

**Town Of Cromwell
Department of Public Works**

**ROAD
CONSTRUCTION
SPECIFICATIONS**

**Adopted
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TOWN OF CROMWELL, CONNECTICUT - ROAD SPECIFICATIONS

1.0 SCOPE

1.1 These Specifications shall govern the construction of all roads, drainage structures, appurtenances and bridges presented or designed to be presented for acceptance and maintenance by the Town of Cromwell.

1.2 These Specifications shall also apply to roads constructed for private use, which may be presented to the town at any subsequent time.

1.3 A road construction permit shall be required for all roads or parking facilities, whether intended as a public or private right of way. Those roads or parking facilities, which are totally within a subdivision, approval of which has been obtained from the Cromwell Planning Commission, shall not be subjected to the requirements of Section 204-4.C. of the Town Code.

2.0 GENERAL

2.1 ADMINISTRATIVE AGENT

2.1.1. The Director of Public Works, or his designated agent, shall be the Administrative Agent to receive maps and applications as noted herein and to make inspections of streets, drainage systems, sidewalks or other improvements, as may be required to assure compliance with these regulations and to carry out such other duties as may be required of him by these regulations. All references to "Director of Public Works" in this document shall also mean "his agent".

2.2 ROAD ACCEPTANCE

2.2.1. Before a road may be submitted to the town for acceptance as a town road, a request must be filed with the Board of Selectmen, in writing, by the developer. Copies of the request shall be filed with the Director of Public Works and the Planning & Zoning Commission, each of whom will make a recommendation to the Board of Selectmen. The Board of Selectmen will then recommend road acceptance or denial at a scheduled town meeting. Prior to acceptance the Town shall have received all submissions required in sections 2.3 through 2.5.

2.3 CERTIFICATION/ DEED

2.3.1. The petitioner shall furnish the Director of Public Works, at the petitioner's expense certification of any interest in property (and all easements) to be conveyed or granted to the Town of Cromwell. The petitioner shall also furnish a deed by which he proposes to convey title of the street right of way to the Town of Cromwell.

2.4 GUARANTY BONDS, INSURANCE AND MAINTENANCE PERIOD

2.4.1 In the case of the construction of roads, under contract to the Town of Cromwell, the contractor shall file with the Director of Public Works, as a guaranty, a performance bond and a payment bond, each in the full amount of said contract, in order to secure the town the satisfactory completion of the work. Both bonds shall be by letter of credit (Through companies licensed to do business in the State of Connecticut), a cash bond or other instrument as approved

by the Director of Public Works and shall be written in acceptable form, sufficiency and manner of execution.

2.4.2 In the case of the construction of roads in a proposed subdivision, the developer shall file with the Planning & Zoning Commission a performance bond in an amount approved by the Planning & Zoning Commission. The amount should be sufficient to secure, to the Town of Cromwell, the actual installation of the proposed improvements. The Planning & Zoning Commission shall not give final approval to any land in the subdivision, until said bond has been accepted and filed. The developer may not commence construction of roads in the proposed development prior to filing said bond. All performance bonds shall be by letter of credit (Through companies licensed to do business in the State of Connecticut), a cash bond or other instrument as approved by Planning & Zoning Commission and shall be written in acceptable form, sufficiency and manner of execution.

2.4.3 Application may be made for approval of a portion or portions of the total proposed road. Such portion or portions must extend from an existing town road and must be fully completed prior to approval. When the portion is approved by the Director of Public Works and the Board of Selectmen, then a pro-rated reduction, in performance bond or deposit, may be allowed. The contractor/developer shall keep and maintain the portions of work in good repair for a period of two (2) years from the date of approval. If the whole work is accepted in portions, as provided above, the maintenance period for the accepted portions shall run for a period of two (2) year from the approval of each accepted portion.

2.4.4 The contractor/developer shall, when notified by the Director of Public Works, promptly and at his own expense, repair all failures in the construction and operation of roads, drainage structures, appurtenances (e.g. detention basins, swales, etc.) and bridges which may occur during the maintenance period; and he shall similarly repair all defects, settlements and irregularities of the of the structures and appurtenances or drains, pipes, mains or conduits, curbs, gutters, sidewalk, road surfaces, area restoration or any other structures within the limits of work or adjacent thereto, occurring during the maintenance period which are caused by or affected by his work. If the contractor/developer fails to remedy such defects within a reasonable time, the Director of Public Works may, without prejudice to any other remedy and after having given 30 days written notice to the contractor/developer and to the bonding company, cause the required repairs to be made and bill the contractor/developer or the bonding company for the cost of the work involved. No recommendation for final acceptance of the road by the town shall be given by the Director of Public Works until construction of all streets, improvements, drainage structures, water mains, sewers and utilities as required by such plan have been completed in accordance with the approved plans and profiles.

2.4.5 Prior to final acceptance of the road by the town, the developer/contractor will file with the treasurer an acceptable maintenance bond (or cash or certified check) in an amount of not less than ten percent (10%) of the performance bond and in an instrument to be established and decided upon by the Director of Public Works and sufficient to secure to the town the maintenance of the road. The term of this bond will be for one (1) year from the date of final acceptance. Upon receipt and approval of this bond, the Town will proceed with the final acceptance of the road.

2.4.6 INSURANCES No permit, for construction of a public or private street in the Town of Cromwell, shall be granted, by the Director of Public Works, until the Contractor files proof of the following insurance:

1. AUTOMOBILE: \$1,000,000 combined single limit for bodily injury and/or property damage.
2. COMPREHENSIVE GENERAL LIABILITY: including products and completed operations
\$1,000,000 each occurrence
\$2,000,000 General Aggregate
\$2,000,000 Products – complete operations aggregate
3. WORKER'S COMPENSATION:
\$100,000/\$500,000/\$100,000 – Employee's Liability
4. UMBRELLA: \$1,000,000 per occurrence

2.5 SUBMISSIONS

2.5.1. Application for road construction permit shall be made per the requirements of Code of the Town of Cromwell Connecticut, Chapter 204, Article I, Section 204-4, subsection "B", and (APPENDIX A), and the following:

2.5.2. Accurate location of monuments with accurate references to a current Town of Cromwell marker elevation (NAVD '88) and coordinate system (NAD '83). All survey information shall meet class "A-2" standards or better.

2.5.3. Watershed data and calculations for design of drainage structures. Minimum submission of data shall consist of Tables 11-4.1, 11-5.1, 11-8.1 and 11-10, as shown in Appendix H.

2.5.4. Streets proposed for acceptance shall be provided with illumination in accordance with section 204-13, subsection "F" of the Town Code. Proposed street illumination plans indicating types of luminaries to be installed and establishing that minimum levels of illumination will be obtained from the electric utility company, Northeast Utilities, Connecticut Light & Power, for the particular function of the road proposed for acceptance. The type and style of street light poles will be FIBERGLASS COLONIAL STYLE unless otherwise directed by the Director of Public Works. If required by the appropriate electric utility company, structures, other than streetlights, shall be placed within a 10' wide easement located outside the town R.O.W. Street lighting plans (showing location and details of all proposed street lights) shall be submitted to the Director of Public Works and must be approved by the Cromwell Chief of Police.

2.5.5. Traffic control plans, showing location of all proposed street signs and traffic control devices (signs, pavement markings, signals, etc.) and approved by the Cromwell Chief of Police, are to be provided. All streets proposed for acceptance shall be provided with street signs, pavement markings and street regulatory signs conforming to the Manual of Uniform Traffic Control Devices and Form 814 (The Connecticut Department of Transportation □Standard

Specifications for Roads, Bridges and Incidental Construction”, current edition or as amended). Any required STC approvals shall be submitted, if applicable.

2.5.6. Construction estimate by quantity and unit price for all roadway and incidental construction must be submitted to the Director of Public Works.

2.5.7. A written request for a required pre-construction meeting, which is made part of the aforementioned application.

2.5.8. If an underground lawn sprinkler system is to be installed a waiver form shall be submitted and filed with the land records at the Town Clerk’s Office. All applicable permits shall be obtained. See APPENDIX “B” of this document.

2.5.9. If a private property needs to connect to the Town storm drainage system for the purpose of draining water, a waiver form must be submitted and filed with the land records at the Town Clerk’s Office. See APPENDIX “E” of this document.

2.5.10. Subsurface Explorations and Testing: The Developer’s Engineer shall plan and execute such field subsurface explorations (pilot borings, etc.) and investigations, field and laboratory soil tests, soil studies, and engineering analyses, as may be required for the proper design of the roadway, including pavement, structures, trenches, channels, etc. The subsurface explorations shall be of sufficient scope to permit determination of general soil and bedrock types and character, including extent of soil strata, detailed classification of soils, shrinkage or swell factors of the predominate materials and subsurface water levels.

Particular attention shall be given to peats, silts and clays in classification type testing. Emphases is required for the determination of which materials in the required excavations will not be suitable for unrestricted use in embankments or other fill, designation of locations where such materials may be used, rate of slope and slope treatment, the need for subsurface drainage in roadbed, toe of slope, in the slope or other special conditions and design of roadway pavement structure (asphalt and processed stone courses) and depth requirements of sub base and any other special soils and foundations concerns.

Soil borings shall be obtained, as a minimum, at every 100-foot station of proposed roadway. In areas of special concern, borings will be required every 50 feet. At all proposed cut sections where rock excavation will be more than ten feet in depth, a sufficient number of borings should be extended to below the bottom of the proposed excavations.

The Developers Engineer shall furnish one copy of all subsurface data secured, including reports of machine or auger borings, bar or power drill soundings, pipe probings, test pits, and geophysical work. Boring logs or other recorded data shall also be submitted. For soil classifications, testing results shall include, where appropriate, the water content, grain size analyses, organic content and Atterberg Limits, consolidation characteristics, soil strength data, moisture-density relationships, soil bearing values and other such tests deemed necessary for adequate and complete soils and foundations design including pavement. The Developer’s Engineer shall plot all subsurface data obtained, including subsurface water levels on all road profiles and cross-sections, which include the roadway templates for the proposed road alignment and grade.

2.5.11. Upon completion of all construction and prior to the final acceptance, one (1) 24" x 36" mylar copy of "as-built" drawings and a digital copy on either diskette or CD shall be filed

with the Director of Public Works. Said "as-built" drawings shall consist of plan and profile views, indicate the actual vertical and horizontal locations of all utilities, sanitary sewer and storm structures and lines, pavement curb, sidewalk easements and right-of-way lines, and traffic control devices as listed in 2.5.4 above. All as-built plans submitted shall be Class "A-2" accuracy and so certified by a Registered Professional Engineer, licensed to practice in the State of Connecticut. Plans shall be of a scale of not more than 1"= 40' horizontal and not more than 1"=4' vertical.

3.0 STREET DESIGN

3.0.1. The purpose of this section is to assure that the proposed street(s) shall be in harmony with existing or proposed Town roads, especially in regard to safe intersections. In this regard, no islands, whether landscaped or paved, shall be constructed anywhere within the public right of way, unless specified within this document or approved in writing by the Director of Public Works. Where the land to be subdivided does not abut an accepted town street or state road, the sub-divider shall provide and construct a street from the subdivision to such Town Street or state road. The following shall apply to the design of streets:

3.1. THOROUGHFARES (MAIN ARTERIAL):

3.1.1. This classification of street is defined as a street serving as an artery for traveling between large areas or towns, or receiving traffic from more than two major collector streets, or giving street access to, or circulation within commercial or industrial areas. Anticipated Average Daily Traffic Volumes, after completion of construction would be over 3000 vehicles. The minimum width of the right-of-way for this classification of street shall be fifty feet (50') to sixty feet (60') with a maximum grade of 5.0%. The paved portion of the street (face of curb to face of curb) shall be at least thirty feet (30') to forty feet (40') wide and the maximum degree of curvature at the horizontal centerline shall be eight (8) degrees (minimum radius 700' +/-). Minimum Design Speed shall be 40 mph.

3.2. MAJOR COLLECTOR STREETS:

3.2.1. Average Daily Traffic Volumes, after completion of construction would be between 1500 and 3000 vehicles. This classification of street shall have a minimum width of right-of-way of fifty feet (50') with a maximum grade not to exceed 10.0%. The paved portion (face of curb to face of curb) of the street shall be at least thirty feet (30') wide and the maximum degree of curvature at the horizontal centerline shall be ten (10) degrees (minimum radius 550' +/-). Minimum Design Speed shall be 35 mph.

3.3 LOCAL STREETS:

3.3.1 Average Daily Traffic Volumes, after completion of construction would be between 500 and 1500 vehicles. This classification of street shall have a minimum width of right-of-way of fifty feet (50') with a maximum grade not to exceed 10.0%. The paved portion of the street (face of curb to face of curb) shall be at least twenty-eight feet (28') wide and the maximum degree of curvature at horizontal centerline shall be sixteen (16) degrees (minimum radius 400' +/-). Minimum Design Speed shall be 30 mph.

3.4 CUL-DE-SAC STREETS:

3.4.1. Average Daily Traffic Volumes, after completion of construction would be under 500 vehicles. This classification of street, defined as a dead end street and providing access to property, shall have a minimum width of right-of-way of fifty feet (50') with a maximum grade of 10.0%. The paved portion of the street (face of curb to face of curb) shall be at least twenty-eight feet (28') wide and the minimum degree of curvature at horizontal centerline shall be twenty-one (21) degrees (minimum radius 300' +/-). No permanent or temporary dead end street shall give the required frontage to more than twenty (20) lots nor exceed 1000 feet in length. All permanent or temporary dead end streets shall terminate in a cul-de-sac one hundred (100) paved feet (face of curb to face of curb) in diameter within a one hundred twenty foot (120') diameter street line right-of-way. Minimum Design Speed shall be 25 mph.

3.5 BOULEVARD STREETS:

3.5.1. This type of street consists of two (2) one-way roadways separated by a raised median. The width of right-of-way for this type of street shall be at least seventy feet (70'). Each roadway shall not be less than twenty feet (20') in width and the raised median shall be a minimum of ten feet (10') in width. Where such roads are proposed for commercial or industrial areas, where exclusive turning lanes may be required, the Director of Public Works may require such pavement and right-of-way widths necessary to accommodate the safe and efficient flow of traffic. Parking shall not be permitted on the median curb of such roads. Geometric design of grades and horizontal curvature shall conform to the standards set for other types of roads as defined by the function of the road. Anticipated Average Daily Traffic Volumes, after completion of construction would be over 3000 vehicles.

3.6 GRADIENT:

3.6.1. As far as practicable, streets shall follow natural contours. The maximum allowable gradient for roads shall be 10.0% and the minimum allowable gradient shall be 1.0%.

3.7 VERTICAL CURVES:

3.7.1. All change in grade shall be connected by vertical curves with a minimum length of two hundred (200) feet. Vertical curves shall provide a minimum sight distance consistent with the design speed of the road. Where any street approaches an intersection at a grade of 4.0% or more, a transition area, having a maximum grade of 2.0% shall be provided for a minimum of twenty-five (25) feet, measured from the gutter line of the street intersected.

3.8 ALIGNMENT

3.8.1. No more than two (2) streets shall intersect at one point. Intersections shall be spaced not less than four hundred (400) feet apart and streets shall intersect one another as near to a right angle as practicable, but no intersections shall be at any angle less than sixty (60) degrees. At intersections, street line corners are to be rounded by an arc having a minimum radius of twenty five (25) feet.

3.9 SIGHT DISTANCES

3.9.1. Safe sight distances, as defined in A Policy On Geometric Design Of Highways and Streets, 2001 Fourth Edition, American Association of State Highway And Transportation Officials, shall be provided in each direction in accordance with the anticipated vehicle operating speeds of the street intersected.

3.10 CROSS-SECTIONS

3.10.1. Streets shall be designed with a cross section providing for grading of the entire right-of-way and for a cross pitch of one-quarter (1/4) inch (2%) to three-eighths (3/8) of an inch (3%) per foot for the pavement constructed on a parabolic curve. Super-elevation will be provided where required, in accordance with the Connecticut Department of Transportation Standards for the design speed. The sidewalk area or shoulder, between the edge of pavement and the right-of-way line, shall be graded to an elevation six (6) inches above the top of the crown of the pavement. The full width of the right-of-way shall be brought to the required grade. No banks adjoining a street right-of-way shall have a slope greater than 4:1 except upon written approval of the Director of Public Works.

3.11 MONUMENTS

3.11.1. Monuments shall be required for all roads proposed for acceptance by the Town of Cromwell and shall be of stone or reinforced concrete, not less than thirty six (36) inches long, with a brass or copper plug or drill hole, or cross marking the center of the four (4) inch square and be set flush with finished grades. All monuments shall be located by a registered land surveyor and shall be set at the point of curvature (PC) and point of tangency (PT) of all curves and angle points in street lines.

4.0 DRAINAGE SYSTEM DESIGN

4.0.1. All roads shall be properly drained and sufficient culverts, manholes and catch basins installed. No portion of any road shall drain in one direction more than three hundred (200) feet, between catch basins. Catch basins shall be installed on both sides of the road. All proposed locations of catch basins shall be justified by a "Gutter Flow Analyses," which is to be submitted to the Director of Public Works.

4.0.2. Drainage systems shall be designed pursuant to the requirements of the latest version of the "DRAINAGE MANUAL", as prepared by the Department of Transportation, Office of Engineering, Bureau of Engineering and Highway Operations, Division of Design Services, Hydraulics and Drainage Section and the "CONNECTICUT STORMWATER QUALITY MANUAL", as prepared by the Department of Environmental Protection, Office of Water Management. All pavement and storm drainage system computations are to be provided.

4.1 DESIGN STORM (RETURN FREQUENCY):

4.1.1. Local street and cul-de-sac street drainage systems shall incorporate pipe designs on the basis of a ten (10) year storm. Major collector street drainage systems shall incorporate pipe designs on the basis of a twenty-five (25) year storm. Thoroughfare and Boulevard street drainage systems shall incorporate pipe designs on the basis of a fifty (50) year storm.

4.2 STORMWATER QUANTITY & QUALITY

4.2.1. Hydrologic sizing criteria for storm water management and treatment practices shall be in compliance with DOT's "DRAINAGE MANUAL", Chapter 6, Hydrology. Pursuant to the definitions within Table 8-4, Chapter 8 of the "DRAINAGE MANUAL", minor structures and culverts, for road crossing of streams, shall be designed on the basis of a twenty five (25) year storm. Small structures and culverts, for road crossing of streams, shall be based on a fifty (50) year flood. Intermediate and Large structures and culverts, for road crossing of streams shall be based on a one-hundred (100) year flood. Watershed area for streams shall be computed and submitted to the Director of Public Works. Reference shall also be made to DEP's "Connecticut Stormwater Quality Manual", Chapter Seven for hydrologic sizing criteria for storm water treatment practices.

4.3 OPEN DRAINAGE:

- 4.3.1. Where open drainage is proposed, the following conditions must be complied with:
1. No major stream is diverted.
 2. All watercourses remain in as natural a state as possible. Where swales or relocated brooks must be utilized, the sides of the resulting cuts must be sloped gently to make lawn mowing and maintenance easy. Adequate provision will be made to prevent erosion.

4.4. DISCHARGE OF STORM WATER:

4.4.1. The discharge of all storm water shall be into an established watercourse. Where discharge shall be into or through private property, proper easements or discharge rights shall be secured by the applicant for the town and shall meet with the approval of the Town Attorney. These permanent easements and rights of way, along with all associated rights, shall be filed with the Cromwell Town Clerk

4.5 STORM SEWER SYSTEMS:

4.5.0. All drainage structures shall be indicated as to size and location on plan and profile sheets. In addition, drawings and calculations showing size of watershed area and quantity of water drained by each culvert that either crosses, or is part of, the roadway drainage system or subdivision drainage system shall be submitted. Permanent drainage rights-of-way through lots shall be at least twenty (20) feet wide and shall be clearly identified on submission documents. These permanent easements and rights of way, along with all associated rights, shall be filed with the Cromwell Town Clerk.

4.5.1 Pipe: All drainage pipe [shall conform to section 7.1.5 of this regulation and] shall be at least fifteen (15) inches in diameter and installed with a minimum cover of three (3) feet. No culvert pipe shall be installed prior to inspection and approval of the Director of Public Works. Pipe sections evidencing cracks, chipped ends or honeycombs will not be installed. No pipe installed shall be covered until installation has been inspected and approved by the Director of Public Works. All pipes shall be placed with bedding material conforming to Section 6.51 of Form 814. Concrete or stone masonry head walls, or accepted culvert ends shall be located at ends of all culverts and shall be extended to limits of right of way. No pipes or structures shall be constructed, until the Director of Public Works has inspected the materials.

4.5.2 Channels: Channels shall be constructed and rip-rapped in accordance with the “2002 Connecticut Guidelines for Soil Erosion and Sedimentation Control”, Bulletin 34, as prepared by the Department of Environmental Protection.

4.5.3 Structures Catch basins, manholes, and other similar drainage structures shall be constructed in accordance with these regulations.

5.0 INSPECTIONS AND NOTICE TO THE TOWN

5.1 NOTIFICATION

5.1.1. The contractor/developer shall notify the Director of Public Works, in writing, of his intention to start construction of any road at least three days prior to starting such work. As part of this notice, the contractor/developer shall submit a detailed construction schedule. The contractor/developer shall also give timely notice to the Director of Public Works for inspection purposes during the following stages of work:

- A. At the completion of drainage structures, water, gas and sewer utilities.
- B. At completion of preparation of sub-grades and sub-bases, if required.
- C. During construction of processed aggregate base course.
- D. During construction of pavement binding course and curbs.
- E. During construction of pavement wearing surface.

5.2 PHASED CONSTRUCTION

5.2.1. No work shall be started on succeeding stages of construction until all previously required inspection has been made and approval of the Director of Public Works has been given.

5.3. “CALL BEFORE YOU DIG”

5.3.1. No work shall commence until “Call Before You Dig” has been notified and all utilities are properly marked out. All utilities shall be remarked at the end of each thirty (30) day interval, as required by law.

5.4 INSPECTION FEES

5.4.1. Before commencing any work, the Developer shall deposit with the Treasurer of the Town of Cromwell, a sum determined by the Director of the Public Works, to be sufficient to defray the anticipated costs of inspection, to be incurred by the Town. In case said deposit proves to be insufficient at any time during the progress of the work, as determined by the Director of Public Works, the Developer will make a further deposit upon notification by the Treasurer. Upon acceptance of the road, any unexpended portion of said deposit shall be returned to the Developer.

6.0 CONSTRUCTION OF ROADS

6.0.1. The following standards constitute a minimum construction requirement for typical residential use of town roads in areas of average soil bearing strength. These specifications may be increased by the Director of Public Works, or his designated representative, for roads which, due to the nature of the area served, could reasonably be expected to carry types of vehicular

traffic whose distributed axle load would exceed the bearing capacity of the soil types known to be in the area. Certified, soil tests may be required by the Director of Public Works.

6.1 CLEARING:

6.1.1. All slopes and areas adjacent to the road shall be cleared, to the full width of the right-of-way, of excess stones, slumps, brush and refuse of any kind. All overhanging branches shall be trimmed to a fourteen (14) foot clearance above the finished grade of the road. The trees along the right-of-way area shall be trimmed properly in order to provide adequate visibility. Within the fill lines where an embankment is to be made, not more than three (3) feet in depth, trees, stumps, roots, etc., shall be removed. Where the embankment to be constructed exceeds three (3) feet in depth, trees, stumps, roots, etc., shall be cut off within six (6) inches of the ground surface. Within the right-of-way limits, but outside of the roadway limits, all stumps shall be removed or ground at least six (6) inches below ground level and all dead or uprooted trees, brush, roots or other objectionable material shall be removed as directed by the Director of Public Works. The developer shall dispose of all such trees, stumps, brush, etc. offsite, in a satisfactory manner.

6.2 DRAINAGE:

6.2.1. Pipes and Excavations: Prior to laying pipe, the trench shall be excavated to the required depth, the bottom of which shall be graded 6" below the pipe, to afford a uniformly firm bearing for the pipe throughout its length, or as directed by the Director of Public Works. Where rock is encountered, it shall be excavated to not less than twelve (12) inches below the bottom of the trench. The depth shall be refilled with 3/4" crushed stone of a quality specified in Form 814, [or other material suitable to the Director of Public Works or his designated agent], and thoroughly tamped and shaped. Where nature of the foundation material is poor, it shall be removed and backfilled with 3/4" crushed stone.

All pipes shall be carefully laid, true to the lines and grades given, hubs up and with the spigot ends fully entered into adjacent hubs. Joints in concrete pipe shall be caulked and filled with Portland cement mortar unless said pipes are of the "O" ring gasket type. The joints in concrete pipe shall be thoroughly wetted before making the mortar joint. Asphalt coated corrugated metal pipe (where permitted), coated metal pipe and plastic pipe shall be carefully joined and firmly clamped together by approved connecting bands, which shall be properly, tied or clamped in place (as per manufacturers specifications) before any backfill is placed. Backfilling of appropriate fill material, as shown on the standard detail sheet, along with filter fabric and warning tapes shall proceed. Upon completion of construction, all pipes and structures shall be thoroughly cleaned and fully operable to their design capacity before acceptance by the town.

6.2.2. Catch basin, manholes, drop inlets, end walls: The design, materials, and construction methods that apply to this section are as outlined in Form 814 and Town of Cromwell Standard Detail Sheets as shown in Appendix G of this document. In instances where the applicant is desirous of employing the design and materials of different types of catch basins, manholes, drop inlets and end walls, he shall submit the design and specifications governing the materials and construction methods to the Director of Public Works for review. The Director of Public Works will either approve or disapprove of the requested change.

6.3 ROADS:

6.3.1. Preparation of Sub-grade: All soft and yielding material, along with loose rock and boulders (any stone greater than 6" in diameter) and other portions of the sub-grade which will not compact readily when rolled, shall be removed. All rock shall be removed twelve (12) inches below sub-grade. All holes or depressions, made by the removal of unsuitable material, shall be filled with suitable material and the whole surface compacted uniformly, with a vibratory roller to 95% compaction. The Director of Public Works shall require the developer to furnish certified reports of appropriate density tests performed during construction. Embankments shall be compacted to obtain 95% dry density.

If the sub-grade surface becomes impervious, due to a concentration of fine material, such areas shall be scarified and compacted. If the surface, of an existing road, is one (1) foot or less below the proposed sub-grade surface; it shall be scarified for the full width of the roadbed. The foundation shall be shaped to the gradient shown on the "Typical Roadway Section" and rolled to provide a suitable surface for the placement of sub-base. The developer shall notify the Director of Public Works and his designated agent for inspection of the sub-grade. The developer shall be notified of the results of the inspection and shall perform whatever is required, i.e. geotextiles, may be required by the Director of the DPW, to make the sub-grade acceptable prior to the placement of the sub-base material. Where under drains and outlets are specified on the plans or as ordered by the Director, they shall be in place and functioning before any sub-base material is placed.

6.3.2. Sub-base: The sub-base shall consist of a minimum of six (6) inches of a clean soil-aggregate mixture of bank or crushed gravel, crusher run stone, reclaimed miscellaneous aggregate containing no more than 15 percent by weight of recycled bituminous concrete or any combination thereof. Material shall be spread uniformly upon the required grade, in courses not to exceed six (6) inches in thickness, after final compaction. However, if the required thickness of sub-base does not exceed 8 inches, it may be placed in one course. The Director of Public Works may require additional lifts of sub-base, as he deems necessary.

