



CITY OF NEW BRUNSWICK
MIDDLESEX COUNTY, NJ

ENGINEERING,
UTILITY AND LANDSCAPE
STANDARDS

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PREPARED BY
CITY OF NEW BRUNSWICK
DEPARTMENT OF ENGINEERING

CITY OF NEW BUNSWICK
ENGINEERING, UTILITY & LANDSCAPING STANDARDS

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CITY OF NEW BRUNSWICK

ENGINEERING STANDARDS

1.0 GENERAL

The following Engineering, Utility and Landscape Standards henceforth, referred to as Engineering Standards or just Standards, are intended for use within the City of New Brunswick by developers, contractors, residents or anyone performing work within the Public Right-of-Way (Streets), Public Lands or Private Property.

Furthermore, the Standards shall apply to proposed as well as existing developments or improvements on single or multi-lot properties.

The following documents are hereby made part of these Standards by reference:

NJDCA's Residential Site Improvement Standards, N.J.A.C. 5:21, as adopted, in accordance with the Site Improvement Act, Chapter 32 of the laws of 1993,

NJDOT's Standard Specification for Road and Bridge Construction, latest edition, and *Standard Construction Details Roadway-Traffic Control-Bridge*.¹

FHWA's Manual on Uniform Traffic Control Device for Streets and Highways (MUTCD) latest edition,

AASHTO's Green Book - A Policy on Geometric Design of Highways and Streets, latest edition

Although by law the "Residential Site Improvement Standards" apply only to residential subdivisions or site plan reviews, for purposes of these Engineering Standards, they shall apply to all work unless set forth otherwise in the following Specifications and Details.

Conflicts between the written part of these Standards and the Details shall be resolved by the City Engineer to the benefit of the City.

The City Engineer may grant de minimis exceptions from the requirements of the site improvement standards as may be reasonable and within the general purpose and intent of the standards if the literal enforcement of one or more provisions of the standards is impracticable or will exact undue hardship because of peculiar conditions pertaining to the development in question.

The City Engineer's authority in granting a request for de minimis exceptions shall be

based on a finding that the requested exception meets the following criteria:

1. They are consistent with the intent of the Site Improvement Act,
2. They are reasonable, limited, and not unduly burdensome,
3. They meet the needs of public health and safety, and
4. They take into account existing infrastructure and possible surrounding future development.

An application for exception shall be filed in writing with the City Engineer and shall include:

1. A statement of the requirements of standards from which an exception is sought;
2. A statement of the manner by which strict compliance with said provisions would result in practical difficulties; and
3. A statement of the nature and extent of such practical difficulties.

2.0 SITE PLANS

Site plans shall be prepared in accordance with Title 16 "LAND DEVELOPMENT CODE" and Title 17 "ZONING" of the New Brunswick Revised General Ordinances. Any conflicts between the Revised General Ordinances and these Engineering Standards shall be brought to the City Engineer's attention immediately. The City Engineer's decision as to which shall govern is final.

At the completion of the improvement or project "as-built" drawings prepared by a licensed New Jersey surveyor shall be submitted to the City Engineer. Points of interest (such as structures, property lines and corners, utility lines and feature including surface elevations, inverts, pipe sizes and direction, storm water discharge points, connection to systems in the adjacent R.O.W., fences, etc.) shall be based on the State Plane Coordinate System. Vertical datam shall be NAVD 88. Furthermore, the developer shall submit the survey information in an electronic format, CAD and Pdf., unless waived in writing by the City Engineer.

3.0 STREETS

Streets shall be of sufficient width and of suitable design to accommodate prospective traffic, but in all cases shall have a Right-of-Way width, measured from lot line to lot line no less than the following:

RESIDENTIAL ACCESS AND COLLECTOR STREETS RIGHT-OF-WAY 50 FEET, CARTWAY 30 FEET, minimum, for non-residential development. Right-of-way and cartway width for residential development shall comply with the Residential Site Improvement Standards.

The Right-of-Way width for internal roads and alleys in multi-family, commercial and industrial developments shall be determined on an individual basis, and shall in all cases be of sufficient width and design to safely accommodate the maximum access for fire-fighting and refuse collecting equipment. The graded and paved width of each street shall not be less than three fifths of the Right-of-Way width.

Grades for residential streets shall not exceed 12% MAX. or 1.0% Min.

Within fifty (50') feet of the intersection of any street the maximum grade shall be limited to 5%.

Street intersections shall be as nearly at right angles as is possible, and in no case shall be more than sixty degrees (60°). At the street corners, curbs shall be rounded with a curve having a radius of not less than twenty-five (25') feet unless otherwise approved by the City Engineer.

Sight easements on vertical and horizontal curves shall be required and determined based on the sight distance requirements contained in the AASHTO's "A Policy on Geometric Design of Highways and Streets" standards, taking into consideration the speed limits established by the government agency having jurisdiction. Residential access, residential neighborhood, and rural street design should be based on a speed limit of 25 miles per hour. Minor and Major collector street design should be based on a speed of 30 miles per hour. Sight triangle easements shall include the area on each street corner that is bounded by the line which connects the sight or "connecting" points located on each of the Right-of-Way lines of the intersecting streets. The planting of trees or other plantings, or the location of structures exceeding thirty (30") inches in height that would obstruct the clear sight across the area of the easements, shall be prohibited; and a public right of entry shall be reserved for the purpose of removing any object, material or otherwise, that obstructs the clear sight.

Vertical and horizontal curves shall be designed in accordance with AASHTO's "*A Policy on Geometric Design of Highways and Streets*" standards (latest edition), incorporated herein by reference.

Streets shall be designed to accommodate City vehicles with the largest required turning

radius as set forth by the Department of Public Works and the Fire Department.

Dead end streets shall be avoided to the extent feasible.

Otherwise, a cul-de-sac shall be installed with a minimum diameter of 60 feet. Such streets shall be no longer than six hundred (600') feet from the intersection of the centerline of the two streets to the centerpoint of the turnaround, and shall provide a turnaround Right-of-Way at the end with a radius of not less than thirty (30') feet, tangent whenever possible to the right side of the street. Where the street or alley is in excess of one hundred (100) feet in length, it shall be subject to a determination by the City reviewing agency that the design is such that fire-fighting apparatus of the City shall not be deprived of ready access to structures served by such cul-de-sac. Future extension of the street shall result in the reversion of the Right-of-Way to the adjoining properties, removal of the existing turnaround. Roadway restoration shall be an off-tract responsibility of the Developer creating the improved street extension.

Hammerhead turns may be considered as an alternative upon evidence or extenuating circumstances as determined by the City Engineer.

The continuation of an existing street shall have the same name. The names of new streets must be approved by the City Council and recorded by the City Clerk, Tax Assessor, and City Engineer.

Speed Humps (Tables) may be installed at the discretion and approval of the City Engineer. Speed Humps shall be a total of 20 feet long including a 10-foot-long top and two 5-foot-long ramps. The height of the hump shall be 3 to 3 ½ inches. Justification for alternate dimensions must be provided by a licensed engineer to the City for approval. Spacing and delineation shall be as approved by the Director of Public Works. Pavement markings and signage shall conform with the current MUTCD and City detail.

4.0 STREET, PARKING LOT & DRIVEWAY PAVEMENT

Street, Parking Lot and Driveway Pavements shall be constructed in accordance with the following standards.

4.1 SUBGRADE

All unsuitable materials, such as debris, stumps, loose boulders, soft clay, muck or other materials, shall be removed from the Right-of-Way limits as may be directed by the City Engineer.

All underground utilities shall be installed and recorded on plans prior to the installation of the pavement.

All excavations for utilities or as a result of removing unsuitable materials shall be backfilled to the proper road grade in twelve-inch maximum lifts with select fill material consisting of an approved sand and gravel mix. Each select fill lift shall be compacted to ninety-five percent (95%) of its modified proctor density. Where deemed necessary by the City Engineer, crushed stone or NJDOT # 5, Class A quarry process stone or dense graded aggregate shall be utilized as a subbase.

If the road base remains wet for prolonged periods or is unstable as a result of wet conditions, the City Engineer may require the installation of subsurface piping to drain the road base.

The subgrade shall be thoroughly compacted to 95% of its modified proctor density.

4.2 BASE COURSE

After the subgrade has been thoroughly compacted, graded and approved by the City Engineer, the minimum base pavement thickness shall be as follows:

FOR LOCAL STREETS (max. ADT* 1500) - 5 "

FOR COLLECTOR STREETS (max. ADT 7500) - 7 ½"

(ADT - Average Daily Traffic)

Pavement material shall consist of hot bituminous stabilized base course (NJ D.O.T. Standard for Bituminous Concrete Mixtures – HMA19M64 shall be installed in two (2) lifts in accordance with the latest requirements of the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction. The City Engineer may permit installation of one (1) five-inch lift if conditions warrant. The thickness of the base course shall be increased as deemed necessary by the City Engineer, if California Bearing Ratio (CBR) testing or field evaluation of soil classification or other site

conditions warrant. Also, see Section on **"PARKING AREAS"**.

4.3 SURFACE COURSE

The road surface pavement course shall be HMA 9.5M64 (NJ D.O.T. Standard for Bituminous Concrete Mixtures) bituminous concrete and shall be manufactured and installed in accordance with the New Jersey Department of Transportation Standards for Road and Bridge Construction (latest revision). The required minimum compacted thickness shall be as follows:

FOR LOCAL STREETS (max. ADT* 1500)	2"
FOR COLLECTOR STREETS (max. ADT* 3500-7500)	2"
*(ADT -Average Daily Traffic)	

For the replacement of an existing surface course the minimum thickness shall be 2".

Prior to the placement of the road surface wearing course, the road base course shall be cleaned of debris and "loose material" and given an application of grade RC-70 or RC-T cutback asphalt or grade RS-1 emulsified asphalt at a rate of 0.1 to 0.12 gallons per square yard as directed by the City Engineer. All work shall be in accordance with the New Jersey Department of Transportation Standards for Road and Bridge Construction (latest revision). The wearing surface shall not be permitted to be installed until all major construction is completed, public and private underground utilities are installed, all curbs and sidewalks repaired, all base pavement repairs are made in accordance with the directions of the City Engineer, all low spots are brought to grade with leveling courses, all manhole and inlet castings are grouted and the road is approved for paving by the City Engineer.

4.4 CONSTRUCTION WITHIN AND ALONG EXISTINGSTREETS

Where existing streets are to be excavated for curbs, utilities extension or other purposes, trenches shall be backfilled, and pavement replacement shall be in accordance with the design details and the requirements of the City Engineer. Excavations along existing paved streets shall be saw cut in a rectangular fashion and repaired in a manner to assure a smooth transition. After completion of all pavement excavation, curbing and utility installations in existing streets, the pavement base shall be replaced within the excavations as specified by the City Engineer, and the entire roadway shall be milled, if necessary, and overlaid with minimum of two (2") inch of bituminous concrete surface overlay or as otherwise specified by the Engineer along the entire frontage.

When the street is under moratorium (five years from the placement of a new surface course) The final surface restoration shall include an infrared surface repair.

5.0 PARKING AREAS

5.1 COMMERCIAL AND INDUSTRIAL DEVELOPMENTS

All parking areas, interior driveways and loading/unloading areas for Commercial and Industrial Developments whether proposed or existing, shall be constructed or repaired with bituminous material to the thickness as shown below in accordance with the "Asphalt Handbook for County and Municipal Engineers" (latest Edition) for the following subsurface conditions:

Subgrade Condition	Surface Course		Base Course	
	Mix 1-4 or HMA		HMA	
	9.5M64		19M64	
Good to Excellent	1½	in	3½	in
Medium	1½	in	5½	in
Poor	1½	in	7½	in

The above shall be applied over a minimum of 4" compacted DGA

Subgrade Condition shall be determined as per the "Residential Site Improvement Standards" NJAC Title 5 Chapter 21, Table 4.7 Subgrade Categories. Deviations from the above will be considered only upon submission of supporting documentation provided by a Licensed Engineer to the City of New Brunswick for approval.

5.2 RESIDENTIAL – Multi Family

Parking areas and interior driveways for 3 or more Family Residential Units, whether proposed or existing, shall be constructed or repaired as follows provided the subgrade has a "Medium" rated condition. Otherwise, an Engineering evaluation is necessary.

The minimum required pavement shall consist of the following materials and thickness:

Surface Course, HMA 9.5M64	1½ in
Stabilized Base Course, HMA 19M64	3½ in
Dense Graded Aggregate Course	3 in

Deviations from the above will be considered only upon submission of supporting documentation provided by a Licensed Engineer to the City of New Brunswick for approval.

6.0 DRIVEWAY AND PARKING AREAS FOR 1 AND 2 FAMILY RESIDENTIAL HOMES

6.1 ASPHALT PAVEMENT

Parking areas and driveways, shall be constructed or repaired with one of the materials identified hereinafter. The minimum required pavement shall consist of the following materials and thickness, installed on a suitable subgrade:

Surface Course, NJDOT HMA 9.5M64	3 in
Dense Graded Aggregate Course	3 in

Deviations from the above will be considered only upon submission of supporting documentation provided by a Licensed Engineer to the City of New Brunswick Engineering Department for approval.

6.2 GRAVEL PAVEMENT

The gravel pavement shall consist of 3/4" Clean Crushed Stone. The pavement area shall be compacted to a minimum thickness of 6".

Furthermore, gravel pavement parking lots shall have an edging of appropriate material to contain the gravel within a defined area (see "Edging " below). Edging may be eliminated in low areas of the lot or driveway to accommodate surface sheet flow when, in the City's opinion, such is appropriate.

6.3 "OTHER" PAVEMENT MATERIAL

Brick, masonry pavers, or architectural (decorative) gravel is acceptable provided the material and installation is approved by the City Engineer and in accordance with the manufacturer's requirements. Edging will be necessary where appropriate.

6.4 EDGING

Edging will be required for all GRAVEL PAVEMENT and "OTHER" PAVEMENT MATERIAL DRIVEWAYS AND PARKING AREAS. Edging may consist of any of the following 1" thick Flagstone 18" deep; 1/4 " X 5" Galvanized Steel Edging with 18"steel stakes at 4 ft on center. Railroad ties or pressure treated wood with 1" x 2" x 8" treated wood stakes; granite or precast concrete curb, or any other material approved by the City Engineer.

7.0 STREET SIGNS

Design and placement of traffic signs shall follow the requirements specified in "Manual on Uniform Traffic Control Devices for Streets and Highways," published by the U.S. Department of Transportation and adopted by the N.J. Department of Transportation.

At least two street name signs shall be placed at each four-way street intersection and one at each "T" intersection. Signs shall be placed so as not to obstruct sight distance and under light standards, if present, so that they are clearly visible. The design of street name signs shall be consistent with the current style and type of signs as acceptable to the Traffic Division, Department of Engineering.

At signalized intersections, street signs shall be located on the overhead arm supporting the traffic signal, or otherwise suitably suspended over the intersection. Roadway clearance shall be a minimum of 15 feet from the bottom of any sign or supporting equipment and the top of the paved surface.

Signs shall be installed at a minimum height of 7 ft from the ground surface to the bottom of the lowest sign and set back a minimum of 2ft from the face of curb.

Signs installed within the County or State Right-of-Way shall be in accordance with their respective standards and requirements.

Street signs shall be reflective faced metal on concrete embedded metal posts or if approved by the City Engineer driven a min. $2\pm$ ft. into the ground in accordance with the City's installation detail.

Signs shall be reflective faced metal of the type, design and standard as set forth in the NJ Department of Transportation Standard Specifications for Road and Bridge Construction (latest Edition). All signs shall conform with the retro reflectivity standards established by the MUTCD.

8.0 PARKING

8.1 GENERAL

Each and every parking area shall be subject to plan approval by the appropriate City reviewing agency. The appropriate City reviewing agency shall consider the effect of any parking area upon traffic safety and abutting properties and shall ascertain that all requirements of this chapter are met. The review agency and/or City Engineer may require the applicant to submit a traffic impact analysis showing the effect of development on the municipal roadway system and intersections. Applicant shall submit a traffic impact analysis showing effect of development on the municipal roadway system.

All parking areas shall be used only for the parking of registered vehicles. No commercial trade or sales of any kind shall be conducted in any parking area unless specifically approved for that use. No sign other than entrance, exit, stop, handicap, identification and conditions of use signs shall be maintained in any parking area without prior approval. No such sign shall be larger than two square feet, excluding stop signs, which may be larger, in area. Nothing herein contained shall be construed to permit any required parking area to be used for the commercial storage of new or used motor vehicles by a new or used car dealer or motor vehicle rental agency.

8.2 NUMBER OF PARKING SPACES

The number of parking spaces required shall be in conformance with the "Residential Site Improvement Standards " New Jersey Administrative Code Title 5 Chapter 21. (N.J.A.C. 5:21-4-14) or the Zoning Ordinance, as applicable.

8.3 DESIGN OF PARKING AREA

Off- Street parking areas shall be oriented to, and within a reasonable walking distance of, the buildings or structure they are designed to serve.

No parking, driveway or loading area shall be located in a minimum required front yard setback area except as permitted by Title 17.05.010 of the City Codes or within 3 feet of property line.

Each parking, loading or service area shall be connected to a public street Right-of-Way by means of a driveway, and each parking space shall connect to an aisle providing access thereto.

Access to parking lots shall be designed so as not to include queues on travel ways, and to provide adequate pedestrian circulation and safety. There shall be adequate provision for ingress to and egress from all parking spaces to ensure ease of mobility, ample clearance, and safety of vehicles and pedestrians.

No access drive, driveway or other means of ingress or egress shall be located in any

residential zone to provide access to uses other than those permitted in such residential zone.

8.4 CIRCULATION

Parking space allocations should be oriented to specific buildings wherever possible.

Parking areas may be designed to focus on major walkways, which should be clearly identified and marked.

Where pedestrians must cross service roads to reach parking areas, crosswalks should be clearly designated by pavement markings or signs. Crosswalk surfaces may be slightly raised to designate them to drivers unless drainage problems would result. A one-way car movement (to the left or counterclockwise) should be encouraged. A major loop road should be developed around the perpendicular of the access roads.

Driveways should approach from the right to permit to alight to or from the sidewalk.

Whenever possible, one-way traffic should be established at building entrances.

Where buses are a factor, the City reviewing agency shall consider special bus identification slots off the roadway to allow passengers to enter and exit quickly and safely.

Roads and driveways from main roads should be located at grade and not below the crest of vertical curves.

Circulation and driveway exits for all developments other than 1 and 2 family residences shall be designed so that vehicles DO NOT back out onto a public street. Exceptions to this requirement must be approved by the City's Engineer.

8.5 DESIGN OF DRIVEWAY

All entrance and exit driveways shall be located to afford maximum safety to traffic, provide for safe and convenient ingress and egress to and from the site, and to minimize conflict with the flow of traffic. The City reviewing agency shall give approval to such design after review of the report by the City Engineer regarding same.

Any exit driveway or driveway lane shall be so designated in profile, grading and located in such a manner as to provide a minimum allowable speed of 15 miles per hour.

No entrance or exit driveway shall be located on a rotary, ramp of an interchange, or within twenty feet of the beginning of any ramp or other portion of an interchange.

No driveway shall be located within 50 feet of a "Stop" sign.

Parking shall not be permitted within 5 ft. of the driveway curb return.

8.6 LOCATION OF CURB CUT

At street intersections, curb cuts shall be set back not less than fifty (50) feet from the intersection of the two (2) curb lines, or such lines extended, and shall be set back not less than ten (10) feet from the intersection of two (2) property lines, or such lines extended except in residential zones where the minimum distance between the property line and edge of driveway shall be three (3) feet. The maximum driveway opening shall not exceed 35'. Between the curb returns for any two (2) driveways serving the same property, there shall be at least twenty-five (25) feet of curb, except that this distance may be reduced to as little as five (5) feet where it is demonstrated that restricted frontage makes this necessary in order to provide adequate driveways [not more than two (2)] or the property on any one roadway.

