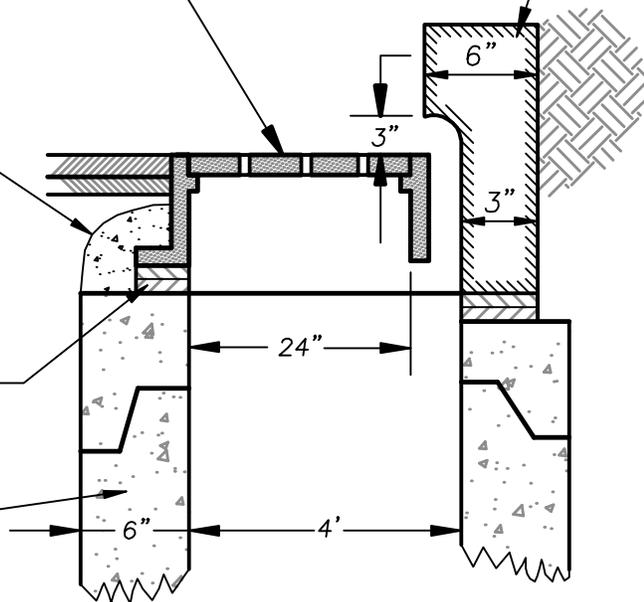
LEBARON LF 248-2, OR  
EQUAL W/ ONLY 3 FLANGES

GRANITE CURB INLET  
(SEE DETAIL ST-4)

CONCRETE CAP

ADJUST TO REQUIRED GRADE W/  
MIN. OF 2 OR MAX. OF 5 COURSES  
OF RED SEWER BRICK OR  
EQUIVALENT DIMENSION WITH  
REINFORCED CONCRETE COLLAR

PRECAST CONCRETE  
CATCHBASIN W/ FLAT  
TOP (SEE DETAIL DR-1)



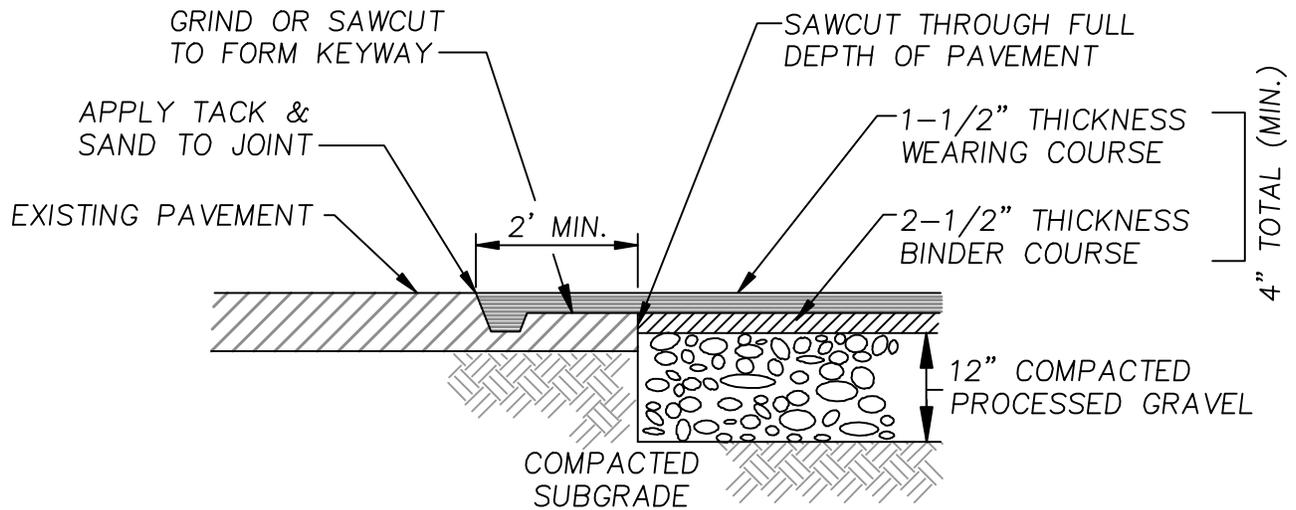
TOWN OF NORTHBOROUGH  
DEPARTMENT OF PUBLIC WORKS  
CONSTRUCTION DETAILS

CATCHBASIN WITH GRANITE  
CURB DETAIL

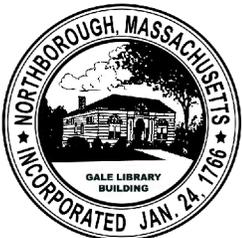
SCALE: NTS	DATE: 3-21-14
---------------	------------------

REVISED:

DETAIL NO.: DR-2
---------------------



NOTE: WHERE THE WIDTH OF THE NEW PAVEMENT IS LESS THAN 4 FEET, THE PROCESSED GRAVEL SUB BASE SHALL BE REPLACED WITH HIGH EARLY STRENGTH CEMENT CONCRETE.