Each layer of sub-base shall be compacted at optimum moisture content. No subsequent layer shall be placed until the specified compaction is obtained for the previous layer. Should the foundation material beneath the sub-base become churned up and mixed with sub-base material at any time, the Contractor shall, without additional compensation, remove the mixture and replace it with new sub-base material to the required thickness shown on the plans or as previously required by the Director. Such replaced sub-base material shall be compacted to the required minimum density.

6.3.3. Base: The base shall consist of at least twelve (12) inches of not less than 1-1/4" nor greater than 1-1/2" processed aggregate constructed in accordance with Section 7.1.1 of these specifications. Processed aggregate shall be laid in lifts of not more than six (6) inches. The Director of Public Works may require additional lifts of processed aggregate, as he deems necessary. After each course has been placed, its entire area shall be compacted with equipment specifically manufactured for that purpose. Compaction shall be continued until the entire course is uniformly compacted to the minimum 95% of the dry density for that sub-base material

6.3.4. Pavement: The bituminous concrete pavement shall be 3-1/2" of compacted bituminous concrete pavement, constructed in two (2) courses: (first course) 2" of compacted Class I binder and (second course) 1-1/2" of compacted Class II surface (wearing) course, and in

accordance with Section 4.06. of Form 814. Before the construction of the other subsequent courses, the binder course shall be coated with an approved bitumen tack coat. The Director of Public Works may require core samples to substantiate that pavement thickness has been obtained in accordance with this specification.

6.3.5. Curbs: Lip curbs of six (6") inches, final measurement, shall be constructed of bituminous concrete on both sides of all roads; wherever guidance is needed for proper water drainage to a catch basin; and where it is deemed necessary by the Director of Public Works. With the concurrence of the Director of DPW, the Developer may construct nine (9") inch curbs on the binder course or six (6") inches on the surface course. Curbs shall be placed by an approved bituminous concrete curb machine, and true to line and grade indicated on the plan/profile drawings. Immediately prior to placement of the curb, the surface of the road shall be coated with an approved bitumen tack coat. Approved backfill material shall be placed behind the lip curbing in accordance with the detail for Typical Roadway Cross-Section, located in Appendix G. Curbs at all intersection radii and at cul-de-sacs shall be constructed either of granite stone or concrete. Stone or concrete curbs shall start at a point ten (10) feet prior to the point of curvature and end at a point ten (10) feet past the point of tangency.

6.3.6. Sidewalks: Wherever sidewalks are required they shall be a minimum measurement of four (4) feet wide. Sidewalks in residential areas shall be a minimum of six (6) inches of 4000 lb. air entrained, CLASS "F" cement concrete slab with 6"x 6" wire reinforcing fabric on a minimum of an eight (8) inch gravel base, constructed in accordance with Section 9.21 of Form 817. In business or industrial applications, the slab thickness in driveways shall be increased to eight (8) inches, with 6"x 6" wire reinforcing fabric, on a minimum of a ten (10) inch compacted base. Handicap ramps shall be provided at all intersections in accordance with the requirements of the General Statutes, ANSI 411.1-92 (or current edition) and the American Disabilities Act. Ramps shall be constructed of Portland Cement Concrete in compliance with the standards set by the Connecticut Department of Transportation. All concrete shall be coated with HARRIS CERTI-VEX AC 1315 curing/sealing compound or equivalent.

6.4 GRADING AND SEEDING

6.4.1. Before completion of the work, all unpaved areas within street lines, and excavated or filled areas on private property, shall be graded, covered with a minimum of four (4) inches of suitable topsoil or loam, rolled, fertilized and seeded, with a mixture of grass seed conforming to Section M.13.04 of Form 817, or as otherwise directed by the Director of Public Works, and properly mulched. Hydro seeding is an acceptable method seeding. Should construction take place during seasons of the year which are not conducive to turf establishment, temporary seeding mulching and erosion controls shall be carried out to minimize soil erosion during such time and before final grading and seeding are performed prior to acceptance, as directed by the Director of Public Works or his designated agent.

6.5 WORK TO BE LEFT CLEAN

6.5.1. Upon suspension or completion of the work or any portion thereof, the developer/contractor shall remove from all public and private property all temporary structures, tools and equipment, rubbish or waste materials resulting from his operations. All ditches shall be filled or covered, all sewers, drains, catch basins and manholes cleaned and flushed, streets, walks, curbs and other structures cleaned and repaired and the whole work left in a neat and

clean condition. All work in process shall be protected by adequate barricades, planking warning signs and night lights where needed.

7.0 CONSTRUCTION STANDARDS

7.0.1. The determination of all road requirements shall be under the jurisdiction of the Board of Selectmen, by Town Code. The Board of Selectmen, or their agent, may vary these requirements depending on location, anticipated traffic, and conditions in the area affected by the proposed subdivision.

7.1. MATERIALS

7.1.1. Sub-Pavement Materials - Processed stone shall consist of sound, tough, durable particles of crushed stone, free from soft, thin, elongated, laminated pieces or pieces of vegetable or other deleterious substances. It shall be hard and durable enough to resist weathering, traffic abrasion and crushing. It shall meet the following gradation:

Square Opening Sieves				
1-3/4"	3/4"	1/4"	No.40	No.100
100	60-75	25-45	10-25	3-12
Percent Passing				

Processed stone shall be obtained from a source provided by the developer. The contractor shall procure a Certified Sieve Analyses of material, showing compliance with these specifications, by a laboratory suitable to the Director of Public Works and submit the results. The cost of such testing shall be borne by the developer.

In the event that the aforementioned processed stone is not available or the developer wishes to use another material, the developer may apply to the Director of Public Works for approval of a suitable substitute, having comparable properties. The Director of Public works will require samples and certified test results of the subject material, to insure that it meets the minimum standards at described above.

Sub-base materials for this work shall conform to the requirements of Form 817, Articles M.02.02, Grading "B" and M.02.06. The contractor shall provide Certified Sieve Analyses of material, showing compliance with these specifications.

Geo-textiles shall consist of Exxon GTF-300, "Tygar" 3401, or equal.

7.1.2. Pavement - Pavement shall consist of 2" of compacted Class 1 bituminous concrete binder course, in conformance with Section 4.06 of Form 817, and 1-1/2" of compacted Class 2 bituminous concrete pavement in conformance with appropriate sections of 4.06 of Form 817.

7.1.3. Bituminous Concrete Lip Curb - Materials shall be Class 3 bituminous concrete and conform to requirements of Section 8.15 of Form 817.

7.1.4. GUIDE RAILING, ANCHORAGES AND SINGLE POSTS - Guide railing shall be placed on fills of six (6) feet or more and at such other locations deemed necessary by the Director of Public Works or designated agent. The specifications, that govern the materials and construction methods, shall be as outlined in the Form 817, Section M.10, and as approved by the director of Public Works. If the applicant desires another type of railing, he shall submit the design and specifications governing the materials and construction methods to the Director of Public Works for review. The Director of Public Works will either approve or disapprove of the requested installation. All submissions will only be approved if they meet the current AASHTO standards.

7.1.5. PIPE

7.1.5.1 Coated Corrugated Metal Pipe and Corrugated Metal Pipe: In general, this pipe shall be used only when directed by the Director of Public Works, where culvert gradients in excess of 10% are involved. When used, this item shall conform to Connecticut State Highway Department Specifications, Form 817, Section M.08.01-2. Coated corrugated metal pipe shall only be used with the express permission of the Director of Public Works.

7.1.5.2 Reinforced Concrete Pipe: The material for this item shall conform to Form 817, M.08.01-6. Wherever this pipe is used, it shall be Class IV, except at road crossing, where it shall be Class V reinforced pipe.

7.1.5.3 Corrugated Polyethylene Pipe: This material, whether smooth interior or corrugated interior, is allowed. All materials shall conform to Form 817, Section M.08.01.25 and method of construction shall conform to Form 817.

7.1.5.4 Polyvinyl Chloride Plastic Pipe: This material, whether smooth interior or corrugated interior, is allowed where approved by the Director of Public Works. All materials shall conform to Form 817, Section M.08.01.27 and method of construction shall conform to Form 817.

7.1.6 CULVERTS AND BRIDGES

7.1.6.1. Culverts and bridges shall be designed, installed and constructed, when required, in accordance with Form 817 and as accepted by the Director of Public Works.

8.0. DETENTION BASINS

8.1. DEFINITION

8.1.1. An impoundment made by constructing a dam or an embankment, or by excavating a pit or dugout. An impoundment made by the construction of underground structures. All detention systems will consist of three components: (1.) A fore-bay area, either additional storage volume at the upstream end of the open impoundment or an underground structure to capture sedimentation; (2.) the water detention volume and (3.) a discharge structure (weir, headwall, level spreader, etc.), which will control the rate and volume of discharge flow. The Town will require underground detention systems where feasible and desirable.

8.1.2. In addition to the components described above, the detention basin system shall be preceded by a "Water Quality" treatment structure, acceptable to the Director of Public Works.

8.2. PURPOSE

8.2.1. The purpose for detention basin is to regulate the rate and amount of runoff from development sites during and after construction operations, and to minimize such undesirable effects as flooding, erosion and sedimentation. A detention basin system must be designed to also function as a sediment basin.

8.3. APPLICABILITY

8.3.1. Basins created by construction of dams or barriers are referred to as Embankment Detention Basins and those constructed by excavation as Excavated Detention Basins. Basins resulting from both excavation and embankment construction are classified as Embankment Detention Basins where the depth of water impounded against the embankment at emergency spillway elevation is three feet or more.

Detention basins shall be constructed to control increased downstream flooding, erosion, or sedimentation due to construction at development sites or from other land use changes. The increased downstream flooding, erosion, or sedimentation may be caused by increased runoff volume, increased peak discharge, reduced time of concentration, or reduced natural storage.

Detention basins that do not meet the above conditions shall be designed to meet the criteria in Earth Dams and Reservoirs, Technical Release 60 (TR60) by the Soil Conservation Service, U.S. Department of Agriculture.

8.4. PLANNING CONSIDERATIONS

8.4.1. No detention basin is to be proposed within a wetland area. A State Water Diversion Permit from the Department of Environmental Protection Water Resources Unit will be required for detention basins with drainage areas greater than 100 acres. A copy of the required permit shall be submitted to the Director of Public Works prior to construction. The state Department of Environmental Protection regulates all dam construction within the state.

8.5. DESIGN CRITERIA

8.5.1. Overall - A detention basin must be compatible with the floodplain management and storm water management programs of the Town of Cromwell and with local regulations for controlling sediment, erosion and runoff. The basin must properly regulate storm discharges from a site to a safe, adequate outlet. Consideration must be given to the duration of flow as well as to the present and future peak discharges. Adequate erosion control measures and other water-quality practices must be provided. The basin must be planned and designed pursuant to the "2002 Guidelines for Soil Erosion and Sediment Control" or other acceptable procedures, to ensure minimal impact on visual quality and human enjoyment of the landscape. Structures and materials must harmonize with surrounding areas. The peak discharges, runoff volume, storage volume and pond routing calculations for each storm must also be determined and submitted. Those basins, which will become Town of Cromwell property, must be provided with suitable access, as approved by the Director of Public Works.

8.5.2. Design Storms – For the primary purpose of erosion and sedimentation control, the peak discharge from the 2-year, 10-year and 25-year frequency, 24-hour duration, Type III distribution storms shall be analyzed. For the primary purpose of minimizing flooding, the peak

discharge from the 2-year, 10-year, 25-year, 50-year and 100-year frequency, 24-hour duration, Type III distribution storms shall be analyzed.

No increase in rate of peak flow from these storms shall be allowed unless downstream increases are compatible with an overall floodplain management system. Some of the items to consider in determining if increased peak flows are compatible with an overall floodplain management system are:

- (1) The timing of peak flows from sub-watersheds
- (2) The increased duration of high flow rates
- (3) The stability of the downstream channels
- (4) The distance downstream that the peak discharges are increased.

8.5.3. Sediment Storage Volume - The sediment storage volume shall be equal the volume of sediment expected to be trapped at the site, during construction and the planned useful life of the sediment basin. Where it is determined that periodic removal of sediment is practical, the sediment storage volume may be proportionately reduced. Planned periodic removal of sediment shall not be less frequently than once a year. Trap efficiency is the amount expressed as a percent of the total sediment delivered to the basin that will remain in the reservoir. It is a function of detention storage time, characteristics of the sediment, nature and properties of inflow, and other factors. Once sedimentation control is no longer necessary, the bottom of the open impoundment is to be graded to drain any standing water, then topsoil and seeded.

The use of a structural sedimentation chamber, located upstream of the detention pond, on the formal storm water collection system, is highly encouraged.

8.6. SAFETY

8.6.1. Appropriate safety features and devices shall be installed to protect humans and animals from such accidents as falling or drowning. Temporary fencing can be used until barrier plantings are established. Such protective measures as guardrails and fences shall be used on spillways and impoundments as needed.

APPENDICES

APPENDIX A

CROMWELL CODE

Chapter 204

STREETS AND SIDEWALKS

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Removal of Obstructions on Highways

- § 204-26. Definitions.
- § 204-27. Obstructions restricted; removal procedure.
- § 204-28. Enforcement; penalties for offenses.

[HISTORY: Adopted as indicated in article histories. Amendments noted where applicable.]

GENERAL REFERENCES

Sewer Commission- See Ch. 60.
Building construction- See Ch. 99.
Fire lanes- See Ch. 130.
Sewers- See Ch. 193.
Subdivision of land- See Ch. 207.
Zoning- See Ch. 236.

ARTICLE I
Construction and Acceptance Procedures
[Adopted by the Board of Selectmen 4-12-1977]

§ 204-1. Promulgation of standards and specifications.

- A. The Board of Selectmen of the Town of Cromwell is hereby empowered to adopt, promulgate and mandate road standards and specifications for the following:
- (1) Private roads, which are to be submitted to the Town for acceptance as Town roads.
 - (2) Private roads which are not submitted to the Town for acceptance as Town roads but which connect to a Town or state road, are open to the general public for use.
 - (3) Parking areas on private property, which open to the general public for use.
- B. Road standards and specifications shall be adopted in accordance with § 204-3 hereof and may be amended by the Board of Selectmen from time to time in accordance with the procedures set forth therein.
- C. The term "Town roads" as used herein, shall be deemed to include all land and pavement within existing street lines; however, in the case of roads where street lines have not been established, the Town road shall be deemed to end at the edge of the existing pavement.

§ 204-2. Designation of administrative agent; powers and duties.

The Director of Public Works is hereby designated as administrative agent. Who shall have the powers and duties necessary to administer this Article, which shall include but not limited to the following:

- A. Receive and file maps, engineering plans and surveys submitted under this Article.
- B. Conduct inspections of street construction, sewer drains, sidewalks, materials used therein and any other improvements, buried hereunder or associated therewith to ensure compliance with the terms of this Article.
- C. Make recommendations to the Board of Selectmen regarding the road specifications and standards.
- D. Carry out such other duties as may be required of him by these regulations or the Board of Selectmen.

§ 204-3. Procedure for adoption of standards and specifications.

- A. The Board of Selectmen shall publish a notice of its intent to act, in a newspaper having general circulation in the Town of Cromwell, at least seven days prior to adoption or amendment of road standards and specifications.
- B. Copies of the road standards and specifications or any amendments thereto shall be available in the office of the Town Clerk at least seven days prior to a meeting of the Board of Selectmen, at which action thereon is to be taken.

- C. Road standards and specifications adopted hereunder shall be effective with respect to any road or street to be constructed after the effective date of this Article.

§ 204-4. Construction permit required.

- A. Prior to the start of construction of any road or parking area for which road standards and specifications have been adopted hereunder, the owner of the property upon which the road or parking area is to be constructed shall make application to the administrative agent for a road construction permit.
- B. Application for a road construction permit shall be made upon a form adopted by the administration agent and shall be accompanied by the information described in § 204-5 hereof and a permit fee of \$25.
- C. Prior to issuance of a road construction permit hereunder, the proposed plans shall be referred by the administrative agent, to the Planning Commission, Zoning Commission, Cromwell Fire District and the Sewer Commission for written comment and review.
- D. The administrative agent shall have the authority to issue a road construction permit upon review of the proposed plans and the comments of the organizations to whom the plans have been referred.
- E. The Board of Selectmen shall have the authority to enjoin construction of any road for which a road construction permit is required and has not been issued hereunder and to revoke a road construction permit which has been issued and enjoin construction of a road upon a determination that it is not being constructed in accordance with the proposed plans or with the road standards and specifications applicable thereto.
- F. A road construction permit shall not be required with respect to roads or parking facilities, which are totally within a subdivision, approval of which has been obtained for the Cromwell Planning Commission.
- G. Any person receiving a road construction permit hereunder shall be responsible for maintaining adequate police protection during construction.

§ 204-5. Plans required.

Applications to the administrative agent for a road construction permit, pursuant to § 204-4, hereunder shall be accompanied by engineering and survey plans conform to the following requirements:

- A. Seven paper prints of the proposed road plans, which have a scale of one inch equals 60 feet and are sealed by a Connecticut licensed professional engineer certifying that the proposed plans are in compliance with the road standards and specifications adopted by the Board of Selectmen.
- B. Said proposed plans shall show details of road design, including both horizontal and vertical alignment; utilities; drainage systems, including the design and location of all structures and pipes; sewage disposal and/or water systems, if applicable; and such other details required by the road standards and specifications adopted hereunder.

- C. Plans shall be adapted to standard plan and/or profile paper, having a sheet size not to exceed 24 by 36 inches.
- D. The proposal plans shall contain a certification by a Connecticut licensed surveyor that the boundaries of the property within which construction is to take place and the street lines have been established.

§ 204-6. Acceptance procedure; maintenance bond.

- A. Upon the completion of a road in compliance with road standards and specifications in effect at the time of its construction or in compliance with an approval granted by the Cromwell Planning Commission, a written application may be filed with the Board of Selectmen for acceptance of the road as a Town road.
- B. Prior to acceptance by the Town of Cromwell of any road, it shall be the obligation of the owner of the property upon which the road has been constructed to maintain the road, keep it in passable condition at all times and provide for the removal of snow, ice and any other obstructions.
- C. Roads, which transferred to the Town of Cromwell, for nominal consideration recited in the deed, may be accepted as Town roads by action of the Board of Selectmen.
- D. Roads for which more than a nominal consideration is to be paid by the Town of Cromwell may be accepted as Town roads by action of the Town Meeting, as required by Section C603(e) of the Charter.¹
- E. Applications for road acceptance shall be accompanied by the following:
 - (1) A letter from the administrative agent or the Planning Commission certifying that the road satisfies the applicable road standards and specifications and all public improvements have been completed.
 - (2) A preliminary certificate of the title showing any encumbrances on the property proposed to be conveyed to the Town and showing that all necessary drainage easements have been obtained.
 - (3) A draft of the deed by which the applicant proposes to convey title to the roads to the Town of Cromwell.
 - (4) A maintenance bond, either in cash or written upon a surety company licensed to do business in the State of Connecticut, in an amount determined by the administrative agent sufficient to secure to the Town the full maintenance of the road, excluding snow removal service, effective for a term of a minimum of one year from the date of acceptance.

1. Editor's Note: Charter Section C603 was amended approved 11-3-1981; therefore, this reference should apparently now be to Section C603(c.)

F. (Reserved)²

§ 204-7. Maintenance of road; release of bond.

- A. After acceptance of a road by the Town of Cromwell, the owner of the property shall, when notified by the administrative agent and within a time period set by said administrative agent, at the sole expense of said owner, repair all failures in the construction and operation of roads, drainage structures, appurtenances, bridges and other public improvements as may occur during the maintenance period established by the administrative agent, pursuant to § 204-6E(4) hereof.
- B. Said owner shall similarly repair all defects, settlements and irregularities of the structures and appurtenances of drains, pipes, mains, conduits, curbs, gutters, sidewalks, road surfacing, turf establishment or any other defective conditions in the road or right-of-way occurring or detected during the maintenance period.
- C. In the event that the owner fails to remedy any such defects within the time period set, the First Selectmen may, without prejudice to any other remedy cause the repairs to be made and bill the owner for the cost of the work involved.
- D. If the owner does not pay the said bill, within 30 days from the date the work is completed, the Board of Selectmen may require that the bill be paid from the maintenance bond, posted in accordance with § 204—hereof, together with any costs of placing said work to bid and attorney's fees and other costs of collection.
- E. Upon termination of the maintenance period, the owner may make application to the Board of Selectmen for release of the maintenance bond. The Board of Selectmen may release said bond upon receipt of a letter from the administrative agent certifying that the roads are in good condition, reasonable wear and tear excepted.

§ 204-8. Permit required to alter Town roads.

- A. Before any person, company, utility or agency, public or private, shall dig in the paved surface of a Town road or shall alter, excavate or fill in a Town road, they shall obtain a digging permit in accordance with this section. The provisions of this section shall include any activity, including driveway construction, which takes place within a Town right-of-way.
- B. The Director of Public Works may issue digging permit.
- C. The fee for a digging permit shall be \$10, which shall be waived for any agency of the Town of Cromwell and for the Cromwell Fire District.
- D. Any person receiving a digging permit shall be required, upon completion of any work therein, to repair and resurface the Town road in accordance with road standards and specifications currently in force.

2. Editor's Note: Former Subsection F, requiring street and drainage construction and acceptance before issuance of a building permit, added 9-19-1980, was repealed 5-19-1993.

- E. Before receiving a digging permit, the applicant shall be required to post a bond in favor of the Town of Cromwell, in the amount and for a term to be determined, by the Director of Public Works, to insure that the requirements of Subsection D hereof are carried out.
- F. In the event of an emergency, activities regulated by this section may be conducted without a permit so long as the administrative agent is notified of the activity conducted and the nature of the emergency no later than the next business day following the activity.

§ 204-9. Violations and penalties.

Any person who violates any provision of this Article shall be fined not more than \$100 for each offense.

§ 204-10. Maintenance of private roads.

All private roads in the Town of Cromwell, which are open to use by the general public shall be maintained by the owner in a passable condition, in good maintenance and free of ice, snow and debris.

ARTICLE II
Standards and Specifications
[Adopted 3-1-1970 STM]

§ 204-11. Scope.

The following shall be considered a minimum standard. The Town reserves the right to add to or elaborate on these requirements at the discretion of its Board of Selectmen.

§ 204-12. Submission of plans required before initiation of work.

Before initialization of work, the applicant or developer shall submit a suitable plan of the proposed development showing all proposed roads or streets, established boundaries and, if dead-end streets, their proposed turnaround or rotary at the end of the street, their proposed finished profile grades and details of the proposed drainage system, including, all rights necessary for complete installation of such drainage system, also including proposed areas for four-foot sidewalks and utility service installations. These plans shall be of a permanent type, on a size of sheet and drawn to scale approved by the Board of Selectmen, and if such road or street is accepted, all plans or maps and right-of-ways then become the property of the Town of Cromwell.

§ 204-13. General Specifications.

Proposed roads or streets shall conform with the following general requirements:

- A. Right-of-way. A minimum width of 50 linear feet will be required.
- B. Boundaries, Markers, of a type approved by the Board of Selectmen, shall be set at the point of curvature (PC) and at the point of tangency (PT) of all curves and angle points in a street line.
- C. All roads to be presented to the Town for acceptance must connect with existing public highways now in use.

D. Width of pavement. A minimum width of 28 linear feet shall be constructed between the limits of the right-of-way. Banks are to be sloped 4:1.

E. Construction of new road:

(1) Type of pavement. All new roads to be constructed by a development group or contractor will be required, after the street or road has been made ready for surface treatment, to have a binder course of two inches of bituminous concrete binder and 1 ½ inches of surface course material. Grade II, rolled with a five-ton roller of a minimum weight.

(2) Subgrade. All unsuitable material encountered in cuts shall be removed to a depth of one foot below subgrade. The area so excavated shall be backfilled with gravel of a quality satisfactory to the Selectmen.

(3) Embankments. Embankments shall be constructed of earth or a mixture of earth and rock deposited in successive layers for the full width of the embankment. In no case shall stumps, trees, sod, wood or material, which will not compact, be placed in embankments. Before placing the base material the subgrade shall be shaped so that it is parallel to and the specified depth below the approved finished surface.

(4) Base materials used to make ready for surface treatment:

(a) Gravel: course processed aggregate broken trap-rock.

(b) This gravel shall be a minimum of 12 inches in thickness after compaction, constructed on the prepared sub-grade with the approved lines and grades.

(5) Drainage. A complete drainage system shall be installed to provide for the natural drainage throughout the area of development and for drainage conditions created by the construction of the road or street. All pipes installed shall be a size that will be sufficient to carry the volume of water for which it is intended. All drainage pipes and structure (catch basins, manholes and end walls) shall be of a type consistent with standards established by the Town and shown in the proposed plans.

(6) Curbing. Curbing shall be required to be five inches or six inches in height with an eight-inch or nine-inch base.

(7) Trees and shrubs must be planted far enough back from the curb-line to allow for the construction of sidewalks.

F. Streetlights. Electric lights of 2,500-lumen power shall be placed on every other pole along a street or road with four thousand lumen-power lights at all intersections.

G. Street signs. All streets must be named and street markers of baked enamel with letters four inches tall placed at all intersections.

ARTICLE III

Sidewalk Maintenance

[Adopted by the Board of Selectmen 6-10-1992³]

§ 204-14. Program to repair or replace

It shall be the duty of the Director of Public Works to establish a program to repair or replace all sidewalks, which, in his opinion, in accordance with details and specifications prescribed by the Department of Public Works, are of such a condition that they warrant repair or replacement and to seek sufficient appropriations to funds said programs.

§ 204-15. Notice to property owner; appeal.

Whenever the Director of Public Works determines that any sidewalk is in need of repair or replacement to make it safe for public travel, and verifies that sufficient funding is available, he shall notify the adjacent landowner that the Town will undertake the necessary work and that an assessment will be made in accordance with the provisions of this article. The notice shall be mailed by certified mail, return receipt requested, or hand-delivered to the owner of any property to be affected thereby at such owner's address as shown in the last completed grand list of the municipality or at any later address of which the Director of Public Works may have knowledge and shall include a description of the work and an estimate of the cost of work to be assessed against the landowner. Any owner of land who is aggrieved by any notice made in accordance with the above may petition the Board of Selectmen for rescission or modification of the foresaid notice. Such appeal shall be in writing and must be received by the Board of Selectmen within 10 calendar days after the Director of Public Works has mailed the notice. If no such appeal is made or if such appeal shall be denied, the Director of Public Works shall have the defective sidewalks corrected.

§ 204-15.1. Assessment of costs.

A. At the conclusion of such installation, the Director of Public Works shall calculate the total cost of the installation and the cost to be assessed against each property owner. The cost for sidewalk construction shall be calculated as the total cost of all the work associated with replacing the sidewalk abutting the property. The cost shall be assessed upon the adjoining property owners as follows:

- (1) Costs associated with damage by trees located within the Town right-of-way shall be borne wholly by the Town.
- (2) Costs associated with damage caused by surface water runoff within the public right-of-way shall be borne wholly by the Town.
- (3) Costs associated with damage caused by surface water runoff from adjoining property shall be borne wholly by the property owner.
- (4) Costs associated with damage, which, in the opinion of the Director of Public Works, are caused by vehicle making deliveries to the property or by other action of the property owner, shall be borne wholly by the property owner.
- (5) Costs associated with the replacement of driveway aprons shall be borne wholly on the property owner.
- (6) Costs associated with the replacement of handicapped ramps shall be borne wholly by the Town.