8.7 DRIVEWAY ANGLE

Two-way operation: Driveways used for two-way operation shall intersect the road at an angle to be as near ninety degrees as site condition will permit and in no case will be less than sixty degrees.

One-way operation: Driveways used by vehicles in one direction of travel (right turn only) shall not form an angle greater than 45 degrees with a road, unless acceleration and deceleration lanes are provided.

8.8 DIMENSIONS OF DRIVEWAY

The dimensions of driveways shall be designed to adequately accommodate the volume and character of vehicles anticipated to be attracted daily onto the land development for which site plan is prepared. The required maximum and minimum dimensions for driveways are indicated below. Driveways serving large volumes of daily traffic of over fifteen percent (15%) truck traffic shall be required to utilize maximum dimensions.

	One Way Operation Driveway Width (In Feet)	Two Way Operation Driveway Width (In Feet)
3-10 Dwelling Units	12-18	24-30
10 or More Dwelling Units	16-26	30-36
Commercial and Industrial	16-30	30-40

Residential Driveways for one- and two-family homes shall be a minimum of 10 ft. in width. All driveway dimensions shall be five feet wider at the curb line of an intersecting road.

8.9 DRIVEWAY PROFILE

Any vertical curve on a driveway shall be so designed to prevent the dragging of any vehicle undercarriage. Driveway aprons shall be brought to sidewalk grade such that the sidewalk elevation remains level and continuous throughout the driveway width. Should the sidewalk be so close to the curb at a depressed curb driveway as to cause the ramp to be too steep and be likely to cause undercarriage drag, the sidewalk shall be appropriately lowered to provide a suitable ramp gradient.

8.10 AISLE AND PARKING STALL SIZE

The width of all aisles providing direct access to individual parking stalls shall be in accordance with the requirements specified below. Only one-way traffic shall be permitted in aisles serving single-row parking spaces at an angle other than 90 degrees.

Parallel Angle (degrees)	Min. Depth of Stall Perpendicular to Aisle (feet)	Min. Aisle Width (for back up) ft
Parallel Parking	N/A	12'
30°	17'	12'
45°	19'	13'
60°	20'	18'
90°	18'	24'

The required area for parking spaces oriented at 0° (zero degrees) or parallel parking shall not be less than (8') eight feet wide, nor less than (23') twenty- three feet deep; exclusive of passageways. Parking spaces other than parallel parking shall be a minimum size of (9') nine feet wide nor less than eighteen (18') feet deep exclusive of passageways. Also, there shall be provided adequate interior driveways to connect each parking space with a possible Right-of-Way (street).

Parking Spaces for people with disabilities shall be in accordance with the New Jersey Uniform Construction Code (N.J.A.C. 5:23-7) Barrier Free Subcode or the Americans with Disability Act Accessibility Guideline, (ADAAG), as applicable.

Where sidewalks occur in parking areas vehicles shall not overhang or extend over the sidewalk unless an additional two feet of sidewalk width are provided to accommodate such overhang.

8.11 LOADING AREA

In any zone, in connection with every building or building group, or part thereof hereafter erected which is to be occupied by industrial, office and laboratory or commercial uses or distribution by vehicles of material or merchandise, there shall be provided and maintained, on the same lot with such building, off-street loading berths.

Each loading space shall be no less than twelve (12) feet in width, and length shall be based on the design vehicle. Furthermore, the loading space may not occupy any part of any required front, side or rear yard setback area. However, lots with rear yards that abut a limited access of highway or railroad, such loading space may occupy the rear yard up to the rear property line.

8.12 OTHER DESIGN CRITERIA

All parking and loading areas shall be drained in accordance with good engineering practice and as approved by the City Engineer. Where sub-base conditions are wet, springy, or of such nature that surfacing would be inadvisable without first treating the sub-base, these areas shall be excavated to a depth as necessary to provide a stable sub-base and filled with a suitable sub-base material acceptable to the City Engineer. Where required by the Engineer, a system of porous pipe sub-surface drains shall be constructed beneath the surface of the paving and connected to a suitable drain. After the sub-base material has been properly placed and compacted, the driveway and /or parking area surfacing material shall be applied. Off-site drainage facilities and structures requiring enlargement, modification, or reconstruction resulting in part from or totally as the result of the proposed development shall be subject to off-site improvements requirements and standards as established by the City Engineer.

8.13 MARKINGS AND ACCESS

The City's reviewing agency may require certain areas to be accessible for firefighting and other emergency purposes pursuant to the direction of the appropriate code official or enforcement officer. These areas in addition to parking stalls, barrier free spaces, driveways, aisles, loading zones, shall be clearly marked, delineated, striped and signed in accordance with the Federal Highway Administration "Manual on Uniform Traffic Control Devices", latest Edition.

9.0 CONCRETE AND MASONRY

9.1 CURBING

Concrete or granite curb shall be installed, in accordance with these Standards, along every street within the development and at intersections and City Streets, County Roads and State Highways. Existing blue stone curbing, unacceptable concrete curb or curbing made of "other" material shall be replaced with new concrete or granite block curb. The standard concrete curb section to be used shall not be more than twenty (20 ft.) feet in length with scored joints every ten (10 ft) feet and shall be set in accordance with approved lines and grades. Radial curbs shall be formed in an arc segment, in order to create a smooth curve. Chord segments are prohibited. Concrete curbs shall be 6" x 18" x 8", using air entrained concrete having a 28-day compressive strength of 4500 p.s.i. At locations specified by the City Engineer, the curbing shall be designated to provide an access ramp for the handicapped.

Replacement curbing shall be formed on both side full depth. No face forming shall be permitted. A winter moratorium on the construction curb shall be imposed from December 1st to March 15th.

All parking lots and all loading areas shall have concrete or granite block curbing, in accordance with the City's Standard Details, around the perimeter of the parking and loading areas in conjunction with an overall grading and drainage plan. Curbing at the driveway entrance from the street shall be depressed in order to establish a defined entrance. Special approval must be given by the City Engineer in order to have the access drive connected to the street in the same manner as another street. If a curb separates the sidewalk from the driveway, ramps shall be installed from the driveway grade to the sidewalk grade.

9.2 SIDEWALKS

Concrete Sidewalks or, upon approval, Brick Paver Sidewalk shall be provided between parking areas and principal structures, along aisles and driveways, and wherever pedestrian traffic shall occur, in accordance with the City's Standard Details, with a minimum width of five (5) feet of passable area and shall be raised six (6) inches or more above the parking area except when crossing streets or driveways, guardrails, and wheel stops permanently anchored to the ground shall be provided in appropriate locations. Parked vehicles shall not overhang or extend over sidewalk areas, unless an additional sidewalk width of two and one-half feet is provided to accommodate such overhang. Walkways may be reduced to a sidewalk width of 4' for residential developments of 2 units or less.

Sidewalks shall be at least four (4") inches thick, except at points of vehicular crossing where they shall be at least six (6") inches thick having a 28-day compressive strength of 4500 p.s.i., and shall be air-entrained. Sidewalks at intersections shall be 6" thick and reinforced with wire mesh between the tangents of the curb radii. Where directed by the City Engineer, the

sidewalk shall be poured on a shaped and graded base of four (4") inches minimum thickness of gravel or broken stone. Handicap ramps shall be provided at all street intersections and points of required pedestrian crossing. A winter moratorium on the construction sidewalk shall be imposed from December 1st to March 15th

1. Sidewalks shall be provided along the frontage of all but industrial zones and in other locations deemed necessary by the City except as waived by the appropriate Board.
2. Sidewalks and sitting areas shall be surfaced so that they will be easily maintained and properly illuminated if in use after sunset. Walks along the frontage of property shall be in accordance with City Standards.
3. A private pedestrian walk shall have a minimum concrete width of five (5) feet, and, if dedicated to the City as a public walkway, the pedestrian walk shall have an easement with a minimum width of ten (10) feet unless otherwise approved by the City.
4. The City may require tree pits to be installed within the sidewalk area. Tree pits shall be a minimum of 4'x5' (20 SF) or as approved by the City Engineer or the Division of Parks & Shade Tree.

9.3 DECORATIVE WALK

Decorative walks made of concrete block, brick, decorative concrete, architectural concrete, imprinted concrete, etc. will be considered on a case by case basis. If requested, material samples, specifications and installation details shall be submitted for review by the City Engineer. The City's decision will be based on what is deemed to be appropriate and in conformance with the surrounding neighborhood.

10.0 UTILITIES

10.1 SANITARY SEWERS

10.1.1 DESIGN STANDARDS

1. All subdivisions and site plans shall be provided with sanitary sewer facilities in such a manner as to provide adequate sewerage collection and conveyance within the development to transport all sewage from each lot and the total development to the City's collection system. Where a collection system is part of the adopted City Capital Improvements Program and said system will be accessible to the proposed development, the developer shall install dry sewers designed to tie into the proposed facility upon its completion. Industrial sites shall be required to install Manholes at easily accessible locations on their laterals for retrieval of effluent by the City. The City may require the installation of flow meters, in accordance to the City Engineer's requirements, in order to determine discharge volumes. Grease traps shall be installed as set forth by City Ordinance.
2. Capped sanitary sewers shall be allowed only in areas indicated for sewer service in the State of New Jersey Statewide Water Quality Management (WQM) Plans and where permitted by NJDEP through sewer connection approval.
3. Sanitary sewer laterals when abandoned shall be capped at the entrance to the City's collection system.
4. Any sanitary sewer collection system shall be adequate to handle all present and estimates of probable future development (see paragraph f below).
5. The planning, design, construction, installation, modification, and operation of any treatment works or sanitary system shall be in accordance with the applicable NJDEP rules implementing the New Jersey Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and the New Jersey Water Quality Planning Act (N.J.S.A. 58:11A-1 et seq.); and for items not covered by NJDEP rules, with ASCE Manual on Engineering Practice No.37, incorporated herein by reference, and the City's Code, Title 13.08.
6. Sanitary sewer pumping stations shall be considered where gravity system design leads to excessive sewer depths which are not economically justifiable and shall comply with N.J.A.C. 7:14A-23.10, 23.11 and 23.12.
7. Sanitary sewer system design and placement shall comply with the standards set forth in the "Residential Site Improvement Standards" (NJ Administrative Code Title 5 Chapter 21) 5:21-6.2 (c)
8. The following sanitary sewer standards are required for all developments in the immediate vicinity of sanitary sewerage facilities.

a. All sanitary sewers shall be designed to carry the average flow estimated 25 years in advance with a peaking factor of .4 unless otherwise determined by the City Engineer. Average and peak flows shall be calculated based on appropriate D.E.P. standards.

b. A complete engineer's report, setting forth the basis of design, shall be submitted to the City Engineer.

c. All sewer mains shall be extended along the entire frontage of the tract from the existing sewer main.

d. All trunk and interceptor sewers shall conform generally to the City's sanitary sewer master where applicable.

e. All sewers shall be designed to meet the New Jersey Department of Environmental Protection's slope standards at N.J.A.C. 7:14A-23 .6(b). The minimum gravity sewer size shall be 8" in diameter. The minimum sewer lateral and force main size shall be 4" in diameter, unless approved otherwise.

f. All residential units shall be connected to a sanitary sewer by a 4"(minimum) diameter sewer lateral. The lateral shall include connecting fitting and cleanout shall be in accordance with the City's Standard Details. No lateral shall be accepted if the line has not been tested for water tightness. No connection shall be made without the approval of the City

g. Commercial and industrial units shall utilize a sewer lateral size in accordance with estimated sewerage flow from the particular unit with a minimum size of four (4) inches.

h. Pipe materials used in the construction of gravity sanitary sewers shall be one of the following:

Reinforced Concrete Pipe shall be used only in sizes 24" and larger and shall meet the requirements of ASTM C76. All pipe shall be Class III strength with class C ordinary bedding, except in the following conditions where stronger pipe may be needed:

For depths less than 3', measured from the top of the pipe, installed under traffic areas, Marston Class IV shall be required.

The presence of clay soils, poor bedding conditions, or other unusual loading conditions shall be given special consideration and the developer shall submit an engineering analysis to the City for approval.

PVC sewer pipe shall have bell and spigot ends and O-ring rubber gasket joints. PVC pipe and fittings shall conform to ASTM D3034, with a minimum wall

thickness designation of SDR 35. Pipe shall be installed as specified in ASTM D2321. In no case shall less than a Class III material be used for bedding and haunching material, unless approved in writing by the City engineer. When installing pipe in unstable soil or excessive ground water, a determination regarding special precautions, such as poured concrete slabs shall be made by the City Engineer. Trench cross-sections shall comply with bedding details.

Ductile Iron Pipe shall be centrifugally cast in metal or sand- lined molds to ANSI/AWWA C151/A21.51. The joint shall be of a type that employs a single, elongated, grooved gasket to affect the joint seal. Pipe should be furnished with flanges where connections to flange fittings are required. Pipe shall be a minimum of Class 50. The outside of the pipe shall be coated with a uniform thickness of hot applied coal tar coating; the inside shall be lined with cement in accordance with ANSI/AWWA C104/A21.4. Ductile iron pipe shall be installed with Class C, Ordinary Bedding, when site conditions allow. In corrosive soils or on sewer that receive discharge from a force main where hydrogen sulfide is present, ductile iron pipe with polyethylene coating, which protects the interior and exterior of the pipe, shall be used.

i. Inverted siphons, force mains, and outfalls shall consist of two pipes with provisions for flushing. Flow control gates shall be provided in the chambers.

j. In addition to the pipe material at N.J.A.C 7:14A-23.6(b)5, PVC pipe shall be considered a suitable material.

9. For other than PVC pipe, pipe and manhole bedding and backfill shall be provided as specified in "Gravity Sanitary Sewer Design and Construction, current edition, prepared by the ASCE Joint Committee and the Water Pollution Control Federation. Any pipe material not covered by this manual shall be installed in accordance with the manufacturer's recommendations.

The City may require the developer to provide an opinion of a professional engineer regarding the suitability of the on-site material to be used as backfill. The City shall rely on this opinion.

Where the on-site material is deemed suitable, the opinion shall specify the appropriate installation methods for the material. Where the on-site material is deemed not suitable, the opinion shall specify modification or replacement of the material and the appropriate installation methods for the specified material.

10. Manholes shall comply with the standards in reference in section 5 above.

a. Manholes shall be pre-cast concrete or concrete block. Concrete block shall be coated with two (2) coats of Portland cement mortar. Pre-cast concrete or concrete block shall be sealed with two (2) coats of an acceptable waterproofing tar, asphalt or polyplastic alloy, with enough time allowed to bond between the sealed coats.

b. Masonry brick, concrete bloc, or half rings may be used to make vertical adjustments to rims.

c. Where pipe size varies, crowns of pipes shall be matched except in special conditions, as required by applicable NJDEP rules.

d. If precast manhole barrels and cones are used, they shall conform to ASTM C478, with round rubber gasketed joints conforming to ASTM C361 and ASTM C443. Maximum absorption shall be nine (9) percent, in accordance with ASTM C478, method A. The entire outside surface of the manhole shall be coated with a bituminous waterproofing material acceptable to the City Engineer or utility authority. Cracked manholes shall not be used. The top riser section of pre-cast manholes shall terminate less than one (1) foot below the finished grades to provide for proper adjustment.

e. Manhole frames and covers shall be of cast iron and shall conform to ASTM A48, Class 30, and shall be suitable for H-20 loading capacity. All manhole covers in unpaved rights-of-way or in remote areas shall be provide with a locking device, as specified by the City. The words "City of New Brunswick SEWER" shall be cast integrally into the manhole cover. (see detail)

f. Where watertight and low-profile frames and covers are utilized, they shall conform to ASTM C923. Manholes shall be supplied with flexible, watertight adaptors, such as inserts or gaskets, suitable for the pipe materials used.

11. Laterals and cleanouts shall comply with the following:

a. The house connection or lateral from the street main to the cleanout shall be considered an integral part of the sanitary sewer system. The type of material used for the house connection shall be as follows: four (4") inch cast iron soil pipe, extra heavy; four-(4) inch PVC pipe, SDR 35, or four (4") inch ductile pipe. Common laterals for multifamily units shall be designed to have adequate conveyance capacity.

b. Wye connections shall be the same material as the sewer main. Saddles shall be used only for connection to an existing main.

c. Bends in house connection lines shall be made using standard fittings. A riser with a cleanout shall be provided in the lateral between the edge of the pavement and property line or within a designated easement as determined by the City.

d. Inspection cleanouts or observation tees within the easement or right-of-way shall be fitted with either a metallic cap or a nonmetal cap fitted with a metallic plug that is suitable for locating the cleanout. Caps shall have a depressed or inverted nut. The inspection cleanout or observation tee shall be placed between the curb or edge of pavement and property line or within a designated easement.

e. Connections beyond the cleanout are under the jurisdiction of the Plumbing Subcode

of the Uniform Construction Code (N.J.A.C. 5:23- 3.15) through the Plumbing Subcode Official. The pipe size and specifications shall comply with the regulation and requirements of the Plumbing Subcode of the Uniform Construction Code.

f. As-built drawings that include the location of plumbing wyes, as supplied by the contractor, shall be submitted to the City Engineer.

A general map of the entire project shall be furnished showing sewers, pumping stations and appurtenances. Plans shall show sanitary sewers and shall be of uniform size, 24"x 36", with a one-half inch border on top, bottom, and right side, and a two-inch border on the left side, the last one for binding.

The Plans shall show the following:

Details: The Plans shall show contours of all existing and proposed streets, and surface elevations of all breaks in grade and street intersections, tributary areas with population per acre, the true or magnetic meridian, boundary line, title, date and scale. Any area from which the sewage is to be pumped shall be indicated clearly. All sheets shall be numbered.

Symbols: Sewers to be built now and to be constructed later shall be shown by solid and dashed lines respectively. Existing sanitary sewers shall be shown by special designation. All topographical symbols and conventions shall be the same as the ones of the United States Geological Survey.

Elevations: All permanent bench marks of New Jersey Coast and Geodetic Survey shall be shown. Elevations of streets shall be placed outside the street lines. The elevations of sewer inverts, shown as street intersections, ends of lines and at changes of grades, shall be written parallel with the sewer lines and between the street lines. The elevation of street surfaces and manhole rims shall be shown to the nearest 0.01 foot, the sewer inverts to the nearest 0.01 foot.

Distances, Grades and Sizes: The distances and stationing between manholes, grades in decimals and sewer sizes and material shall be shown on the Plans. Arrows shall show the direction of the flow.

Profiles: Profiles shall show all manholes, siphons, pumping stations, and elevations of stream crossings, gradients and sizes of sewers, surface elevations and sewer inverts shall be shown at each manhole. They shall be drawn to standard engineering scale, and the scales shall also be shown on each sheet.

Details of Construction of Manholes, etc.: The Standard Details of the City for manholes, building service connections, siphons, etc., shall accompany the Plans. Details shall be drawn to standard scales to show clearly the nature of the design.

Detailed plans for sewage pumping stations of a type acceptable to the City Engineer

shall be provided. Complete specifications for the construction of the proposed sewerage system and appurtenances, including sewage pumping stations shall accompany the Plans.

A detailed estimate of the entire cost of construction shall be furnished. This estimate shall also include cost of Right-of-Way, inspections, "as-built" plans, etc.

10.1.2 CONSTRUCTION STANDARDS

Unless noted otherwise in these Standards construction shall be in accordance with the appropriate section of the New Jersey Department of Transportation Standard Specification (latest Edition).

10.1.3 OTHER APPROVALS AND SYSTEM TESTING

Approval of Plans by State Agencies and Others

Approval of Plans, a permit to construct, and a permit to operate by the Regional Utilities Authority and/or the New Jersey State Department of Environmental Protection must be obtained by the Applicant before the City's final approval will be given. The Applicant shall obtain permits for all stream crossings or encroachments from the New Jersey Department of Environmental Protection. Permits to construct sewers and/or other structures within the Right-of-Way limits of State, County and City roads and all railroads must be secured and paid for by the Applicant.