TOWN OF NORTHBOROUGH  
 DEPARTMENT OF PUBLIC WORKS  
 CONSTRUCTION DETAILS

TRANSITION AT EXISTING PAVEMENT

SCALE: NTS      DATE: 3-21-14

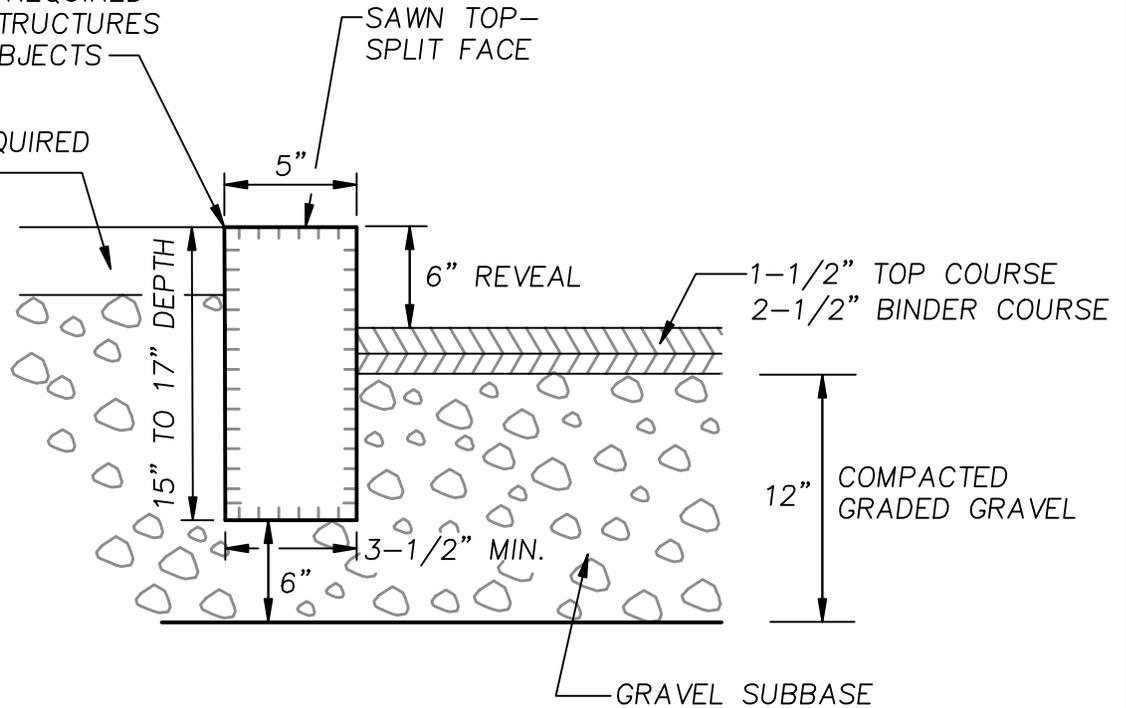
REVISED:

DETAIL NO.: ST-1

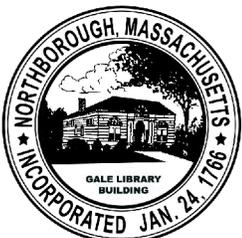
CONTINUOUS 5/8"  
EXPANSION JOINT REQUIRED  
AT ALL WALKS, STRUCTURES  
OR PERMANENT OBJECTS

SURFACE AS REQUIRED  
SEE SITE PLAN

SAWN TOP-  
SPLIT FACE



FOR MORE DETAILS SEE MASSDOT STANDARD SPECIFICATIONS  
FOR HIGHWAYS AND BRIDGES SECTION M9.04.1 TYPE VB



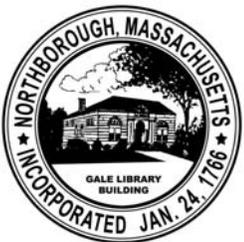
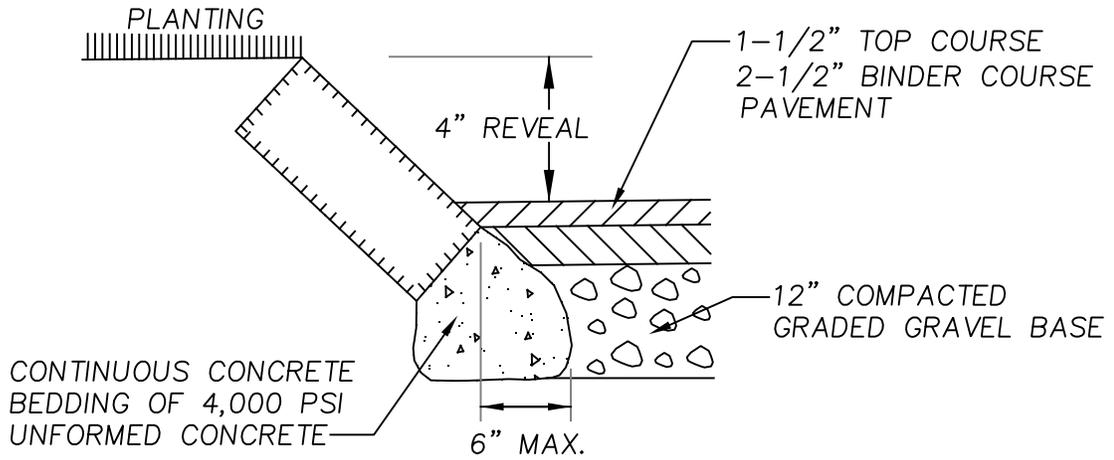
TOWN OF NORTHBOROUGH  
DEPARTMENT OF PUBLIC WORKS  
CONSTRUCTION DETAILS

VERTICAL GRANITE CURB

SCALE: NTS	DATE: 3-21-14
---------------	------------------

REVISED:

DETAIL NO.:	ST-2
-------------	------

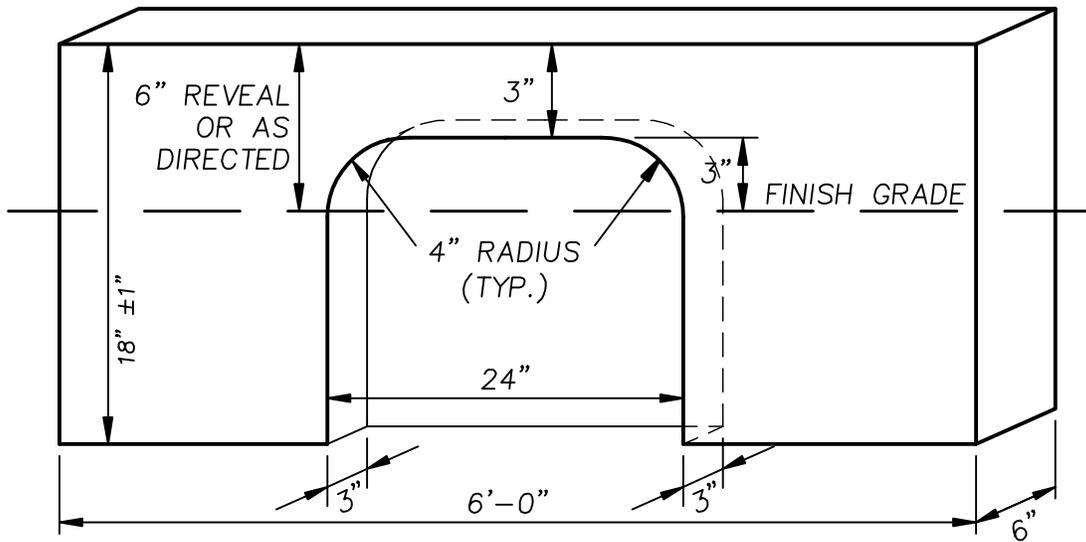


TOWN OF NORTHBOROUGH  
DEPARTMENT OF PUBLIC WORKS  
CONSTRUCTION DETAILS

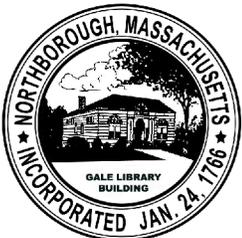
**SLOPED GRANITE EDGING**

SCALE: NTS	DATE: 2-27-14
REVISED:	
DETAIL NO.: ST-3	

CATCHBASINS SHALL HAVE CURB INLET STONES WITH TRANSITION STONES WHEN SLOPED GRANITE EDGESTONE IS USED (SEE DETAIL ST-5)



FOR MORE DETAIL SEE MASSDOT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES SECTION M9.04.5



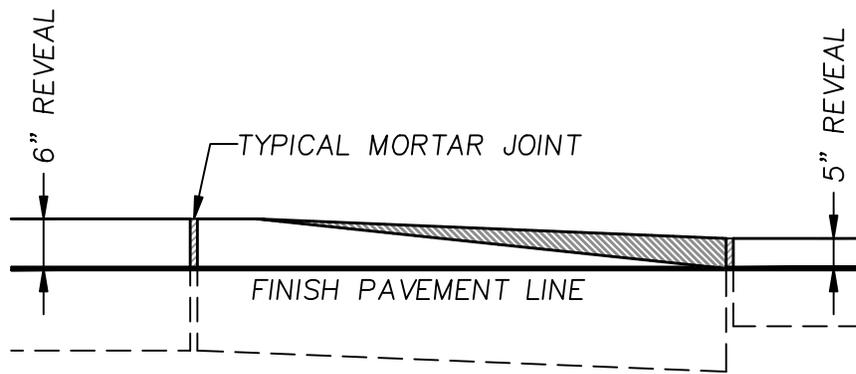
TOWN OF NORTHBOROUGH  
DEPARTMENT OF PUBLIC WORKS  
CONSTRUCTION DETAILS

GRANITE CURB INLET STONE

SCALE:	DATE:
NTS	3-21-14

REVISED:

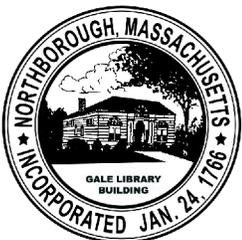
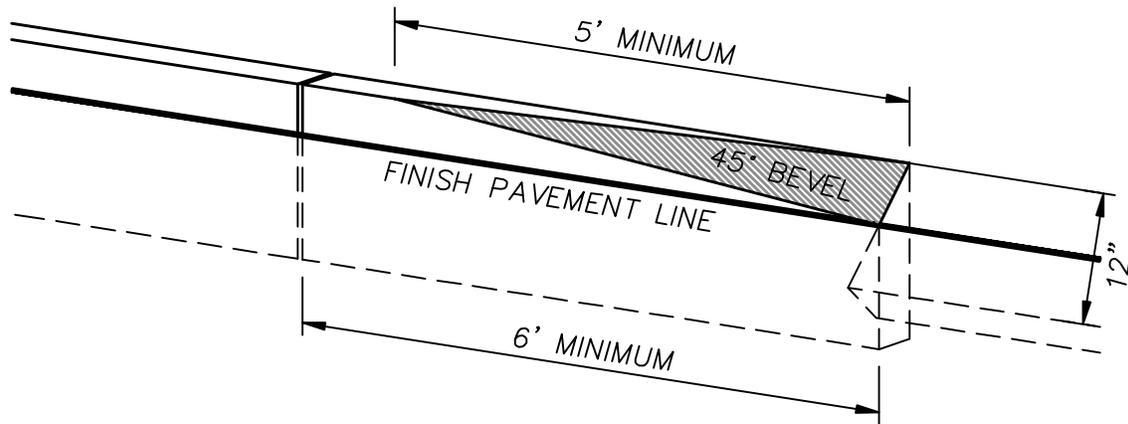
DETAIL NO.:
ST-4