3. Editor's Note: This legislation superseded former Art. III, Sidewalk Maintenance, adopted 9-9-1980

- (7) Costs associated with the reconstruction of sidewalks in order to modify or revise the alignment, location, elevation, width or cross-section of said sidewalks shall be borne wholly by the Town.
- B. A lot with frontage on more than one street shall be assessed for the frontage along only one street. The assessment shall be computed for that street which results in the greatest assessment.
- C. Assessments shall be computed in accordance with the following schedule:
 - (1) Total cost less than \$200; no assessment
 - (2) Total cost more than \$200; assessment equal to ½ of all the costs over \$200.
- D. After the Director of Public Works has computed the cost of such assessment. He shall deliver or mail to the owner of the abutting property a bill for said assessment.

§ 204-15.2. Payment of costs.

- A. The owner of any lands so assessed shall pay such assessment within 30 days from the date of notice of such assessment; provided, however, that if the assessment shall exceed the sum of \$200, he may notify the Tax Collector within that time of his election to pay the amount so assessed in installments as follows: in annual payments including interest at the rate of 9% per annum for a period not exceeding 10 years from the date of notice of such assessment.
- B. All assessments and/or installments payments unpaid after the 30 days from the due date shall be delinquent and shall be subject to interest from such due date at the interest rate and in the manner provided by the General Statutes of the State of Connecticut for delinquent property taxes.
- C. If the property owner elects to pay the assessment by the installment plan or otherwise fails to pay said assessment within 30 days from the date of notice of assessment, then said assessment shall be a lien upon the premises adjoining such sidewalk, provided that the Director of Public Works and/or Town Clerk's office within 60 days from the date of such notice.

§ 204-15.3. Rules and Regulations

The Director of Public Works is hereby authorized and empowered to adopt from time to time such reasonable rules, regulations and specifications for the repair, replacement or construction of sidewalks, driveway aprons, curbs and handicapped ramps as may be in the best interest of the Town,

§ 204-15.4. Permits required.

No person, firm or corporation shall construct, repair, replace or otherwise perform any work on any sidewalk, driveway apron, curb or handicapped ramp within the public highways and streets of the Town of Cromwell which work may be described by the Director of Public Works in

accordance with § 204-15.3 of this article unless such person, firm or corporation shall have obtained from the Director of Public Works a permit to do such work.

ARTICLE IV
Snow and Ice on Sidewalks
[Adopted by the Board of Selectmen 6-8-1988]

§ 204-16. Standards adopted.

The provisions of C.C.C. § 7-163a are hereby adopted and are set forth in §§ 204-17 through 204-19.

§ 204-17. Liability of Town

Notwithstanding the provisions of C.G.C § 13a-149 or any other general statute or special acts, the Town of Cromwell shall not be liable to any person injured in person or property caused by the presence of ice or snow on a public sidewalk unless the Town of Cromwell is the owner or person in possession and control of land abutting such sidewalk other than land used as a highway or street, provided that the Town of Cromwell shall be liable for its affirmative acts with respect to such sidewalk.

§ 204-18. Duty and liabilities of adjacent property owners.

The owner or person in possession and control of land abutting a public sidewalk shall have the same duty of care with respect to the presence of ice or snow on such sidewalk toward the portion of the sidewalk abutting his property as the municipality had prior to the effective date of this article adopted pursuant to the provisions of C.G.S. § 7-163a and shall be liable of said duty in the proximate cause of said injury.

§ 204-19. Limitation on actions.

No action to recover damages for injury to the person or to property caused by the presence of ice or snow on a public sidewalk against a person who owns or is in possession and control of land abutting a public sidewalk shall be brought but within two years from the date when the injury is first sustained.

ARTICLE V
Snow Removal From Sidewalks
[Adopted by the Board of Selectmen 5-19-1993; amended in its entirety 10-13-2004]

§ 204-20. Definitions

As used in this article, the following terms shall have the meanings indicated:

SIDEWALK- Any gravel, brick, cement, asphalt, or other material constructed or paved as a path or walkway use for the convenience and safety of the general public, except for sidewalks located in private residential and business areas such as condominium complexes, elderly housing complexes, commercial business complexes, and apartment buildings. This exception shall apply to sidewalks that adjoin public streets and such aforementioned properties.

§ 204-21. Removal of snow from sidewalks required.

- A. All owners, entities, or persons in possession and control of property that adjoins any public sidewalk shall remove the snow and ice accumulated on it within 24 hours after the cessation of a snow or ice storm. Ice that has formed on a public sidewalk due to refreezing or standing water or moisture shall be removed or slippery condition abated within 24 hours of such refreezing of water or moisture.
- B. The Public Works Department shall ensure that snow and ice is removed from all sidewalks abutting Town-owned property, except for the Board of Education properties and highways and street that abut sidewalks, in accordance with this article. Where the property owner, entity, or person in control of property abutting a public sidewalk has failed to remove snow and ice twenty-four hours after the cessation of a snow or ice storm, the Police Department shall notify the Director of Public Works to cause to have such snow and ice removed from said sidewalks, with the cost of such removal being charged to the property owner, person, or entity in possession and control of property abutting said public sidewalk. The Director of Public Works (with respect to the removal of snow or ice on a sidewalk in violation of this article) shall take into account department manpower and equipment concerns and may hire private contractors to facilitate the removal of snow and ice in a timely manner.

§ 204-22. Enforcement; penalties for offenses.

If the property owner, person or entity in possession and control of property abutting a public sidewalk fails to remove or abate the snow or ice within 24 hours after the cessation of a snow or ice storm or the refreezing of standing water or moisture from such public sidewalk, such person may be fined \$50 for each day the snow or ice is not removed. If the Department of Public Works removes the snow or ice, as provided in § 204-21, the adjoining property owner shall be billed for the expense of said removal in addition to the penalties provided in this section.

ARTICLE VI
Depositing Snow and Ice on Public Highways
[Adopted by the Board of Selectmen 11-9-1994]

§ 204-23. Definitions.

As used in this article, the following term shall have the meanings indicated:

PUBLIC HIGHWAY- Any public streets, avenues, boulevards, roads, drives, lanes, parkways, alleys and other travel ways within the Town.

§ 204.24. Prohibited acts. [Amended 6-12-1997]

- A. No person shall plow, throw, put or cause to be thrown or any snow or ice from any private property or from any area in the rear of said private property or in the same area between a private dwelling house or structure and the legally laid-out sidewalk into any public highway in the Town.

- B. No person shall lay, construct, open or maintain any drainage pipe, channel or other surface or subsurface conduit which collects or transports water in such a manner that such water is discharged, either directly or via other intervening properties, upon the surface of any sidewalk or public highway or upon other public property of the Town. All such waters shall be discharged into preexisting natural watercourses having sufficient capacity to accept such discharge or directly into public drainage systems in compliance with the procedure set forth in applicable state regulations for public highways of the State of Connecticut, and with § 204-8 of this Code, the Director of Public Works may prescribe specifications, conditions or evaluation procedures prior to the issuance of any permit for discharge of waters into the drainage systems within or appurtenant to Town highways.

§ 204-25. Enforcement; penalties for offenses.

The penalty for violation of this article shall be an infraction and shall be enforced by the Cromwell Police Department. Any violation of this article shall be subject to a maximum penalty of \$90 for each violation.

ARTICLE VII

Removal of Obstructions on Highways

[Adopted by the Board of Selectmen 10-13-2004]

§ 204-26. Definitions.

As used in this article, the following terms shall have the meanings indicated:

OBSTRUCTION- Any impediment on a public highway that interferes with the removal of snow and ice from a public highway, or interferes with the safe and orderly flow or passage of motor vehicle or pedestrian traffic. Such impediments may include, but are limited to, grass clippings, brush, leaves, sand, gravel, stones, litter, vegetable and animal matter, refuse and rubbish.

PERSON- Any individual, corporation, association or other aggregation or individuals.

PUBLIC HIGHWAY- Any public streets, avenues, boulevards, roads, drives, parkways, alleys and other travel ways within the Town.

§ 204-27. Obstructions restricted; removal procedure.

- A. It shall be unlawful for any person to place obstruction on a public highway in the Town. The Police Department shall be responsible for enforcing the provisions of this article. Upon notification of a police officer, the property owner or occupant of the property that adjoins a public highway must remove the obstruction. If the obstruction is deemed by the police officer as an immediate public highway hazard, such police officer shall immediately notify the Department of Public Works for its prompt removal. If the obstruction interferes with or obstructs any public works project or operation, any public works employee may remove such obstruction or interference from the highway. The Town, for the cost of such removal, may bill the owner or occupant of the property. This billing will also apply to any unscheduled leaf collection provided to Town residents as a result of the placement of leaves that are determined to be an obstruction on a public highway.

- B. Placement of leaves on public property. Nothing contained in this article shall prohibit a person who owns or occupies property along a public highway from placing leaves on public property adjacent to or in front of their own property for the purposes of collection only. However, no person shall be permitted to place leaves or other materials on public property that is not in front of or alongside of the property he or she owns or occupies. At no time shall leaves or other materials be placed upon the paved portion of a public highway. **[Added 12-14-2005]**

§ 204-28. Enforcement; penalties for offenses. [Amended 12-14-2005]

Any person observed placing an obstruction on a public highway or any person who places leaves on public property in violation of § 204-27B shall be subject to a fine of \$50. Any property owner adjoining a public highway on which an obstruction is placed shall be subject to a fine of \$50 for failure to remove such obstruction within 48 hours of notification by a police officer, and may be subject to a fine of \$50 per day thereafter for every day the obstruction is on the public highway in violation of this article. If the Department of Public Works removes the obstruction, as provided in § 204-27, the adjoining property owner shall be billed for the expense of said removal in addition to the penalties provided in this section.

APPENDIX B

Lawn Sprinkler Installer Must Be Licensed

If you install lawn sprinkler system in a residential, commercial or industrial property, a new public act requires you be licensed by the State Plumbing Board by October 1.

According to Consumer protection Commissioner Mary M. Heslin, public Act No. 90-194 requires all contractors and journeymen who perform this work to be licensed through the Department's Occupational Licensing Division, which includes the plumbing Board.

In the past, such work fell under the definition of home improvement and individuals had to hold a valid Home Improvement Contractor's Registration in order to legally perform the work.

Heslin explained that the new Lawn Sprinkler contractors and journeymen's licenses will take the place of home improvement contractor's registration to perform lawn sprinkler work.

The examination for the license will take place Sept. 21. Contractors and journeymen must apply no later than Aug. 20, in order to be eligible to take the exam. Applications may be obtained by calling the occupational licensing Division at 566-3290 or writing to: Department of Consumer Protection, Occupational Licensing Division, Room G5, State Office Building, 165 Capital Avenue, Hartford, CT 06106.

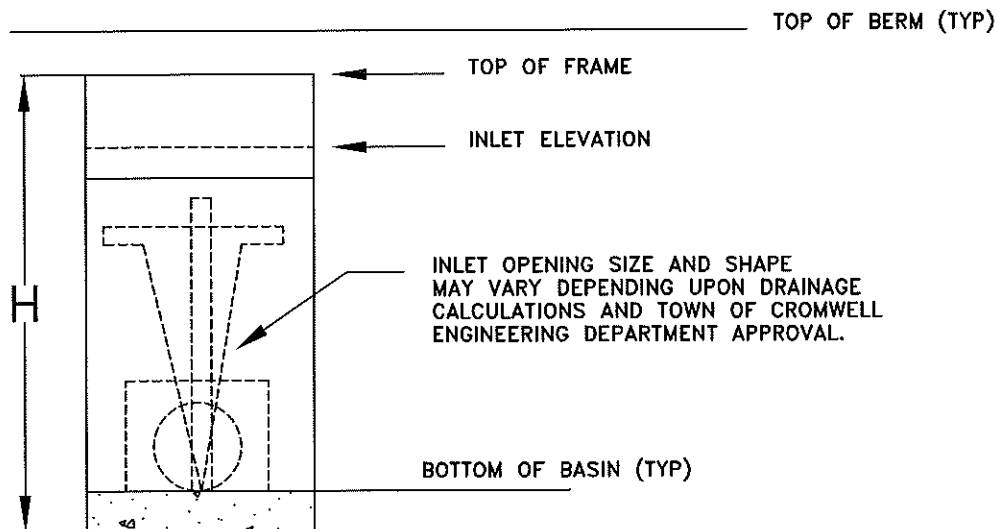
Heslin added that there will be no "grandfather clause" for licensing. However, the Plumbing Board will accept applications from individuals who are now performing lawn sprinkler installations to apply to take the exam. (Installations on agricultural property are excluded.)

The Department of Consumer protection will hold a public hearing on proposed regulations regarding the Public Act on Aug. 20, at 10:00 a.m. in Room 105 of the State Office Building, 165 Capital Avenue, Hartford. All interested persons who wish to express their views orally may do so at this time.

Heslin had a word for homeowners as well. "As of Oct 1, you should contract for lawn sprinkler installations only with licensed contractors. Just call 566-3290 and ask whether the contractor is indeed licensed to do this work".

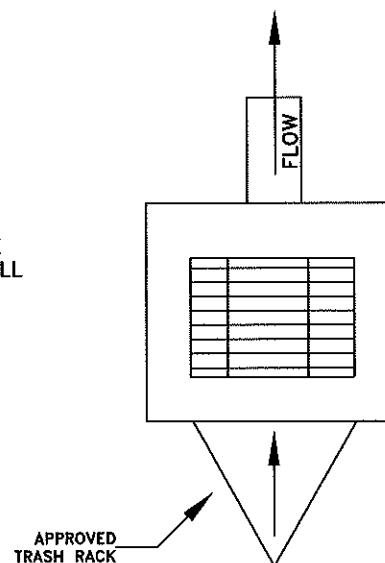
For further information, call June S. Neal, Senior Communications Officer at 566-2274.

APPENDIX C

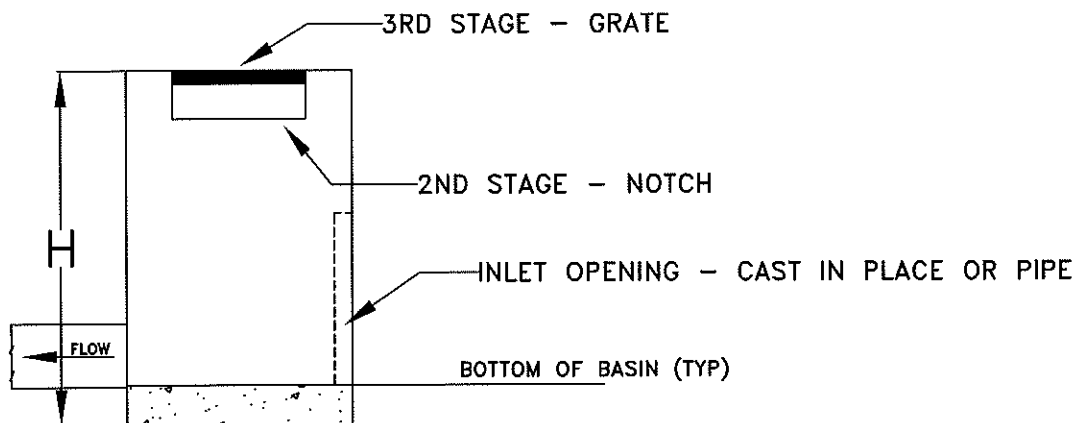


RISER - FRONT VIEW

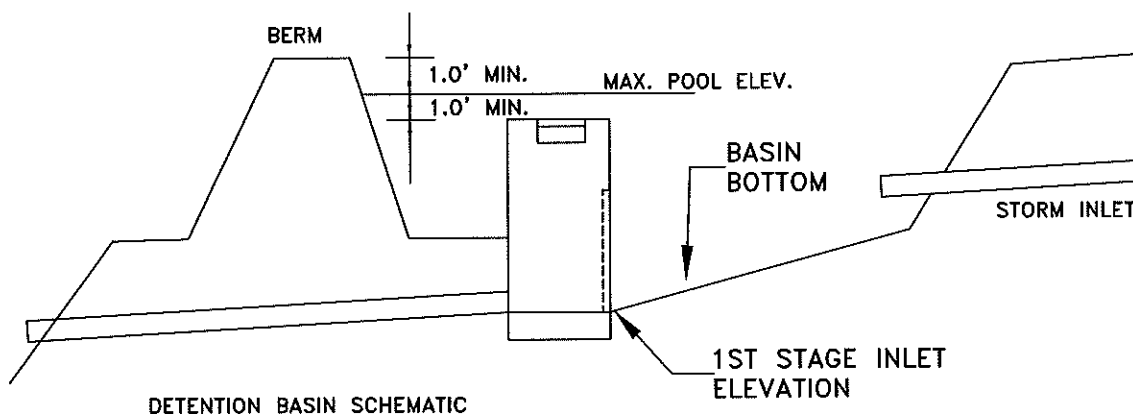
H = STRUCTURE ELEVATION. WILL VARY DEPENDING ON DEPTH OF POND.



RISER - TOP VIEW



RISER - SIDE VIEW



DETENTION BASIN SCHEMATIC

No.	Date	Description
		Revisions

Scale: NTS
 Sheet: DETPOND
 Drawn By: REN
 Checked By: JSM
 Date: 12/03/01

DEPARTMENT OF
 PUBLIC WORKS
 Nathaniel White Building
 41 West Street
 Cromwell, Connecticut 06416-0189
 (203) 632-3420

DETENTION BASIN

Table 8-1 Determining Erosion Rates

(1) $V = (DA) (A) (DR) (TE) (1/Y) (2,000 \text{ lbs./tons}) (1/43560 \text{ sq. ft/ac.})$

V = the volume of sediment trapped in ac. Ft/yr.
 DA = the total drainage area in acres
 A = the average annual erosion in tons per acre year using the values below for the listed land use
 DR = the delivery ratio/determined from figure 8-3
 TE = the trap efficiency as given above
 Y = the estimated sediment density in the sediment basin in lbs-cu. ft (Figure 8-2)
 Y^s = the submerged density in a wet sediment pool
 Y^a = the aerated density in a normally dry sediment pool

Land Use	Average Annual Erosion
Wooded Area	0.2 ton/ac/yr
Developed urban areas, Grassed areas, pastures, hay fields abandoned fields with good cover	1.0 ton/ac/yr
Clean tilled cropland (corn, vegetable, etc.)	10 ton/ac/yr.
Construction areas	50 ton/ac/yr

Source: U.S. Department of Agriculture Soil Conservation Service, Storrs, Connecticut

Table 8-2: ESTIMATED SEDIMENT DENSITY

SOIL TEXTURE	Y^s Submerged (lbs/cu.ft.)	Y^a Aerated (lbs/cu.ft.)
Clay	40-60	60-80
Silt		
Clay-silt mixtures (equal parts)	40-65	65-85
Sand-silt mixtures (equal parts)	75-95	95-100
Clay-silt-sand mixtures (equal parts)	50-80	80-100
Sand	85-100	85-100
Gravel	95-130	95-130

Source: U.S. Department of Agriculture Soil Conservation Service, Storrs, Connecticut

APPENDIX D

TOWN OF CROMWELL
DEPARTMENT OF PUBLIC WORKS

APPLICATION/
PERMIT NO.

ROAD CONSTRUCTION---APPLICATION FORM/CONSTRUCTION PERMIT

APPLICATION FORM:

DATE: STARTING DATE:

DEVELOPMENT NAME:
LOCATION:

APPLICANT:
ADDRESS: TELEPHONE NUMBER:

CONTRACTOR:
ADDRESS: TELEPHONE NUMBER:

CBYD TICKET NUMBER ("CALL BEFORE YOU DIG 1-800-922-4455"): _____

APPROVED DRAWINGS:

DATE OF PRE-CONSTRUCTION CONFERENCE:
(COPY OF MINUTES ATTACHED)

APPLICANT'S SIGNATURE:

CONSTRUCTION PERMIT:

RECEIPT OF FOLLOWING IS ACKNOWLEDGED:

___ APPLICATION FEE, AMOUNT = \$25.00
___ SEVEN (7) SETS OF APPROVED PLANS
___ PERFORMANCE BOND, AMOUNT = ___
___ PAYMENT BOND, AMOUNT = ___
___ INSPECTION FEE, AMOUNT = ___

APPLICANT'S SIGNATURE:
DATE:

DEPARTMENT OF PUBLIC WORKS:
DATE:

Notes:

1. Application for permit shall be made, at least, three (3) business days before work commences.
2. The Cromwell Police and Fire Departments should be advised if construction will involve a road closing, detour or any restricted traffic flows.
3. The Police Department will be the sole judge of the need for protection of the construction by uniformed officers. Payment for police services will be made directly to the Town of Cromwell.

APPENDIX E

TOWN OF CROMWELL



Excavation Ordinance

Revised 9/25/03

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AN ORDINANCE REGULATING EXCAVATIONS

Be it ordained by the Board of Selectmen of the Town of Cromwell as follows:

Section 125-1 PERMIT REQUIREMENTS.

No person, firm or corporation shall make any excavation ditch digging or otherwise alter, open or remove the surface of any street or highway in the Town of Cromwell until a permit has been obtained from the Director of Public Works or his authorized agent. Application for a permit shall be made on forms provided by the Director of Public Works and shall be accompanied by a sketch or drawing describing the work to be done. The sketch or drawing shall be in sufficient detail to facilitate an inspection of the excavation by town personnel. The Director of Public Works may require details plans and specifications and other engineering data to be submitted with the application he shall deem such to be necessary. The permit shall be obtained at least seventy-two (72) hours prior to commencement of excavation activities.

Section 125-2 DISCHARGE FROM PIPES ON PUBLIC GROUNDS

No person, firm or corporation shall lay, construct, open or maintain any drain or conductor pipe in such manner that the water from the same is discharged on any sidewalk, any Town Highway, or public ground in the Town of Cromwell.

Section 125-3 NOTIFICATION OF CALL BEFORE YOU DIG

Call Before you Dig (C.B.Y.D.) (1-800-922-4455) must be notified at least three (3) full working days prior to any excavation and no permit will be issued without an appropriate C.B.Y.D. ticket number.

Section 125-4. FEES

Contractors applying for a permit issued pursuant to this ordinance shall pay a fee to the Town of Cromwell in the amounts computed by measuring the surface area of such excavation as follows:

- a. Thirty-five dollars (\$35.00) for the first five hundred (500) square feet of excavation or fraction thereof, and
- b. Thirty-five dollars (\$35.00) for each additional five hundred (500) square feet of excavation or fraction thereof, as indicated below.

SURFACE AREA				PERMIT FEE
	Up to	500	S.F.	\$35.00
	501 S.F. to	1,000	S.F.;	\$70.00
	1,001 S.F. to	1,500	S.F.	\$105.00
	1,501 S.F. to	2,000	S.F.	\$140.00
	2,001 S.F. to	2,500	S.F.	\$175.00
	2,501 S.F. to	3,000	S.F.	\$210.00
	3,001 S.F. to	3,500	S.F.	\$245.00
	3,501 S.F. to	4,000	S.F.	\$280.00

4,001 S.F. to	4,500 S.F.	\$315.00
4,501 S.F. to	5,000 S.F.	\$350.00

(continuing in \$35.00 increments for each 500 S.F. or fraction thereof.)

No permit fee shall be required of a private contractor or contractors doing work for the Town of Cromwell or any department, agency or commission thereof when done under the direction of the Director of Public Works of the Town of Cromwell.

Section 125-S. INSURANCE AND BOND

A. No permit for any excavation in any town street or highway in the Town of Cromwell shall be granted until the contractor shall file with the Director of public works:

a. Proof of insurance as follows:

Automobile:

\$1,000,000 combined single limit for bodily injury and/or property damage.

Comprehensive General Liability:

\$1,000,000 Each Occurrence

\$2,000,000 General Aggregate

\$2,000,000 Products- Completed operations Aggregate

Workers Compensation Employer's Liability:

\$100,000/\$500,000/\$100,000

Umbrella:

\$1,000,000 per occurrence.

b. Proof of a performance bond in the minimum amount of \$5,000 and in greater amounts as on following page.

Said performance will be an amount relative to the area to be excavated as determined by the Director of Public Works, all predicated on the contractor restoring the street or highway to a condition approved by the Director of Public Works.

SURFACE AREA	BOND AMOUNT
Up to 1,000 S.F.	\$5,000.00
1,001 S.F. to 1,200 S.F.	\$6,000.00
1,201 S.F. to 1,400 S.F.	\$7,000.00
1,401 S.F. to 1,600 S.F.	\$8,000.00
1,601 S.F. to 1,900 S.F.	\$9,000.00
1,901 S.F. to 2,000 S.F.	\$10,000.00

(Continuing in \$1,000.00 increments for each 200 S.F. or fraction thereof.)

B. All such bonds and insurance coverage shall be for a term of at least one year and shall be kept in force continuously until the maintenance provisions hereinafter specified are

satisfied. Evidence of renewal of coverage shall be furnished annually to the Director of Public Works.

- C. The contractor shall hold harmless and indemnify the Town of Cromwell for any and all liability, damages, and costs which may in any manner be incurred by the Town of Cromwell by reason of or in connection with the issuance of a permit for such excavation or by reason of any act or omission of the contractor, his agents, or servants.
- D. Contractors and public service corporations may dispense with the filing of a separate insurance policy and bond for each excavation by filing annually with the first Director of Public Works the proper evidence of insurance coverage and performance bond hereinbefore required, provided however, that an application must be made for a permit for each separate excavation. Evidence of insurance coverage and performance bond shall be filed in the form and in companies or sureties satisfactory to the Director of Public Works. The Surety Company shall be licensed to do business in Connecticut and a form of surety bond is attached to this ordinance

Section 125-6. VIOLATIONS AND PENALTIES

Any person, firm or corporation violating any provision of this ordinance shall be subject to a fine of not more than fifty dollars (\$50) for each day of the violation.

Section 125-7. STOP WORK ORDERS; COMPLETION OF WORK BY TOWN.

- A. Whenever a permit has been issued and the regulations herein are not complied with, a stop-work order shall be delivered to the person, firm or corporation, or their representative by the Director of Public Works. Upon such delivery, all work shall cease, the excavation shall be refilled or otherwise made safe and secure, and the permit shall be deemed to be suspended until the Director of Public Works authorizes, in writing, a resumption of the work. The Director of Public works or his authorized agent shall be authorized to issue stop-work orders.
- B. Any work not conforming to the details and specifications prescribed by the Director of Public Works may be completed by town and all costs for such work shall be billed to the person, firm or corporation taking out such permit. No further permits shall be Issued to said person, firm or corporation so billed until the balance owed the Town is paid. All remittances shall be payable to the Treasurer of the Town of Cromwell

Section 125-0. REGULATIONS

- A. The contractor shall at all times take all proper precautions to safeguard any sewer lines, water mains and services, electrical conduits, telephone conduits, gas main and services, or appurtenances encountered in excavation, and shall properly maintain such installations so as to provide uninterrupted service of the same. In locations, where the use of power equipment will endanger such installations, the work must be done by hand labor
- B. Excavations must be made in open out and no tunneling will be allowed except by special written permission from the Director of Public Works. Trenches shall be braced and sheeted when needed to meet applicable Federal and State trench safety regulations.
- C. No excavated material is to be place on private property without written permission from the property owner, such written permission to be obtained by the contractor and filed with the Director of Public Works prior to placing excavated material on private property.