The Applicant must secure any necessary clearance from any public utility involved.

Testing of Sewer Systems:

Testing of Completed Sewer Systems: All sewers shall be subjected to an infiltration and/or exfiltration test and mandrel test as may be determined by the City Engineer. Exfiltration tests shall be conducted in lieu of infiltration tests when the pipe has been laid above the ground water level. The test shall be performed between two manholes or as otherwise directed by the City Engineer and shall include all related system components including the house connection.

The Contractor shall furnish all labor, material and equipment necessary for the testing.

Exfiltration tests shall be under at least a four feet head or a pressure corresponding to a head equal to the depth of the lower manhole of the section under test.

Allowable infiltration or exfiltration shall not exceed a rate of 10 gallons per mile per inch of diameter of sewer per 24 hours for gravity sewers. Allowable exfiltration for force mains shall not exceed:

$$\frac{D \text{ Sq Rt } (P)}{L - 7400}$$

L = allowable leakage (GPH)

N = number of joints tested

P = average test pressure

D = nominal diameter of pipe

All gravity sewers, siphons and force mains with infiltration or exfiltration in excess of the permissible limit shall be repaired, or removed and replaced, before proceeding with construction.

Use of System During Construction

During construction and before final acceptance, the City shall have the right to use any portion completed without waiving their right to order correction of any defects.

Use of the system for the discharge of sump pumps, or drainage from cellar drains, leaders, downspout, drainage tile, developers cellar pits or pumping out septic tanks shall not be permitted.

Sewage delivered into the facilities shall comply with the requirements of Regional Utilities Authority treating the sewage from the site and specifically;

shall not be of such a nature and in such quantity as to impair the hydraulic capacity of such facilities, normal and reasonable wear and usage expected.

conform to Chapter 13 - Section 13-08.180 prohibited discharges into sewers of the revised general ordinances of the City of New Brunswick.

Within thirty (30) days after construction and before final acceptance by the City, the Applicant is to furnish the City "as-built" drawings CAD and Pdf. formats, acceptable to the City Engineer, and 2 sets of prints (black on white) of each drawing showing the sewers, connections, etc. as constructed.

The "as-built" plans shall accurately show the completed sewer system in sufficient detail to permit the future location and determination of all components of the system; including sewer lines, manholes, wyes or connections, service lines, clean outs and other pertinent features. The size and type of the components shall be indicated and shall be dimensioned and tied to existing physical features such as manholes, curbs, and buildings as may be appropriate. The plan and profile shall indicate invert in and out elevations of all pipes at manholes and as-built slopes of all pipelines.

Preliminary "as-builts" may be required by the City Engineer prior to paving in order to insure facilities locations, beneath paved areas.

10.2 STORM SEWERS

10.2.1 DESIGN STANDARDS

All development plans for subdivisions, site plans and individual residential lots shall include provisions for safely and satisfactorily controlling stormwater runoff, drainage and stream flows in a manner that will not adversely affect existing and proposed properties, both upstream and downstream of the site. When developing a site in an aquifer outcrop area and other area affecting same, the development plan shall include provisions for on-site recharge of underground formations. Storm management systems prepared by design engineers shall emphasize a natural, as opposed to an engineered, drainage strategy.

For all "major developments", as defined per Title 16 Land Development Code, Chapter 16.24.270A, Section 3: Definitions, the City defers to the 16.24.270A "Stormwater Control Ordinance" for stormwater management requirements and controls for major development.

The applicability of a natural approach depends on such factors as site storage capacity, open channel hydraulic capacity, and maintenance needs and resources. N.J.A.C. 7.6-4 references authoritative sources on natural and nonstructural approaches. Applicability of a stormwater approach also can be limited by regulatory constraints that govern certain structures or areas, see N.J.A.C. 5:21-7.5(c).

Construction practices shall conform to "Soil Erosion and Sediment Control in New Jersey", N.J.A.C. 2:90-1, as administered by the New Jersey Department of Agriculture.

All streets shall be provided with catch basins and pipes where the same may be necessary for proper surface drainage. The requirements of this section shall not be satisfied by the construction of dry wells. The system shall be adequate to carry off or store the storm water and natural drainage water which originates within the development boundaries and that which originates beyond the development boundaries and passes through the development calculated on the basis of maximum potential development as permitted under this chapter. No storm water run-off of natural drainage water shall be so diverted as to overload existing drainage system or create flooding or the need for additional drainage structures on other lands without proper and approved provisions being made for taking care of these conditions, involving off-tract improvements.

10.2.2 DRAINAGE REPORT AND PLANS

The Applicant's engineer shall submit a Drainage Plan and Report along with Proposed Development Plans for all major subdivisions and site plans. Approvals may also be required for significant land disturbance, placement of fill material, extensive excavation or regarding of an area (which may result in the change of direction, volume or hydraulic characteristics of the surface runoff) and may cause potential impact on existing storm sewer systems, shall not be permitted unless approval is obtained from the City Engineer. If necessary, the City Engineer may require an Engineer's Report prepared by a New Jersey licensed Engineer to substantiate

that the impact of the site activity on surrounding properties is negligible.

The Drainage Report and Plans shall include:

1. A description of the site in question including soil type and conditions, slopes, wetlands, site vegetation, etc. Particular attention should be given to unique, unusual or environmentally sensitive features or constraints for development.
2. All data necessary to properly evaluate the existing and proposed drainage systems, including overall drainage basins and subbasins, if applicable, with boundaries clearly indicated, areas shown in acres, topographic data, all existing and proposed drainage facilities, size, type, slope, and elevations of all pipelines, culverts and drainage channels, location and type of land use within the drainage basin, drainage device and all other factors that may affect the drainage facilities.
3. Details of the proposed plan to control and dispose of surface waters shall be submitted. Projects requiring detention facilities shall include the following information, including a map or maps of suitable scale:
 - a. Total area to be paved or built upon, estimated land area to be occupied by water detention facilities and the type vegetation there as.
 - b. Appropriate measures to control velocity and erosion from outlets or discharge points.
 - c. Details of all water detention plans during and after construction, including discharge provisions, discharge capacity for each outlet at different levels of detention and emergency spillway provisions with maximum discharge of each spillway.
 - d. Maximum discharge and total volume of runoff for pre and post development conditions. The flood and erosion control standard for detention will require that volumes and rates be controlled so that after development the site will generate no greater peak runoff from the site than prior to development: for 2, 10, 25, 50 and 100 year storm considered individually. The design of the detention system shall be based on the maximum storage volume generated based on various storm durations for the storm described above.

Each project subject to two sections shall include detention facilities of storm runoff through any feasible combination of impoundments, swales, dry wells, underground storage or any other reliable engineering approaches satisfactory to the City Engineer.

The detention facilities shall provide retention of site runoff for any storm up to and including the two, ten, twenty-five, fifty and one hundred year storm. Runoff greater than that for a 100-year storm shall be passed over an emergency spillway.

Computations for storage capacity shall include estimate for one year's accumulation of solid materials and sediment. Water quality shall be addressed using State D.E.P. standards.

e. Poured concrete headwalls or precast flared end pipe sections shall be constructed at the point of discharge of all storm drains, in accordance with the latest New Jersey State Department of Transportation Standard Plans and Specifications. They shall include precast, cast in place or grouted rip-rap energy dissipators at the discharge point.

f. For both major and minor developments and site plans, blocks and lots shall be graded and swaled to secure proper drainage away from all buildings and to prevent the collection of storm water in pools on any lot and to avoid the concentration of storm water from each lot to adjacent lots.

g. Land subject to periodic or occasional flooding shall not be designed for residential occupancy nor for any other purposes which may endanger life or property or aggravate the flood hazard. Such land within a lot shall be considered for open spaces, parks, or other similar uses in accordance with flood plain regulations.

h. Where a minor or major development is traversed by a watercourse, surface or underground drainage away or drainage system, channel or stream, or detention/retention pond, there shall be provided and dedicated a drainage right-of-way easement to the City conforming substantially with the lines of such watercourse, and such further width or construction or both, as will be adequate to accommodate experienced storm water runoff in the future based upon reasonable growth potential in the City and in addition, thereto, a minimum of 15 feet beyond the bank top on at least one side for access to the drainage right-of-way and, in any event, meeting any minimum widths and locations shown on any adopted official map or master plan or as required under the section entitled "Easements" in this Article.

i. Easements or Rights-of-Way shall be required in accordance with the section entitled "Easements" in this Article where storm drains are installed outside streets.

j. Vegetation. All drainage ditches, swales, channels, diversion dikes and berms shall be stabilized with vegetation in accordance with the requirements set forth by the Soil Conservation Service for Erosion and Sediment Control with specific regard to slope, velocity and other applicable design factors.

DESIGN CRITERIA

Design Engineers shall determine hydraulic capacity for open-channel and closed-conduit flow based on the Manning equation, or charts/nomographs based on this equation. Refer to the

"Residential Site Improvement Standards" New Jersey Administrative Code Title 5 Chapter 21. A direct application of Manning's equation may be used for piped storm sewer systems. As an option, design engineers can use a standard step backwater calculation for storm sewer systems if the use of this approach is deemed appropriate by the designer. For other than pipe storm sewer systems, design engineers shall apply Manning's equation only when the bottom slope of the channel, energy grade line, and water surface (hydraulic grade line) are parallel, where the flow regime is in the turbulent range of Reynolds number and where the boundaries of the cross-section channel do not move.

Velocities in open channels, excluding water quality swales, at design flow shall not be less than 0.5 fps and not greater than a velocity that will begin to cause erosion or scouring of the channel as per the "Standards for Soil Erosion and Sediment Control in New Jersey" N.J.A.C. 2:90.

Velocities in closed conduits at design flow shall be at least 2 fps, when the flow depth is full or half of the pipe diameter, but not more than the velocity that will cause erosion damage to the conduit, as per the manufacturer's specifications.

Design Engineers shall base culvert capacity on inlet/outlet analysis, as specified in "Hydraulic Design of Highway Culverts", Hydraulic Design Series (HDS) No.5, Report No. FHWA-IP-85-15, U.S. Department of Transportation, Federal Highway Administration, September 1985, incorporated herein by reference.

In determining runoff peak volumes for pre and post development conditions the designer shall consider the watershed parameters for both conditions. All significant land features such as ponds, depressions, etc. that increase ponding factors shall be considered to compute pre-development runoff. If the design engineer is able to verify that a given hydrologic condition has existed on the site for a period for at least 5 years prior to the time of computation, then this existing condition may be used by the design engineer to determine runoff coefficients. As an alternative the design engineer should assume the drainage area in the pre-development condition to be in good hydrologic condition (if lands are lawns or parks), to have good cover (if lands are woods) or to have had conservation treatment (if lands are cultivated).

Design engineers shall use the runoff hydrograph peak rate to determine the configuration and sizes of pipes, channels, and routing or flow-control structures. They shall use runoff volume calculations generated by hydrograph to determine the necessity for and sizing of detention and retention facilities.

For the runoff peak rate discharge calculations, design engineers shall have the option to choose the methodology to estimate peak rate of discharge. For relatively small drainage areas of up to 320 acres the peak rate of runoff may be calculated by the Rational Method, its derivatives, or the referenced methods that follow.

1. Urban Hydrology for Small Watersheds, Technical Release No. 55 (TR-55) (for areas greater than 320 acres)

2. Computer Program for Project Formulation-Hydrology, Technical Release No. 20 (TR-20)

3. The New HEC-1 Flood Hydrograph Package, Technical Paper No.82

Design engineer shall refer to the "Residential Site Improvement Standards" for specific design coefficients and procedures.

Design engineers shall use a consistent method to calculate peak rate of runoff and volume. If either TR-55, TR-20 or HEC-1 is used to calculate peak rate of runoff, then the same method shall be used to determine volume. If the Rational Method is used for peak flow calculations, design engineers shall use the Modified Rational Method to calculate peak volume to be used for basin routing. A maximum drainage area of 20 acres shall be used for the Modified Rational Method.

RUNOFF COLLECTION SYSTEM DESIGN

Design engineers shall determine pipe sizes based on design runoff, conduit entrance conditions and hydraulic capacity

In general, no pipe size in the storm drainage system shall be less than 15" in diameter. Design engineers may use 12" diameter pipe as a cross-drain to a single inlet. Design engineers shall use the Manning equation to determine hydraulic capacity of pipes.

All pipe shall terminate with an appropriate precast concrete or flared-end section or concrete headwall with or without wingwalls, as conditions require. Design engineers shall consider such site conditions as slope, soil stability, vegetation, grade, and size of conduit to determine whether or not to use wingwalls. Flared End sections will also be permitted.

Materials used in the construction of storm sewers shall be constructed of reinforced concrete, ductile iron, or corrugated polyethylene. The cost-effective materials shall be permitted that conform to local site conditions and reflect the relevant operations, maintenance, and system character of the City's stormwater system. Specifications referred to, such as ASTM or AWWA, etc. should be the latest revision in effect at the time of application.

The following pipe materials are acceptable:

Reinforced Concrete Pipe, Class III, minimum unless load conditions call for stronger pipe (i.e. higher class), fittings to meet ASTM C76 requirements. Joint design and joint material shall meet the requirements of ASTM C443. (The minimum depth of cover over the concrete pipe shall be as designated by the American Concrete Pipe Association. Elliptical Reinforced concrete pipe shall be as per ASTM C507. Elliptical pipe joints shall be bell and spigot or tongue and groove sealed with butyl, rubber tape, rubber ring gaskets, or external sealing bands conforming to ASTM C877.

Ductile Iron Pipe, class 50 (minimum), centrifugally cast in metal or sand-lined molds to

ANSI/AWWA C 151/A21.51. Joints shall conform to ANSI/AWWA C111/A21.11. Pipe shall be furnished with flanges where connections to flange fittings are required. The outside of the pipe shall be coated with a uniform thickness of hot applied coal-tar coating and the inside lined with cement, in accordance with ANSI/AWWA C104/A21.4. Ductile Iron pipe shall be installed with Class C, Ordinary Bedding, unless soil conditions dictate otherwise.

Corrugated Polyethylene Pipe shall be high density, smooth interior pipe and shall conform to AASHTO M294, "Specifications for Corrugated Pipe" 12 to 36 inch in diameter. Materials shall conform to ASTM D 3350, "Standard Specifications for Polyethylene Plastic Pipe and Fittings Materials". Pipe joint and fittings shall be compatible with the pipe material and shall conform to the same standards and specifications as the pipe material. Pipe couplers shall not cover less than one full corrugation on each section of pipe. Installation shall be in accordance with ASTM D2321, "Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications". Backfill material shall be placed in six-inch lifts and compacted to 95% minimum dry density, per AASHTO T99. In areas of high ground water tables, design engineers shall check for flotation.

Pipe Bedding and Backfill shall be provided as specified in "Design and Construction of Urban Stormwater Management System, ASCE Manuals and Reports of Engineering Practice No. 77, latest edition, incorporated herein by reference. Bedding and backfill for any pipe material not covered by this manual shall be installed in accordance with the manufacturer's recommendations. The City may require a professional certification as to the suitability of backfill material and where such suitability does not exist, any modifications needed to use on-site material and the appropriate methods to install this material.

10.2.3 INLETS, MANHOLES, CATCH BASINS

Design Engineers shall design inlets, catch basin, and manholes in accordance with the New Jersey Department of Transportation's Standard Specifications for Road and Bridge Construction (latest Edition). Bicycle-safe grates shall be used at all times. For type "A" inlets a frame and grate should be used. Type "B" inlets require a frame, grate and curb-type inlet with back piece. Type "E" inlets require a frame and double grate. All inlets shall be designed in accordance with the Standard Details of the City and 16.24.270A "Stormwater Control Ordinance" Section 7.

Inlet spacing depends on the inlet capacity. The maximum distance between inlets is 400 ft. The maximum capacity of a curb inlet shall be 6 cfs. Area inlets in parking lots should be limited to 3cfs.

Manholes shall be precast concrete or concrete block coated with two coats of Portland cement mortar outside the manhole. Masonry brick may be used to make vertical adjustment to rims, as long as the adjustments are 12 " or less. In acidic soils, all manholes shall have two coats of black bitumastic waterproofing applied as per manufacturer's instructions.

If precast manhole barrels and cones are used, they shall conform to ASTM Specification

C478, with round rubber gasket joints, conforming to ASTM Specification C923. Both ASTM specifications are incorporated herein by reference. Maximum absorption shall be 8% in accordance with ASTM Specification C478, Method A.

If precast manholes are used, the top riser section shall terminate less than one foot below the finished grade, and the manhole cover shall be flush with the finished grade. Manhole frames and covers shall be of cast iron, conforming to ASTM Specification A48, Class 30, incorporated herein by reference, and be suitable for H-20 loading capacity. Manhole in remote locations may be required to have locking devices.

Outlet grates, fences, and other safety features for stormwater management facilities shall conform with New Jersey Department of Environmental Protection's Stormwater Management Rule, N.J.A.C. 7:8 Safety requirements for detention basin and other stormwater facilities are incorporated in N.J.A.C. 5:21-7.5(f)7.

The invert Channel should be, insofar as possible, a smooth continuation of the pipe. The pipe may be laid through the manhole and the top half removed by saw cut. The completed channel should be u-shaped. The channel height shall be 3/4ths of the diameter of the pipe. The bench should provide good footing for a workman and a place where minor tools and equipment can be laid. It must have a slope of 4-8%.

10.2.4 BUILDING DRAINS

All proposed dwellings and buildings with a basement shall be provided a connection to a storm drainage system for the purpose of utilizing this connection for possible discharge of sump pump and/or gravity basement drains. The connection to the storm sewer shall meet the following requirements:

Each dwelling unit or other building with a basement shall be provided a 4-inch diameter (minimum) connection to be located between curb and sidewalk and five (5) feet towards the center of the lot from the edge of the interior side of the driveway depressed curb.

Lots fronting roads with existing or proposed storm sewers will be permitted to provide a connection in accordance with the City's Standard Basement Drainage Connection Detail.

Lots fronting roads with no existing or proposed storm sewers shall also be required to provide a connection for basement drainage by providing a separate drainage system which shall discharge to an approved storm sewer, drainage ditch, seepage pit or by other methods approved by the City Engineer. Seepage pits for individual dwelling will not be permitted when a storm sewer, drainage ditch, or other storm water system is within 200 feet of the subject property, unless otherwise approved by the City Engineer.

Where it is necessary to construct a separate drainage system to accommodate flows from gravity basement drains of sump pumps due to absence of existing or proposed storm sewers, the City's Standards listed in the Basement Drainage System Design Criteria shall be utilized and a design prepared by a licensed professional engineer shall be submitted for approval.

Plans for all minor or major subdivisions and site plans are required to include provisions for a drainage connection from each lot.

10.2.5 DETENTION FACILITIES

Design engineers shall use the best available technology to accommodate stormwater management by natural drainage strategies where possible and practicable. Detention facilities, when required or selected, shall be designed, Constructed, and maintained in accordance with the standards set forth in the "Residential Site Improvement Standards" N.J.A.C. 5:21.

Underground detention facilities are acceptable provided design details and specifications with engineering calculations are submitted to the City Engineer for review and approval.

10.2.6 STORMWATER QUALITY

In addition to addressing water quantity generated by the site, a stormwater management system shall also prevent, to the greatest extent feasible, an increase in nonpoint pollution.

Stormwater management shall provide for the control of a water quality design storm. The water quality design storm shall be defined as the one-year frequency S.C.S. Type iii, 24-hour storm or 1.25 inches of rainfall uniformly in two hours.

The water quality design storm shall be controlled by best management practices. These include, but are not limited to, the following;

"Dry" weather basins in accordance with the "Residential Site Improvement Standards" NJ Administrative Code, Title 5 Chapter 21.

Permanent or "wet" basins, where the water quality requirements shall be satisfied when the volume of permanent water is at least three (3) time the volume of runoff produced by the water quality design storm.