TYPICAL  
VERTICAL  
GRANITE  
CURB  
INLET  
SECTION

TYPICAL  
CURB  
SECTION  
TIPPED  
DOWN

TYPICAL  
SLOPED  
GRANITE  
CURB  
SECTION



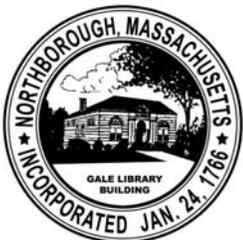
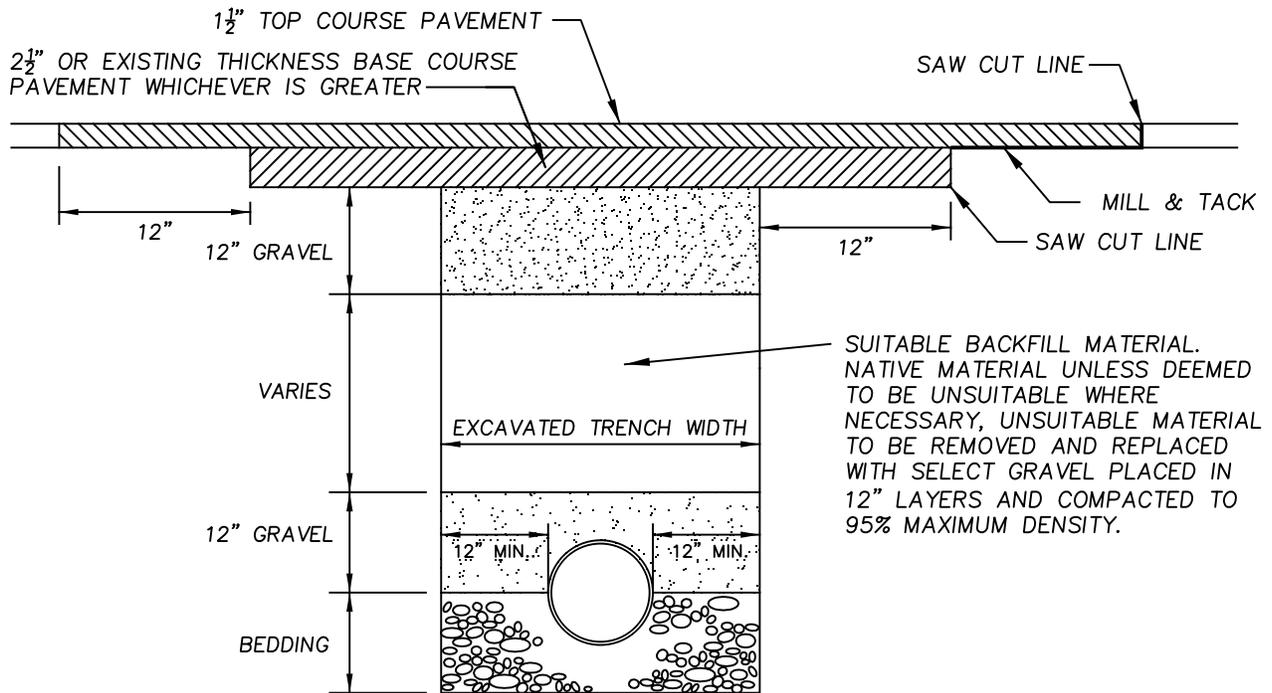
TOWN OF NORTHBOROUGH  
DEPARTMENT OF PUBLIC WORKS  
CONSTRUCTION DETAILS

SLOPE TO VERTICAL  
GRANITE CURB TRANSITION

SCALE: NTS      DATE: 3-21-14

REVISED:

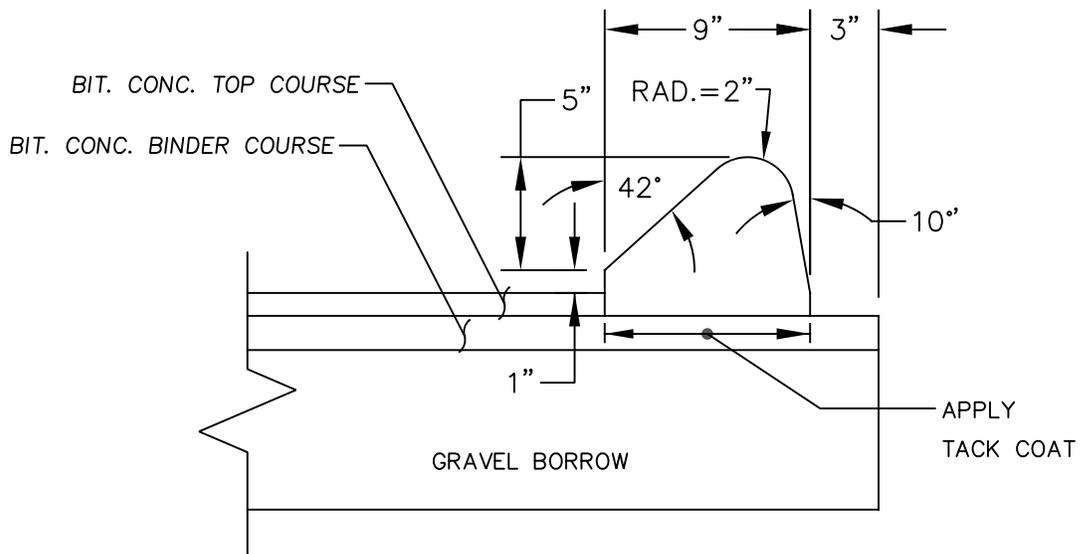
DETAIL NO.: ST-5



TOWN OF NORTHBOROUGH  
 DEPARTMENT OF PUBLIC WORKS  
 CONSTRUCTION DETAILS

**STANDARD TRENCH SECTION**

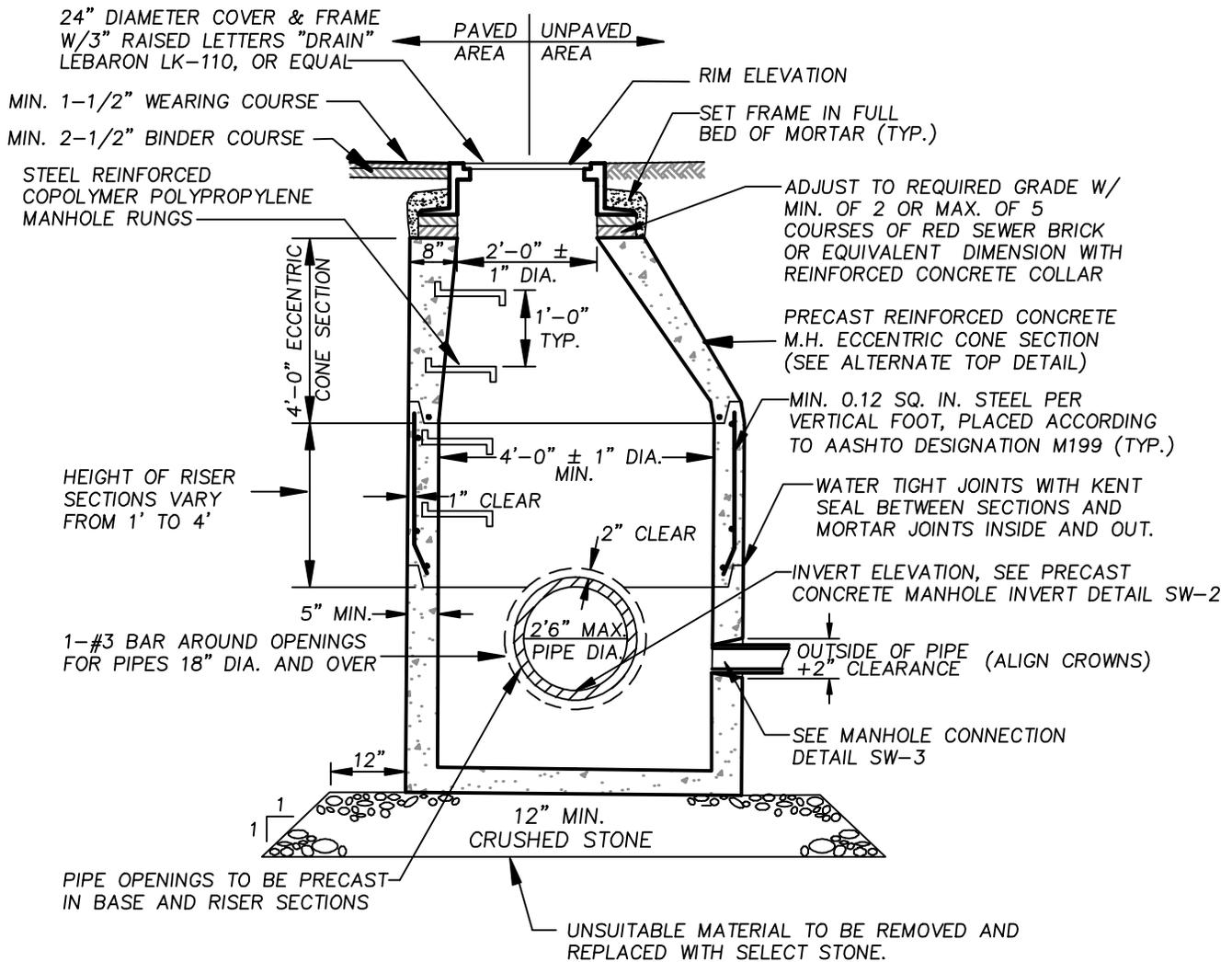
SCALE: NTS	DATE: 7-20-16
REVISED:	
DETAIL NO.: ST-6	



TOWN OF NORTHBOROUGH  
 DEPARTMENT OF PUBLIC WORKS  
 CONSTRUCTION DETAILS

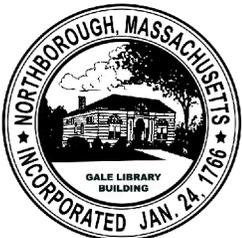
**BITUMINOUS CONCRETE CURB**

SCALE: NTS	DATE: 4-6-16
REVISED:	
DETAIL NO.: ST-7	



NOTES:

1. CONCRETE TO BE 4,000 PSI AT 28 DAYS.
2. MANUFACTURER TO CERTIFY STRUCTURE TO BE CAPABLE OF AASHTO HS-20-44 LOADING & ASTM C478 SPEC. FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
3. SEAL OUTSIDE OF STRUCTURE WITH BITUMEN OR APPROVED SEALANT. ALL STRUCTURES TO BE WATER-TIGHT IN-PLACE.