- D. All excess material removed from street, highways, Town properties or rights-of-way granted in favor of the Town of Cromwell that is not required or suitable for backfilling the excavation will remain the property of the Town of Cromwell and must be removed to and/or disposed of at a site approved by the Director of Public Works.

Section 125-9. PROTECTION OF EXCAVATIONS; SAFE PASSAGE OF TRAFFIC

A permit issued by the Director of Public Works and the Chief of Police shall be obtained prior to excavation of any street or highway within the Town of Cromwell, excluding Interstate 91 and Route 9. A permit issued by the Chief of Police shall be obtained for any street or highway maintained by the State of Connecticut. All excavations shall be protected at all times in accordance with the Manual on Uniform Traffic Control Devices. The Chief of Police may proscribe such protection as deems necessary to allow for the safe passage of vehicular and pedestrian traffic, including requiring police officers or flaggers, whenever there are road closings, lane closings or other restrictions to traffic. Only ½ of the traveled portion of a street or highway shall be excavated, permitting safe passage of vehicular traffic on the remaining half. Under no circumstances shall an excavation or opening be made across the width of the entire street or highway in such a manner as to prohibit safe passage of vehicular traffic without the written permission of the Chief of Police. Excavation permits shall be obtained prior to the commencement of the excavation work and prior to causing and redirection of traffic. In the event of an emergency requiring excavation of a street or highway, verbal notice shall be made to the Cromwell Police Department prior to excavation.

Section 125-10 RESTORING EXCAVATIONS.

- A. All excavations provided for in this ordinance shall be backfilled with bank-run gravel or material approved by the Director of Public Works. Material removed from the excavations may be used for backfill only with permission of the Director of Public Works or his authorized agent. All backfilling must be done in properly compacted layers not exceeding 12 inches in depth after compaction. No muck, clay, frozen earth, topsoil, stones over 6 inches in any dimension or other deleterious material shall be placed in excavation, but shall be disposed of as indicated above. The approved backfill material shall be placed and compacted at a moisture content between 4 and 6 percent (based on dry density, by weight), or within 2 percent of the optimum moisture content as determined by the moisture-density relationship test specified in American Society For Testing And Materials, AD1557.
- B- At locations where the contractor elects to consolidate the backfill material by the so-called "Ho-Pac" method, the compacted layers shall not exceed four (4) feet in depth after compaction. The vibratory compactor shall be placed directly on the backfill surface and the compaction effort shall continue until no further visible settlement occurs.

Section 125-11 RESTORING PAVEMENTS.

- A- After the excavation has been backfilled and compacted as indicated above, twelve (12) inches of processed aggregate base shall be placed and compacted in three (3), four (4) inch layers. The material used and the method of compaction shall be in conformance with the State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 817, and future revisions thereto. A temporary bituminous patch, at least two (2) inches in depth, shall be placed and compacted on top of the aggregate base so that the surface of the patched Excavation is slightly domed above the adjacent pavement. After a minimum period of sixty (60) days

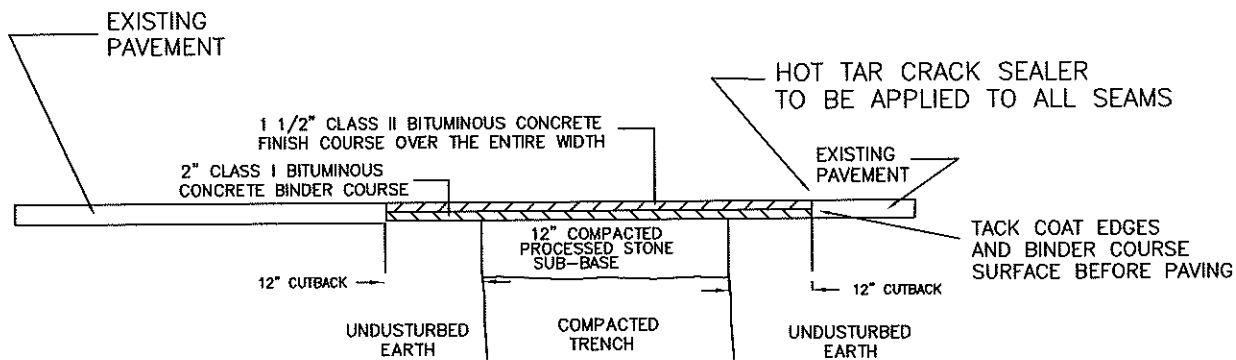
and a maximum of 360 days, the temporary patch material and any fouled aggregate base, shall be removed and replaced with new aggregate base, if needed, and permanent bituminous material as indicated below:

1 1/2" of Bituminous concrete Surface Course on 2' of Bituminous Concrete Binder course.

- B. The bituminous pavement material and the method of placement shall also be in conformance with Form 817 or latest revision. After the removal of the temporary patch and prior to the placement of the permanent bituminous material, the existing pavement will be cut back as directed by the Director of Public Works or his authorized representative to create vertical faces which will either be Public Works Construction Permit Ordinance parallel or perpendicular to the new pavement. The vertical faces will be sealed with 85/100 asphaltic material to ensure a good bond between the old and new pavement material. The surface of the repaved excavation shall be flush with the adjacent pavement. All excavations shall be properly protected by barricades and warning lights furnished and maintained by the contractor during the curing period. Curbs and sidewalks are considered a part of the pavement and are to be restored to their original condition in accordance with applicable town standards and specifications. All grassed areas or open areas are to be rough graded with boulders larger than six (6) inches removed from the site. All lawned areas are to be fine graded with 4 inches of topsoil and seeded as approved by the Director of Public Works. All other highway facilities, signs, pavement markings, sewers or subsurface structures shall be restored to their original condition before excavation was made

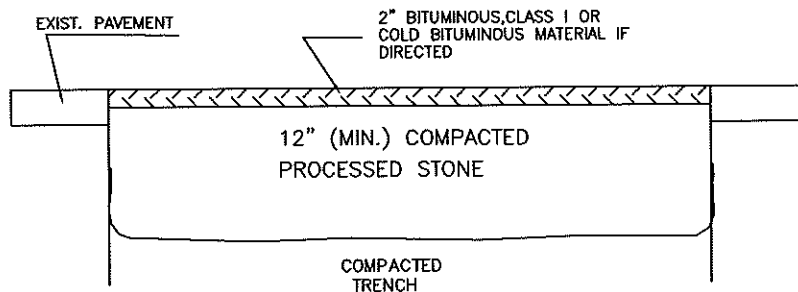
Section 125-12 MAINTENANCE OF PATCHES; REPAIR BY TOWN

- A. The contractor shall be responsible for the maintenance of the repaired patch during the life of the temporary patch and for a period of one year after the acceptance of the permanent patch by the Director of Public Works. In the event that it is necessary to make repairs to the excavation or restoration of the pavement during the one-year period, said guarantee shall extend for an additional period of sixty (60) days. The performance bond shall include said conditions of maintenance within its provisions.
- B. Any patches not satisfactorily maintained by the contractor may be repaired by the Town of Cromwell and the following charges shall be billed to the person, firm, or corporation responsible for the patch: \$150.00 per repair on weekdays and \$250.00 per repair on weekends and holidays. No further permits shall be issued to the person, firm, or corporation so billed until the balance owed the town is paid. All remittances shall be payable to the Treasurer of the Town of Cromwell.



PERMANENT ROAD PAVEMENT REPAIR

N.T.S.



TEMPORARY ROAD PAVEMENT REPAIR

N.T.S.

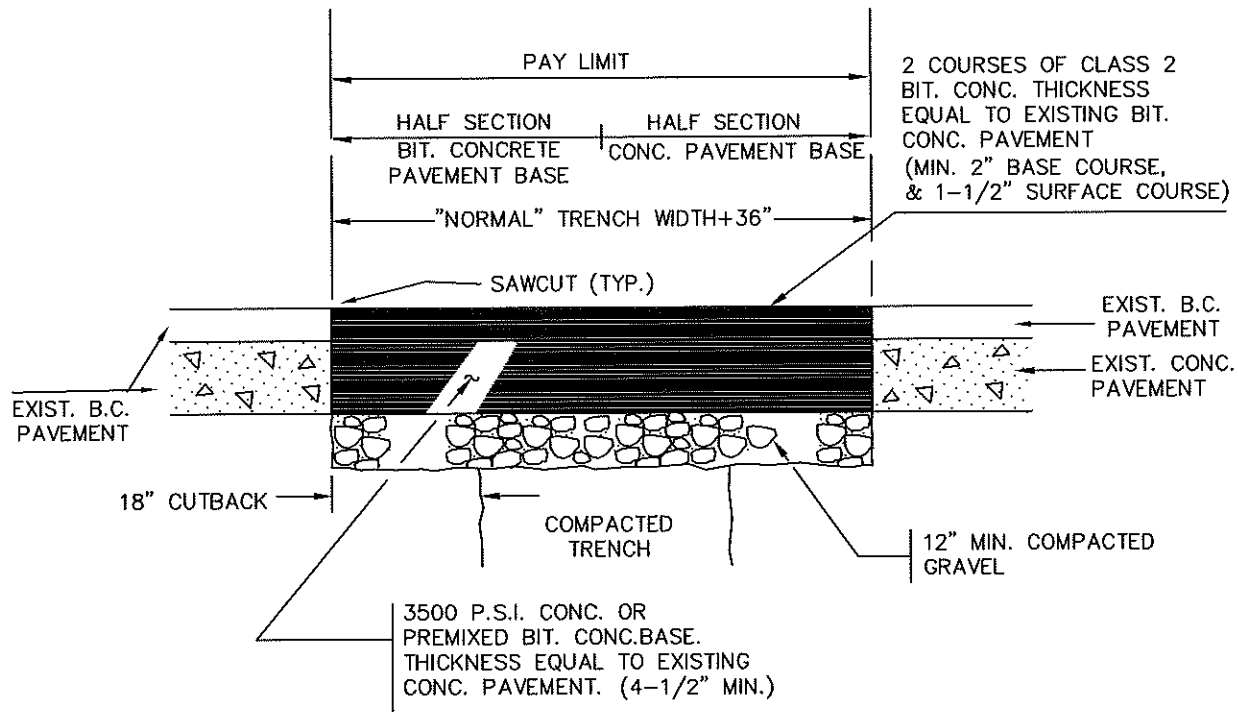
NOTES

1. ALL EXISTING PAVEMENT TO BE SAW CUT.
2. APPLY TACK COAT TO EDGES OF EXISTING PAVEMENT AND SURFACES OF PREVIOUSLY PLACED PAVEMENT, BEFORE LAYING NEW PAVEMENT.
3. ALL SURFACE SEAMS ARE TO BE SEALED WITH HOT POURED TAR CRACK SEALER.
4. 12" OF COMPACTED PROCESSED AGGREGATE SHALL BE PLACED IN TWO EQUAL LIFTS AND COMPACTED TO 95% MINIMUM COMPACTION FOR PERMANENT PAVEMENT REPAIR.
5. PROCESSED AGGREGATE IS TO CONFORM TO SECTION M.05.01, COURSE AGGREGATE, OF CONNDOT FORM 814A.

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			Checked By: JSM
No.	Date	Description	Date: 3/1/2001
Revisions			

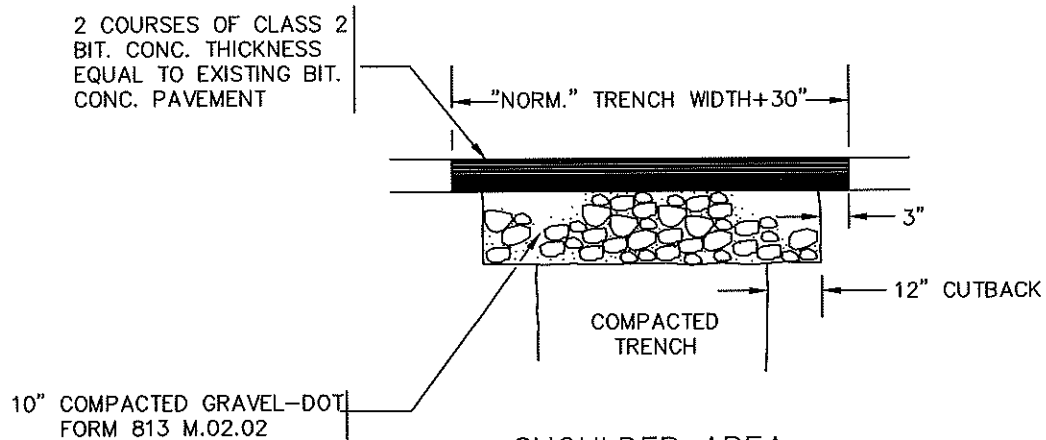
DEPARTMENT OF
PUBLIC WORKS

TOWN ROADS
PAVEMENT REPAIR
DETAILS



PAVEMENT AREA

(IF REQUIRED)



SHOULDER AREA

(IF REQUIRED)

NOTES:

1. ALL EXISTING PAVEMENT TO BE NEATLY CUT.
2. APPLY TACK COAT TO EDGE OF EXISTING PAVING BEFORE LAYING NEW PAVEMENT.
3. CONCRETE REINFORCING TO EQUAL EXISTING CONCRETE PAVEMENT. MIN. OF 18" OF EXIST. REINFORCING TO BE TIED TO NEW REINFORCING.
4. ALL SURFACE EDGES TO BE SEALED WITH HOT POURED TAR CRACK SEALER.

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			Checked By: JSM
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Revisions			

TOWN OF CROMWELL
DEPARTMENT OF
PUBLIC WORKS

PAVEMENT DETAIL
STATE ROADS

TOWN OF CROMWELL
DEPARTMENT OF PUBLIC WORKS
PRIVATE DRAINAGE PERMISSION AND RELEASE OF CLAIM

In consideration of the Town of Cromwell, Connecticut, (hereinafter called "Town") granting to: _____

(hereinafter called "Owner") permission to connect a private drain to the storm drain system owned by the Town for the purpose of draining water from the property located at _____

_____ in Cromwell, Connecticut, the said Owner hereby assumes all responsibility and liability for said private drain including, but not limited to, the construction, repair and maintenance of said private drain, all responsibility and liability for any damage caused by the existence, location and operation of said private storm drain to any person or property, and further agrees to indemnify and save the Town harmless from such claims, Said Owner further waives any claim against the Town for any damages caused to himself or any person or property as a result of the malfunctioning of the Town owned storm drain system to which the private drain is connected. The Owner also agrees to abide by all Federal, State and Local laws and regulations pertaining to the use of such private drains.

The Owner understands that an Excavation Permit must be taken out before any construction commences and that all provisions of the Town Excavation Ordinance must be met. Said Excavation Permit must be taken out within two weeks of said application to connect or else applicant will have to reapply. In the event that the Owner does not abide by said rules, regulations and ordinances of the Town of Cromwell, concerning work within the Town right-of-way, this connection will be severed by the Town and the Owner shall pay the cost of same. The Town shall notify the owner at least two weeks prior to any such severance unless such severance is deemed an emergency at which point immediate severance will be necessary.

Signature

Print Name

In Witness Whereof, the Owner has set his hand and seal this _____ day of _____, 20____

STATE OF CONNECTICUT }

ss:

COUNTY OF MIDDLESEX }

On the _____ day of _____, 20____

, before me personally came and appeared _____

to me known to be the individual(s) described in and who executed the foregoing instrument and who duly acknowledged to me that they executed the same.

NOTARY PUBLIC

COMMISSION EXPIRES

SEAL

APPENDIX F

REGULATIONS CONCERNING DRIVEWAYS OVERVIEW:

To promote traffic safety and prevent or minimize drainage and icing problems, driveways for all lots shall be designed and constructed in conformance with the minimum provisions of this regulation.

All site plans submitted in support of an application for a Certificate of Zoning Compliance shall depict driveway locations, proposed grading, tree and brush removal, drainage improvements and, as appropriate, other construction details. Upon approval, minor on-site modifications may be authorized by the Planning and/or Engineering staff, provided the required driveway standards are complied with.

Proposed lots, which cannot be served by a driveway conforming to required standards shall not be approved by the Director of Public Works, or his agent, unless they are specifically waived by him. Said waiver may be approved in situations where no detrimental traffic or drainage impact is anticipated: where the driveway involves unusual site or roadway conditions or where roadway improvements are pending or anticipated.

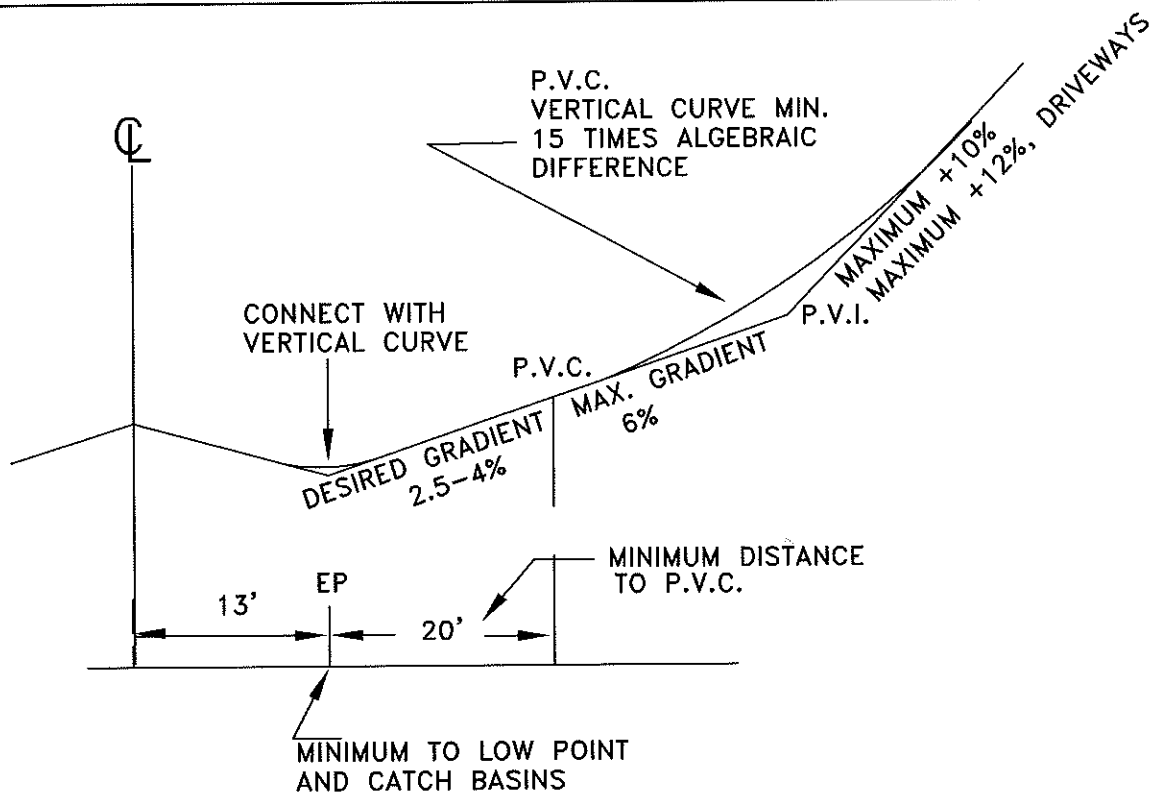
Unless a waiver is authorized, driveways shall comply with the following standards:

1. Driveways shall conform with any curb cut and driveway standards established by the Board of Selectmen, the Director of Public Works or the Town Engineer and, as appropriate, the State Department of Transportation.
2. Paved or unpaved driveways shall not exceed a slope of twelve (12%) percent. All driveways shall have a width of at least ten (10') feet.
3. Driveways shall be designed to minimize storm water flows from entering the Town roadway and, wherever possible, the Town Right-of-Way. Privately owned and maintained drainage diversion swales, detention areas and/or dry wells shall be utilized to the greatest extent possible. Whenever a private drainage swale or private detention area is utilized in diverting driveway water from the Town Right-of-way, the owner of the subject lot(s) shall be responsible for maintaining the depicted swale or detention area and any culverts in accordance with the approved design. To ensure proper maintenance of drainage swale or culvert serving a rear lot, no approval shall be granted on the subject lot until a deed restriction, approved by the Town Attorney, is filed in the Land Records. Said deed restriction shall clearly note the maintenance responsibility and, subject to proper notification by the Town, it shall allow the Town to undertake any necessary maintenance activity and charge the property owner for expenses.
4. Positive slope driveways shall have an area with a slope no greater than four (4%) percent at the intersection with any town road. Driveways with a negative slope shall have a two (2%) percent positive slope at the intersection with any town road. This 2% slope represents a six (6") rise in elevation, above the gutter line of the intersecting road, before dropping into the subject property. If a 6" rise is not possible, a "Release of Driveway Claim" form shall be submitted to the Town, holding them harmless for storm water entering the property through the driveway cut. This letter shall be made part of the building records.

5. Driveway aprons shall be at least twenty (20') feet in depth and intersect the street with a five (5') foot radius. All driveways shall have a paved apron.
6. Driveways shall intersect all town roadways at an angle of approximately ninety (90°) degrees and shall be located and designed with safe sight distances as defined in the Traffic and Transportation Handbook of the Institute of Transportation Engineers with the anticipated operating speeds of the intersecting roadway, street grades, topography, use of the subject property and other properties along the same street.
7. Common driveways and loop driveways may be constructed, but only after a plan is submitted to the Department of Public Works for review and approval. These driveways must still conform to the regulations as set forth herein.
8. All driveways shall be constructed with a base and surface adequate to support 40 tons of fire fighting vehicles.
9. Driveway side slopes shall not exceed a slope of three to one (3:1) unless retaining walls or other suitable stabilizing provisions are utilized, or as directed by engineer. Guardrails, guide posts, headwalls, flared ends or wider driveway widths shall be used when steep side slopes or culvert crossings present a safety hazard or future maintenance problem.
10. Driveway openings shall be located as far as possible from roadway intersections and no closer than seventy-five (75') feet from any roadway intersection, unless some less distance is required to meet sight line requirements of these regulations or to comply with the provisions of any permit issued pursuant to the town Inland Wetlands and Watercourses regulations, or where access is otherwise not possible to the subject site.
11. An anti tracking pad shall be installed for the first twenty (20) feet of all driveways in accordance with the Guidelines for Soil Erosion and Sediment Control, Connecticut, Chapter 8, Structural Measures. No driveway bonds shall be released until a minimum of the first twenty (20) feet of the driveway is paved.
12. A Driveway permit, and/or an Excavation Permit, issued by the Public Works Department is required by this regulation.

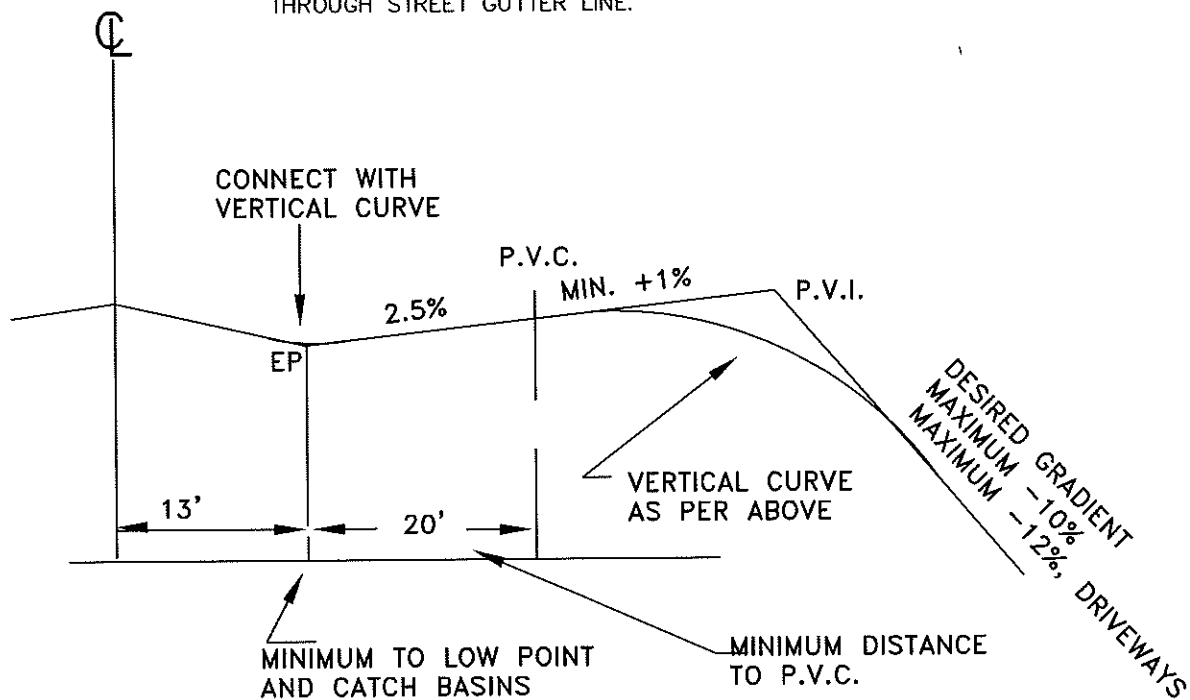
In accordance with item numbered (4) four of the Town of Cromwell, Department of Public Work's "Regulations Concerning Driveways", I, _____, the _____ (Developer/Homeowner/etc.), hereby relieve the Town of Cromwell from any responsibility for surface water entering the property at _____, because of lot/driveway grading.

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TYPICAL PUBLIC ACCESS WITH RISING GRADIENT

NOTE: AT ALL INTERSECTIONS, THROUGH STREETS SHALL MAINTAIN STANDARD CROSS SECTION (SLOPES). SIDE STREETS SHALL MATCH GRADE OF THE THROUGH STREET GUTTER LINE.