Infiltration practices such as dry wells, infiltration basins, infiltration trenches, buffer strips, etc. may be used to satisfy this requirement, provided they produce zero runoff from the water quality design storm and allow for complete infiltration within 72 hours. Engineering analysis will be required to establish native soil infiltration rates.

Package Stormwater Treatment systems are acceptable provided the system, and use of same, has obtained approval from the New Jersey Department of Environmental Protection. Engineering and design analysis must be submitted for review and approval by the City Engineer.

10.2.7 CONSTRUCTION STANDARDS

Unless noted otherwise in these Standards construction shall be in accordance with the appropriate section of the New Jersey Department of Transportation Standard Specification (latest Edition).

10.2.8 AS-BUILT PLANS

Within thirty (30) days after construction and before final acceptance by the City, the applicant is to furnish the City one "as-built" set of drawings of the improved storm and sanitary sewer system, acceptable to the City Engineer, and one electronic file of the as-built plans in AutoCAD "dwg" format.

The "as-built" plans shall accurately show the completed storm and sanitary sewer system in sufficient detail to permit the future location and determination of all components of the system; including: manhole, inlet, valve, pipe, detention/retention facilities and other structure locations, elevations and location of principal features of the system to indicate compliance with approved plans and other pertinent features. The size and type of all pipelines shall be indicated and clearly shown. The system and major components shall be dimensioned and tied to existing physical features as may be deemed appropriate by the City Engineer.

10.3 WATER DISTRIBUTION SYSTEM

10.3.1 GENERAL

Application and Installation for Domestic and Fireline Service

The developer shall make application for water service (fire and domestic) to the NBWU Customer Service Office located in City Hall, at 78 Bayard Street New Brunswick NJ on forms provided the Utility. The applicant shall provide projected demand calculations in support of the requested service sizes. In the case of fire service, flow tests shall be requested and fire protection system design shall be based on the flow test results and provide for a reasonable safety factor.

The developer shall submit the required connection fee for each domestic and/or fire line service as prescribed by Code. Permission to tap into the water main shall be denied until the deposit is received. This process will create a water billing account which can at a later date be transferred to the property owner's name. Metering requirements shall be obtained through the Customer Service office.

When the developer applies for a water service account, he must submit the following information:

Billing Address
Street Address
Size of Service(s)
Size of Water Meter(s)
Size of Fireline(s) if applicable

All existing water service lines that will not be used shall be disconnected at the respective water main. The developer is responsible for the supply and installation of all materials needed to provide domestic and fire service to the building, unit, or complex to receive service. This shall be performed as per all the requirements of the NBWU for materials, specifications and diagrams, and in conformance with the City Code Title 13.04.

Domestic water source lines must be separated and independent of the Fire service line from the point of connection to the water distribution main. Tapping of the domestic water service line to the Fire line is not permitted.

All subdivision and site plans shall be provided with water distribution facilities in such a manner as to provide adequate and continuous potable water to each buildable lot within the development or site. The water system shall be so designed to provide a minimum of 20 p.s.i. on the highest floors of proposed structures.

The design capacity of water mains shall be such as to maintain a minimum pressure of 20 psi at street level under all flow conditions.

All water distribution systems shall be adequate to handle all present and probable future development. Alignments outside streets shall require easements or Right-of-Way in accordance with subsection entitled "Easements" in Section 10.4 this article.

When plans for future development necessitate oversizing of the water supply system, the City may enter into an agreement with the developer to address the fair share of the costs.

All potable water distribution systems shall be designed in accordance with the requirements of the American Water Works Association, Inc. (AWWA), New Jersey State Department of Environmental Protection, Division of Water Resources and applicable City ordinances.

The demand rates for all uses shall be considered in computing the total system demand. Where fire protection is provided in accordance with the appropriate section below, the system shall be capable of providing the required fire demand plus the required average daily residential demand as Indicated in the Table 5.1, or the peak hour flows indicated in Table 5.2 as found in the "Residential Site Improvement Standards", whichever is greater.

Average daily residential consumption shall be computed in accordance with the housing unit type and size as per Table 5.1 found in the Residential Site Improvement Standards". The peak daily flows shall be computed by applying a peak factor of three (3) times the average daily residential consumption. The City may require deviations in the peak factor value provided appropriate documentation and justification for the deviation from the standards is provided.

The design of the on-site water distribution system shall be adequate to provide fire protection as per Insurance Services Office, Inc. (ISO) standard, Fire Suppression Rating Schedule, or per AWWA M31, "Manual of Water Supply Practices-Distribution System Requirements for Fire Protection," ISO method incorporated herein by reference.

The following potable water system standards are required for all developments to be served.

1. A complete Engineer's report, setting forth the basis of design, average daily, peak daily and peak hourly demands shall be submitted.
2. All water distribution mains shall conform to the City's water system master plan where applicable.
3. All water mains shall be designed for a minimum working pressure of 150 p.s.i., unless higher pressure ratings are required. Water main size shall be a minimum of eight (8") inches in diameter and provide a minimum flowrate of 800 GPM at all hydrants unless otherwise approved. Water mains shall be designed with Hazen-Williams coefficient "C" of 120. All water main sizes, flowrates and hydrant locations shall be subject to change and approval by the City's Fire Subcode Official and Water Supervisor. Water mains shall be looped to avoid dead ends. Six-inch diameter water mains may be approved when deemed acceptable by the Engineer.

4. Materials and details of construction shall comply with other applicable sections of these requirements.
5. A general map of the entire project shall be furnished showing water mains, hydrants, main valves, lateral locations, etc.
6. Plans shall show all water distribution, sanitary sewer and drainage facilities and shall be of a uniform size, 24"x 36", with a one-half inch border on the left side, the last one for binding. The placement of electric lines within water sanitary or storm sewer trenches is strictly prohibited.
7. Furthermore, plans shall also show the following:
 - a. Details. The plans shall show contours of all existing and proposed streets, and surface elevations of all breaks in grade and street intersections, the true or magnetic meridian, boundary line, title, date and scale. All sheets shall be numbered.
 - b. Symbols. Water mains to be built now and to be constructed later shall be shown by solid and dashed lines respectively. Existing water mains shall be shown by special designation. All topographical symbols and conventions shall be the same as the ones of the United States Geological Survey.
 - c. Profiles. Profiles shall show all water mains, valves, hydrants, stream crossings, and clearance between sanitary and storm sewers and other underground utilities. The size and material of the water mains and the inverts of the water mains to the nearest 0.1 foot using a USGS datum shall be shown. They shall be drawn to standard engineering scale and the scale shall be shown on each sheet. An index of streets shall also be shown on each sheet.
 - d. Details of Construction. The standard details of the City for hydrants, valves, valve boxes, individual water services, sanitary sewer-water main clearances, etc. shall accompany the plans. Details shall be drawn to standard scales to show clearly the nature of design.

10.3.2 MATERIAL SPECIFICATIONS

An "approved equal" may be substituted for any material or equipment mentioned by manufacturers name. For new construction that is to become part of the New Brunswick Water Utility (NBWU) distribution system, the current requirements and specifications are as follows:

1. Pipe shall be cement lined ductile iron pipe and fittings shall meet the standards of AWWA C150, AWWA C151, AWWA C110 and AWWA C104 1A test revisions. The minimum allowable pipe class shall be Class 52. All joints for the water main, shall be of

the "push-on" joints type utilizing a neoprene rubber gasket with bronze conductivity wedges or mechanical joints. Joints shall meet the standards of AWWA C111, latest revision. Water mains shall be a minimum of 8" dia. except at the end of a permanent cul-de-sac, unless another size is required for fire flow and other criteria. A 6" dia. main may be used when it serves not more than 20 dwelling units and only one fire hydrant.

2. Valves shall be U.S. Pipe METROSEAL 250 R/S (Resilient Seated) Gate Valve for Water Systems, 250 p.s.i. Operating Pressure, 500 p.s.i. Test Pressure, 2 inch square operating nut, mechanical joint ends, Non-Rising stem shall open right (clockwise). They shall conform or exceed the requirements of AWWA C509 and AWWA C500. The size range is between 6 inches and 16 inches inclusive.

Valves larger than 12" shall be Pratt Grounhog butterfly valve or approved equal. It shall have a 2 inch square operating nut, O ring seals and mechanical joint ends, a non-raising stem, and shall open-right (clockwise). 200 psi working pressure and conform to ANSI/AWWA C500.

3. Fittings shall be ductile iron pressure rating 350, cement lined and shall have mechanical and joints. (ANSI/AWWA C110/A21.10) US PIPE TRIM TYTE Ductile Iron Mechanical Joint Fittings shall be cast from ductile iron on accordance with AWWNANSI C153/A21.53 standards with mechanical joint bells. Glands, bolts, nuts and gaskets shall be in accordance with the requirements of AWWNANSI C153/A21.53 standards. The working pressure shall be 350 p.s.i. Fittings shall have an asphaltic outside coating in accordance with AWWNANSI C104/A21.4.

4. Service material shall be comprised of a corporation stop at the main, a curb stop, and a water meter. When the meter is located inside the building, an additional shut-off valve shall be installed on the suction side of the meter. When the meter is located inside the building, valving shall be in accordance with the Plumbing Subcode of the Uniform Construction Code. Curb stops and water meters shall be located as specified by the New Brunswick Water Utility.

Separate water service connections for each unit shall be utilized for detached housing where maintenance is the responsibility of the individual owner.

Common water service connections shall be allowed for multifamily housing where there is an entity, such as a homeowner's association, that is responsible for the maintenance of the common water laterals. Where common laterals are utilized, individual water shutoffs and meters shall be provided for each unit.

Fire protection and water service lines shall be constructed as per the Water Utility requirements.

Unless the developer can provided evidence that an existing 1" or 2" service **doesnot** contain lead or galvanized material the service must be replaced.

STANDARD 1" SERVICE

Unless approved otherwise the minimum standard service connections shall be 1" dia.

Corporations shall be Mueller catalog #H15006, 1-inch size, and shall have an inlet with Mueller CC thread and an outlet with a compression connection for copper tubing.

Curb valves shall be Mueller Mark II Oriseal Curb Valve catalog #H15192, 1-inch size and have an inlet with Flare/Compression connection for copper tubing, and an outlet with inside I.P. thread, and have a check to stop the valve from turning 360 degrees and shall not have a drain.

Curb boxes shall be Mueller Cast Iron Boxes - Improved Extension Type - Arch Patten Base, with pentagonal plug. Box extension shall be 38.5 inches to 54 inches fully extended. Curb box shall fit 1-inch Mueller Mark II Oriseal curb valve with Insta-Tite connection and 1 inch inside I.P. thread outlet. Mueller catalog number H-10385 or H-10306 or approved equal.

Foot pieces for curb boxes shall be Mueller Cast Iron Foot Piece to fit Mueller Mark II Oriseal Curb valve with Insta-Tite connection and 1-inch I.P. thread outlet Mueller catalog number H-10397.

Curb valve rod shall be Mueller catalog number 84247, 39 inches long.

Service tubing shall be 1-inch ASTM B88 type K Copper Tubing with a working pressure of 200 p.s.i.

The service saddle shall meet ASTM A536 and A307 latest revision when required.

STANDARD 1 ½" or 2" SERVICE

Corporations shall be Mueller copper service thread connection, catalog number H15000, 1 ½ inch or 2-inch size, and shall have an inlet with Mueller CC thread and an outlet with a flared CTS straight connection suitable for "K" copper service tubing.

The flare nut would be removed and the following service fitting would be added. The Mueller 110 Compression Connection, catalog number H15071, 1 ½ inch or 2-inch size and shall have an inlet with a Mueller 110 Compression Connection for CTS O.D. PE tubing.

Curb valves shall be Mueller Mark II Oriseal, 110 Compression Connection, catalog number H15172, 1 ½ inch or 2-inch size, and shall have an inlet with a Mueller CTS Compression Connection for CTS O.D. PE tubing, and an outlet with inside I.P. thread, and have a check to stop the valve from turning 360 degrees and shall not have a drain.

Curb boxes shall be Mueller Cast Iron Boxes - Improved Extension Type - Arch Pattern, with pentagonal plug. Box extension shall be 38.5 inches to 54 inches fully extended. Curb box shall fit 1 ½ inch or 2-inch size, Mark II Oriseal Mueller 11O Compression Connection curb valve. Mueller catalog number H- 10385.

Foot pieces for curb boxes shall be Mueller Cast Iron Foot Piece to fit Mueller Mark II Oriseal Curb valve 1 ½ inch (catalog number H10399) or 2-inch size (catalog number 10400), with Mueller CTS Compression Connection for CTS O.D. PE tubing inlet and an I.P. thread outlet.

Curb valve rod shall be Mueller catalog number 84247, 39 inches long.

Service Tubing shall be 1 ½ inch or 2-inch type "K" copper tubing with a working pressure of 200 p.s.i., ASTM 888 type "K" copper.

The service saddle shall meet ASTM A536 and A307, latest revision, when required.

Valve Boxes

Top sections shall be Opelika (Bingham & Taylor) catalog number 53-S, 15 ½ inches long. Or catalog number 56-S, 26 ½ inches long, and shall have the standard additional support flanges 6 inches from the top of the top section, and shall have lids marked with "WATER." Shaft diameter shall be 5 ¼ ". Bottom sections shall be Opelika (Bingham & Taylor) catalog number 64-S, and shall be 36 inches long.

Steel Coupling Devices

Sleeve: Ductile iron ASTM A-536. Ends shall have smooth inside taper for uniform gasket seating.

Gaskets: Grade 30-standard-specially compounded rubber with ingredients to produce superior storage characteristics, performance and resistance to set after installation. Temperature range -40° F to +150° F.

Follower Flanges: Ductile Iron ASTM A-536. Designed for high strength/weight ratio. Thickness determined by coupling size.

Bolts and Nuts: High strength low alloy steel with heavy, semi- finished hexagon nuts to AWWA C111 (ANSI-A21.11) standards.

Finish: Blue shop coat enamel.

Clamp Couplings

Shall be Smith-Blair Type 226 or equal with stainless steel bands, Type 304.

Lugs shall be high strength Ductile Iron ASTM A536. Gasket shall be Grade 30 specially compounded rubber of all new materials with ingredients to produce superior storage characteristics, performance and resistance to set after installation. Temperature range -40° F to+ 150° F.

Tapping Sleeves

U.S. Pipe SMITH Mechanical Joint Tapping Sleeve (flanged tapping end) and U.S. Pipe Metroseal 250 Resilient Seated Tapping Valve, open right (clockwise), flanged by mechanical joint or

Rockwell #622 and #623 Tapping Sleeve (flanged tapping end) and A.P. Smith #3860 MET Valve, open right (clockwise), flanged by mechanical joint or

JCM #412 Tapping Sleeve (flanged tapping end) and A.P. Smith #3860 MET Valve, open right (clockwise), flanged by mechanical joint.

Note: The Rockwell #622 and #623 or the Dresser JCM #412 applies to all the various sizes of tapping sleeves and tapping valves.

Note: The Mechanical Joint Tapping Sleeve may be substituted for the above tapping sleeves, if the flanged end of the sleeve can bolt directly to the Mechanical Joint Tapping Valve (as per NBWU Specifications for valves). All size on size taps shall be made using a Mechanical Joint Tapping sleeve.

Body: 3/8" Carbon Steel ASTM A285 Grade A PVQ.

Flanges: AWWA C207 Class D, ANSI 150 lb. drilling.

Gasket: Grade 60 Concave Wedge Gasket- compounded to resist oil, acids, alkalies, most (aliphatic) hydro-carbon fluids, water and many compounds. Temperatures up to 212° F.

Bolts and Nuts: High strength low allow steel with heavy semi-finished hexagon nuts to AWWA C111 (ANSI A21.11) standards. Optional-type 304 stainless steel bolts and nuts. Nuts are Teflon coated to prevent galling.

Finish: Blue shop coat enamel. Optional-fusion bonded epoxy, coated to an average of 12 mil thickness.

Thread Rods

All rod used for clamping and restraint shall be ¾ " rolled thread and conform to ASTM A242-81.

90° Bend Eye Bolt

All 90° Bend Eye Bolts shall be Corrosion Resistant High Strength Tensile 70,000 min., yield point 50,000 min., Low Alloy with the eye welded closed rolled thread $\frac{3}{4}$ 11 diam. 10 threads UNC 2.

Underground Pipe Clamps

All underground pipe clamps shall be formed from $\frac{1}{2}$ " x 2" steel with two $\frac{1}{2}$ " x 2" washers with 9/16" holes. All parts shall be corrosion resistant high strength, tensile 70,000 min., yield point 50,000 min. Low Alloy. And shall conform to ASTM A242-81.

Water Meters

All meters shall be the single head type, remote reading as approved by the New Brunswick Water Utility. Meters shall not be installed in meter pits unless otherwise approved by the Water Utility. Water meters on domestic lines are always installed horizontally. A shut off valve shall be required in front of and behind the water meter inside of the building.

Services 2 inches and smaller shall be rigid supported pipe of approved material and straight on both sides for a minimum distance of 24 " on both sides of the meter setup. For 3 inch and larger meter setups where the pipe is copper or steel, both sides of the meter shall be flanged.

All meters must be installed in accordance with the manufacturer's requirement. No unmetered bypass shall be accepted. All fire and domestic meters, and backflow preventors will be placed installed immediately after the service line enters the building perimeter.

All meters, backflow preventors, valves and strainers shall be supported by suitable pipe supports and shall be provided at the expense of the owner. Property owners shall be responsible to provide and maintain wiring connecting the meter head and the exterior building mounted radio transmitter.

A gate valve or approved equal must be installed before and after meter. Developer shall supply and install domestic service 5/8" meters for any development larger than three units. For three units or less the City Water Utility will supply the meters.

Meters larger than 2" must be supplied by the developer and shall be approved by NBWU. Meters shall read in cubic feet. Meters shall be of single head type. Meters shall be of the remote type with exterior readers.

Safe and adequate access to the meter location shall be provided by the property owner to NBWU personnel.

All fire lines require meters as required by NBWU, in addition to backflow preventors.

Property owners shall be responsible for testing meters at interval as designated by NBWU

Fire Hydrants

Fire hydrants purchased or installed shall meet or exceed all applicable requirements and tests of the latest revisions of ANSI/AWWA Standard C502. Fire hydrants shall meet all test requirements and be listed by Underwriters Laboratories Inc. Fire hydrants shall meet all test requirements and have full approval of Factory Mutual. In addition, fire hydrants shall meet the following requirements

Fire hydrants shall be rated for a working pressure of 250 Psig. (1725 kPa).

Fire hydrants shall be of the compression type, opening against the pressure and closing with the pressure. They shall have a 5-1/4" main valve opening and a minimum inside lower/upper barrel diameter (I.D.) of 7" to assure maximum flow performance. Pressure loss at 1,000 GPM shall not exceed 2.50psi through a 4.5" pumper nozzle.

The Fire hydrant shall be painted red with a silver bonnet and nozzle caps. (Private hydrants shall have the bonnet and caps painted yellow) Fire hydrants shall be three-way in design, having one 5" Storz pumper nozzle and two 2-1/2" NST hose nozzles. The nozzles shall thread counterclockwise into hydrant barrel utilizing o-ring seals. A stainless-steel nozzle lock shall be in place to prevent inadvertent nozzle removal. The 5" Storz pumper nozzle shall be integral to the hydrant and installed at the fire hydrant manufacturing facility, prior to hydrostatic testing. The Storz nozzle shall meet or exceed AWWA C502, NFPA-1963 and must be UL Certified and FM Approved for use on the fire hydrant.

The bonnet assembly shall provide an oil reservoir and lubrication system that automatically circulates lubricant to all stem threads and bearing surfaces each time the hydrant is operated. This lubrication system shall be sealed from the waterway and any external contaminants by use of o-ring seals. An anti-friction washer shall be in place above the thrust collar to further minimize operating torque. The oil reservoir shall be factory filled with an FDA approved, non-toxic oil lubricant which will remain fluid through a temperature range of -600 F. to +1500 F.