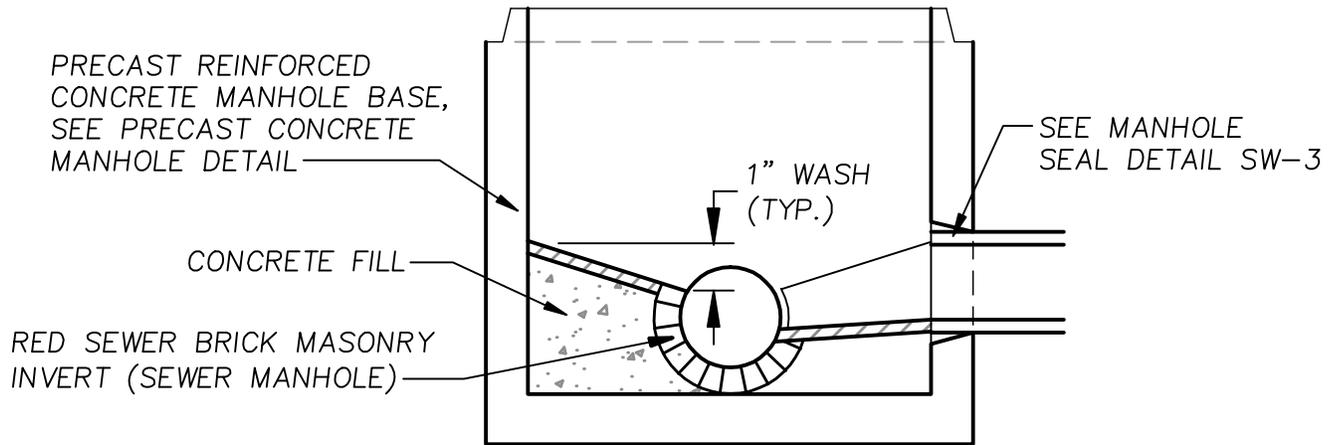
TOWN OF NORTHBOROUGH  
DEPARTMENT OF PUBLIC WORKS  
CONSTRUCTION DETAILS

PRECAST CONCRETE MANHOLE

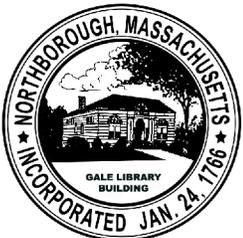
SCALE:	DATE:
NTS	3-21-14

REVISED:

DETAIL NO.:
SW-1



NOTE:  
DRAIN MANHOLE INVERT TO BE BUILT  
TO SHAPE WITH POURED CONCRETE



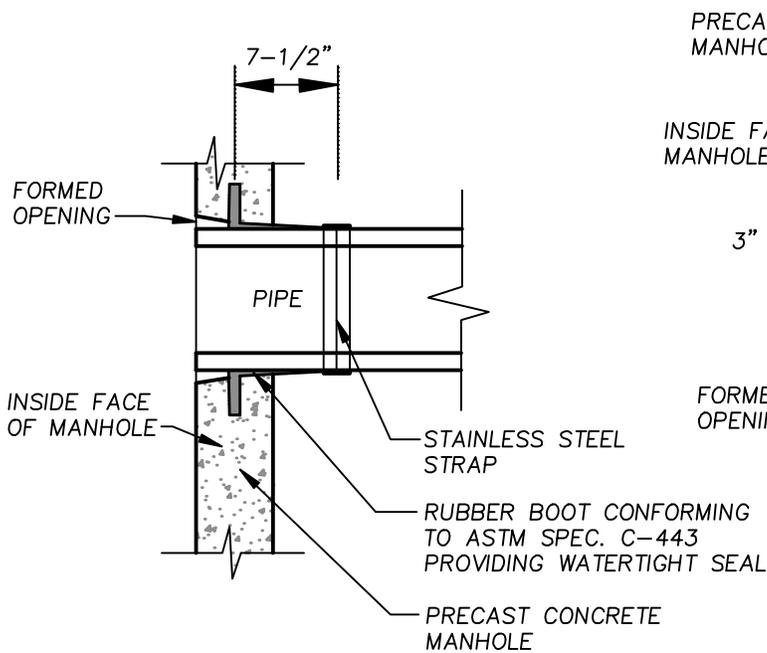
TOWN OF NORTHBOROUGH  
DEPARTMENT OF PUBLIC WORKS  
CONSTRUCTION DETAILS

PRECAST CONCRETE MANHOLE  
INVERT DETAIL

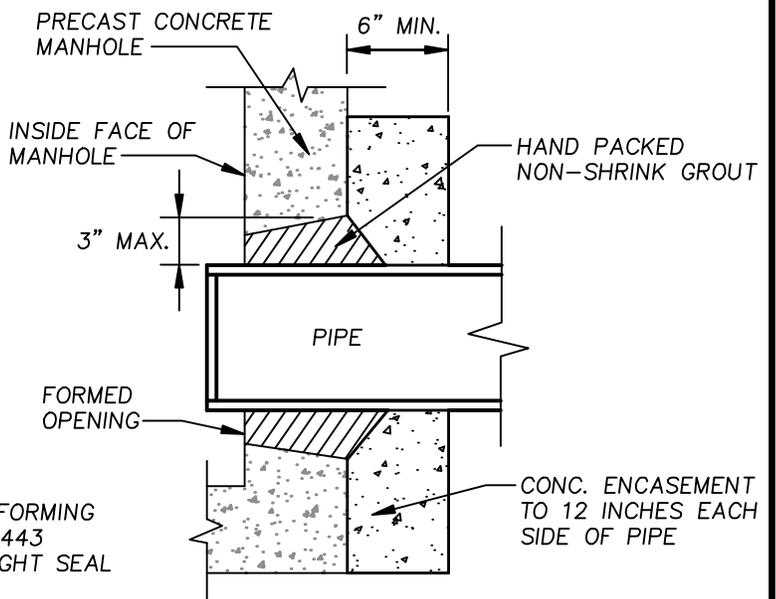
SCALE: NTS	DATE: 3-21-14
---------------	------------------

REVISED:

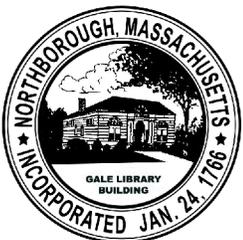
DETAIL NO.: SW-2
---------------------



SEWER MANHOLE



DRAIN MANHOLE



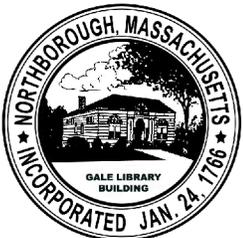
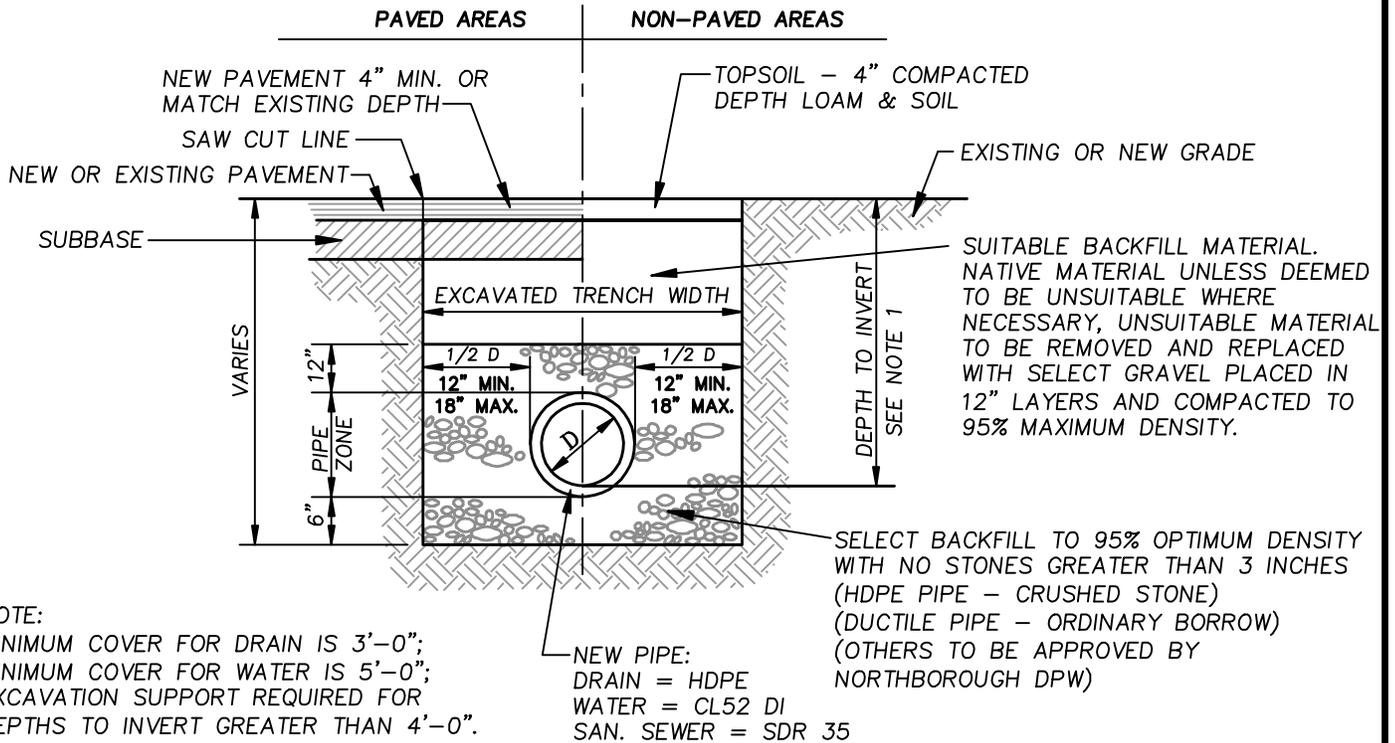
TOWN OF NORTHBOROUGH  
DEPARTMENT OF PUBLIC WORKS  
CONSTRUCTION DETAILS

MANHOLE CONNECTION DETAIL

SCALE:	DATE:
NTS	3-21-14

REVISED:

DETAIL NO.:
SW-3

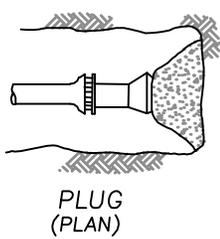
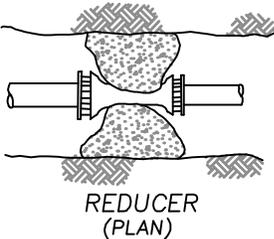
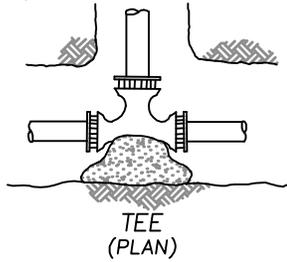
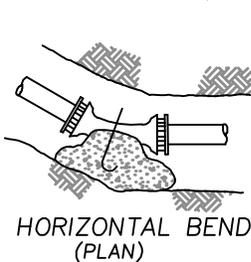
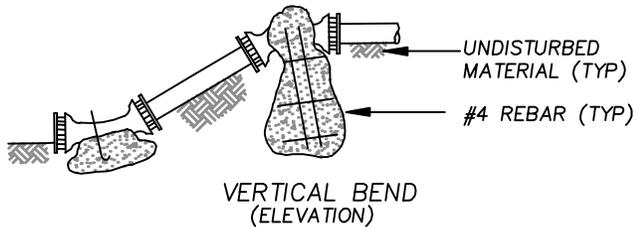