TYPICAL PUBLIC ACCESS WITH DECREASING GRADIENT

1	11/01	Road Width	Scale: NTS
			Sheet: RDGRADE
			Drawn By: REN
			Checked By: JSM
No.	Date	Description	Date: 3/1/2001
Revisions			

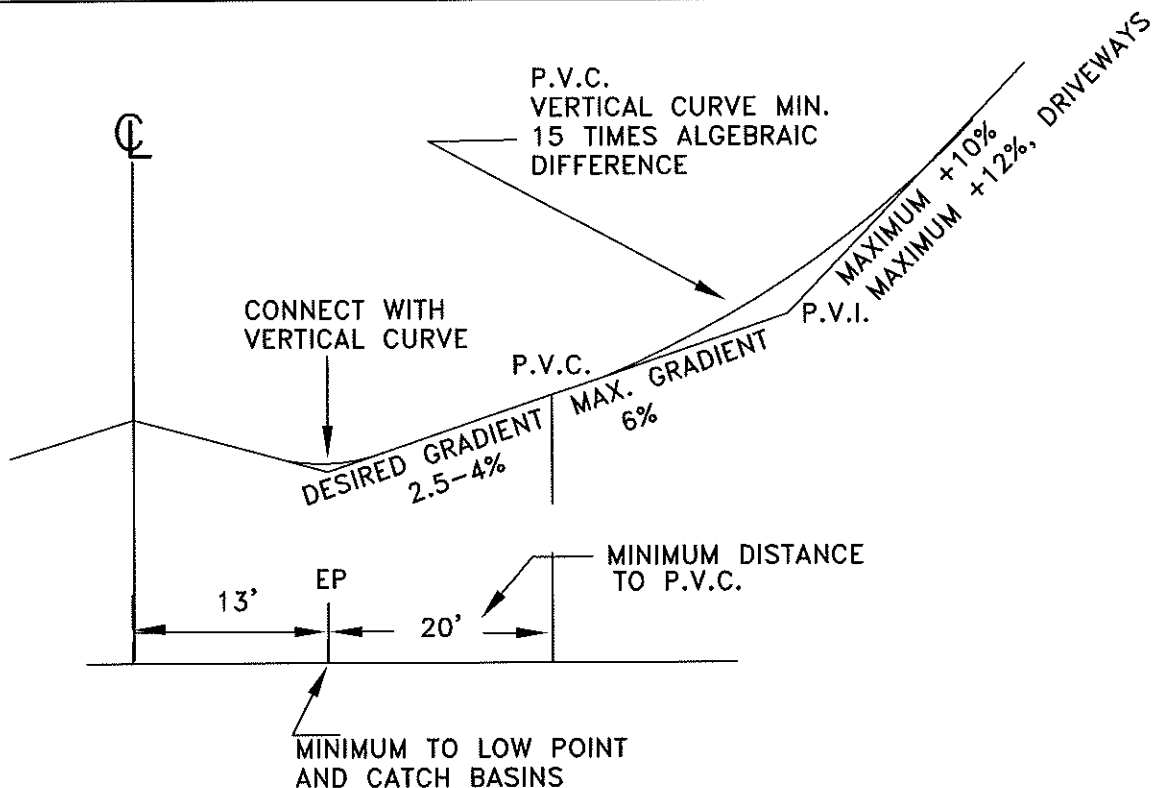
TOWN OF CROMWELL
DEPARTMENT OF
PUBLIC WORKS

PUBLIC
ACCESS
DESIGN



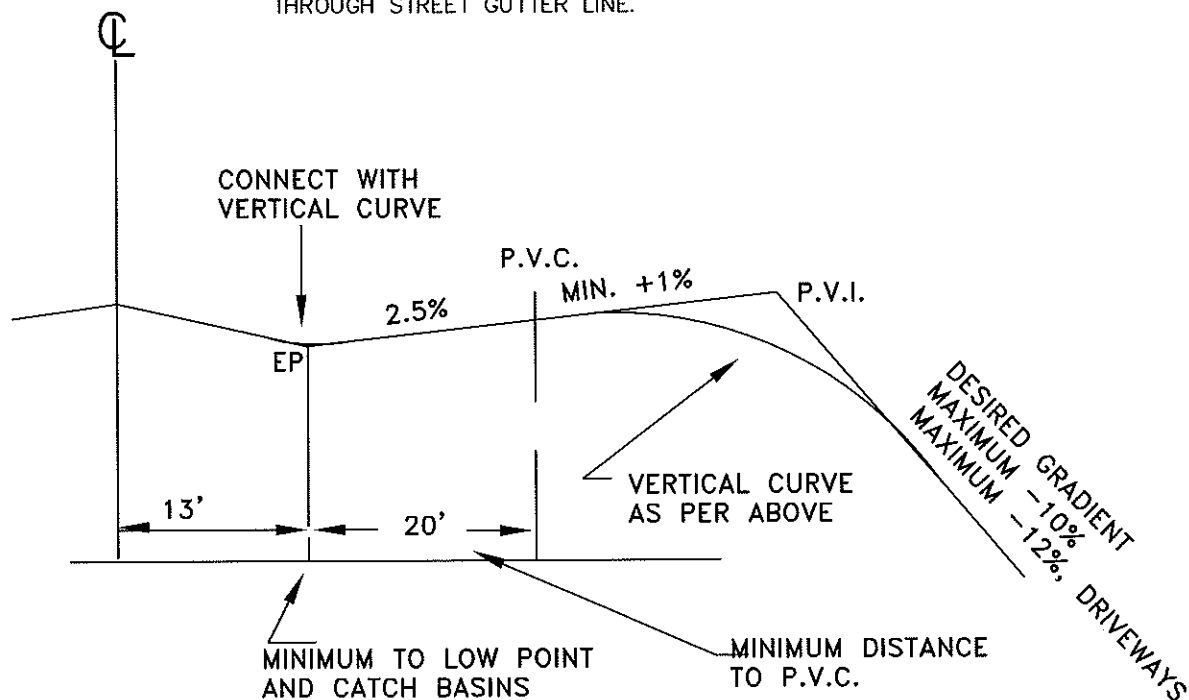
1	11/01	Concrete Strength	Scale: NTS	TOWN OF CROMWELL DEPARTMENT OF PUBLIC WORKS	DRIVEWAY APRONS
			Sheet: APRONS		
			Drawn By: REN		
			Checked By: JSM		
No.	Date	Description	Date: 3/1/2001		
Revisions					

APPENDIX G



TYPICAL PUBLIC ACCESS WITH RISING GRADIENT

NOTE: AT ALL INTERSECTIONS, THROUGH STREETS SHALL MAINTAIN STANDARD CROSS SECTION (SLOPES). SIDE STREETS SHALL MATCH GRADE OF THE THROUGH STREET GUTTER LINE.

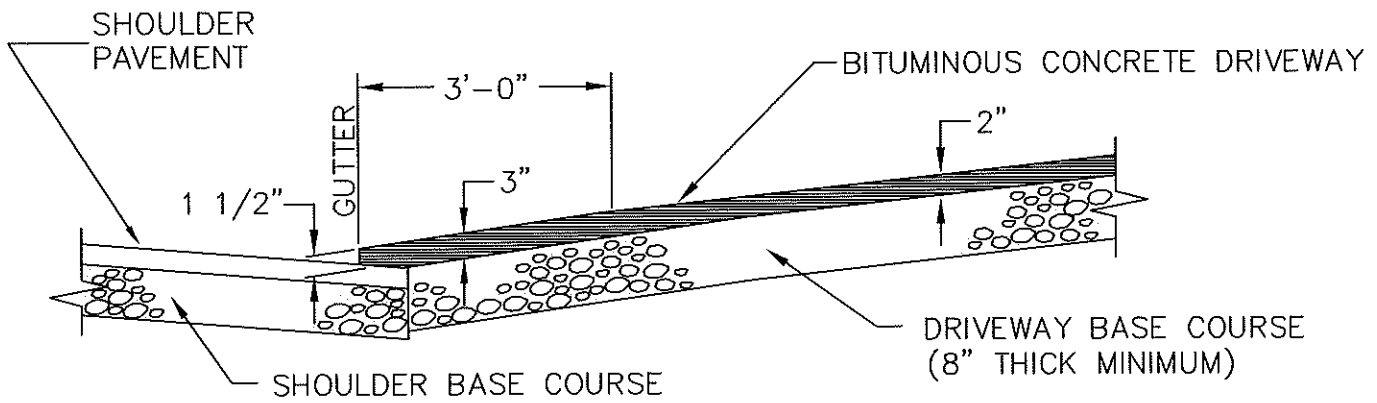


TYPICAL PUBLIC ACCESS WITH DECREASING GRADIENT

1	11/01	Road Width	Scale: NTS
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No.	Date	Description	Date: 3/1/2001
Revisions			

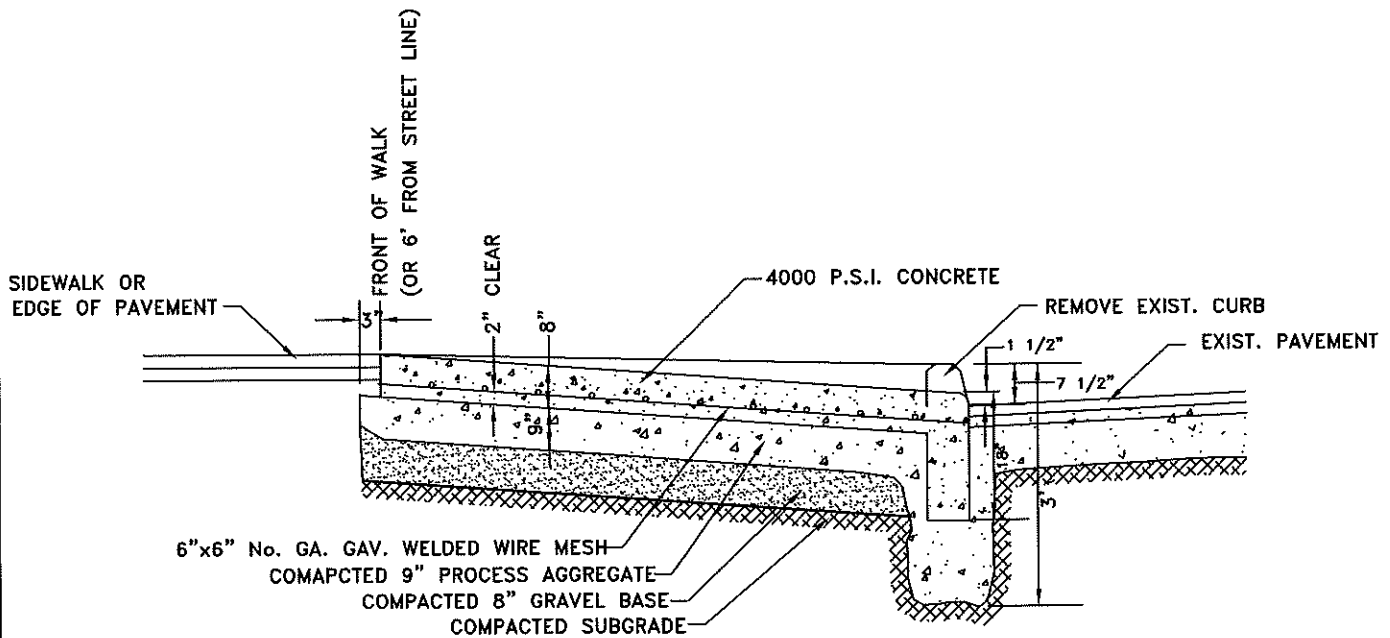
TOWN OF CROMWELL
DEPARTMENT OF
PUBLIC WORKS

PUBLIC
ACCESS
DESIGN



B.C. DRIVEWAY APRON

N.T.S.



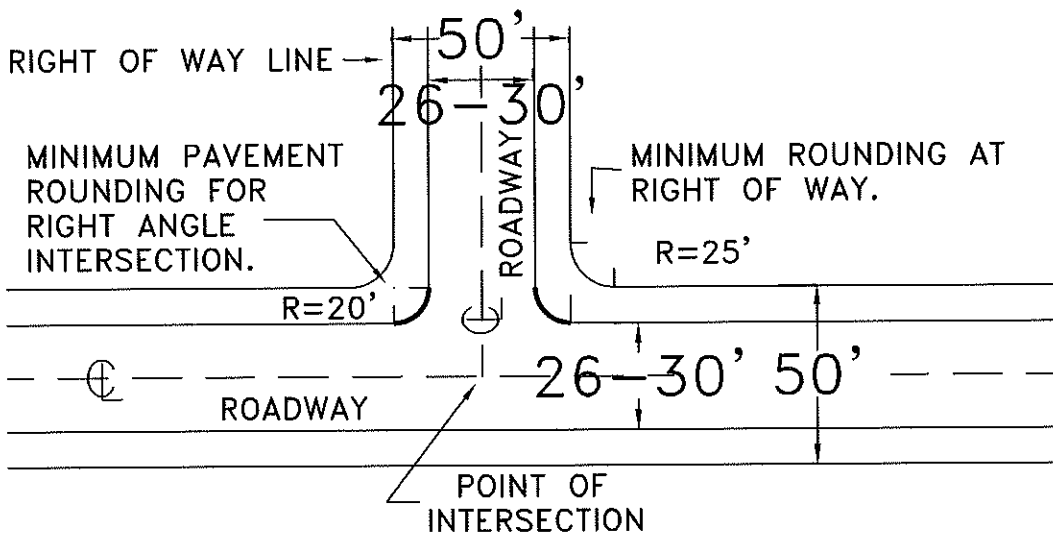
CONC. DRIVEWAY APRON

N.T.S.

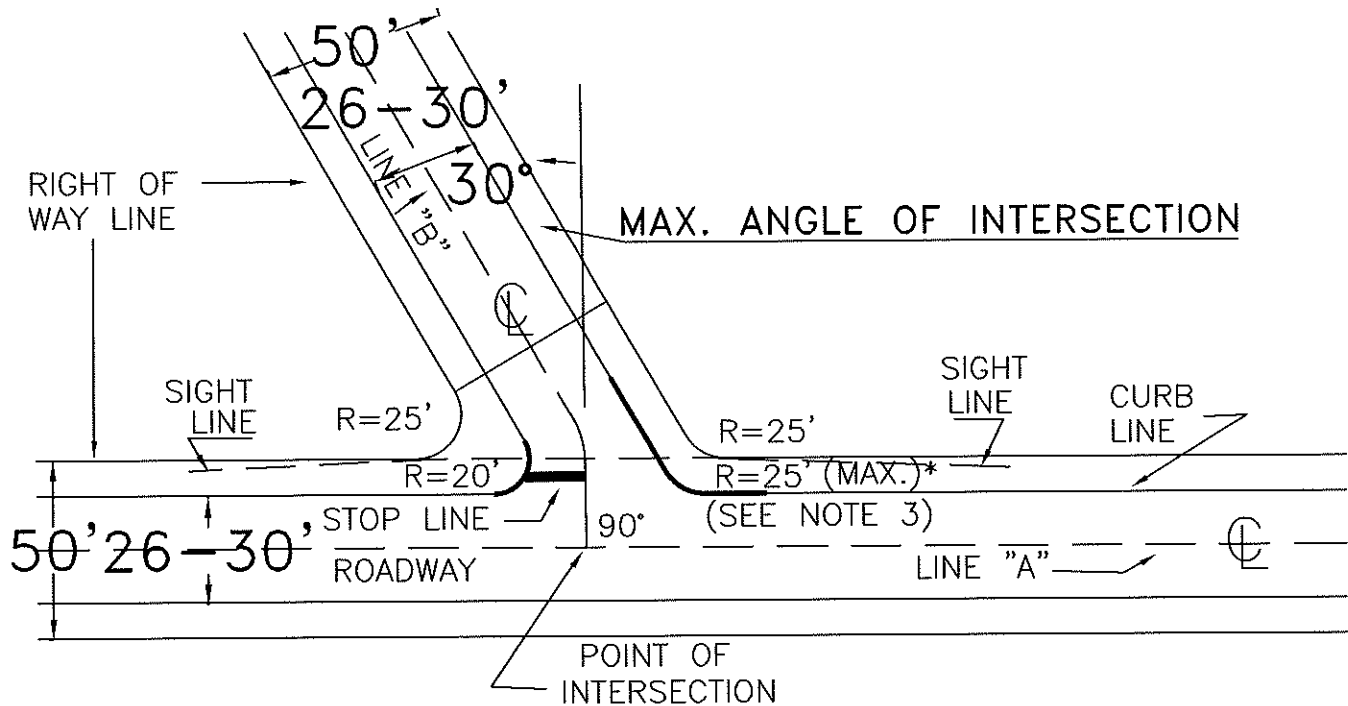
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			Sheet: APRONS
			Drawn By: REN
			Checked By: JSM
No.	Date	Description	Date: 3/1/2001
Revisions			

TOWN OF CROMWELL
DEPARTMENT OF
PUBLIC WORKS

DRIVEWAY
APRONS



TYPICAL RIGHT ANGLE INTERSECTION



MAXIMUM ANGLE INTERSECTION

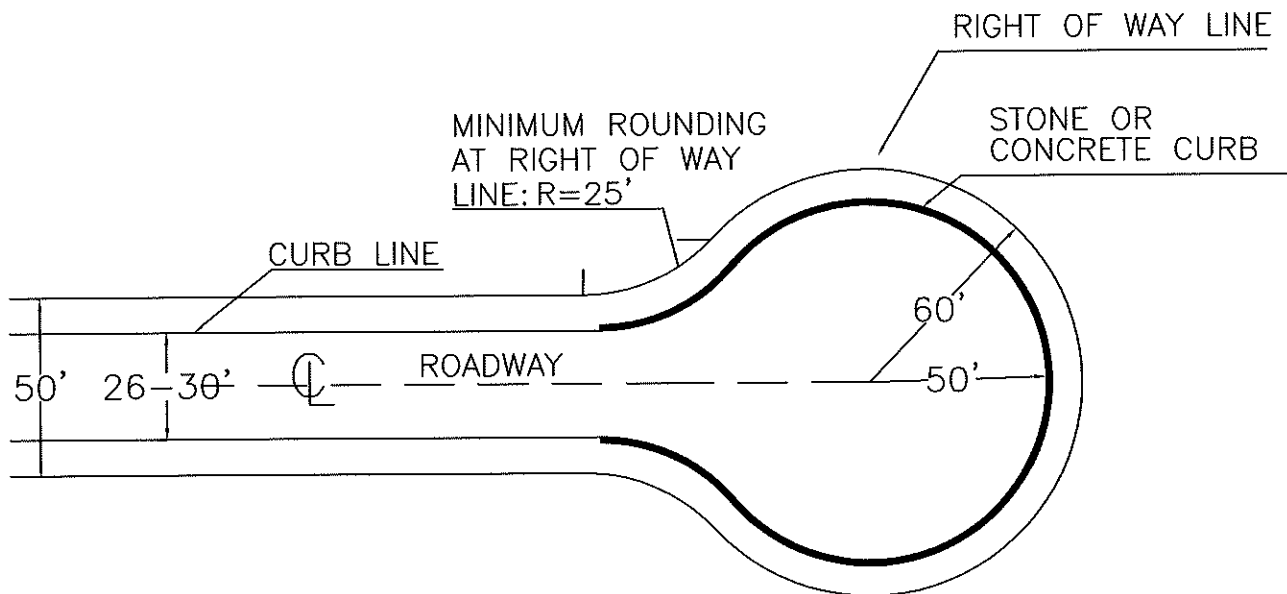
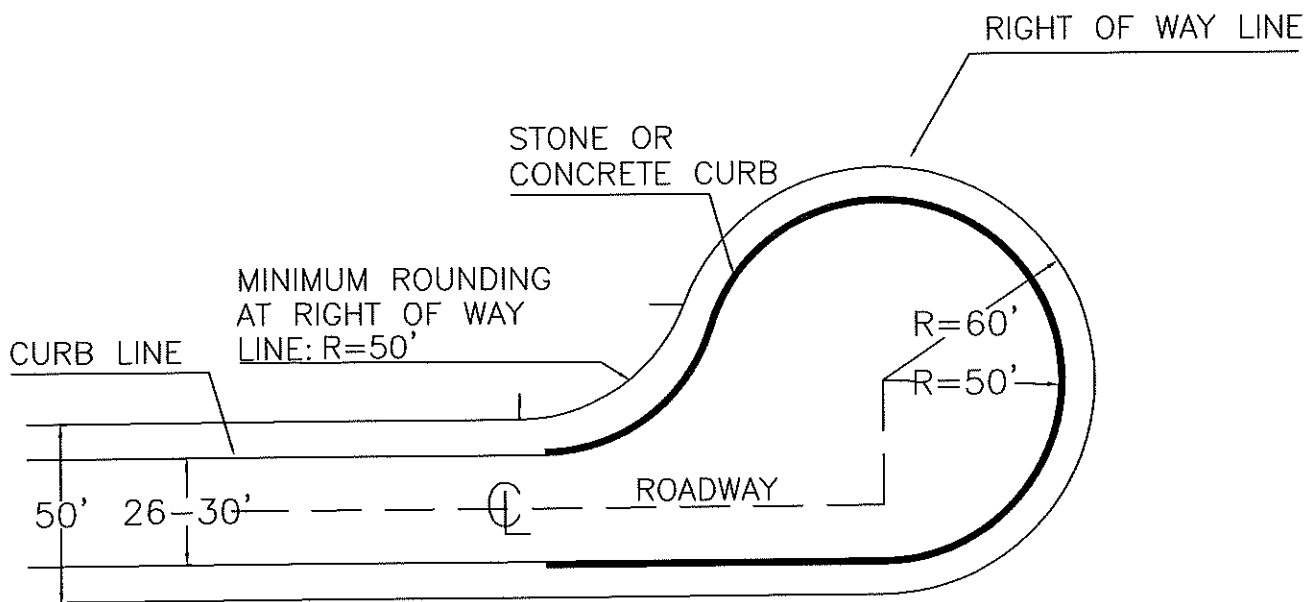
NOTES:

- Intersections at angles between 0° and 30° shall be designed so that:
 - Proper sight line distance must be attained.
 - Traffic from Line "B" should stop perpendicular to Line "A".
 - Radius with "*" designation should be sufficient to provide smooth turning movements, but not great enough to encourage excessive speeds.
 - Mirror image intersections are subject to same requirements.
- SIGNING AND PAVEMENT MARKINGS ARE TO BE IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

No.	Date	Description	Scale:	NTS
			Sheet:	INTSCN
			Drawn By:	REN
			Checked By:	JSM
			Date:	3/1/2001
Revisions				

TOWN OF CROMWELL
DEPARTMENT OF
PUBLIC WORKS

TYPICAL
INTERSECTIONS



NOTES:

1. CUL-DE-SACS SHALL BE DESIGNED SO AS TO HANDLE THE TYPE AND AMOUNT OF TRAFFIC INVOLVED. HOWEVER, THE ABOVE MINIMUM SPECIFICATIONS MUST BE MET.
2. NO ISLANDS ARE ALLOWED WITHIN THE CUL-DE-SAC.

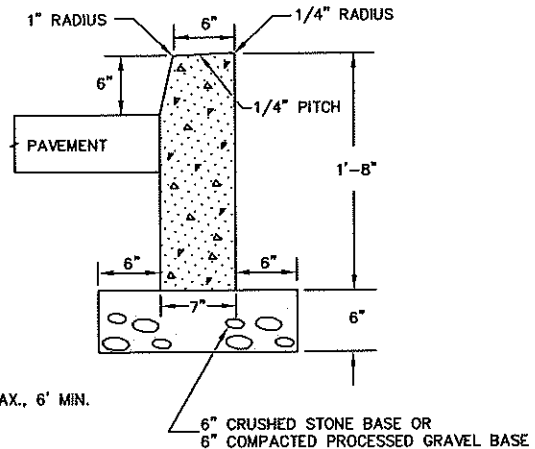
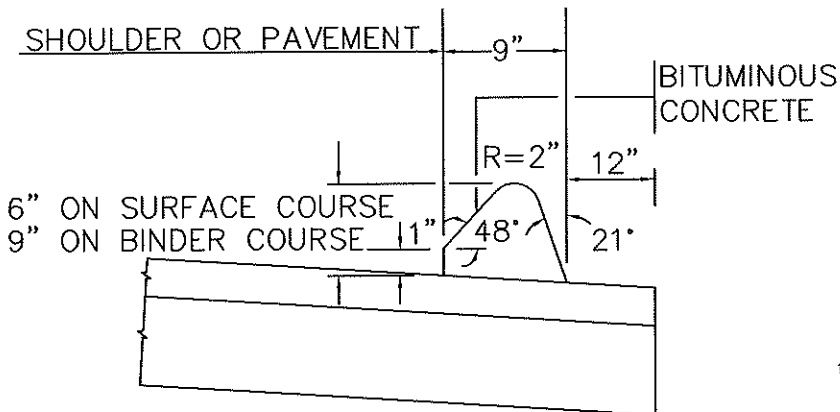
No.	Date	Description	Scale: NTS
			Sheet: CULDSAC
			Drawn By: REN
			Checked By: JSM
			Date: 3/1/2001
Revisions			

TOWN OF CROMWELL
DEPARTMENT OF
PUBLIC WORKS

TYPICAL
CUL-DE-SAC

BITUMINOUS CONCRETE LIP CURBING

N.T.S.

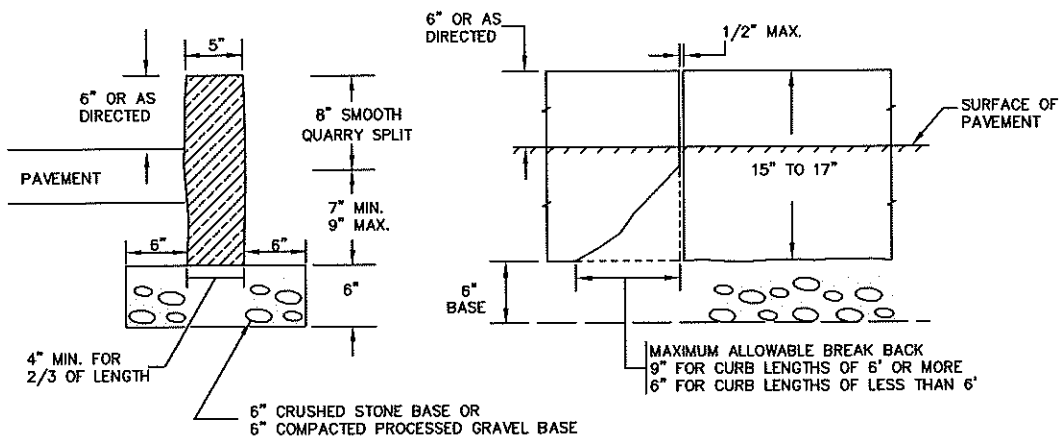


NOTE:

JOINTS AT 10' MAX., 6' MIN.

CONCRETE CURBING

N.T.S.



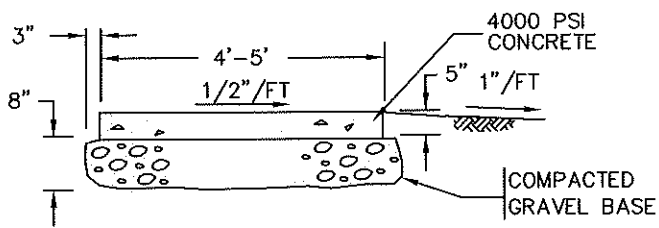
SECTION

ELEVATION

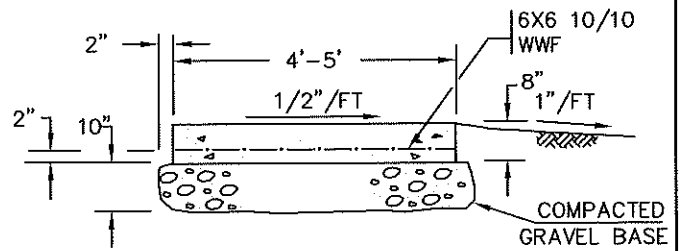
STONE CURBING

N.T.S.