The operating nut shall be a one-piece design, manufactured of ASTM B-584 bronze. It shall have a 1 7/32" pentagon shaped nut. The operating nut shall be affixed to the bonnet by means of an ASTM B-584 bronze hold down nut. The hold down nut shall be threaded into the bonnet in such a manner as to prevent accidental disengagement during the opening cycle of the hydrant. The use of set screws as a means of retention is unacceptable. A resilient weather seal shall be incorporated into the hold down nut, for the purpose of protecting the operating mechanism from the elements.

The opening direction shall be left. An arrow shall be cast on the bonnet flange to indicate the specified opening direction. The hydrant bonnet shall be attached to the upper barrel by not less than eight bolts and nuts and sealed by an o-ring.

Hydrants shall be a "traffic-model" having upper and lower barrels joined at the ground line by a separate and breakable "swivel" flange providing 3600 rotation of upper barrel for proper nozzle facing. This flange shall employ not less than eight bolts, and shall have no less than 2

grooves to ensure proper breakage. The safety flange segments shall be located under the upper barrel flange to prevent the segments from falling into the lower barrel when the hydrant is struck. The pressure seal between the barrels shall be an "o" ring. The proper ground line shall be cast clearly on the lower barrel and shall provide not less than 18" of clearance from the centerline of the lowest nozzle to the ground.

The operating stem shall consist of two pieces, not less than 1 1/4" diameter (excluding threaded or machined areas) and shall be connected by a stainless-steel safety coupling. The safety coupling shall have an integral internal stop to prevent the coupling from sliding down into the lower barrel when the hydrant is struck. Screws, pins, bolts, or fasteners used in conjunction with the stem couplings shall also be stainless steel. The top of the lower stem shall be recessed 2" below the face of the safety flange to prevent water hammer in the event of a "drive over" where a vehicle tire might accidentally depress the main valve.

The lower barrel shall be an integrally cast unit. The use of threaded on or mechanically attached flanges is deemed unacceptable. The hydrant bury depth shall be clearly marked on the hydrant lower barrel.

Composition of the main valve shall be a molded rubber having a durometer hardness of 95 +/- 5 and shall be reversible in design so either side can be used. This will provide a spare in place. Plastic (polyurethane) main valves are unacceptable. The main valve shall have a cross section not less than 1".

The upper valve plate, seat ring and drain ring must be bronze and work in conjunction to form an all bronze drain way. A minimum of two (2) internal and two (2) external drain openings are required. These drain openings shall work with (2) two drain valves which drain the barrel when the hydrant is closed and seal shut when the hydrant is opened. These drain valves shall be an integral part of the one-piece bronze upper valve plate. They shall operate without the use of springs, toggles, tubes, levers or other intricate synchronizing mechanisms. Seat rings shall be o-ring pressure sealed, and shall have two (2) lugs, on top, which are sufficient for seat wrench engagement.

All brass components in contact with potable water must be made from either CDA/UNS Brass Alloys C89520 or C89833 with a maximum lead content of .25% by weight.

The hydrant shall have a 6", ductile iron, mechanical joint shoe. A minimum of six bolts and nuts are required to fasten the shoe to the lower barrel. The interior of the shoe including the lower valve plate and stem cap nut shall have a protective coating that meets the requirements of AWWA C-550. A stem cap nut shall be utilized, and must be locked in place by a stainless-steel lock washer or similar non-corrosive device that will prevent the cap nut from backing-off during normal use.

Hydrants shall be warranted by the manufacturer against defects in materials or workmanship for a period of ten years (10) from the date of manufacture. The manufacturing facility for the hydrant must have current ISO certification, and shall have been manufacturing and selling this model hydrant for at least five years.

Hydrants shall be made in the U.S.A. Furthermore, the hydrant's castings including the bonnet, upper barrel, lower barrel and shoe must be made in the U.S.A.

Hydrants shall be the Mueller A-423 Super Centurion 250, U.S. Pipe Metropolitan, or pre-approved equal.

Certification shall be provided confirming compliance to these specifications, including the use of low lead brass, hydrant configuration, and domestic castings as referenced above. Certification shall come from a licensed professional engineer and/or an officer of the hydrant manufacturing company. The certification shall reference the City of New Brunswick, the project and/or bid the hydrants are designated for, and the hydrant warranty.

Failure to comply with any of these above requirements is sufficient cause for rejection of proposed hydrants. The City of New Brunswick reserves the right to accept only those materials which are in full compliance with these specifications and deemed most advantageous to its interests.

Valve Boxes: (See Roadway Box Installation Detail)

Both sections of the valve box shall be plumb and the valve box shall be situated so that the valve nut is centered and can be operated with the valve key.

Valve boxes shall also be free of dirt, asphalt, etc.

NO ADAPTERS shall be used to raise the valve boxes to finished grade.

Mechanical Joint End Gate Valve (See attached standard valve replacement detail)

The M.J.E. gate valve with the METROSEAL 250 R/S open right is made by U.S. Pipe, or equal.

Curb Boxes

The curb stop lid shall be visible and flush with the surrounding ground. The pentagonal insert shall be intact and free of dirt, cement, etc.

The curb stop box shall be at a distance of approximately 18 inches from the street side of the curb to the center of the curb box.

All curb stop boxes shall have foot pieces to prevent rotation of the curb stop.

Services to curb stops from the main shall be perpendicular to the main. If for any reason this is not possible, the deviation must be noted on as-built sketches. Tracer Wire (#12 AWG insulated copper) shall be used for all plastic services. The Service Record Sheet shall be filled out by the Contractor/Developer before the Hydrostatic Test can be performed. _

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10.3.3 CONSTRUCTION STANDARDS

It is the intent of this procedure to secure the best workmanship consistent with the job conditions and the contractor's skill. No provision in this provision in this procedure shall be construed by the contractor as an excuse for poor workmanship or results. The contractor shall guarantee that the material, equipment, and apparatus required for the development shall be free from all defects in the material, design, and the workmanship. The contractor shall give satisfactory and continuous service under all conditions of service required and specified or which may be reasonable inferred from the submitted mark-up plans, procedures, and specifications and that all work performed by him/her shall be perfect in material and workmanship. The contractor shall agree to repair or replace, at his own expense, a part of the material, apparatus, or workmanship proving defective in Inspection prior to New Brunswick Water Utilities ownership takeover of the new water distribution system.

Curb Box Installation

The curb stop lid shall be visible and flush with the surrounding ground. The pentagonal insert shall be intact and free of dirt, cement, etc.

The curb stop box shall be at a distance of approximately 18 inches from the street side of the curb to the center of the curb box.

All curb boxes shall have foot pieces to prevent rotation of the curb stop.

Services to curb stops from the main shall be perpendicular to the main. If for any reason this is not possible, the deviation must be noted on as-built sketches. Tracer Wire shall be used for all plastic services. The Service Record Sheet shall be filled out by the Contractor/Developer before the Hydrostatic Test can be performed.

Installation of the Hydrants

Fire hydrants shall be located as directed by the City Engineer and/or Fire Subcode Official and shall be required at the end of all dead-end mains and a minimum of three hundred (300) feet apart as measured along the curb line of the roadway. Hydrants shall be provided at all high spots as a means of air releases and at low points as a means of blow off. The farthest corner of a building must be within 150 feet of a hydrant. Fire hydrants shall be equipped with six inch gate valve on the lateral and shall be constructed with the City's Standard Details.

The fire hydrant shall be installed in accordance with the latest revision to AWWA specification C502-54 and according to the City of New Brunswick Standards. Hydrant shall be U.S.P. Metropolitan Hydrant, Mueller A-423 Super Centurion, or approved equal.

Valve Boxes

Both sections of the valve box shall be plumb and the bottom of the valve box shall be situated

so that the valve nut is centered and can be operated with the valve key.

Valve boxes shall also be free of dirt, asphalt, etc.

No adapters shall be used to raise the valve boxes to finished grade.

Water Main Construction

The top of the water main shall be installed at a depth of 4 feet from the top of finished grade. This depth of cover can be varied from the standard of 3 feet to and a maximum of 5 feet ONLY upon presentation to the New Brunswick Water Utility of the particular circumstances and reasons that would warrant such a decision. Profiles of the water main and sewer main must be indicated on the site plans. All regulations of the NJ Safe Drinking Water Act Standards for construction of public community water systems must be complied with. If there are any questions, this regulation can be obtained from the N.J.D.E.P by calling 609/292-5550.

The water main shall be installed to be consistent with one side of the street, approximately 5 to 8 feet off the curb line in the limits of the street pavement.

Water connections shall be made to a street main only under the supervision and inspection of the Water Utility Superintendent or his designate representative. Connection to the main shall be made with a wet tap machine and AWWA approved service saddles, tapping sleeves, valves and other appurtenances.

All underground components of the water distribution system shall be installed with a minimum cover top of pipe of 4 feet or below the most severe frost line, whichever is greater.

Horizontal and vertical clearances shall be a minimum of 18" between sewer lines and water line unless otherwise approved by the Water Utility and the City Engineer.

"Concrete cradle bedding" is that method of bedding mains in which the lower part of the main exterior is bedded in 2000 p.s.i. strength concrete without reinforcement, having a minimum thickness under the pipe of one-fourth its nominal internal diameter and extending upward to a height equal to one-half of the nominal inside diameter and same shall be utilized where so ordered by the City Engineer.

"Concrete encased pipe bedding" is that method of bedding main in which the entire exterior is encased in 2000-pound concrete or better and same shall be utilized where ordered by the City Engineer.

All water mains shall be extended along the entire frontage of the site to the farthest property limit from the existing main.

Valves shall be provided at the intersection. Accordingly, three (3) gate valves are required at T-type intersections. Valves shall be provided between the water main and fire hydrant, upstream of all wet taps for water main extensions, at all wyes, tees and crosses in the mains,

and at other locations recommended by the City Engineer or Water Utility Supervisor.

Thrust blocks and/or retrained joint fittings and pipe will be employed to resist any movement in mains and shall be placed at all fittings, reducers, tees, crosses, bends, hydrants and dead ends.

Thrust blocks shall be used only when retrained joint material is impractical or on existing pipe. All thrust blocks shall be cast-in-place concrete, 3500 p.s.i. minimum strength. All bearing surfaces of thrust blocks shall be against undisturbed soil. The use of epoxy coated anchoring rods and fittings or mechanical joint retainer glands shall be utilized for installation of main except where subsurface conditions require special stone bedding or concrete cradle bedding, by the City Engineer. Ordinary bedding shall be defined as that method of bedding mains in which the main is bedded, on approved granular material, with "ordinary" care in an earth foundations shaped to fit the lower part of the main exterior with reasonable closeness for a width of at least 50 percent of the main diameter; and in which the remainder of the main is surrounded to a height of at least 0.5 feet above its top with approved granular material, shovel placed and shovel tapped.

Testing the Main

Testing of the Completed Water System. The water distribution system shall be subject to a hydrostatic test with a pressure of 150 PSIG as directed by the City Engineer or Water Utility Superintendent. Any joint or component of the distribution system having a visible leak during testing shall be repaired or replaced prior to continuing construction.

Hydrostatic testing shall be done in accordance with AWWA Standard C600-82 Section 4 and shall be performed under the supervision of the New Brunswick Water Utility or its designated representative. The contractor shall subject the water main, valves, hydrants and appurtenances to the pressure test for two (2) hours.

The contractor shall provide the hydraulic pump with an "in line" check valve to prevent backflow through the pump during testing.

Disinfection of Water System

After completion of the public water supply (including transmission and distribution mains and distribution system tanks), all surfaces with which adequately protected water may come into contact shall be effectively disinfected in accordance with AWWA C601, latest revision, and tested for the presence of bacteria by an NJDEP certified laboratory, before being placed into service.

Disinfection shall be done in accordance with the AWWA Standard C651-86, Section 5.1 Tablet Method.

During construction the pipe and appurtenances shall be kept clean and dry.

During construction of the water main, chlorine tablets (calcium Hypochlorite; 65% available chlorine) shall be attached to the inside top of the water main in each length of pipe. Tablets shall be attached by a food-grade adhesive (AWWA C651a-90) such as:

PERMATEX FORM-A GASKET NO. 2 SEALANT (Fast Drying, Hard Setting)

or

PERMATEX CLEAR RTVSILICONE ADHESIVE SEALANT
(Fast Drying, Hard Setting)

The products have both been approved by the USDA. They are manufactured by Loctite Corporation, Kansas City, KS 66115.

The amount of chlorine tablets shall be determined in the field by the Engineer or the appropriate representative of the New Brunswick Water Utility.

When installation has been completed, the water main shall be filled with water. The water shall remain in the pipe for at least 24 hours.

After the 24-hour contact period, the New Brunswick Water Utility shall be contacted so that a determination of the residual chlorine concentration can be ascertained.

The main shall not be flushed until after the Hydrostatic Test has been performed and approved by the New Brunswick Water Utility.

Bacteriological and Turbidity Testing

After the Hydrostatic test has been passed by the New Brunswick Water Utility, the water main shall be flushed to remove the heavily chlorinated water and to scour the interior of the pipe. The duration of the flushing shall be determined in the field by the engineer or the appropriate representative of the New Brunswick Water Utility.

Once flushing is completed the New Brunswick Water Utility office shall perform a bacteriological and a Turbidity Analysis. This office can be reached at 732-745-5060.

The process for final acceptance of the water main and related appurtenances cannot be consummated until the Water Quality (Bacteria, Chlorine, Turbidity, etc.) and Hydrostatic (Pressure test to 150 p.s.i.) Tests have passed and met the approval of the New Brunswick Water Utility.

Tapping Sleeves and Tapping Valves

New Brunswick Water Utility will accept the following tapping appurtenances:

Rockwell #622 Tapping Sleeve Flanged & METROSEAL 250 Resilient Seated Gate Valve, open right, flanged by mechanical joint. OR:

JCM #412 Tapping Sleeve Flanged & METROSEAL 250 Resilient Seated Gate Valve, open right, flanged by mechanical joint.

All developments shall be required to perform their own wet cuts and service taps to the New Brunswick Water Utility distribution system. Before the wet cut can be made the appropriate street, opening permit must be obtained and the New Brunswick Utility Office 732-745-5062 must be notified 48 hours in advance to allow a representative to observe the installation of the cut.

Thrust Blocks/Restraints and Rodding of Mechanical Joint Fittings and Pipe

It is the responsibility of the contractor to assure that all mechanical joint fittings are properly restrained.

At a minimum retainer glands or U.S. Pipe's M.J. Field Lok Gasket, Ebaa Iron's MegaLug Joint Restraint Glands, or $\frac{3}{4}$ " threaded rods shall be used on all joints as required to provide proper thrust restraint due to pipe size, maximum working pressure and ground conditions.

All plugs, caps, tees, flushers and bends, unless otherwise specified, shall be provided with thrust blocks or suitably restrained joints as shown or directed by New Brunswick Water Utility. (see detail drawing showing thrust and anchoring blocks).

All thrust restraints shall be designed to withstand the test pressure, and any potential surge pressure of the pipe.

Concrete thrust blocks of both the vertical and horizontal orientation shall be made of concrete having a minimum compressive strength of not less than 2500 p.s.i. after 28 days. Thrust blocks shall be placed between solid ground and the fitting to be anchored. Each instance shall be shown or directed by New Brunswick Water Utility. Upon written notice from the contractor to the effect that he/she has performed all the work required by the specifications, marked up plans, and requirements, New Brunswick Water Utility will inspect the job promptly to see if everything is satisfactory. Much that has been previously inspected and accepted by the New Brunswick Water Utility need not be re-examined in great detail, but if something needing correction is discovered in the work that has been approved earlier, the former acceptance does not prevent the Engineer from requiring that it may be remedied by the contractor.

10.3.4 BACKFLOW PREVENTION FOR DOMESTIC AND WET PIPE FIRE PROTECTION SERVICES

The primary objective of the New Brunswick Water Utility is the preservation of safe potable water that is free from contamination of foreign liquids and water from other sources. Cross connection can occur when installing Fire Protection Systems or installing domestic water service to a residence that previously has well water.

If an existing system is refurbished, it must be upgraded to satisfy the most recent

requirements for the New Brunswick Water Utility as described in this section and by the local plumbing inspector and or Fire Protection Sub-Code Official.

All construction shall be reviewed for cross connection control, to determine if any protection against backflow and backsiphonage is required. Review for protection of domestic water supply shall be made in accordance with

THE NEW JERSEY SAFE DRINKING WATER REGULATIONS, THE NATIONAL PLUMBING CODE, AND THE NEW BRUNSWICK WATER UTILITY RULES & POLICIES SHALL CONTROL IN MATTERS OF CROSS CONNECTION CONTROL. THE PLUMBING SUB-CODE OFFICIAL HAS THE JURISDICTION TO UPGRADE ANY BACKFLOW PROTECTION

Domestic Line Requirements

The requirements of the NJ Uniform Construction Code and the National Standard Plumbing Code NJ Edition (currently adopted revision), Chapter 10, section 10.5 are included by reference.

The degree of backflow protection required to protect potable water system is dependent on the hazard type of wet fire protection system to be installed.

The minimum Backflow Prevention on irrigation services to be used within the New Brunswick Water Utility system shall be Double Check Backflow Preventer Assembly (AWWA approved).

A reduced pressure zone backflow preventor shall be required as the minimum protection where an unapproved water supply is derived from any surface source or a known contaminated source or where the premises is a hospital, sewage or industrial waste treatment plant or pumping station, or is a commercial, industrial or manufacturing installation wherein liquids, vapors, gases, or chemicals of unsafe, unknown or questionable quality are handled. This shall include but not be limited to irrigation or fireline systems in which an unapproved foreign substance or water supply is used. Furthermore, a Reduced Pressure Zone Backflow Preventer shall be installed in developments operating a privately maintained distribution system.

Fire Protection Systems

The degree of backflow protection required to protect potable water System is dependent on the hazard type of wet fire protection system to be installed.

An AWWA double check valve backflow preventor with detector check meter will be installed where no additives of any kind are used in the fire protection system and no alternate sources are tied in (i.e. storage tanks, ponds, well system, etc.) to the fire line. It must be placed just inside the building at the point of entry.

In this case the fire system has an anti-freeze added to it (Ethylene glycol or Propylene glycol) a Reduced Pressure Backflow Preventer (AWWA approved) must be placed on the fireline as

the line enters the building from the street.

A gate valve shall be Required before and after the Backflow Preventer, if they are not provided as part of the AWWA approved backflow Preventer Device.

REQUIREMENT ON PRIVATE PROPERTY FOR CONSTRUCTION UNDER UCC CONTROL.

10.3.5 AS-BUILT PLANS

Within thirty (30) days after construction and before final acceptance by the City, the applicant is to furnish the City two signed and sealed “as-built” drawings of the improved water distribution system, acceptable to the City Engineer and one electronic file of the as-built plans suitable of AutoCAD “dwg” file format.

The “as-built” plans shall accurately show the completed water system in sufficient detail to permit the future location and determination of all components of the system; including: Valve location, hydrants, and other hardware, elevations and location of principal features of the system to indicate compliance with approved plans and other pertinent features. The size and type of all pipelines shall be indicated and clearly shown. The system and major components shall be dimensioned and tied to existing physical features as may be deemed appropriate by the City Engineer.

Preliminary “As Built” may be required by the City Engineer prior to paving in order to insure facilities location beneath paved areas.

10.4 OTHER UTILITIES

Other Utilities, such as gas, telephone, cable TV and fiber optic cable communications, servicing industrial, commercial, single and two family or multi-family residences shall be installed in underground conduits. The contractor shall provide “as-built” drawings and location measurements so that said conduits can be readily found in the field. All conduits shall be approved non-metallic conduit installed as per the UCC Electric Sub-Code requirements and /or the requirements of the electric utility. The City shall have the right to waive this requirement if field conditions so warrant and it is in the best interest of the City to do so. See” LIGHTING” section for electric service requirements.