TOWN OF NORTHBOROUGH  
 DEPARTMENT OF PUBLIC WORKS  
 CONSTRUCTION DETAILS

SEWERS, STORM DRAINS & WATER  
 MAIN EXCAVATION & BACKFILL LIMITS

SCALE: NTS	DATE: 3-21-14
REVISED:	
DETAIL NO.: SW-4	



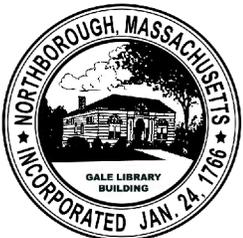


AREA OF BEARING FACE OF CONCRETE THRUST BLOCKS IN SQUARE FEET BASED ON 250 P.S.I. & 1.5 TONS/S.F. ALLOWABLE SOIL BEARING CAPACITY

PIPE SIZE (M.)	1/4 BEND	1/8 BEND	1/16 BEND	PLUG & TEES
4,6,8	6.0	2.9	2.3	4.5
10	9.6	5.2	2.3	6.7
12	13.3	6.7	3.7	9.6
16	24.0	11.8	3.7	17.0

NORMAL FITTING DIAMETER	BEARING AREA - SQ. FT.				
	90° BEND	45° BEND	BETWEEN 10°-45°	BRANCH OF TEE	DEAD END
6"	4	2	2	4	4
8"	7	4	3	5	5

1. ALL BENDS, TEES, WYES, HYDRANTS AND DEAD ENDS SHALL BE BRACED WITH CONCRETE THRUST BLOCKS.
2. BEARING AREA (H X L) IS AREA OF CONE IN CONTACT WITH WALL OF TRENCH.
3. HEIGHT (H) & LENGTH (L) AS REQUIRED TO OBTAIN BEARING AREA IN TABLE.
4. BOULDERS ARE NOT TO BE USED AS THRUST BLOCKS.



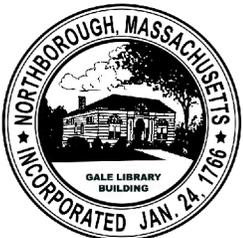
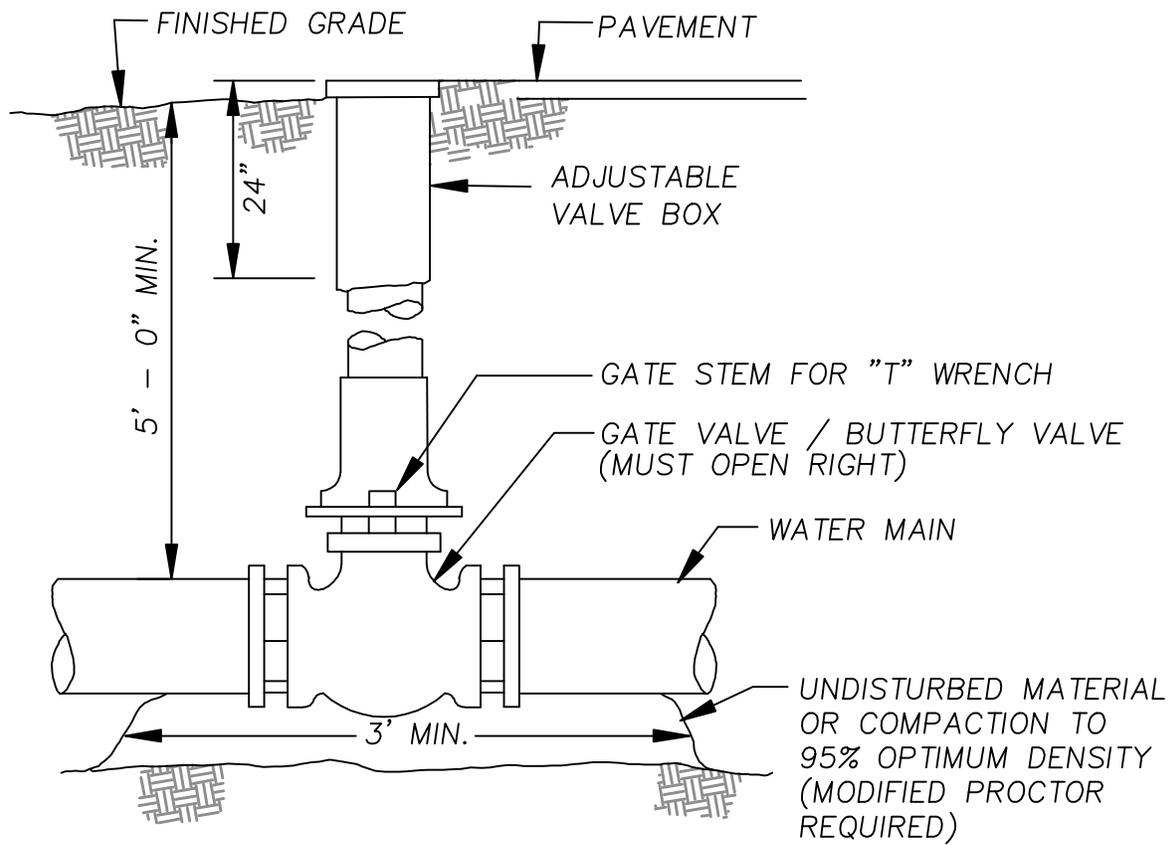
TOWN OF NORTHBOROUGH  
DEPARTMENT OF PUBLIC WORKS  
CONSTRUCTION DETAILS

THRUST BLOCK DETAILS

SCALE: NTS      DATE: 3-21-14

REVISED:

DETAIL NO.: WT-2



TOWN OF NORTHBOROUGH  
 DEPARTMENT OF PUBLIC WORKS  
 CONSTRUCTION DETAILS

GATE VALVE DETAIL

SCALE: NTS	DATE: 3-21-14
REVISED:	
DETAIL NO.: WT-3	