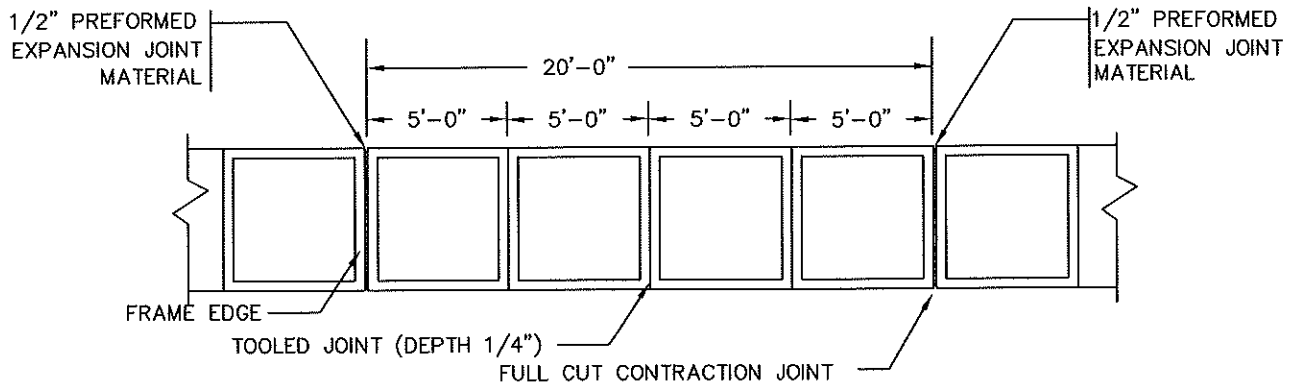
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			Sheet: CURBS		
			Drawn By: REN		
			Checked By: JSM		
			Date: 3/1/2001		
No.	Date	Description			
Revisions					



TYPICAL SIDEWALK



SIDEWALK AT DRIVEWAY



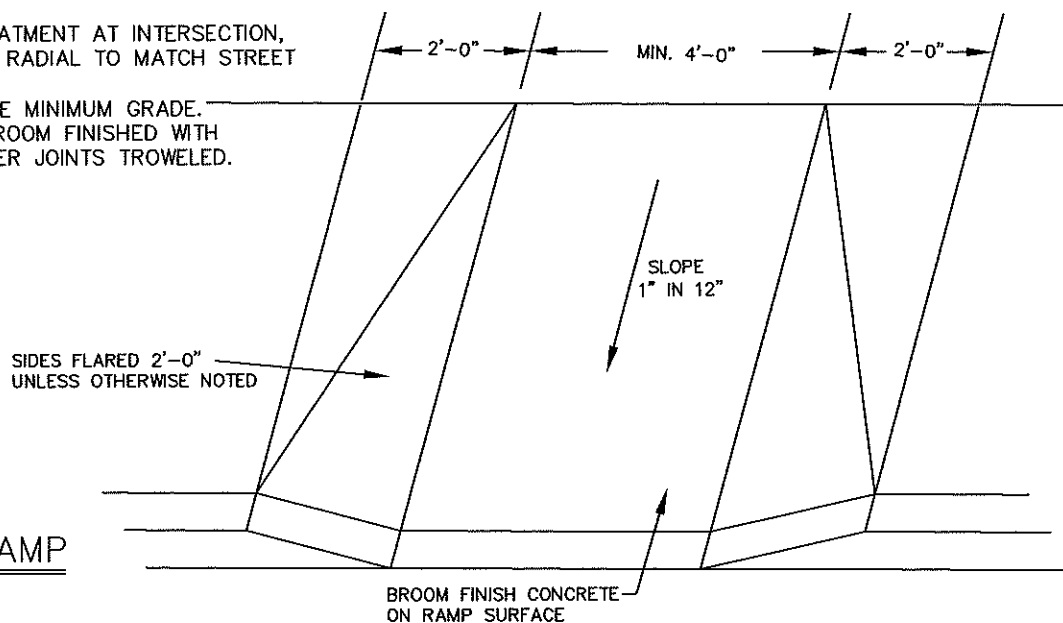
CONCRETE SIDEWALK

N.T.S.

NOTES:

1. FOR SIDEWALK TREATMENT AT INTERSECTION, JOINTS ARE TO BE RADIAL TO MATCH STREET CORNER RADIUS.
2. 4000 PSI CONCRETE MINIMUM GRADE.
3. SURFACE TO BE BROOM FINISHED WITH EDGES AND CENTER JOINTS TROWELED.

CONCRETE SIDEWALK



HANDICAP RAMP

N.T.S.

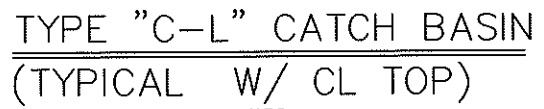
1	12/3/01	SLAB LENGTH	Scale: NTS
			Sheet: SIDEWALKS
			Drawn By: REN
			Checked By: JSM
No.	Date	Description	Date: 3/1/2001
Revisions			

TOWN OF CROMWELL
DEPARTMENT OF
PUBLIC WORKS

CONCRETE
SIDEWALK



SECTION B-B



N.T.S.

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				Drawn By: REN
				Checked By: JSM
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Revisions				

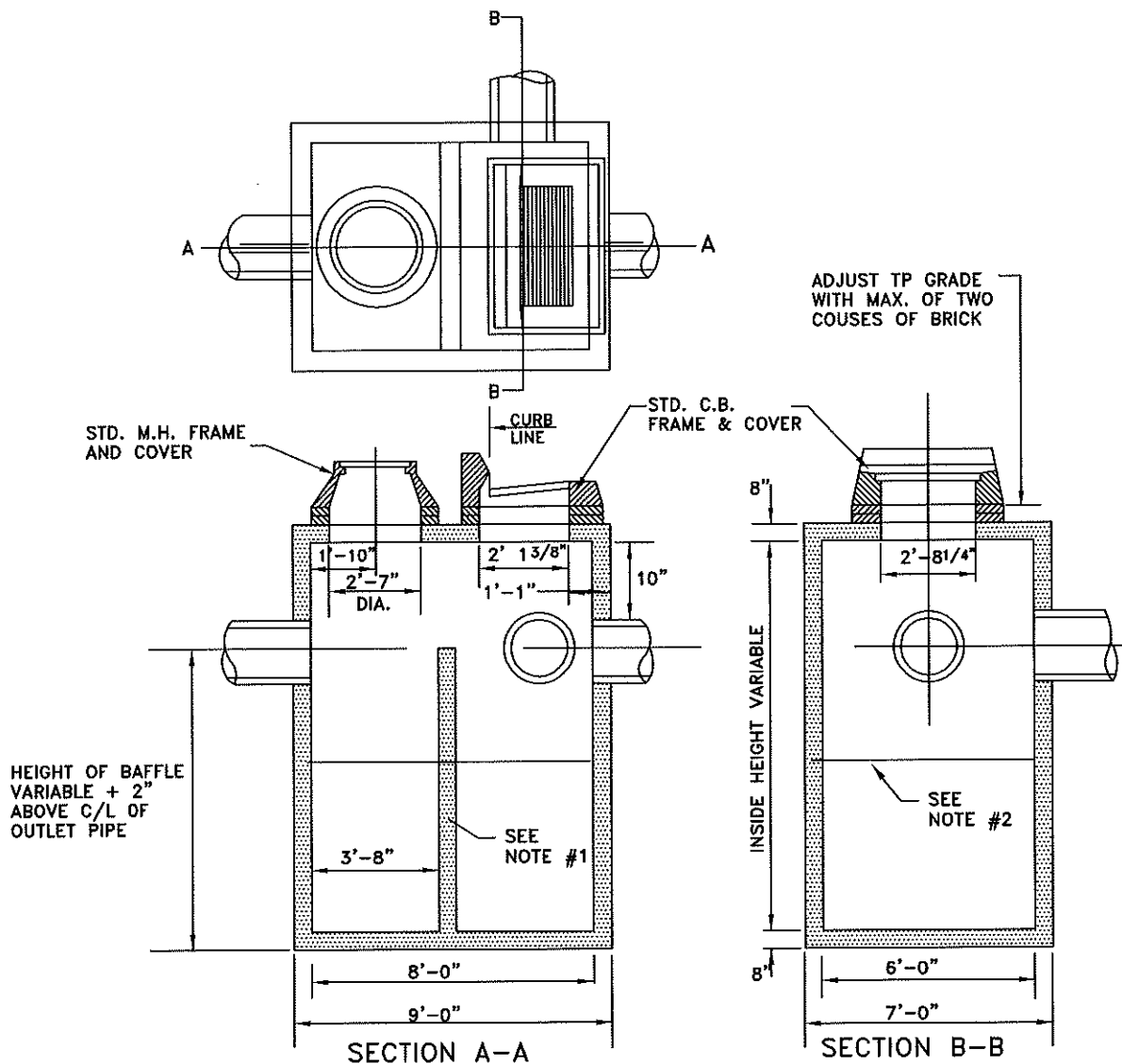
TOWN OF CROMWELL
DEPARTMENT OF
PUBLIC WORKS

TYPICAL CATCHBASIN DETAILS

NOTE:

1. WALLS OF CATCH BASINS OVER 10' DEEP TO BE INCREASED TO 12" THICKNESS, INSIDE DIMENSIONS TO REMAIN THE SAME.
2. CATCH BASINS ARE TO BE CONSTRUCTED WITH COMPONENTS MANUFACTURED BY CROMWELL CONCRETE PRODUCTS, INC. OR EQUAL.
3. SUMPS AND WALL SHALL BE PRECAST, CLASS "A" CONCRETE (DOT FORM 814A).
4. ALL INLET AND OUTLET PIPES SHALL BE CUT FLUSH WITH INTERIOR OF WALLS.
5. MAX. CORBEL IS TO BE 3".
6. MORTAR MIX SHALL NOT CONTAIN LIME.
7. ALL MORTAR JOINTS SHALL BE FULL WITH INTERIOR POINTED.
8. EXTERIOR CORBEL JOINTS MUST BE WEDGED.
9. GRADE CHANGES ARE TO BE MADE WITH PRECAST CONCRETE SPACERS.
10. NO CATCH BASIN SHALL BE BACKFILLED UNTIL INSPECTED BY TOWN.
11. CATCH BASIN FRAMES SHALL MATCH THE ABUTTING CURB TYPE.
12. ALL PROPOSED CATCH BASINS TO HAVE 2 FOOT INTERIOR SUMP.

			Scale: NTS	TOWN OF CROMWELL DEPARTMENT OF PUBLIC WORKS	CATCHBASIN NOTES
			Sheet: CBASINS		
			Drawn By: REN		
			Checked By: JSM		
No.	Date	Description	Date: 3/1/2001		
Revisions					



TYPICAL SEDIMENT BASIN

N.T.S.

NOTES:

1. BAFFLE CONSTRUCTION TO BE OF CAST MATERIAL WITH THRU HOLES ABOVE OUTLET FLOW LINE OR MORTARED CEMENT BLOCKS WITH WEEP HOLES ABOVE OUTLET FLOW LINE.

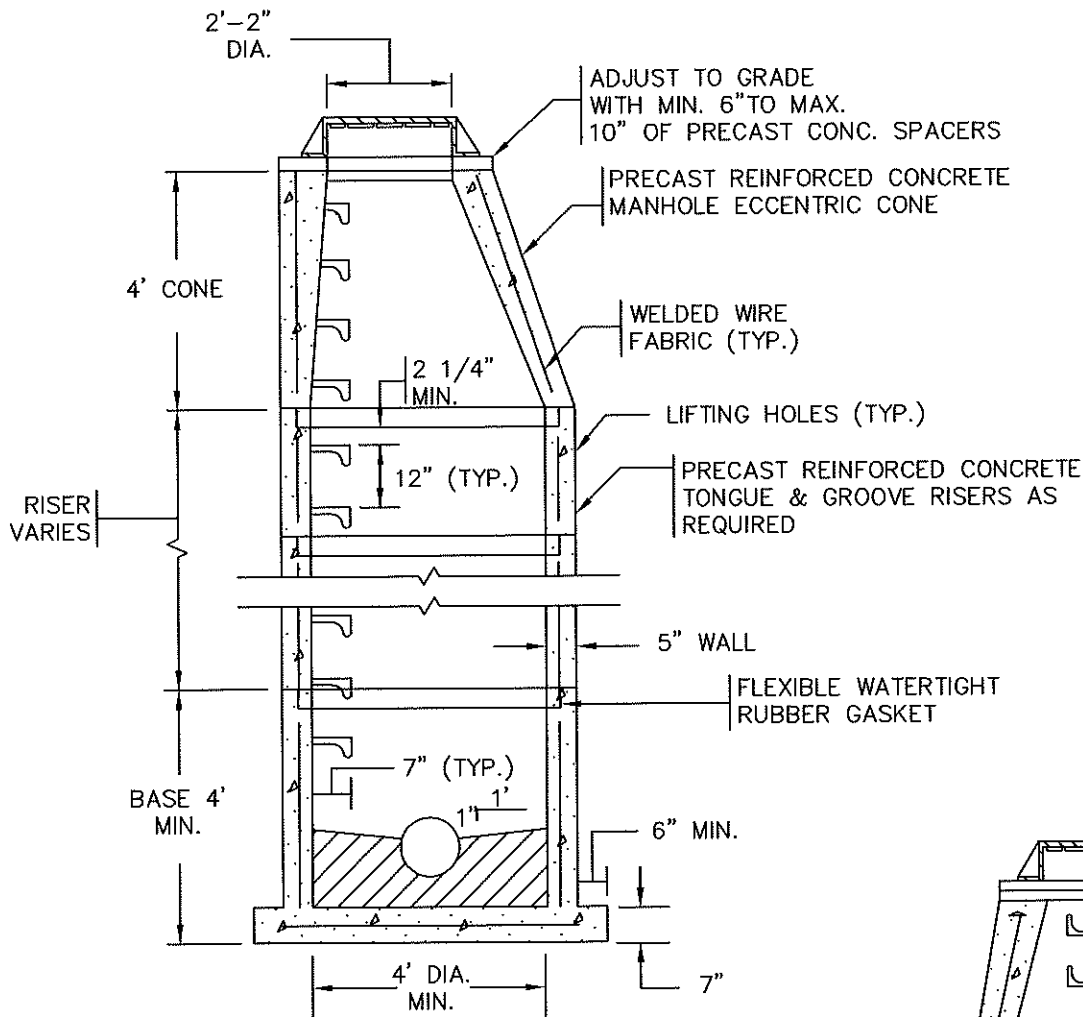
DESIGN LOADING—
STANDARD: AASHO HS20-44
STEEL REINFORCED: ASTM A-615-75
GRADE 60, 1" MIN. COVER.

3. ADJUST M.H. FRAME W/ SPACERS, TO SUIT REQUIRED FIELD HEIGHT.
4. CONCRETE MINIMUM STRENGTH—5,000 P.S.I. @ 28 DAYS.
5. MAXIMUM HEIGHT FOR 2 PIECE CHAMBER 8'-0"
6. ROOF AND SIDE WALL OPENING AS SPECIFIED.

No.	Date	Description	Scale: NTS
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			Drawn By: REN
			Checked By: JSM
			Date: 3/1/2001

TOWN OF CROMWELL
DEPARTMENT OF
PUBLIC WORKS

SEDIMENT
BASIN



SECTION

NOTES:

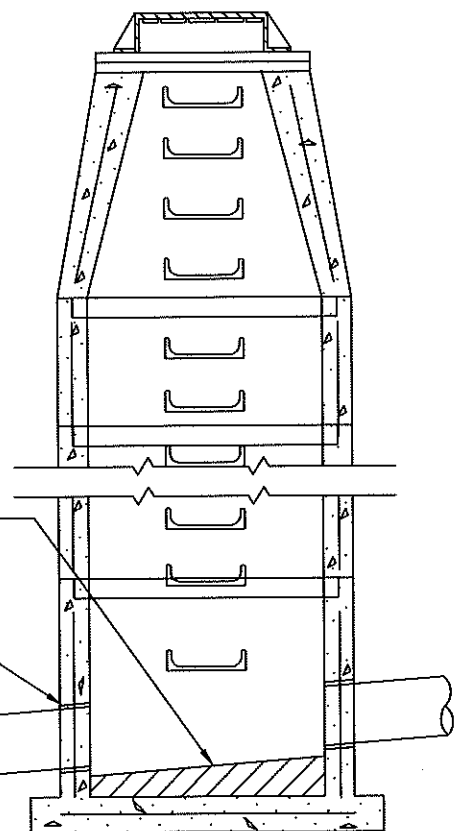
1. 5' OR 6' DIA. PRECAST BASES MAY BE USED WHEN REQUIRED DUE TO SIZE OR NUMBER OF PIPES AT THE MANHOLE. PRECAST REDUCERS WILL BE PLACED ABOVE THE 5' & 6' BASES AS DIRECTED BY THE ENGINEER. WALL THICKNESS TO INCREASE 1" FOR EACH 1' OF INSIDE DIAMETER INCREASE.
2. FILL LIFTING HOLES WITH MORTAR
3. KNOCKOUTS FOR PIPES MIN. 4" FROM TOP & BOTTOM OF BASE.

STORM MANHOLE

N.T.S.

CONCRETE OR BRICK & MORTAR INVERT

PACK ANNULAR SPACE WITH NON SHRINK GROUT



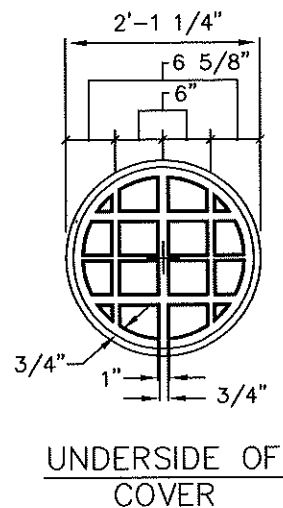
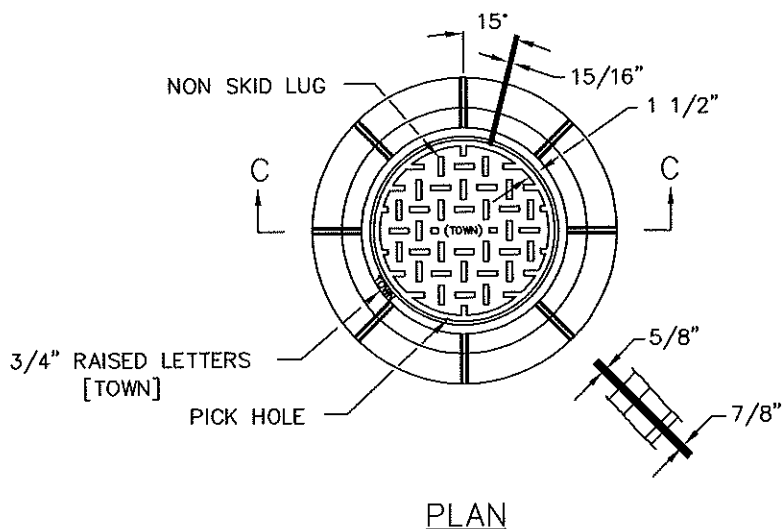
SECTION

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 Checked By: JSM
 Date: 3/1/2001

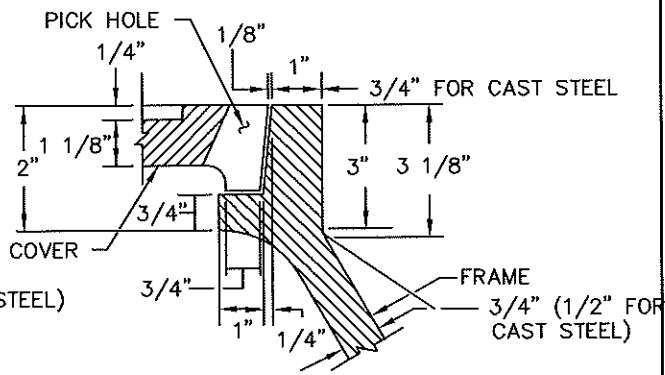
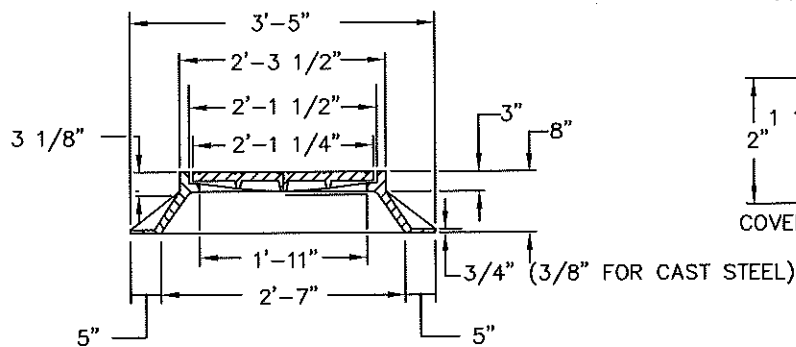
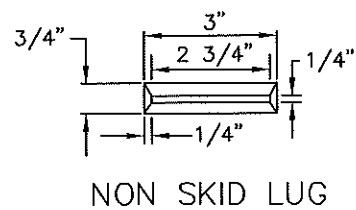
TOWN OF CROMWELL
 DEPARTMENT OF
 PUBLIC WORKS

STORM
 MANHOLE



NOTES:

- | MATERIAL | CAST IRON | CAST STEEL |
|-----------------------------|-----------|------------|
| APPROXIMATE WEIGHT OF COVER | 184 LB. | 134 LB. |
| APPROXIMATE WEIGHT OF FRAME | 312 LB. | 27 LB. |
- ALL DIMENSIONS SUBJECT TO MANUFACTURING TOLERANCES
- FRAME & COVER TO BE NEENAH FOUNDRY CO.
R-1792-EL OR EQUAL;
R-1792-EG OR EQUAL; OR
AS APPROVED BY THE DPW.



FRAME & COVER

N.T.S.

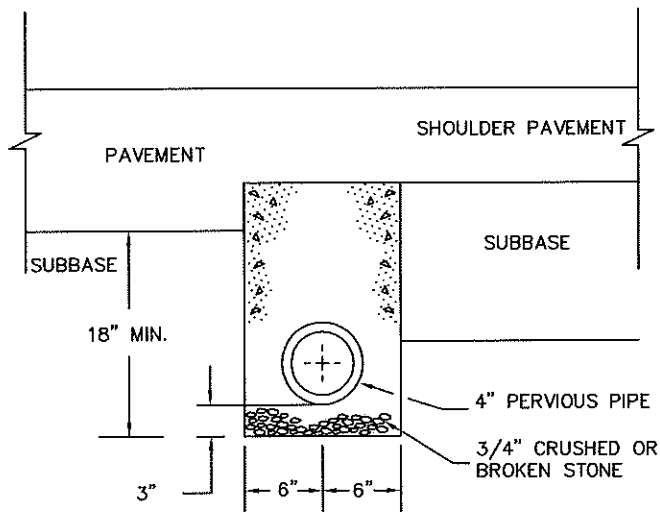
No.	Date	Description
		Revisions

Scale: NTS
Sheet: MHCOVER
Drawn By: REN
Checked By: JSM
Date: 3/1/2001

TOWN OF CROMWELL
DEPARTMENT OF
PUBLIC WORKS

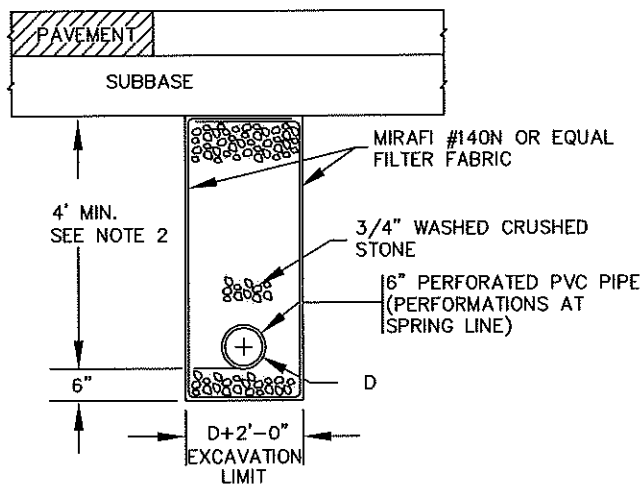
STORM MANHOLE
FRAME & COVER

STORM DRAINAGE TRENCH DETAILS



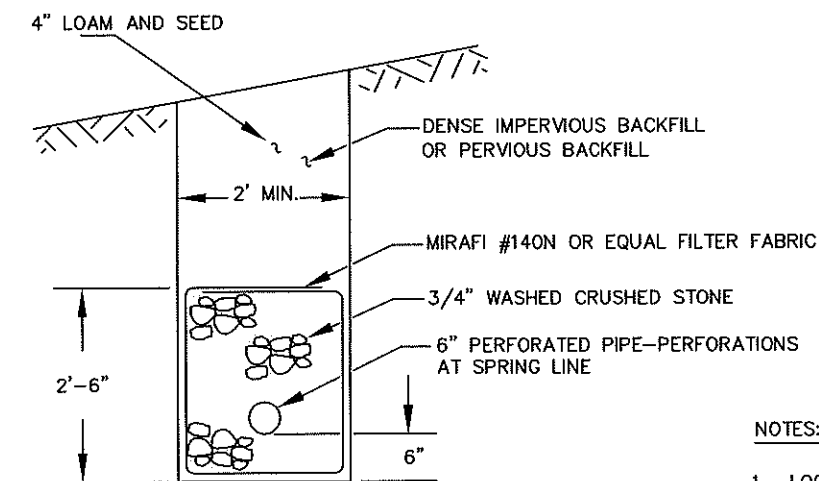
EDGE DRAIN

N.T.S.



UNDERDRAIN

N.T.S.



CURTAIN DRAIN

N.T.S.

NOTES:

1. LOCATION SHALL BE AS DIRECTED BY THE ENGINEER.
2. DEPTH MAY BE VARIED FOR NECESSARY OUTLET GRADE.
3. THE BOTTOM OF PAVEMENT EDGE DRAIN TRENCH SHALL BE 18" MIN., OR TO THE BOTTOM OF SUBBASE WHEN THE SUBBASE DEPTH IS GREATER THAN 18".

No.	Date	Description
		Revisions

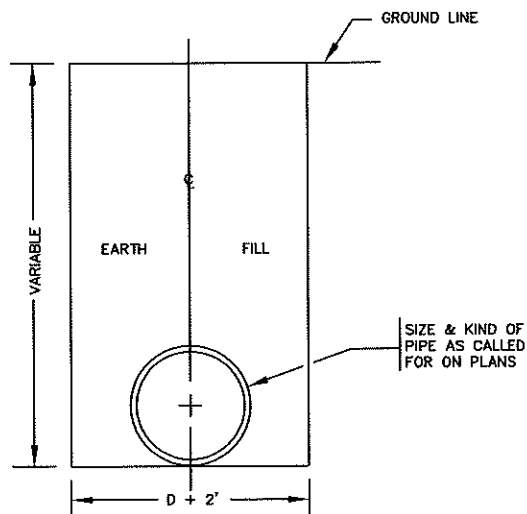
Scale: NTS
 Sheet: UNDERDR
 Drawn By: REN
 Checked By: JSM
 Date: 3/01/2001

TOWN OF CROMWELL
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 PUBLIC WORKS

UNDERDRAINS



1. THE OUTLET ENDWALL CAN BE EITHER PRECAST OR CAST IN PLACE.
2. CONCRETE SHALL BE CLASS "C" CONCRETE.
3. IF PRECAST CONC. ENDWALL IS USED, OUTLET SHAL BE GROUTED & SEALED TO ENDWALL OPENING WITH NON-SHRINK GROUT.



OUTLETS

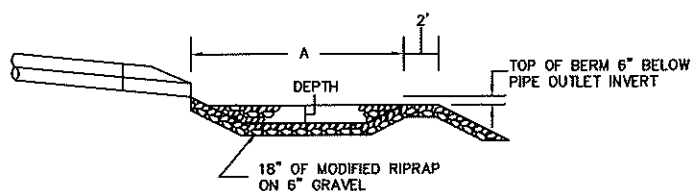
UNDERDRAIN OUTLET

N.I.S.