10.5 UTILITY EASEMENTS

Easements along rear property lines or elsewhere for utility installation shall be required and obtained by the developer. Such easements shall be at least 20 feet wide for one utility and five additional feet for each additional utility and be located in consultation with the companies or City departments concerned and, to the fullest extent possible, be centered on or adjacent to rear or side lot lines. Easements shall be identified by concrete monuments in the field and shown on the Plan.

Flood plains and conservation easements shall be indicated on the preliminary and final plats and shown in such a manner that their boundaries can be accurately determined.

The removal of trees and ground cover shall be prohibited in a conservation easement or flood plain except for the following purposes; the removal of dead and diseased trees; limited thinning of trees and growth to encourage the most desirable growth; and the removal of trees to allow for structures designed to impound water or in areas to be flooded in the creation of ponds or lakes.

The boundary line of any easement shall be monumented along one side at its intersection with all existing or proposed street lines. Such easement dedication shall be expressed on the plat as follows: “Utility” easement granted to the (City) as provided for in the Ordinances of the (City) and a deed shall be provided for all easement to the City and recorded with the County Clerk.

11.0 LIGHTING

11.1 GENERAL

All subdivisions, development plans, and site plans should be provided with lighting facilities in a manner to provide safe levels of lighting for the uses intended while minimizing the impact of excessive or improperly directed lighting on adjoining properties.

11.2 ALONG PUBLIC ROADWAYS

It is recognized that Public Service Electric provides lighting along public Right-of-Ways and the utility company does not provide electric plans to the developer until after preliminary approval of the project is obtained.

Lighting plans for public roadways shall be submitted to the City Engineer for approval prior to construction. If deemed acceptable the City Engineer shall recommend approval to the Planning Board wherein the Planning Board shall take action to approve or disapprove the lighting plan.

11.3 OFF STREET PARKING AREAS AND DRIVES

Lighting Plans for off street parking areas and drives shall be submitted to the appropriate Board for review and approval along with the site plan application.

Design Criteria (Private Roadways and Parking Lots)

1. All project lighting shall be designed in accordance with minimum standards of safety and suggested lighting levels as specified herein and the standards of the Illuminating Engineering Society (I.E.S.).
2. Multi phased projects shall be designed in phases and all fixtures, light sources, standards and lighting levels shall be consistent throughout unless otherwise ordered by the appropriate Board.
3. Requested changes in fixture type, pole locations, lamp wattage etc. shall be reviewed by the City Engineer who shall make his recommendation to the Planning Board.

11.4 LIGHTING LEVELS

Design Standard for lighting levels shall be as follows:

1. Residential Parking Lots - .25 footcandles minimum maintained

with established depreciation factor calculated into lighting level at a maximum to minimum illumination ratio not to exceed 15:1.

2. Commercial Parking Lots - 0.50 footcandles minimum maintained with established depreciation factor calculated into lighting level at a maximum to minimum illumination ratio not to extend 15:1.

3. Roadway Lighting - (Classified as Residential Collector Type Roadway) .50 footcandles minimum maintained with established depreciation factor calculated into lighting level at a maximum to minimum illumination ratio not to exceed 4:1.

4. Other Types - Shall be designed in accordance with recommended Illumination Engineering Society (I.E.S.) Standards, and submitted with standard submission package.

5. Levels at Property Line - Unless otherwise specified the maximum lighting level permitted at the property line shall not exceed 0.25 footcandles.

11.5 LIGHTING FIXTURES

1. All lighting fixtures are to be of an approved type and supplied by a reputable manufacturer. The use of LED fixtures is encouraged and incandescent fixtures are to be avoided.

2. All lighting fixtures shall utilize maximum 75° cutoff luminaire type reflector so as to minimize glare.

3. All fixtures being utilized shall be submitted with complete fixture photometrics, as supplied by manufacturer. Any fixture which is submitted without photometrics is not acceptable. Plans must show photometrics to scale.

4. Where determined to be required by the Board, house side shields (internal or external) shall be provided to minimize fixture glare and light pollution onto adjacent properties.

5. All fixtures shall be aesthetically compatible with the lighting standards (poles), contiguous fixtures, and the adjacent environment.

6. All lamps shall be of an inside coated type phosphor coating or inside frost. No clear lamps shall be permitted.

7. All fixtures shall contain a shielding medium within the fixture to protect lamps, such as, clear tempered glass door or borosilicate prismatic retractor. Unprotected

lamps other than incandescent type units, shall not be permitted.

8. Where incandescent lamps are exposed to the weather they shall be of the proper type (Ex. "Par" lamps).

11.6 STANDARD LIGHTING POLES

1. All poles shall be of an approved type, able to withstand wind loads typical to the region and supplied by a reputable manufacturer.
2. The maximum allowable pole height shall be 35'-0" commercial use, 18' residential use measured from the highest point of the pole and fixture to finished grade.
3. All poles shall be aesthetically compatible with the lighting fixtures and surrounding environment.
4. Pole bases shall be designed in accordance with manufacturer's recommendations and approved by a licensed professional engineer as to structural stability.
5. "Corten" - rust inhibiting type steel poles shall not be permitted.
6. Any deviation of the above standards must be approved by the City Engineer.

11.7 UNDERGROUND LIGHTING CONDUITS

Electric conduits for lighting, whether public or private, serving industrial, commercial or two (2) or more residential home developments shall be installed in underground conduits. The contractor shall provide "as built" drawings and location measurements so that said conduits can be readily found in the field. The City shall have the right to waive this requirement if field conditions so warrant and if it is in the best interest of the City to do so.

11.9 SITE LIGHTING PLAN

All site lighting plans shall be submitted with the complete application with the required amount of prints as stipulated for the submission in accordance with the land subdivision and site plan ordinance.

The lighting plan shall include the following information:

1. Fixture manufacturer literature: showing fixture type, color etc.
2. Fixture photometrics as furnished by the manufacturer.

3. Lighting standard (poles) literature showing pole type, height, etc.
4. Site lighting plans showing fixture locations and photometric data (isolux diagrams) indicating footcandle intensities along fixture output distribution drawn to plan scale.
5. Design Criteria: Containing
 1. Lighting Source utilized
 2. Footcandle level
6. Type of Light Source.

1. LED	
2. Quartz	
3. Metal Halide	High Intensity Discharge
4 High Pressure Sodium	"
5 Low Pressure Sodium	"
7. Wattage of lamps shall be indicated on drawings.
8. All other data deemed necessary to make an informed decision on the application.

(Note: For installation of electric conduits refer to "Other Utilities".)

11.9 PSE&G DECORATIVE LIGHTS

Unless otherwise approved by the City, decorative lights within the Public Right-of-Way shall consist of PSE&G supplied and installed 14 ft. Colonial Fluted Poles with LED Lamps on Cross Arm Bracket, style and number of lamps designated by the City. The spacing and location of fixtures shall be designed by the developer and submitted to the City for review.

12.0 LANDSCAPING

12.1 PURPOSE

It is the intent of this chapter to provide guidelines and specifications for the proper landscape development of residential, commercial and industrial sites within the City of New Brunswick. The health, safety, and general welfare of the community will be enhanced by the development of a more aesthetical pleasing, vibrant community, increased property values better air quality, reduced sound pollution and better visual and wind buffering.

12.2 DEFINITIONS

As used in this chapter, the following terms shall have the meaning indicated:

BERM - A mound of soil on a site used as a view or access obstruction, either natural or man-made.

BUFFER - An area within a property line, either consisting of natural existing vegetation or created by the use of trees, shrubs, fences and/or berms, designed to continuously limit view of the site from adjacent sites of or properties.

CALIPER - The diameter of a tree trunk measures in inches:

Measured 6 inches above ground level for trees up to 4 inches in diameter.

Measured 12 inches above ground level for trees above ground level for trees above 4 inches in diameter and up to 12 inches in diameter.

Measured at breast height (D.B.H. = 44"above ground level) for trees above 12 inches in diameter.

DECIDUOUS TREES OR SHRUBS - Plants that drop their leaves before becoming dormant in winter; not evergreen.

EVERGREEN TREES OR SHRUBS - Plants which have leaves throughout the entire year.

GROUND COVER - Low-growing plants or sod that in time form a dense mat covering the area in which they are planted preventing the growth of unwanted plants while holding the soil in place. Examples are ivy species, juniper species, honeysuckle species, pachysandra species, vinca species and sod.

LANDSCAPE - The total area of a site or property, excluding the area occupied by building(s), but including other structures. The harmonious blending of these building(s) and structures within the site and with adjacent property by the use of the existing topography or alterations to the existing topography trees, shrubs, ground covers and/or mulches.

MULCH - Any covering placed on soil to conserve moisture, eliminate weed growth and protect plants from extremes of heat and cold.
Typically gravel, stone, hardwood bark, licorice root, cedar mulch, etc.

SCREEN - A structure or planting providing a continuous view obstruction within the site or property, consisting of fencing, berms, and/or evergreen trees shrubs.

SHRUBS - Any plant(s), deciduous or evergreen, generally multi stemmed, classified and sold by height or spread, measured in inches or feet.

12.3 GENERAL REQUIREMENTS

General regulations for all Zones:

1. Landscaped areas. All areas in a development not used for construction of buildings, roads, access ways, parking or sidewalk shall be fully landscaped in accordance with these regulations.
2. Site considerations. Natural site features such as existing trees, topography, etc. 4" caliper one foot above ground level, or larger shall be indicated on drawings and preserved if possible.
3. Design. Landscape plans shall be required, except for single - and two-family homes, where no plan is required.

12.4 LANDSCAPE PLAN REQUIREMENTS

This Article shall pertain to all developments other than single-family residences. Site plan applications must include a separate, detailed plan, drawn to scale of at least one (1) inch equals thirty (30) feet of all proposed landscaping, buffering, screening and existing trees and all of the following items:

1. Plant list, including:
 - a. All plants material to be used, keyed to plan(s) and defined by botanic and common name.
 - b. Quantity to be used.
 - c. Size of material used at time of planting. Trees are to be designated by caliper, evergreens and ornamental trees by height, upright shrubs by height and prostrate shrubs by spread.
2. Design must include:

- a. Location of all existing plant material 4" caliper and larger and all plant material to remain on site.
 - b. Indication of screening and buffer plantings required by ordinance.
 - c. Location, spacing, and labeling of each plant used; shown to scale.
 - d. Methods to be used in planting, welling, staking and guying, mulching and wrapping according to City of New Brunswick standards.
 - e. Every ground plan must be clearly labeled i.e., sod, seed, mulch, stone, pavers, pavement, etc.
 - f. Ground covers to be used in design which may be indicated as a mass planting, but spacing must be defined in plant list.
 - g. A means of screening utility boxes, refuse areas, loading areas, and unsightly site structures.
3. Name, address, and qualifications of person preparing landscape plans. If person preparing plans is not a certified landscape architect, a written list of experience, coarse work, seminars, etc. is to be included in submittal package.
 4. Placement of street trees must be indicated along all thoroughfares in accordance with City standard specifications.

12.5 GENERAL STANDARDS

The following general standards shall be used to prepare and review landscaping for any development plan:

1. The following species of trees are not allowed to be used within the City of New Brunswick:

Ailanthus Altissima	(Tree of Heaven)
Gleditsia Triacanthos	(Honey Locust with Thorn/Fruit)
Ulmus Americana	(American Elm)
Acer Saccharinum	(Silver Maple)
Pinus Nigra	(Austrian Pine)

2. Plant Species. The selection of plant species to be used shall be appropriate in terms of function and size and shall be hardy for the climatic zone in which the City is located. Consideration shall be given to soil conditions, availability of water, exposure to sunlight and other existing conditions.
3. Minimum size of plant material at time of planting.

Deciduous Trees 2 ½" - 3" caliper (must have 6 ft. clearance to first branch within

public R.O.W. The City may require 7 ft. clearance if a potential hazard exists or if deemed necessary by the City Engineer.)

Ornamentals & Conifers	6' - 7'
Height Hedges	2' - 3' Height
Large Shrubs	2 ½' Height
Small/Medium Shrubs	15" - 18" Height
Prostrate, Small Shrubs	15" - 18" Spread

4. Planting Specifications. Only nursery grown plant material shall be utilized. All trees, shrubs and ground cover shall be planted according to accepted horticultural standards and the City's Approved Planting Details. All grass shall be planted in accordance with the New Jersey State Soil Conservation Committee's "Standards for Soil Erosion and Sedimentation Control in New Jersey," current edition. All plant material shall be guaranteed by the contractor for a period of one year upon final acceptance of owner.

5. Maintenance. Plantings shall be watered regularly and, in a manner, appropriate for the specific plant material through the first growing season. All landscaped areas shall be well maintained and kept free of all debris, rubbish, weeds, tall grass other overgrown conditions and the storage of any equipment or materials.

6. Street Trees. Shade trees shall be of the type and species and shall be planted at locations and intervals as approved by the Division of Parks and Shade Tree.

Acceptable Street Trees:

Katsura Tree
Armstrong red maple
October glory maple
Columnar sugar maple
Village green Zelkova
Kwanzan cherry
Columnar sargent cherry
American hophornbeam
Autumn flowering cherry

Any deviation from this list shall be approved by the Division of Parks and Shade Tree

Generally Street trees shall be spaced as follows:

Minor Street Tree	30 ft on center
Medium Street Tree	40 ft on center
Major Street Tree	50 ft on center

Minimum size of street trees at time of planting shall be 2- 2 ½ " caliper.

See General Requirements for prohibited trees. Existing trees near street lines shall be preserved by the developer. If existing trees removed or severely damaged, they are to

be replaced at an equal caliper equal value.

Example - One (1) 9" caliper trees removed, three (3) 3" caliper trees can be used for replacement. If trees cannot be used on site, an equivalent value must be contributed to the New Brunswick Tree Replacement Trust Fund.

Trees and planting guidelines shall conform to New Jersey Shade Tree Federation guidelines unless otherwise required by the Division of Parks and Shade Tree.

12.6 SPECIFIC STANDARDS

The following standards shall be used to prepare and review landscaping on any development plan.

1. Parking Lots. The interior area of all parking lots shall be landscaped to provide visual relief from the undesirable and monotonous appearances of extensive parking areas and to provide shading that will reduce solar heat gain to both the surface of the parking lot and vehicles parked thereon. Such landscaped areas shall be provided in protected planting islands or peninsulas within the perimeter of the parking lot and shall be placed so as not to obstruct the vision of motorists. The area and types of plantings shall be provided based on the number of parking spaces in the lot as follows:

- a. For parking lots with ten (10) spaces or less, no such interior landscaping shall be required if the Board determines there is adequate landscaping directly surrounding the perimeter of the parking lot. If the Board finds that such landscaping is inadequate, then the requirements of Sub-paragraph b. below shall apply.
- b. For parking lots with eleven (11) spaces or more, a minimum of five percent (5%) of the interior area of the parking lot shall be landscaped with a minimum of one (1) deciduous tree planted for every five (5) parking spaces. The remainder of any such interior planting areas not containing trees shall be planted with low growing evergreen shrubs. If all of the above required trees cannot all be located within such interior planting location then they shall be planted directly surrounding the perimeter of the parking lot.

- c. If trees cannot be planted onsite, a payment shall be made to the City's Tree Preservation fund as per the Tree Preservation Ordinance.

2. Foundation Planting. The base of all sides of a building shall be planted with foundation plantings consisting of evergreen and/or semi- evergreen shrubs and trees. Such plantings shall be a minimum of two feet high at time of planting and spaced an average of three (3) feet on center.

3. Slope Plantings. All cut and fill areas, terraces, earth berms and roadway embankments, with slopes steeper than one (1) increment vertical to three (3) increments horizontal (1:3), shall be sufficiently landscaped to prevent erosion.

4. Drainage Facilities. Detention basins, headwalls, outlet structures, concrete flow channels, rip rap channels and other drainage facilities shall be suitably planted with shrubs and trees. Detention basin embankments shall be extensively landscaped with wet site tolerant plantings.

5. Energy Conservation. Landscaping shall be designed to conserve energy, such as the planting of evergreen windbreaks to provide shielding from northwesterly winds during the winter and deciduous shade trees to reduce solar heat gain during the summer.

6. Street or Site Furniture. Benches, trash receptacles, kiosks, phone booths and other street or site furniture shall be located and sized in accordance with the functional need of such. Selection of such furniture shall take into consideration issues of durability, maintenance and vandalism. All such furniture shall be architecturally compatible with the style, materials, colors and details of buildings on the site.

12.7 VEGETATION PRESERVATION AND PROTECTION STANDARDS

1. Vegetation Preservation. To the greatest extent possible, existing vegetation on the tract in good health and condition shall be preserved. Particular consideration shall be given to individual trees with a diameter of four (4) inches one foot above ground level or greater, stands of trees and mature shrubs and hedgerows located within yard setbacks and buffer areas and greater than ten (10) feet from a building foundation.

2. Dead Vegetation. All dead or dying vegetation, either standing or fallen, shall be removed from the tract.

3. Vegetation Protection. Existing vegetation to be preserved shall be protected during the period of construction as follows:

a. No staging, storage or stockpiling areas for construction materials or soil shall be located under the dripline of existing trees to be preserved, wherever possible, but in no case shall such area be located within ten (10) feet of an existing tree to be preserved, whether such tree is located on the tract or adjacent properties. No such area shall be located within five (5) feet of existing shrubs or hedgerow to be preserved.

b. A protective barrier containing of snow or silt fencing a minimum of four (4) feet high shall be installed around all existing vegetation to be preserved prior to the commencement of any site work or construction. Such protective barrier shall be free-standing and sturdy, not supported in any way by the vegetation such is protecting, and shall remain in place until construction is completed.

c. Where greater than three (3) inches of fill is proposed to be placed around an existing tree to be placed around an existing tree to be preserved, such tree shall be protected by an air well measuring six (6) feet in diameter, or as otherwise needed, around the trunk to prevent the intrusion of soil. The design of such air well shall be as specified in "Protection and Care of the Urban Forest," published by N.J.D.E.P.

12.8 BUFFERING AND SCREENING GUIDELINES AND STANDARDS

1. Guidelines. The following guidelines shall be used to prepare and review buffering and

screening for any development plan. The provision of buffer area and screening within such areas shall take into account the opportunities and constraints of existing conditions on the site, such as existing vegetation to be preserved, critical views into and out of the site, the days and hours of operation, intensity of use of the proposed development, potential off-site impacts and other such issues.

2. General Screening Standards. The following standards be used to prepare and review screening devices required in this Section.

a. Evergreen Trees or Hedges. Where an evergreen screen is utilized, such planting shall be sufficiently dense so as to provide a minimum of seventy-five percent (75%) of the required screening at time of planting. Arrangement of plantings shall be in a continuous row and may be overlapped or staggered within such row. Placement of such plantings shall provide maximum protection to existing vegetation to be preserved located in the buffer area and on adjacent properties.

b. Walls and Fences. Where a masonry wall or solid wooden fence is utilized, the design of such shall be architecturally compatible with the style, materials, colors, and details of the building(s) on the site. Where such wall or fence fronts toward or is visible from a public right-of-way, the aesthetic import must be taken into consideration and softening by the use of plant material will be required if deemed necessary.

c. Earth Berms. Where an earth berm is utilized, it shall be designed to have a maximum side slope of one increment high to two increments wide or a ratio of one height to two wide (1:3). The minimum width of the top of a berm shall be four (4) feet. Berms shall be composed of a soil type sufficient to sustain the growth of planting it will support. Berms shall be landscaped with combinations of evergreen and deciduous trees and shrubs, and ground cover.