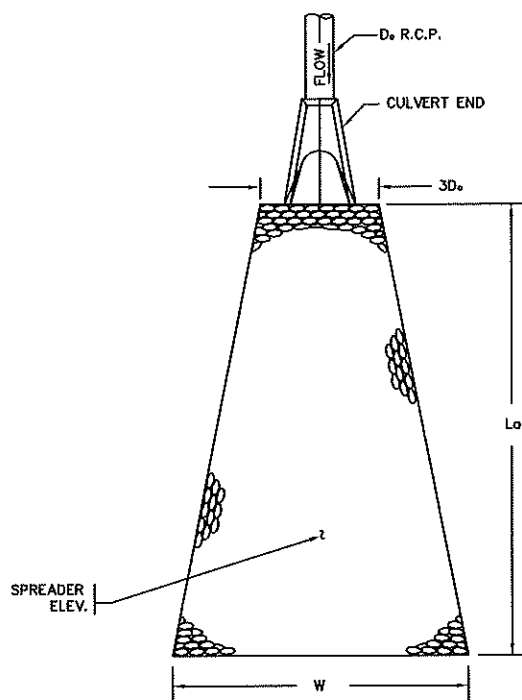
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			Sheet: DROUTLET
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No.	Date	Description	Checked By: JSM
Revisions			Date: 3/1/2001

TOWN OF CROMWELL
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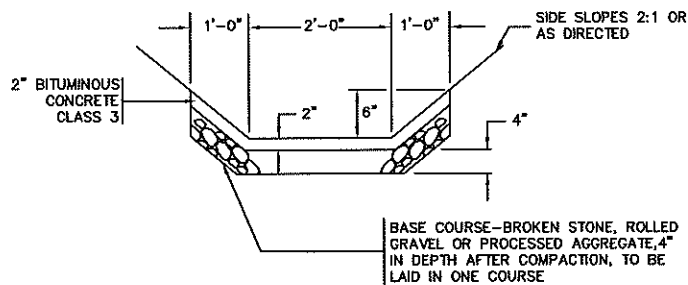
UNDERDRAIN
OUTLET



PIPE SIZE	A	B	DEPTH
15"	10'	7'	1'
18"	12'	8'	1'
21"	15'	9'	1-1/2'
24"	17'	10'	1-1/2'
30"	20'	13'	2'
36"	24'	16'	2'



N.T.S.



N.T.S.

					Scale: NTS
					Sheet: ENDTREAT
					Drawn By: REN
					Checked By: JSM
No.	Date	Description			Date: 3/1/2001
		Revisions			

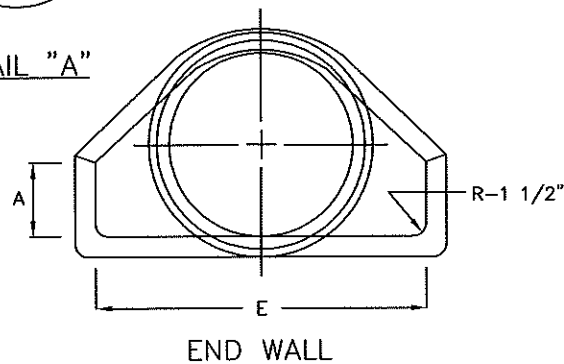
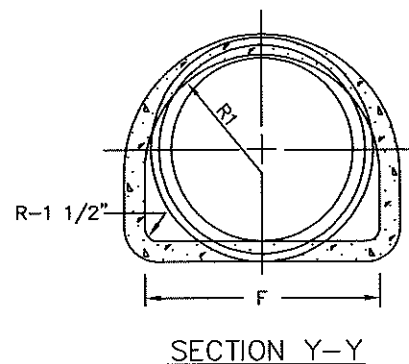
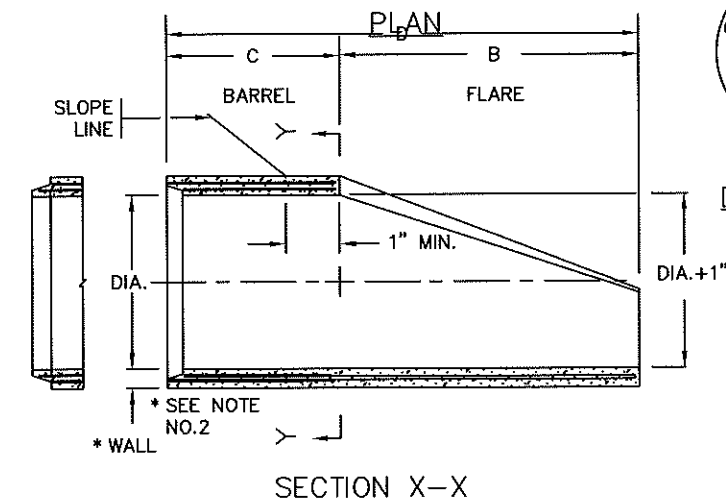
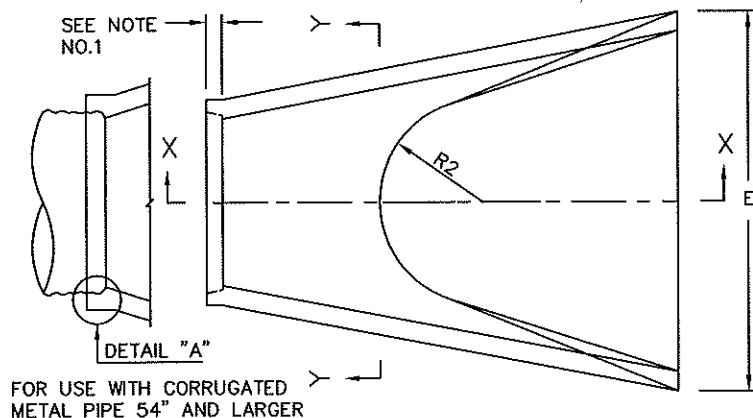
TOWN OF CROMWELL
DEPARTMENT OF
PUBLIC WORKS

END OF PIPE TREATMENT ALTERNATIVES

DIMENSIONS FOR REINFORCED CONCRETE CULVERT END									FLARE REINFORCEMENT ONE LAYER ONLY IN CENTER OF WALL	
DIA.	A	B	C	D	E	F	R1	R2	MIN. AREA OF LONGITUDINALS SQ. IN. PER FT.	MIN. AREA OF TRANSVERSE STEEL SQ. IN. PER FT.
12"	4"	2'-0"	4'-0 3/8"	6'-0 3/8"	2'-0"	1'-7 15/16"	10 1/4"	9"	0.048	0.048
15"	6"	2'-3"	3'-10"	6'-1"	2'-6"	2'-0 5/16"	1'-0 1/2"	11"	0.054	0.054
18"	9"	2'-3"	3'-10"	6'-1"	3'-0"	2'-5"	1'-3 1/2"	1'-0"	0.060	0.060
21"	9"	2'-11"	3'-2"	6'-1"	3'-6"	2'-7 1/2"	1'-4"	1'-1"	0.066	0.066
24"	9 1/2"	3'-7 1/2"	2'-6"	6'-1 1/2"	4'-0"	2'-9 3/16"	1'-4 13/16"	1'-2"	0.072	0.072
30"	1'-0"	4'-6"	1'-7 3/4"	6'-1 3/4"	5'-0"	3'-1"	1'-6 1/2"	1'-3"	0.084	0.084
36"	1'-3"	5'-3"	2'-10 3/4"	8'-1 3/4"	6'-0"	3'-11 13/16"	2'-0 5/16"	1'-8"	0.096	0.096
42"	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"	4'-5 7/8"	2'-3 1/2"	1'-10"	0.108	0.108
48"	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"	4'-8 1/2"	2'-4 1/2"	1'-10"	0.120	0.120
54"	2'-3"	5'-5"	2'-11"	8'-4"	7'-6"	5'-5 1/2"	2'-9 1/8"	2'-0"	0.132	0.132
60"	2'-6"	5'-0"	3'-3"	8'-3"	8'-0"	6'-0 1/2"	3'-0 11/16"	2'-0"	0.144	0.144

NOTES:

- JOINTS SHALL BE TONGUE AND GROOVE OR BELL AND SPIGOT AS REQUIRED TO CONFORM TO PIPE INSTALLED.
- WALL THICKNESS SHALL CONFORM TO PIPE THICKNESS.



REINFORCED CONCRETE CULVERT END

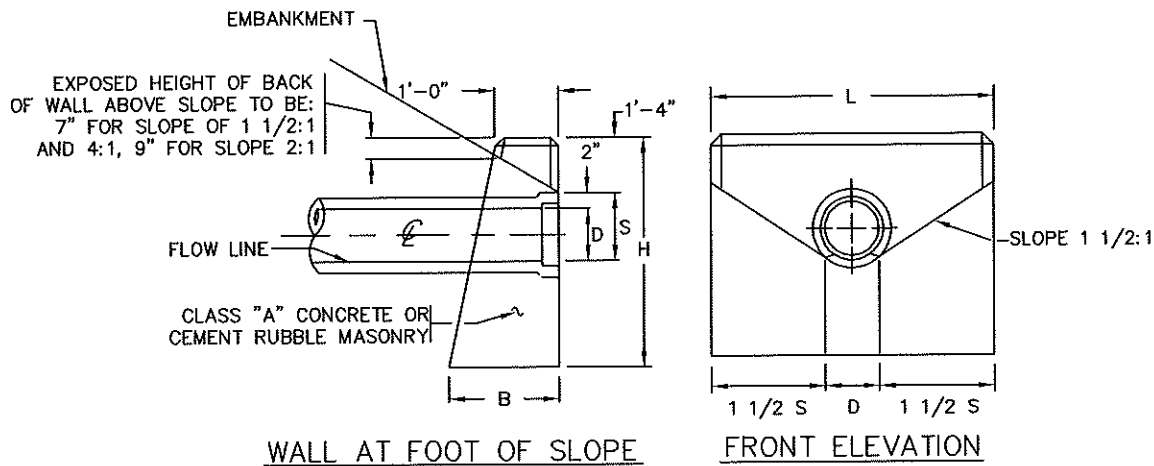
N.T.S.

No.	Date	Description
1		Revisions

Scale: NTS
 Sheet: RCPEND
 Drawn By: REN
 Checked By: JSM
 Date: 3/1/2001

TOWN OF CROMWELL
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REINFORCED
 CONC. CULVERT
 END



DIMENSIONS AND QUANTITIES FOR ONE ENDWALL BASED ON $S=D+2"$						
D	S	H	L	BATTER	B	VOL.
INS.	FT.& INS.	FT.& INS.	FT.& INS.	INS./FT.	FT.& INS.	CU.YD.
12"	1'-2"	4'-6"	4'-6"	2 1/2"	1'-11 1/4"	1.10
15"	1'-5"	4'-9"	5'-6"	2 1/2"	1'-11 7/8"	1.45
18"	1'-8"	5'-0"	6'-6"	2 1/2"	2'-0 1/2"	1.83
24"	2'-2"	5'-6"	8'-6"	2 1/2"	2'-1 3/4"	2.72
30"	2'-8"	6'-0"	10'-6"	2 1/2"	2'-3"	3.79
36"	3'-2"	6'-6"	12'-6"	3"	2'-7 1/2"	5.45
42"	3'-8"	7'-0"	14'-6"	3"	2'-9"	6.40 *
48"	4'-2"	7'-6"	16'-6"	3"	2'-10 1/2"	8.00 *

H = TOTAL HEIGHT OF ENDWALL
 B = BASE
 D = INSIDE DIAMETER OF PIPE
 S = HEIGHT OF SLOPE ABOVE FLOW LINE
 AT FACE OF WALL-MINIMUM=D+2
 L = LENGTH OF WALL=3S=D

* VOLUME BASED ON "D" AND WALL THICKNESS AT CENTER LINE OF PIPE HAS BEEN DEDUCTED

NOTE:

- ALL CONSTRUCTION DIMENSIONS ARE NOMINAL.
- WHEN ONE ENDWALL IS TO BE USED FOR TWO PIPES, THE DIMENSIONS OF THAT ENDWALL SHALL CONFORM TO THAT REQUIRED FOR THE LARGER PIPE, EXCEPT THE DIMENSION "L" SHALL BE INCREASED BY THE OUTSIDE DIAMETER OF THE SMALLER PIPE PLUS ONE FOOT. THESE ENDWALLS WILL BE USED ONLY AT LOCATIONS WHERE THEY WILL NOT BE A HAZARD TO VEHICLES THAT RUN OFF THE ROAD IN NO CASE WILL THE LOCATION OF THESE ENDWALLS BE LESS THAN 30' FROM THE EDGE OF THE TRAVELED WAY.
- COST REINFORCING BARS TO BE INCLUDED IN THE CONTRACT UNIT PRICE FOR CLASS "A" CONCRETE.
- ALL EDGES OF EXPOSED SURFACES TO BE CHAMFERED APPROXIMATELY ONE INCH.

STANDARD ENDWALL

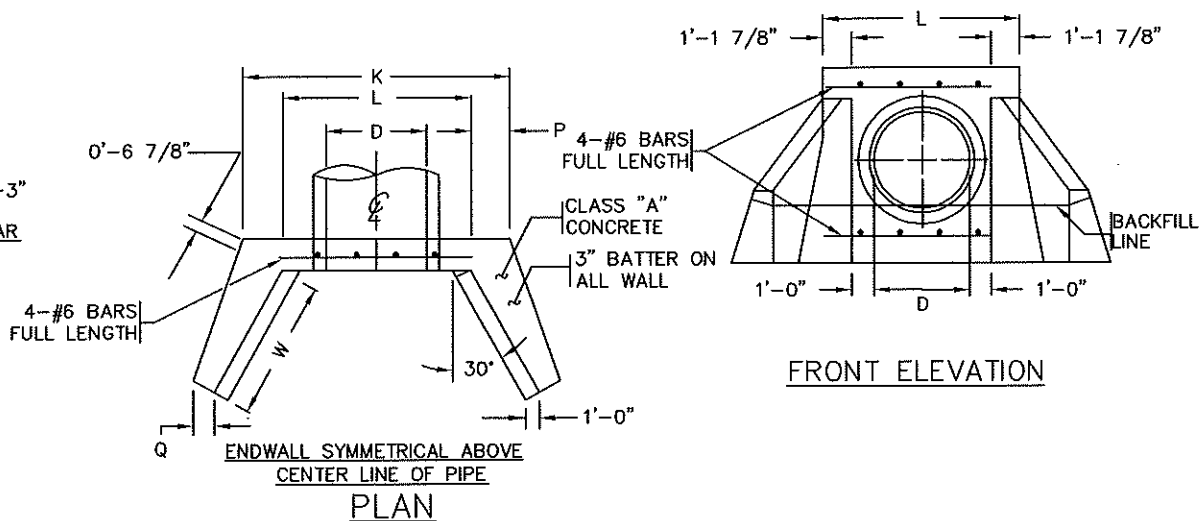
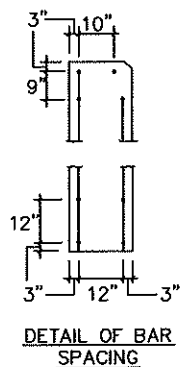
N.T.S.

No.	Date	Description
		Revisions

Scale: NTS
 Sheet: STDENDWL
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TOWN OF CROMWELL
 DEPARTMENT OF
 PUBLIC WORKS

STANDARD
 ENDWALL

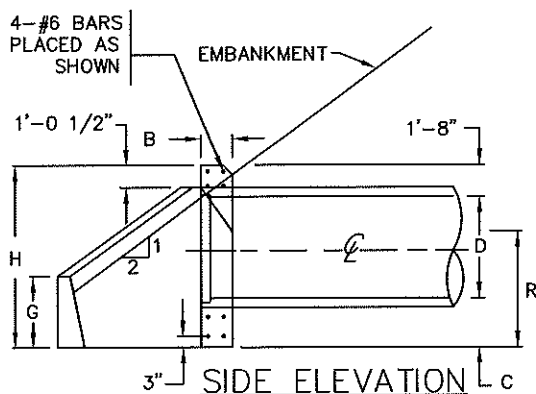


DIMENSIONS AND QUANTITIES FOR ONE WING TYPE ENDWALL

D	B	C	G	H	K	L	P	Q	R	W	VOL.
INS.	FT. & IN.	FT. & IN.	FT. & IN.	FT. & IN.	FT. & IN.	FT. & IN.	FT. & IN.	FT. & IN.	FT. & IN.	FT. & IN.	CU. YD.
36"	1'-6"	2'-0"	3'-3"	6'-8"	9'-1 1/2"	7'-3 3/4"	1'-4 7/8"	0'-9 3/4"	3'-4 7/8"	5'-5 3/4"	5.87
42"	1'-6"	2'-0"	3'-3"	7'-2"	9'-10 1/2"	7'-9 3/4"	1'-6 3/8"	0'-9 3/4"	3'-10 1/2"	6'-7 3/4"	6.67
48"	1'-7"	2'-6"	3'-9"	8'-2"	10'-10"	8'-3 3/4"	1'-9 3/8"	0'-11 1/4"	4'-9"	7'-9 1/2"	9.11
60"	1'-7"	2'-6"	3'-9"	9'-2"	12'-4 1/2"	9'-3 3/4"	2'-0 3/8"	0'-11 1/4"	5'-9"	10'-1 1/4"	12.43
72"	1'-7"	2'-6"	3'-9"	10'-2"	13'-10 3/4"	10'-3 3/4"	2'-3 3/8"	0'-11 1/4"	6'-9"	12'-5"	16.30

NOTES:

1. ALL CONSTRUCTION DIMENSIONS ARE NOMINAL.
2. WHEN ONE ENDWALL IS TO BE USED FOR TWO PIPES, THE DIMENSIONS OF THAT ENDWALL SHALL CONFORM TO THAT REQUIRED FOR THE LARGER PIPE, EXCEPT THE DIMENSION "L" SHALL BE INCREASED BY THE OUTSIDE DIAMETER OF THE SMALLER PIPE PLUS ONE FOOT.
3. THESE ENDWALLS WILL BE USED ONLY AT LOCATIONS WHERE THEY WILL NOT BE A HAZARD TO VEHICLES THAT RUN OFF THE ROAD IN NO CASE WILL THE LOCATION OF THESE ENDWALLS BE LESS THAN 30' FROM THE EDGE OF THE TRAVELED WAY.
4. REINFORCEMENT TO BE PLACED FOR 48" PIPE AND UP



STANDARD WING TYPE ENDWALL

N.T.S.

No.	Date	Description
		Revisions

Scale: NTS
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 Date: 3/1/2001

TOWN OF CROMWELL
 DEPARTMENT OF
 PUBLIC WORKS

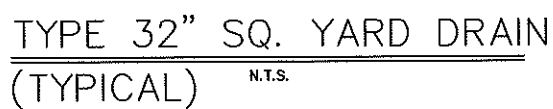
STANDARD WING
 TYPE ENDWALL

STONE
ENDWALL



ADAPTER

SUMPS



				Scale: NTS
				Sheet: YDDRAIN
				Drawn By: REN
				Checked By: JSM
No.	Date	Description		Date: 3/1/2001
Revisions				

TOWN OF CROMWELL
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TYPICAL YARD DRAIN DETAILS

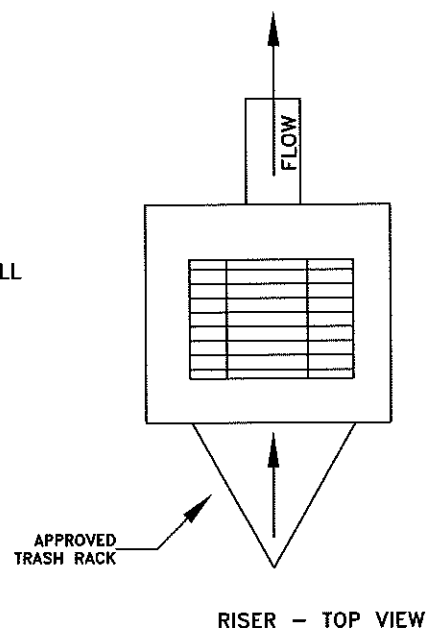
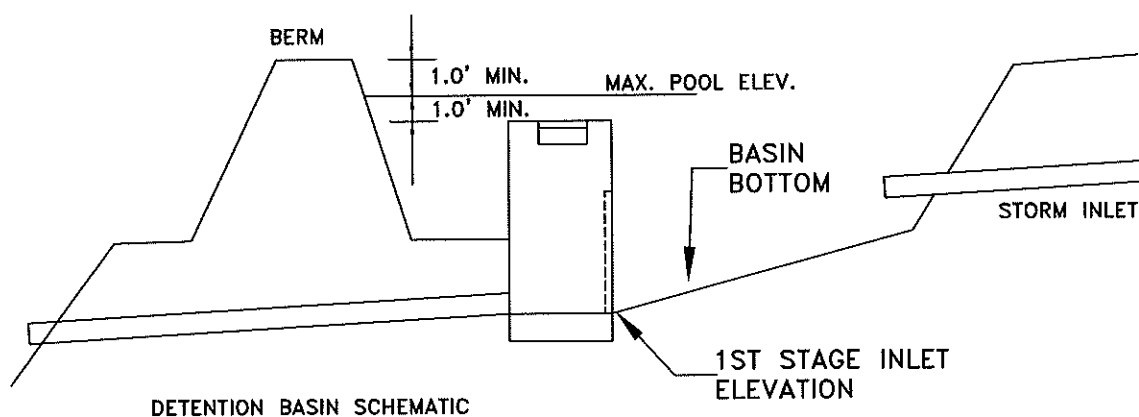


Diagram illustrating the side view of a riser structure. The diagram shows a vertical riser with a horizontal inlet opening at the bottom. The riser is divided into stages. The 3rd stage is a grate, and the 2nd stage is a notch. The inlet opening is labeled as "INLET OPENING - CAST IN PLACE OR PIPE". The bottom of the basin is labeled "BOTTOM OF BASIN (TYP)". The height of the riser is labeled "H". The flow direction is indicated by an arrow labeled "FLOW".

Labels in the diagram:

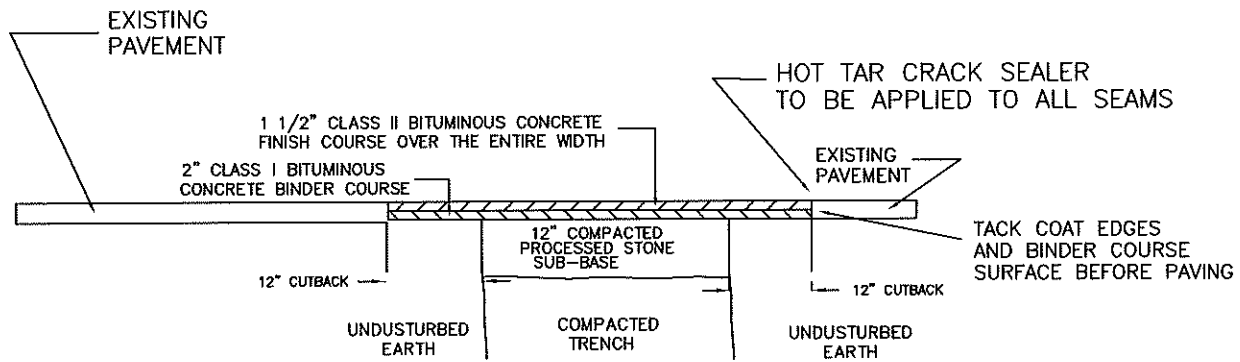
- 3RD STAGE - GRATE
- 2ND STAGE - NOTCH
- INLET OPENING - CAST IN PLACE OR PIPE
- BOTTOM OF BASIN (TYP)
- H
- FLOW
- RISER - SIDE VIEW



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				Drawn By:	REN
				Checked By:	JSM
No.	Date	Description			Date:
Revisions					12/03/01

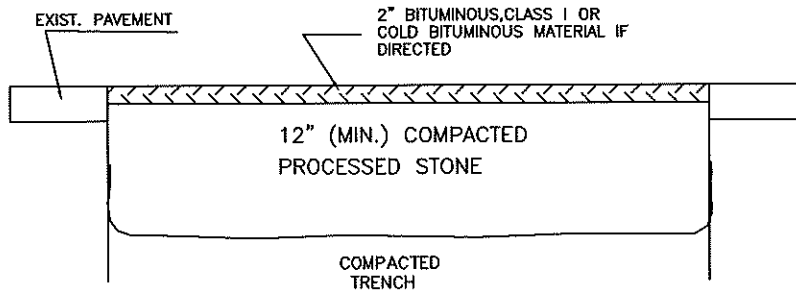
DEPARTMENT OF
PUBLIC WORKS
Nathaniel White Building
41 West Street
Cromwell, Connecticut 06416-0189
(203) 632-3420

DETENTION BASIN



PERMANENT ROAD PAVEMENT REPAIR

N.T.S.



TEMPORARY ROAD PAVEMENT REPAIR

N.T.S.

NOTES

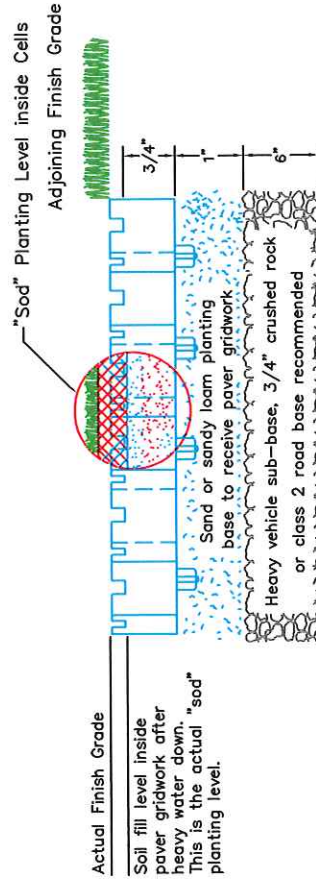
1. ALL EXISTING PAVEMENT TO BE SAW CUT.
2. APPLY TACK COAT TO EDGES OF EXISTING PAVEMENT AND SURFACES OF PREVIOUSLY PLACED PAVEMENT, BEFORE LAYING NEW PAVEMENT.
3. ALL SURFACE SEAMS ARE TO BE SEALED WITH HOT POURED TAR CRACK SEALER.
4. 12" OF COMPACTED PROCESSED AGGREGATE SHALL BE PLACED IN TWO EQUAL LIFTS AND COMPACTED TO 95% MINIMUM COMPACTION FOR PERMANENT PAVEMENT REPAIR.
5. PROCESSED AGGREGATE IS TO CONFORM TO SECTION M.05.01, COURSE AGGREGATE, OF CONNDOT FORM 814A.

			Scale: NTS
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			Checked By: JSM
No.	Date	Description	Date: 3/1/2001
Revisions			

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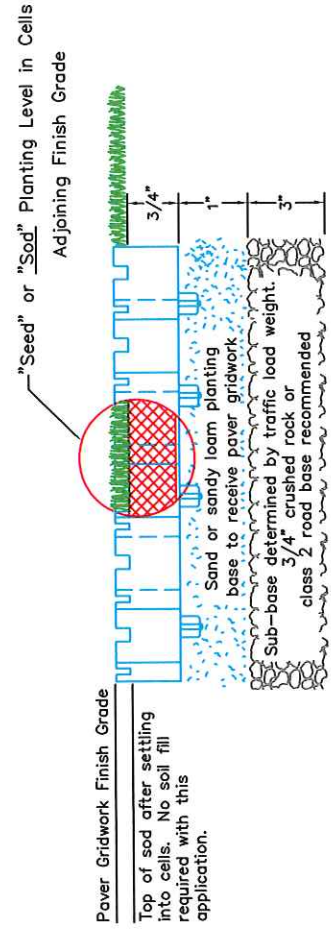
TOWN ROADS
PAVEMENT REPAIR
DETAILS

PLANTING LEVEL DETAILS



1. HEAVY VEHICLE/
FIRE ACCESS ROAD
Planting level using std. cut
5/8" sod

NOTE: If native soil consists of sand (e.g. Palm Springs), crushed rock sub-base is not required.



2. LIGHT/LOAD
HIGH USE TRAFFIC
Planting level using special cut
1" sod

NOTE: If native soil consists of sand (e.g. Palm Springs), crushed rock sub-base is not required.



NOTE:

LAY MATERIALS FOR BERM IN 6" TO 12" LAYERS AND COMPACT TO 95% OF MAXIMUM DENSITY UNDER OPTIMUM MOISTURE CONDITIONS.

TOWN OF CROMWELL
DEPARTMENT OF
PUBLIC WORKS

EMBANKMENT
DETENTION BASIN

APPENDIX H

Culvert Design Form - (English Version)

PROJECT : _____		STATION : _____ SHEET _____ OF _____																																																																																																																																																																					
HYDROLOGICAL DATA <input type="checkbox"/> METHOD: _____ <input type="checkbox"/> DRAINAGE AREA: _____ <input type="checkbox"/> CHANNEL SHAPE: _____ <input type="checkbox"/> ROUTING: _____ <input type="checkbox"/> OTHER: _____		CULVERT DESIGN FORM DESIGNER / DATE : _____ REVIEWER / DATE : _____																																																																																																																																																																					
DESIGN FLOWS/TAILWATER R.I. (YEARS) _____ FLOW (cfs) _____ TW (ft) _____		<p style="text-align: center;"> ROADWAY ELEVATION : _____ (ft) $S \approx S_g = \text{FALL} / L_g$ $L_g =$ _____ </p>																																																																																																																																																																					
CULVERT DESCRIPTION: MATERIAL - SHAPE - SIZE - ENTRANCE																																																																																																																																																																							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">TOTAL FLOW PER BARREL</th> <th colspan="4">INLET CONTROL</th> <th colspan="4">OUTLET CONTROL</th> <th rowspan="2">CONTROL HEADWATER ELEVATION</th> <th rowspan="2">OUTLET VELOCITY</th> <th rowspan="2">COMMENTS</th> </tr> <tr> <th>Q (cfs)</th> <th>Q/N</th> <th>HW/D</th> <th>HW₁</th> <th>FALL</th> <th>EL_{IN}</th> <th>TW</th> <th>d_c^2/D</th> <th>h_o</th> <th>h_s</th> <th>H</th> <th>EL₂₀</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>		TOTAL FLOW PER BARREL	INLET CONTROL				OUTLET CONTROL				CONTROL HEADWATER ELEVATION	OUTLET VELOCITY	COMMENTS	Q (cfs)	Q/N	HW/D	HW ₁	FALL	EL _{IN}	TW	d_c^2/D	h_o	h_s	H	EL ₂₀																																																																																																																																													HEADWATER CALCULATIONS (4) EL _{IN} = HW ₁ + EL ₁ (INVERT OF INLET CONTROL SECTION) (5) TW BASED ON DOWN STREAM CONTROL OR FLOW DEPTH IN CHANNEL. (6) EL ₂₀ = EL ₀ + H + h ₀ (7) H = $\left[1 + h_0 + (29.9^2 L) / R^{1.33} \right] v^2 / 2g$ (8) EL ₂₀ = TW OF (d _c + D/2) (WHICHEVER IS GREATER)	
TOTAL FLOW PER BARREL	INLET CONTROL				OUTLET CONTROL				CONTROL HEADWATER ELEVATION	OUTLET VELOCITY				COMMENTS																																																																																																																																																									
	Q (cfs)	Q/N	HW/D	HW ₁	FALL	EL _{IN}	TW	d_c^2/D			h_o	h_s	H		EL ₂₀																																																																																																																																																								
TECHNICAL FOOTNOTES: (1) USE Q/NB FOR BOX CULVERTS (2) HW ₁ /D = HW ₁ /D OR HW ₁ /D FROM DESIGN CHARTS (3) FALL = HW ₁ - (EL _{IN} - EL ₀); FALL IS ZERO FOR DRAVERTS OR GRADE		COMMENTS / DISCUSSION :																																																																																																																																																																					
SUBSCRIPT DEFINITIONS : 0. APPROXIMATE 1. CULVERT FACE 2. DESIGN HEADWATER 3. HEADWATER IN INLET CONTROL 4. HEADWATER IN OUTLET CONTROL 5. HEADWATER IN INLET CONTROL 6. HEADWATER IN OUTLET CONTROL 7. HEADWATER IN INLET CONTROL 8. HEADWATER IN OUTLET CONTROL 9. HEADWATER IN INLET CONTROL 10. HEADWATER IN OUTLET CONTROL 11. HEADWATER IN INLET CONTROL 12. HEADWATER IN OUTLET CONTROL		CULVERT BARREL SELECTED : SIZE : _____ SHAPE : _____ MATERIAL : _____ ENTRANCE : _____																																																																																																																																																																					

Appendix F – Data Collection and Field Review Form**I. GENERAL PROJECT DATA**

Bridge No.: _____

Town: _____

Feature carried: _____

Quadrangle: _____

County: _____

Feature crossed: _____

DEP watershed basin no.: _____

Functional class:

- ☐ urban principal arterial-interstate
☐ urban principal arterial-other expwy.
☐ urban principal arterial-other
☐ urban minor arterial
☐ urban collector
☐ urban local

- ☐ rural principal arterial-interstate
☐ rural principal arterial-other expwy.
☐ rural principal arterial-other
☐ rural minor arterial
☐ rural major collector
☐ rural minor collector
☐ rural local

Year built: _____

Year of reconstruction: _____

Overall NBIS structure rating: _____

Sufficiency rating: _____

Plans available?: ☐ yes☐ no**II. HYDROLOGIC AND HYDRAULIC INFORMATION**Watershed area: _____ km² (sq. mi.)Is it tidally influenced? ☐ yes☐ no

What information is available?

- ☐ hydraulic report
☐ SCCEL analysis
☐ Other: _____

- ☐ floodway analysis report
☐ FEMA F.I.S.

	Source	2 Yr. Event	10 Yr. Event	50 Yr. Event	100 Yr. Event	500 Yr. Event
Flow rates m ³ /s (cfs)						
Precipitation mm (in)						
Tidal elevations m (ft)						

Elevations m (ft.)						
At Structure		Water Surface at Approach Cross Section				
Streambed	Roadway	2 Yr. Event	10 Yr. Event	50 Yr. Event	100 Yr. Event	500 Yr. Event

Comments: _____

III. CULVERT DATA

Type

☐ concrete

☐ stone masonry

☐ corrugated metal

☐ steel

☐ aluminum

 structural plate
corrugations

☐ yes

☐ no

☐ 68mm x 13mm (2 2/3" x 1/2")

☐ 75mm x 25mm (3" x 1")

☐ 125mm x 25mm (5" x 1")

☐ 152mm x 51mm (6" x 2")

☐ 19 x 19 x 190mm (3/4" x 3/4" x 7 1/2")

☐ Other _____

Shape

☐ circular

☐ box

☐ arch

☐ elliptical

☐ other _____

Size [diameter or (width x height)]

_____ mm (inch)

_____ mm (in.) x _____ mm(in.)

_____ mm (in.) x _____ mm(in.)

_____ mm (in.) x _____ mm(in.)

End Treatment

☐ stone masonry

☐ other _____

☐ standard endwall

☐ projecting

☐ standard wing type endwall

☐ mitered

☐ slope paving

Inlet Edge

☐ square

☐ beveled

☐ socket end in headwall

Length _____ m (ft)

IV. APPROACH ROADWAY, EMBANKMENT AND CULVERT CONDITION

See ConnDOT Drainage Manual, Chapter 4, Culvert Repair, Materials, and Structural Design, Appendix A, Culvert Inspection Guideline

Approach Roadway and Embankment:

Evidence of:

settlement

☐ yes

☐ no

patching or otherwise pavement built-up

☐ yes

☐ no

cracks running parallel to the culvert centerline

☐ yes

☐ no

erosion or failure of the embankment slope over the culvert

☐ yes

☐ no

sink holes over the culvert

☐ yes

☐ no

Comment on roadway alignment and sight distance at the culvert _____

Width of travelway _____ m (ft.) Width of shoulders _____ m (ft.)

Comment on objects in clear zone including culvert appurtenances _____

Safety features present:

☐ metal beam rail

☐ cable guide rail

☐ other _____

Embankment erosion protection:

☐ vegetation

☐ crushed stone

☐ modified riprap

☐ intermediate riprap

☐ standard riprap

☐ slope paving

☐ other _____

Note the overall adequacy of this protection and note any vegetation near the culvert where root systems may damage the culvert: _____

Culvert Barrel and End Treatments:

Check the culvert headwall, wingwalls, cutoff walls and footings (bottomless culverts) for any deficiencies or deterioration, undermining, scour, piping, tipping, or settlement. Note condition and/or deficiencies: _____

Check the culvert barrel for deformations, settlement, leaking or distressed joints and other deficiencies or signs of deterioration. Check for evidence that lateral earth pressure is causing bulging, flattening, peaking, sliding or rotation in the barrel. Note condition and/or deficiencies:

Note: Where practical, the floors of metal pipe culverts should be sounded with a metal rod in an attempt to locate voids due to undermining.

Dimensions should be taken at the inlet, outlet, mid-length and at 8m (26 ft.) intervals (maximum) as applicable, if access to the interior of the culvert is possible. Locations of sagging, bulging, flattening or peaking should also be measured.

inlet	_____ mm (in)	_____ mm (in)
mid-length	_____ mm (in)	_____ mm (in)
outlet	_____ mm (in)	_____ mm (in)

Any separation of the culvert barrel from the headwalls or cutoff walls. ☐ yes ☐ no

V. VISUAL SCOUR EVIDENCE

History of scour problem at outlet: ☐ yes ☐ no

Outlet protection

Type: ☐ modified ☐ intermediate ☐ standard ☐ slope paving
☐ concrete ☐ other ☐ none

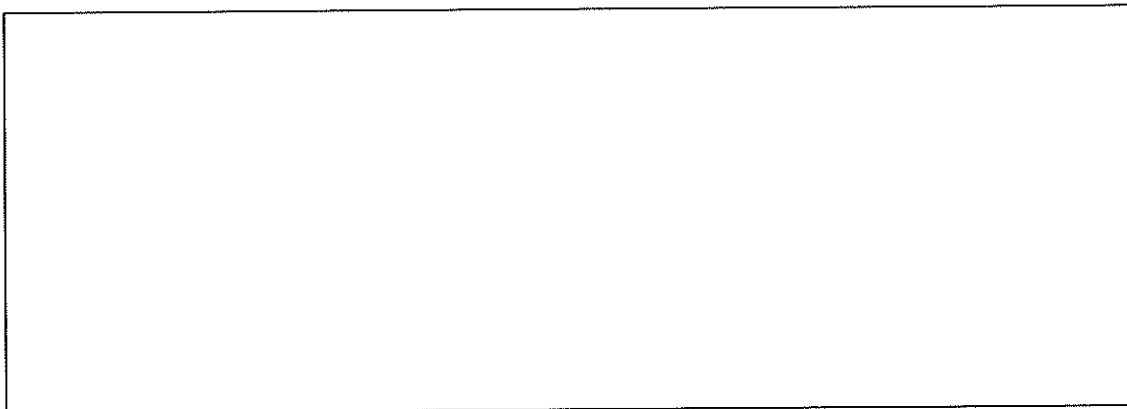
Condition: ☐ good ☐ weathered ☐ slumped ☐ missing
☐ fair ☐ poor ☐ N/A

Comments: _____

* Note: For bottomless culverts, complete item VIII Visual Scour Evidence 9.A-9 to 9.A-11.

VI. SITE DATA

- A. Existing structure(s) – Provide sketch of culvert/structure with dimensions and brief description.



Comments: Include structure or culvert type and condition. Note particularly any scour adjacent to abutments or at culvert outlet and the presence of debris or sediment. Also note the location of any utilities in the area of the crossing.

- B. High water marks – Describe the nature and location of any apparent high water marks and relate to a date of occurrence, if possible.

- C. Maximum allowable headwater – Describe the nature of the apparent controlling feature and note its location.

- D. Fish passage requirements – Comment on the apparent need for fish passage or impediments to same; such as dams or restrictive crossings in the area.

VII. PERIPHERAL SITE DATA

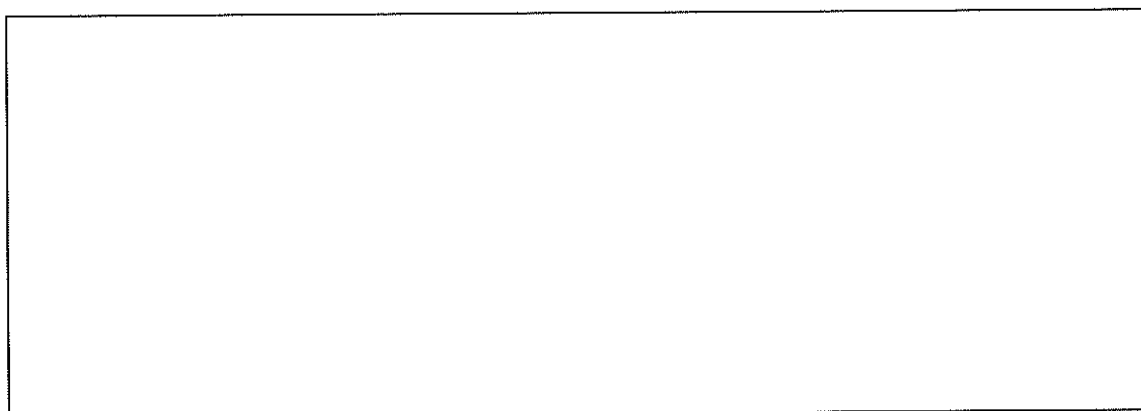
- A. Hydraulic control - Note location and description.

- B. Upstream and downstream structures - Provide sketches and brief descriptions of existing bridges/culverts. Include dimensions.

Comments:

- C. Watershed area – Check watershed boundaries for accuracy. Note current land uses within watershed.

- D. Flow control structures within watershed – Note the location and type of all significant flow control structures (dams, etc.) within the watershed. Provide sketches with dimensions as required.



- E. Site photographs – Attach to report. Include an index and sketch of photograph locations.

VIII. STREAM CHANNEL AND RELATED ASPECTS

A. Stream characterization

Twenty Groupings of Stream Characteristics (check box)

	Identifier	Drainage Area	Streambed Slope	Streambed Soils	Land Use
<input type="checkbox"/>	A	Large	Low	SD	S/F
<input type="checkbox"/>	B	Large	Low	SD	Urban
<input type="checkbox"/>	C	Large	Moderate	SD	Forested
<input type="checkbox"/>	D	Medium	Moderate	SD	Urban
<input type="checkbox"/>	E	Medium	Moderate	SD	S/F
<input type="checkbox"/>	F	Medium	Moderate	CLAY	S/F
<input type="checkbox"/>	G	Medium	Moderate	TILL	S/F
<input type="checkbox"/>	H	Medium	Moderate	SD	Forested
<input type="checkbox"/>	I	Medium	Moderate	TILL	Forested
<input type="checkbox"/>	J	Small	Low	SD	Urban
<input type="checkbox"/>	K	Small	Moderate	TILL	Urban
<input type="checkbox"/>	L	Small	Low	SD	S/F
<input type="checkbox"/>	M	Small	Moderate	SD	S/F
<input type="checkbox"/>	N	Small	Moderate	SD	Forested
<input type="checkbox"/>	O	Small	Low	CLAY	S/F
<input type="checkbox"/>	P	Small	Steep	TILL	S/F
<input type="checkbox"/>	Q	Small	Moderate	TILL	S/F
<input type="checkbox"/>	R	Small	Low	TILL	S/F
<input type="checkbox"/>	S	Small	Moderate	TILL	Forested
<input type="checkbox"/>	T	Small	Steep	TILL	Forested

Drainage area Small $\leq 64.75 \text{ km}^2$ (25 mi^2)
 Medium $> 64.75 \text{ km}^2$ (25 mi^2) and $\leq 259 \text{ km}^2$ (100 mi^2)
 Large $> 259 \text{ km}^2$ (100 mi^2)

Streambed slope Low $\leq 4.76 \text{ m/km}$ (25 ft/mi)
 Moderate $> 4.76 \text{ m/km}$ (25 ft/mi) and $\leq 19.05 \text{ m/km}$ (100 ft/mi)
 Steep $> 19.05 \text{ m/km}$ (100 ft/mi)

Streambed soils SD = Stratified Drift

Land Use S/F = Suburban or Farming

B. Channel stability

Previous NBIS Item 61 rating: _____








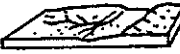


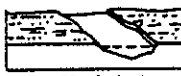




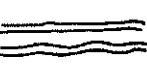








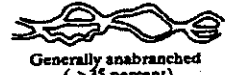
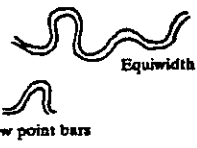
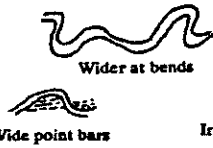
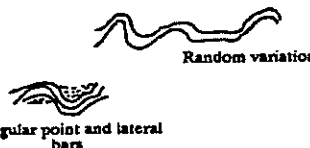
Lateral stability: ☐ stable ☐ unstable

Bank erosion:
☐ none ☐ light fluvial erosion ☐ heavy fluvial erosion ☐ mass wasting

Streambed: ☐ stable ☐ aggradating ☐ degrading

Armoring potential: ☐ none ☐ low ☐ moderate ☐ high

Geomorphic factors that affect stream stability (circle factors that apply)

STREAM SIZE	Small (< 30 m wide)		Medium (30-150 m)		Wide (> 150 m)
FLOW HABIT	Ephemeral (Intermittent)		Perennial but flashy		Perennial
BED MATERIAL	Silt-clay	Silt	Sand	Gravel	Cobble or boulder
VALLEY SETTING	 No valley; alluvial fan	 Low relief valley (< 30 m deep)	 Moderate relief (30-300 m)	 High relief (> 300 m)	
FLOOD PLAINS	 Little or none (< 2X channel width)	 Narrow (2-10 channel width)	 Wide (> 10X channel width)		
NATURAL LEVEES	 Little or None	 Mainly on Concave	 Well Developed on Both Banks		
APPARENT INCISION	 Not Incised	 Probably Incised			
CHANNEL BOUNDARIES	 Alluvial	 Semi-alluvial	 Non-alluvial		
TREE COVER ON BANKS	< 50 percent of bankline		50-90 percent		> 90 percent
SINUOSITY	 Straight Sinuosity 1-1.05	 Sinuous (1.06-1.25)	 Meandering (1.25-2.0)	 Highly meandering (> 2)	
BRAIDED STREAMS	 Not braided (< 5 percent)	 Locally braided (5-35 percent)	 Generally braided (> 35 percent)		
ANABRANCHED STREAMS	 Not anabranching (< 5 percent)	 Locally anabranching (5-35 percent)	 Generally anabranching (> 35 percent)		
VARIABILITY OF WIDTH AND DEVELOPMENT OF BARS	 Narrow point bars	 Wide point bars	 Irregular point and lateral bars		

Source: Adapted From Brice and Blodgett, 1978

(See also FHWA HEC-20, "Stream Stability at Highway Structures" for discussion of the above factors)

Secondary bed material: ☐ sand ☐ gravel ☐ boulders ☐ manmade
☐ silt/clay ☐ cobble ☐ bedrock

Bank protection

Type ☐ none ☐ modified ☐ intermediate ☐ standard
☐ concrete ☐ slope paving ☐ absent
☐ other
Condition ☐ n/a ☐ good ☐ weathered ☐ slumped
☐ poor ☐ missing ☐ fair

Comment on the need (if any) for training walls, cutoff walls or special slope or channel protection.

C. Channel and overbank roughness coefficients

Basic channel description: ☐ channel in earth ☐ channel cut into rock
☐ channel fine gravel ☐ channel coarse gravel

Surface irregularity of channel:

- ☐ smooth – best obtainable section for materials involved
☐ minor – slightly eroded or scoured side slopes
☐ moderate – moderately sloughed or eroded side slopes.
☐ severe – badly sloughed banks of natural channels or badly eroded sides of man-made channels - jagged and irregular sides or bottom sections of channels in rock.

Variations in shape and size of cross sections

- ☐ changes in size or shape occurring gradually
☐ large and small sections alternating occasionally or shape changes causing occasional shifting of main flow from side to side.
☐ large and small sections alternating frequently or shape changes causing frequent shifting of main flow from side to side.

Channel obstructions – (Judge the relative effect of obstructions – consider the degree to which the obstructions reduce the average cross sectional area, character of obstructions, and location and spacing of obstructions).

NOTE: Smooth or rounded objects create less turbulence than sharp, angular objects.

The effect of obstructions is:

- ☐ negligible
☐ minor
☐ appreciable
☐ severe

Degree of vegetation – (Note amount and character of foliage).

The effect of vegetative growth upon flow conditions is:

☐ LOW - Dense growths of flexible turf grasses where average depth of flow is 2 to 3 times the height of vegetation. Sparse seedling tree switches where the average depth of flow is 3 to 4 times the height of the vegetation.

☐ MEDIUM - Turf grasses where the average depth of flow is 1 to 2 times the height of vegetation. Stemmy grasses, weeds or tree seedlings, (moderate cover), average depth of flow 2 to 3 times the height of vegetation. Bushy growths, (moderately dense), along channel side slopes with no significant vegetation along channel bottom.

☐ HIGH - Turf grasses where average height is about equal to the average depth of flow. Willow or Cottonwood trees 8 to 10 years old with some weeds or brush. Bushy growths about 1 year old with some weeds. No significant vegetation along channel bottom.

☐ VERY HIGH - Turf grasses where the average depth of flow is less than one half the height of vegetation. Bushy growths about 1 year old intergrown with weeds. Dense growth of cattails along channel bottom. Trees intergrown with weeds and brush (thick growth).

Additional comments:

IX. HYDRAULIC VULNERABILITY

Previous Item 71 rating: _____

Is there confluence present? ☐ yes ☐ no

Angle of attack (flood flow): ☐ yes ☐ no

Bends in channel: ☐ upstream of bridge ☐ downstream of bridge
☐ straight channel reach ☐ at bridge

Velocity order of magnitude: ____ m/s (ft/s)

Trapping potential: ☐ low ☐ medium ☐ high

Debris potential: ☐ low ☐ moderate ☐ high

Overtopping relief: ☐ none ☐ left approach ☐ right approach
☐ on bridge ☐ relief bridge ☐ cannot be determined

Primary bed material: ☐ sand ☐ gravel ☐ boulders ☐ manmade
☐ silt/clay ☐ cobble ☐ bedrock

Comments: _____

Appendix G – Culvert Design Data Form

Prepared by: _____

Project No. _____

Date: _____

Town _____

Checked: _____

Route _____

Date: _____

Location _____

1. DRAINAGE AREA

a) Total area _____

b) Special Considerations _____

c) Existing culverts _____

2. DESIGN DISCHARGE _____ for _____ year frequency

a) Rational Formula less than 81 ha (200 acres)

 T_c (Min) _____ Rainfall intensity mm/hr (in/hr) _____

Coefficient of Imperviousness _____

b) _____ HEC-1 _____ SCS _____ TR20 _____ TR55 _____

CN _____ T_c (Hr.) _____

Rainfall distribution: _____ SCS Type III-24 Hr.

c) Other _____

3. FISH PASSAGE REQUIRED? _____ Yes _____ No

a) Special considerations _____

4. CULVERT HYDRAULIC DATA

a) Size _____ Type _____

b) Maximum permissible headwater elevation _____

c) Proposed headwater elevation _____

d) Elevation of channel bed at outlet _____ Inlet _____

e) Length _____ Slope _____

f) Inlet invert elevation _____ Outlet _____

g) Improved inlet Yes _____ No _____

_____ Beveled Edge _____ Side-Tapered _____ Slope-Tapered

TAPER = ____:1 (4:1 TO 6:1) FALL = _____ S_f ____:1 (2:1 to 3:1)

h) Entrance loss coefficient _____

i) Type and location of hydraulic control _____

5. MISCELLANEOUS DATA

- a) Height of cover _____
- b) Culvert strength requirements: CMP _____ (wall or plate thickness)
RCP _____ (Class)
- c) End treatment _____

- d) Entrance channel _____
- e) Outlet channel _____
- f) Bank protection _____

Appendix A – Outlet Protection Form**OUTLET PROTECTION**

Project No.: _____ **Designed By:** _____ **Date:** _____
Town: _____ **Checked By:** _____ **Date:** _____
Route: _____ **Station:** _____

1. Assess the erosion potential at the outlet and other critical site factors

Describe the conditions at the outlet location:

- ☐ No well-defined channel
- ☐ Well-defined channel

Sketch

2. Determine the tailwater (TW) conditions at the outlet

TW depth: _____ TW elevation: _____
 TW computational method: _____
 Channel bed elevation: _____ Estimated velocity in channel: _____

3. Calculate and evaluate the outlet velocity for the design discharge

Design Discharge: _____ Design Frequency: _____
 Outlet Pipe Size: _____ Type: _____
 Length: _____ Slope: _____ Outlet Invert Elevation: _____
 Outlet Velocity at design discharge: _____
 Velocity computational method: _____

4. Select the type of outlet protection

- ☐ Riprap Apron
(See Figures 11-13 & 11-14)

Type _____ (A,B,C)

Riprap type: _____
 Length (L_a): _____
 Width (W_1): _____
 Width (W_2): _____
 Width-Type C (W_3): _____

- ☐ Preformed Scour Hole
(See Figure 11-15)

Type 1Type 2

d_{50}	_____	_____
F	_____	_____
C	_____	_____
B	_____	_____
S_p	_____	_____

Proposed Type: _____
 Riprap Type: _____

PROJECT _____	ROADWAY TYPE _____
	(See Table 11-2)
TOWN _____	ADT _____
ROUTE _____	DESIGN SPEED _____
DESIGNED BY: _____	ALLOWABLE SPEED _____
DATE: _____	
CHECKED BY: _____	
DATE: _____	

[illegible]

Table 11-4.1 Inlet Spacing Computation Sheet – English units

PROJECT _____ TOWN _____ ROUTE _____ DESIGNED BY: _____ DATE: _____ CHECKED BY: _____ DATE: _____	ROADWAY TYPE _____ (See Table 11-2) ADT _____ DESIGN SPEED _____ ALLOWABLE SPEED _____
---	--

GUTTER FLOW ANALYSIS AT LOW POINT LOCATIONS

[illegible]

Table 11-5.1 Low Point Analysis Computation Sheet – English units

Storm Drainage Systems

Project

Route

Station

[illegible]

Project No. _____
Route _____
Town _____
Stations _____

[illegible]

Table 11-10 Hydraulic Grade Line Computation Form