3. Specific Buffering and Screening Standards. The following standards shall be used to prepare buffering and screening for any development plan.

a. Residential Uses and Districts. Any residential development of 5 or more units shall be suitably buffered and screened from all uses other than single- and two-family dwellings in order to minimize the impacts of noise, glare, vibration, vehicular traffic, pedestrian activity and other potential nuisances. The width of buffering and height of screening shall be provided based on the type of use that is being buffered and the district in which it is located, as follows:

<u>Type of Use/Location</u>	<u>Width of Buffering</u>	<u>Height of Screening</u>
Conditional uses of residential districts	10 feet	6 feet
Permitted residential uses other than single- and two-family dwellings	5 feet	6 feet
Permitted non-residential uses	10 feet	6 feet
Permitted light industrial uses	25 feet	10 feet
All non-conforming uses	As deemed appropriate by the Board	

b. **Parking Lots.** Parking lots shall be suitable buffered and screened to minimize the impacts of noise, lighting and glare, exhaust fumes, views of parked vehicles and other nuisances. Buffering and screening shall minimize such impacts both within the site itself, as well as from adjacent and nearby properties and public right-of-ways as follows:

Buffering shall consist of a minimum five (5) foot wide area surrounding all sides of a parking lot exposed to view. Where such parking area is located on a tract adjacent to a residential use of district, such buffering shall consist of a minimum ten (10) foot wide area surrounding all sides of a parking lot exposed to view.

Screening shall consist of a minimum four (4) foot high visually impervious screen to be located within the buffering area. Where such parking area is located on a tract adjacent to a residential use of district; such screening shall consist of a minimum six (6) foot high visually impervious screen. The height of any required screen shall decrease to a maximum of three (3) feet in height, in order to provide a vehicular intersections adequate visibility from motor vehicles.

c. **Loading Areas.** All loading areas, including loading dock areas of building and driveways providing access to same, shall be suitably buffered and screened to minimize the impacts of noise, loading and unloading activities, lighting and glare, exhaust fumes, views of loading and unloading vehicles and other nuisances. Buffering and screening shall minimize such impacts both within the site itself, as well as from adjacent and nearby properties and public right-of-ways as follows:

Buffering shall consist of a minimum ten (10) foot wide area surrounding all sides of a loading area exposed to view. Where such loading area is located on a tract adjacent to a residential use or district, such buffering shall consist of a minimum twenty-five (25) foot wide area surrounding all sides of a parking lot exposed to view.

Screening shall consist of a minimum ten (10) foot high visually impervious screen. If such screen consists of a wall or fence, the buffer area between the wall or fence and the lot line shall be a minimum of ten (10) feet in width and shall also be extensively planted with both deciduous and evergreen trees.

d. **Solid Waste Disposal and Recyclable Collection Areas.** All areas used for solid waste disposal and recyclable collection facilities shall be suitable buffered and screened to minimize the impacts of noise, odors, disposal and collection activities, and views of collection bins and dumpsters. Buffering and screening shall minimize such impacts both within the site itself, as well as from adjacent and nearby properties and public right-of-ways.

Buffering shall consist of a minimum four (4) foot wide area surrounding all sides of such facilities exposed to view. If such facility is located on a site adjacent to a residential use or district, such buffering shall consist of a minimum ten (10) foot wide area surrounding all sides of such facilities exposed to view.

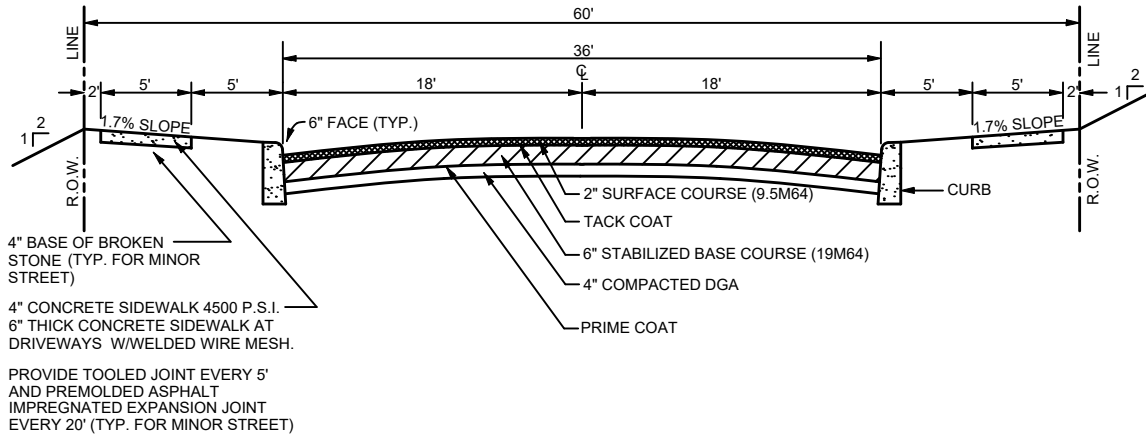
Screening shall consist of a minimum six (6) foot high masonry wall, solid wooden fence or accessory building with gates or doors and ramped access to facilitate the

movement of bins or dumpsters. The amount, height and density of the plant material around the facility will be directly related to its appearance. Plain block walks and fences will require an evergreen screen planted along the sides and rear four (4) foot in height, 3-4 foot on center.

e. HVAC Equipment and Utility Services Boxes. All ground level HVAC equipment and utility service boxes shall be suitably buffered and screened to minimize views of same from both within the site itself, as well as from adjacent and nearby properties and public right-of-ways as follows:

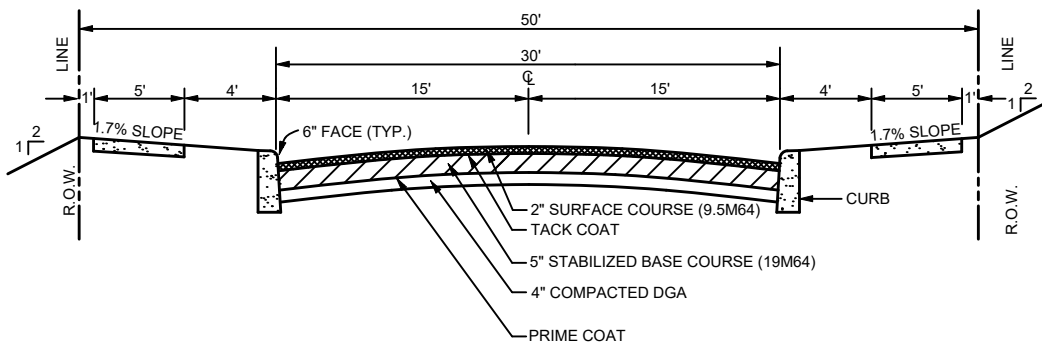
Buffering shall consist of a minimum three (3) foot wide area surrounding all sides of HVAC equipment and utility storage boxes exposed to view.

Screening shall consist of a minimum four (4) foot high evergreen hedge along all sides of same.



TYPICAL COLLECTOR STREET DETAIL

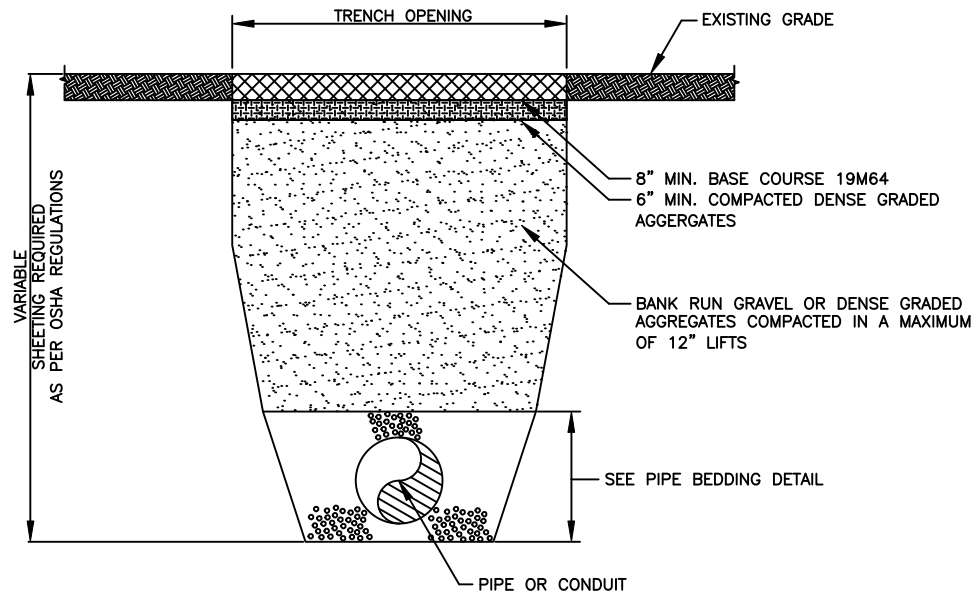
(NOT TO SCALE)



TYPICAL LOCAL STREET DETAIL

(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**



NOTE:
ALL PAVEMENT THICKNESSES ARE MINIMUM.

BACKFILL OPERATIONS MUST BE WITNESSED BY THE CITY ENGINEER OR HIS REPRESENTATIVE. FAILURE TO NOTIFY THE ENGINEER 24 HOURS PRIOR TO BACKFILLING MAY RESULT IN REMOVAL AND REPLACEMENT OF THE MATERIAL.

AT THE DISCRETION OF THE CITY ENGINEER, THE CONTRACTOR MAY BE REQUIRED TO INSTALL STEEL PLATES ACROSS THE OPENING UNTIL THE START OF TEMPORARY PAVEMENT REPAIRS COMMENCE.

TEMPORARY PAVEMENT REPAIRS SHALL BE COMPLETED PROMPTLY AS TRENCHES ARE BACKFILLED. THE PATCHING IS TO CONSIST OF A MINIMUM OF 8" OF COMPACTED BITUMINOUS CONCRETE 19M64.

PERMANENT PAVEMENT REPLACEMENT SHALL BE COMPLETED WITHIN A PERIOD OF SIX MONTHS FROM THE DATE OF TEMPORARY REPAIRS UNLESS THE CITY ENGINEER SHALL DESIGNATE A DIFFERENT PERIOD OF TIME. DURING THE WINTER SEASON, AS DETERMINED BY THE CITY ENGINEER, THE PERMANENT PAVEMENT REPLACEMENT WILL BE DEFERRED UNTIL WEATHER PERMITS.

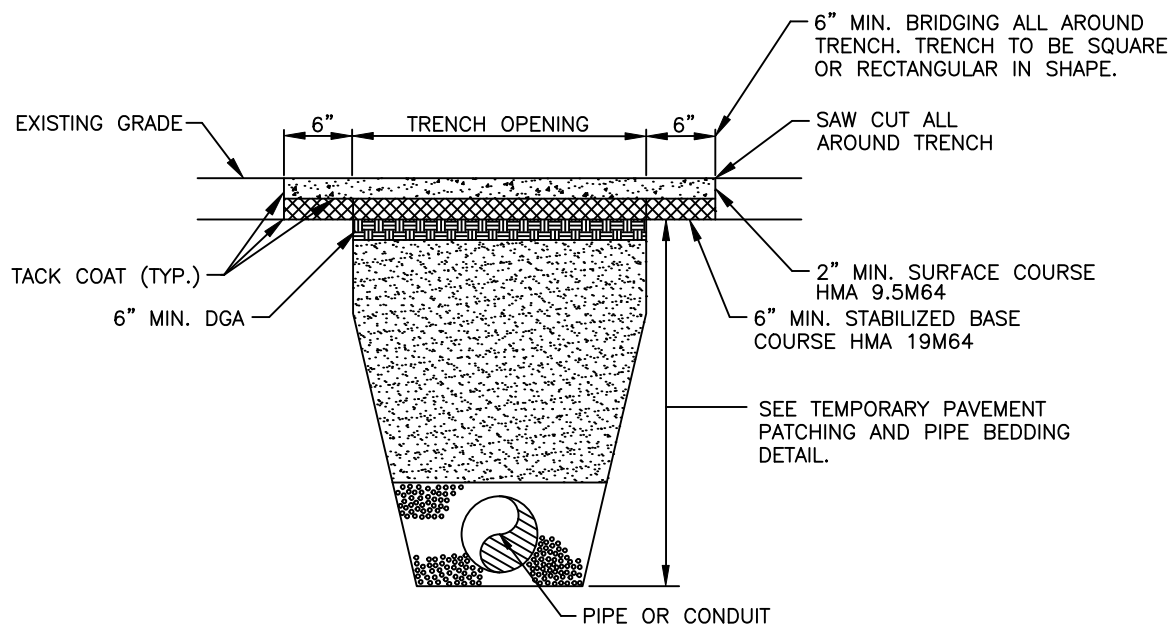
TEMPORARY PAVEMENT SHALL BE PLACED AT A MINIMUM THICKNESS OF 8 INCHES. IT SHALL BE THE RESPONSIBILITY OF THE PERMITTEE TO MAINTAIN SUCH TEMPORARY PAVEMENT PATCHING AND BACKFILLING TO THE EXISTING GRADE BY THE ADDITION OF BITUMINOUS CONCRETE AS REQUIRED, UNTIL PERMANENT PAVEMENT REPAIRS ARE COMPLETED.

THE CONTRACTOR MUST RESPOND WITHIN 24 HOURS UPON NOTIFICATION OF FAILURE OF PATCH.

TEMPORARY PAVEMENT REPAIR

(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**



NOTE:

ALL PAVEMENT THICKNESSES ARE MINIMUM COMPACTED.

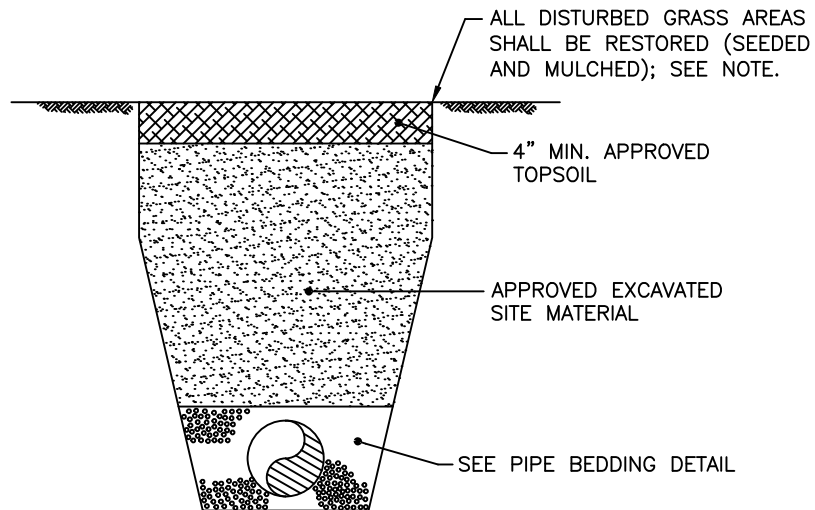
WHEN, IN THE OPINION OF THE CITY ENGINEER, SETTLEMENT IN THE PAVEMENT OPENING HAS CEASED, PERMISSION SHALL BE GRANTED FOR PERMANENT PAVEMENT REPAIR. PERMANENT PAVEMENT REPAIR SHALL INCLUDE, BUT NOT NECESSARILY BE LIMITED TO:

- A. SAW CUT 6" OUTSIDE OF EXISTING OPENING EDGE.
- B. CAREFUL REMOVAL OF 2" OF EXISTING MATERIAL.
- C. THOROUGH COMPACTION OF ANY SUBBASE WHICH MAY HAVE BEEN DISTURBED.
- D. INSTALLATION OF MINIMUM OF 2" OF BITUMINOUS MATERIAL AS SHOWN ABOVE.

PERMANENT PAVEMENT REPAIR

(NOT TO SCALE)

**STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT**



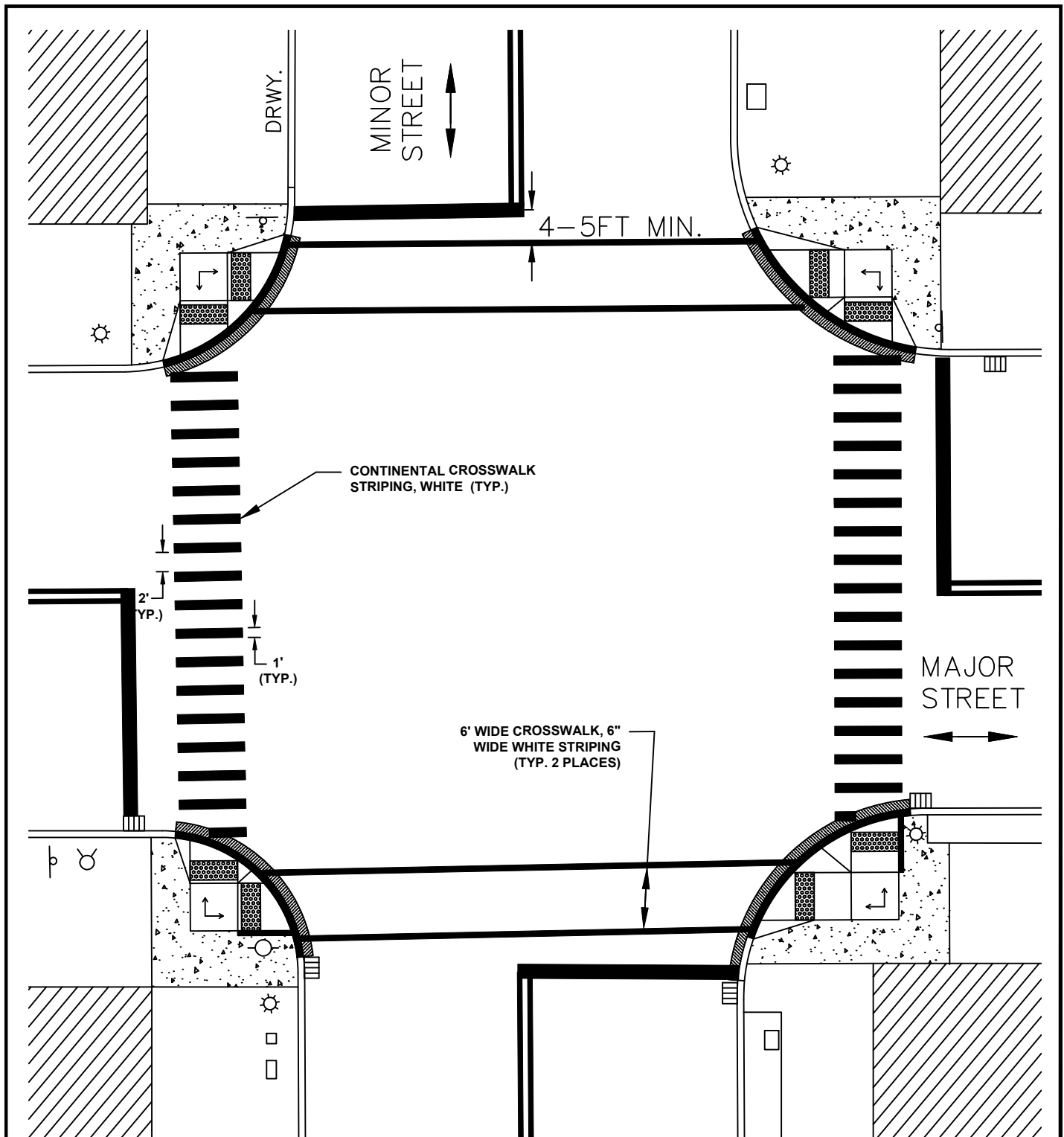
NOTE: LAWN RESTORATION SHALL CONSIST OF THE FOLLOWING:

- A. GRADE AND FIRM EXISTING SUBSOIL TO 4" BELOW FINISHED GRADE.
- B. PLACE AND FIRM 4" OF TOPSOIL OVER SUBSOIL (TOPSOIL MUST BE ACCEPTABLE TO CITY ENGINEER).
- C. LIME SOIL WITH PULVERIZED LIMESTONE (APPLIED AT A RATE OF 90 LBS. PER 1,000 S.F.).
- D. FERTILIZE THE AREA WITH A 1-2-1 RATIO OF FERTILIZER CONTAINING A MINIMUM OF 5 PERCENT NITROGEN, 10 PERCENT AVAILABLE PHOSPHORIC ACID AND 5 PERCENT SOLUBLE POTASH. (APPLIED AT A RATE OF 11 LBS. PER 1,000 S.F. FOR 10-20-10)
- E. PREPARE SEEDBED BY WORKING LIME AND FERTILIZER INTO THE TOP 1/3 OF TOPSOIL. FIRM ENTIRE SEEDBED.
- F. APPLY APPROVED SEED MIX UNIFORMLY OVER ENTIRE AREA (APPLIED AT A RATE OF 1.5 LBS. PER 1,000 S.F.). *** SEED IS TO CONSIST OF A 60% MIX OF RED FESCUES (CREEPING OR CHEWINGS) AND 40% PERENNIAL RYEGRASS (MANHATTAN) OR APPROVED EQUAL.
- G. INCORPORATE SEED INTO TOP 1/4 - 1/2" OF TOPSOIL BY RAKING. FIRM THE SOIL.
- H. EVENLY DISTRIBUTE APPROVED STRAW MULCH (APPLIED AT A RATE 70-90 LBS. PER 1,000 S.F.)

TYPICAL TRENCH REPAIR "GRASS AREAS"

(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**

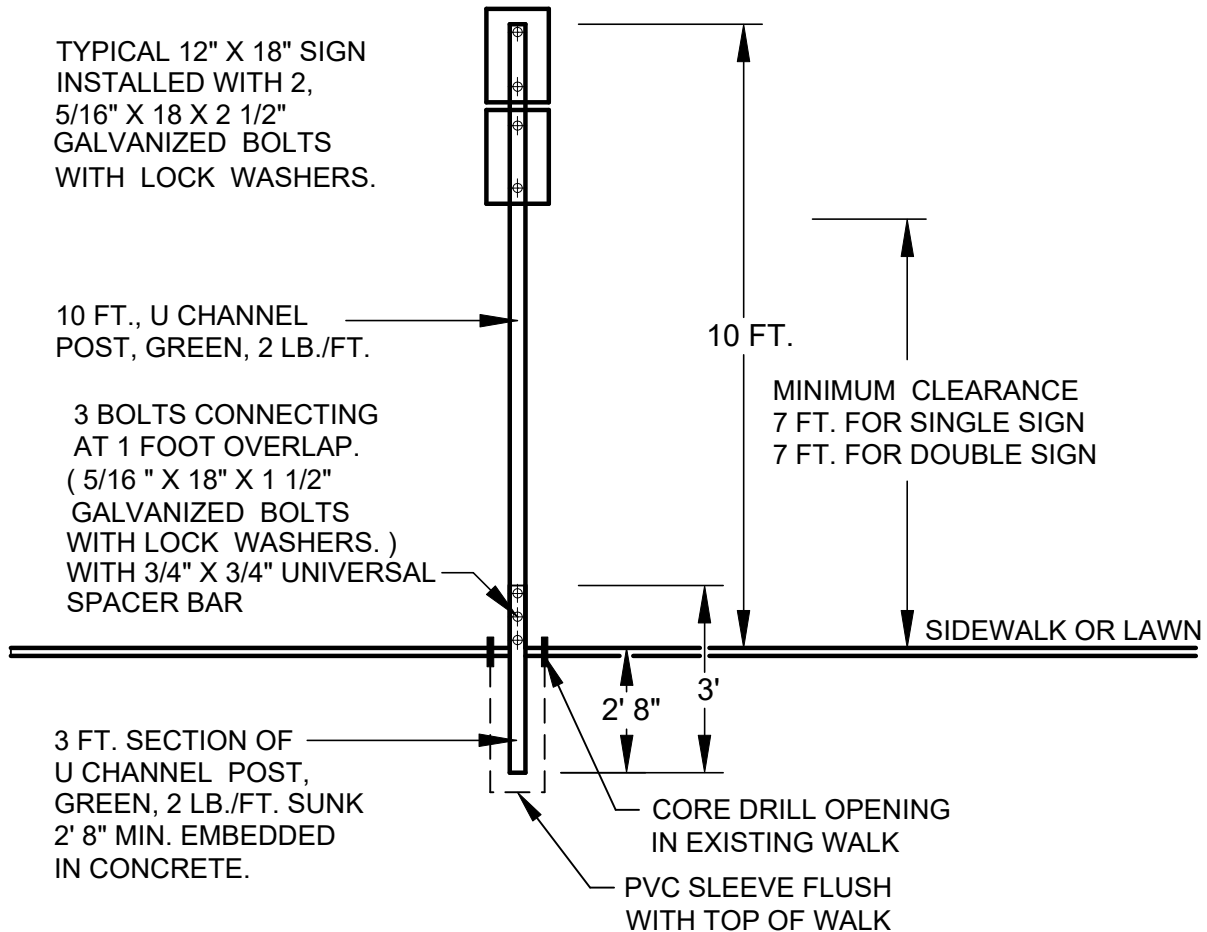


INTERSECTION STRIPING DETAIL

(NOT TO SCALE)

**STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT**

NOTE: FOR LOCATIONS IN CONCRETE WALK
4" DIA. P.V.C. PIPE, CUT TO 4" LENGTH, TO
BE PLACED IN LOCATION OF NEW STREET
SIGN POSTS. FILL ANNULAR SPACE WITH
CONCRETE.

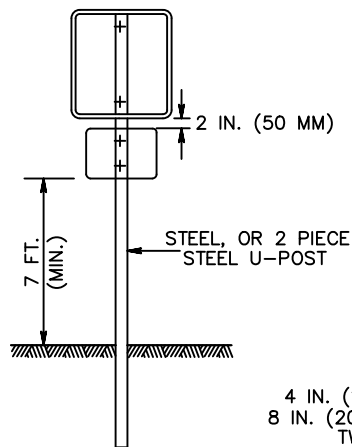


BREAKAWAY SIGN INSTALLATION DETAIL

(NOT TO SCALE)

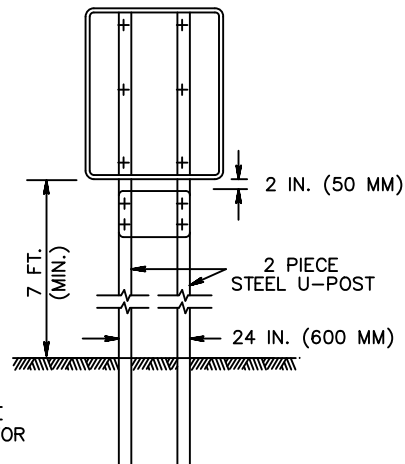
BREAKAWAY SYSTEM SHALL BE EQUAL TO
U-CHANNEL. BREAKAWAY SYSTEM BY
GARDEN STATE HIGHWAY PRODUCTS INC.

1/21/13

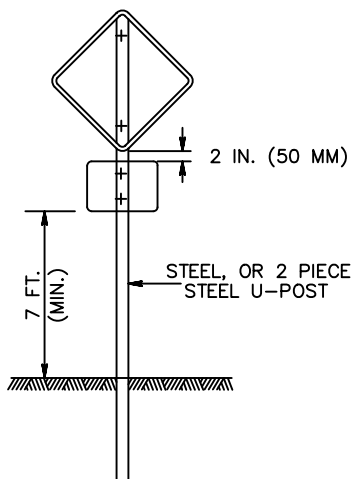


4 IN. (100 MM) DIA. SLEEVE
8 IN. (200 MM DIA.) SLEEVE FOR
TWO-PIECE U-POST

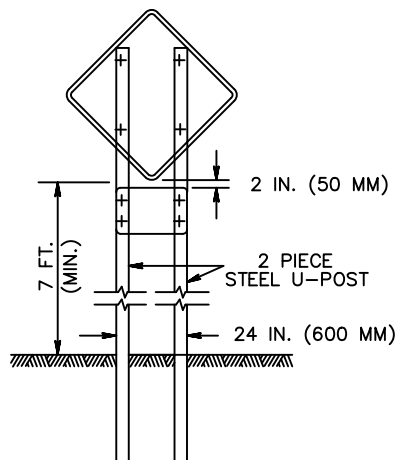
30 IN. (750 MM) x 30 IN. (750 MM)
OR
SMALLER



36 IN. (900 MM) x 36 IN. (900 MM)
OR
LARGER



30 IN. (750 MM) x 30 IN. (750 MM)
OR
SMALLER



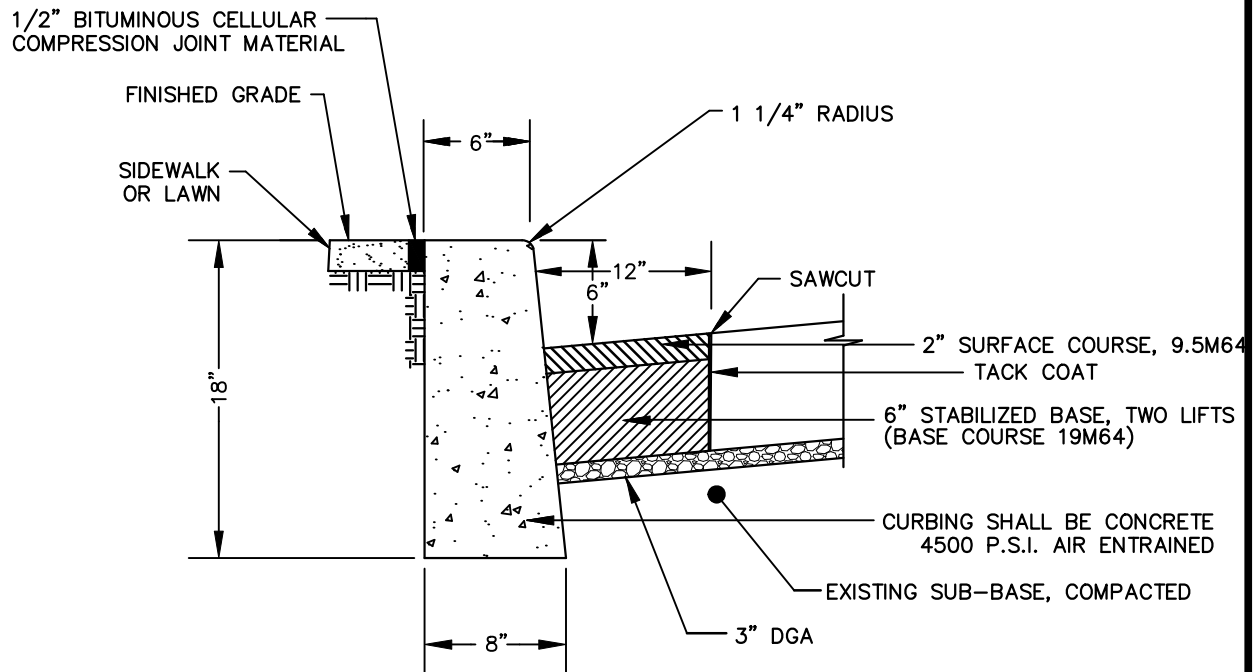
36 IN. (900 MM) x 36 IN. (900 MM)
OR
LARGER

SIGN DETAIL

(NOT TO SCALE)

BREAKAWAY POST SYSTEM TO
BE PROVIDED - SEE DETAIL.

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**

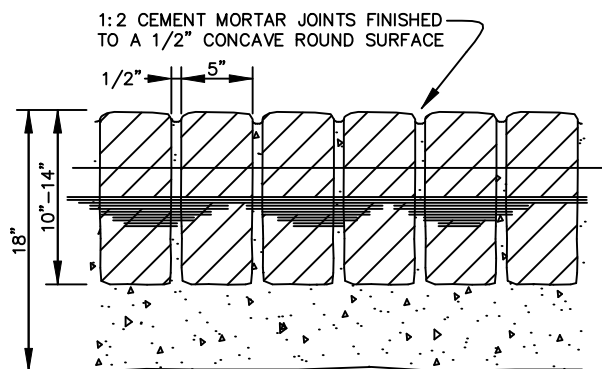
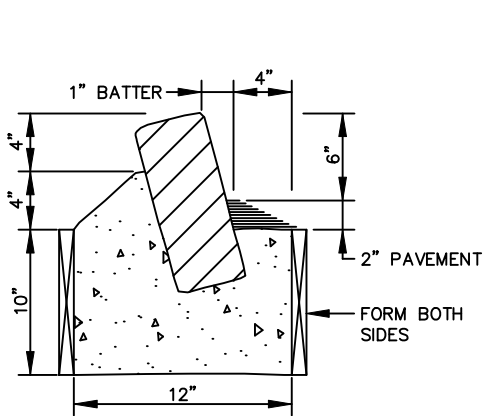


NOTES

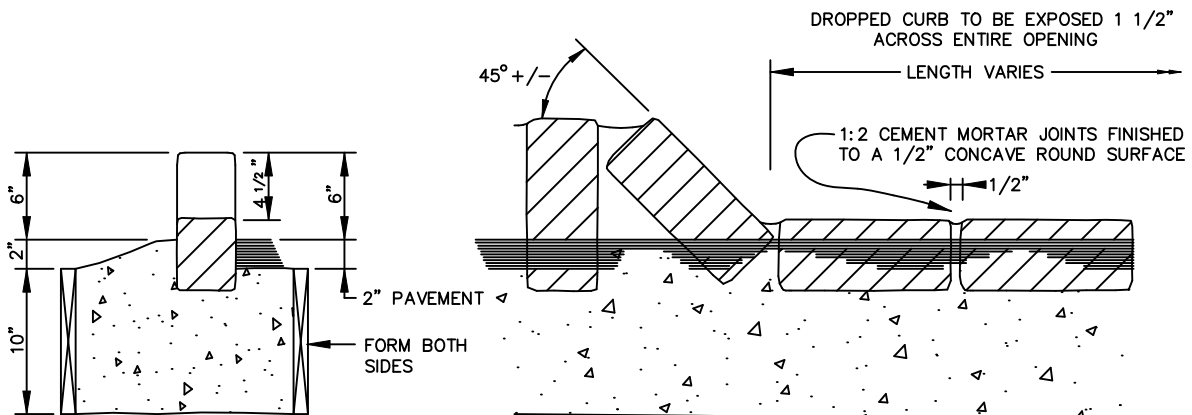
1. OPEN JOINTS SHALL BE PROVIDED AT INTERVALS OF 10 FEET AND SHALL BE FILLED WITH 1/2 INCH BITUMINOUS CELLULAR COMPRESSION JOINT MATERIAL, RECESSED 1/4 INCH FROM THE FRONT FACE AND TOP OF THE CURB.
2. EXPANSION JOINTS SHALL ALSO BE INSTALLED WHERE THE CURB IS ADJACENT TO SIDEWALKS AND CATCH BASINS.
3. CURB AT DRIVEWAYS AND ENTRANCES SHALL BE DEPRESSED SO THAT THE TOP OF THE CONCRETE IS 1 1/2 INCHES MAX ABOVE THE ADJACENT PAVEMENT.
4. CONCRETE SHALL BE AIR ENTRAINED 4500 P.S.I. AT 28 DAY TEST.
5. FACE FORMING IS NOT PERMITTED. DOUBLE CURB FORMS MUST BE USED.

CITY CONCRETE CURB DETAIL

(NOT TO SCALE)



BELGIAN BLOCK CURB DETAIL
(NOT TO SCALE)

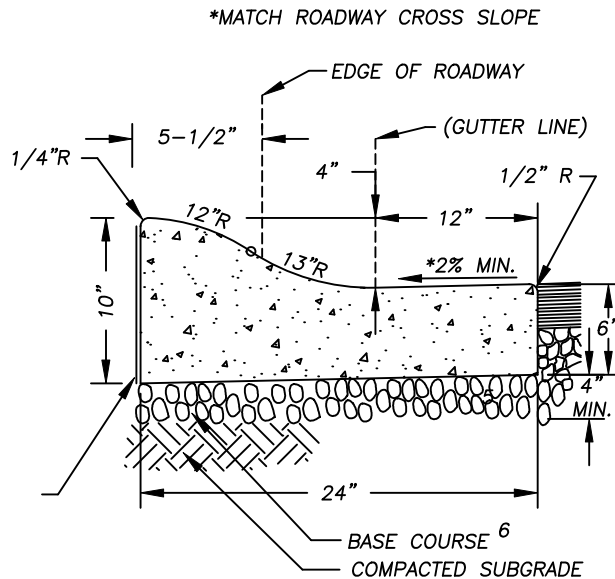


DEPRESSED BELGIAN BLOCK CURB DETAIL
(NOT TO SCALE)

BELGIAN BLOCK CURB DETAILS

(NOT TO SCALE)

**STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT**



NOTES:

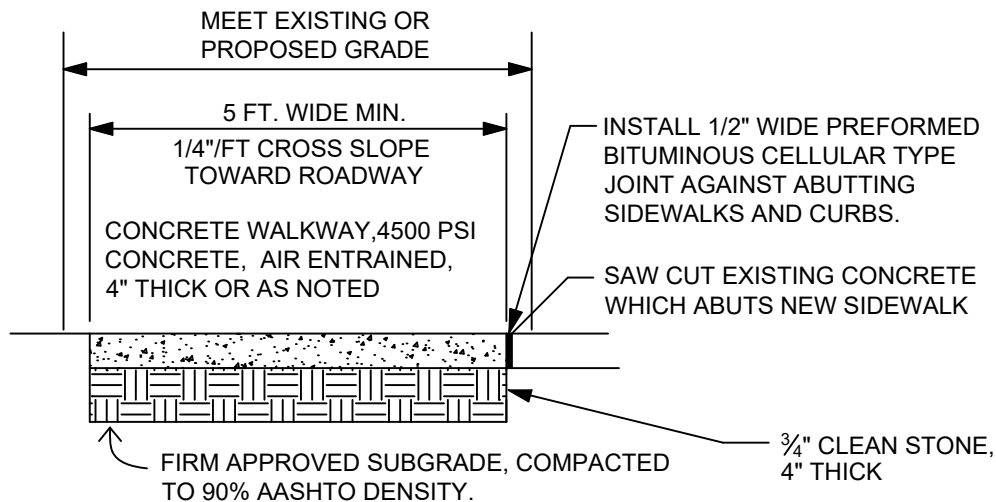
1. CONCRETE SHALL BE 4500 PSI MIN. 3 1/2" SLUMP (MAX.).
2. CURBS ADJACENT TO PAVEMENT OR SIDEWALK TO HAVE EXPANSION AND/OR CONTRACTION JOINTS TO MATCH EXISTING PATTERNS.
3. 3/8" EXPANSION JOINTS TO BE PROVIDED WHERE THE CURB IS ADJACENT TO SIDEWALKS, CATCH BASINS, COLD JOINTS, EACH SIDE OF INLET STRUCTURES AND DRIVEWAYS BUT NOT GREATER THAN 10FT. MATERIAL TO BE PRE-MOLDED, ASPHALT IMPREGNATED AND NON EXTRUDING.
4. CONTROL JOINT SPACING NOT TO EXCEED 3W OF SIDEWALK PANELS. THE DEPTH OF THE JOINT SHALL BE AT LEAST 1-1/2 INCHES.
5. THICKENED EDGE SIDEWALK SHALL BE PLACED ON 2" (MIN.) CSTC OR CSBC. SUBGRADE AND BASE COURSE COMPACTED TO 95% MAX. DRY DENSITY.
6. BASE COURSE UNDER ROLL CURB & GUTTER SHALL BE TO SUBGRADE OF STREET SECTION OR 4 INCHES, WHICHEVER IS GREATER, AND SHALL EXTEND 6" BEHIND THE CURB.
7. CURB TO BE BRUSH FINISHED. ALL EXISTING EDGES SHALL BE SAWCUT.
8. USE OF ROLL CURB & GUTTER WITH COMMERCIAL DRIVEWAYS WILL REQUIRE REINFORCING STEEL (6"x6"x10 GA. WIRE MESH) MIN. 3" COVER.

CONCRETE ROLLED CURB & GUTTER

NOT TO SCALE

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**

NOTE: PATCHING OF A PORTION OF SIDEWALK SHALL NOT BE ACCEPTED, REPAIR SHALL CONSIST OF REPLACEMENT OF ENTIRE SLAB. (TOOLED JOINTS)



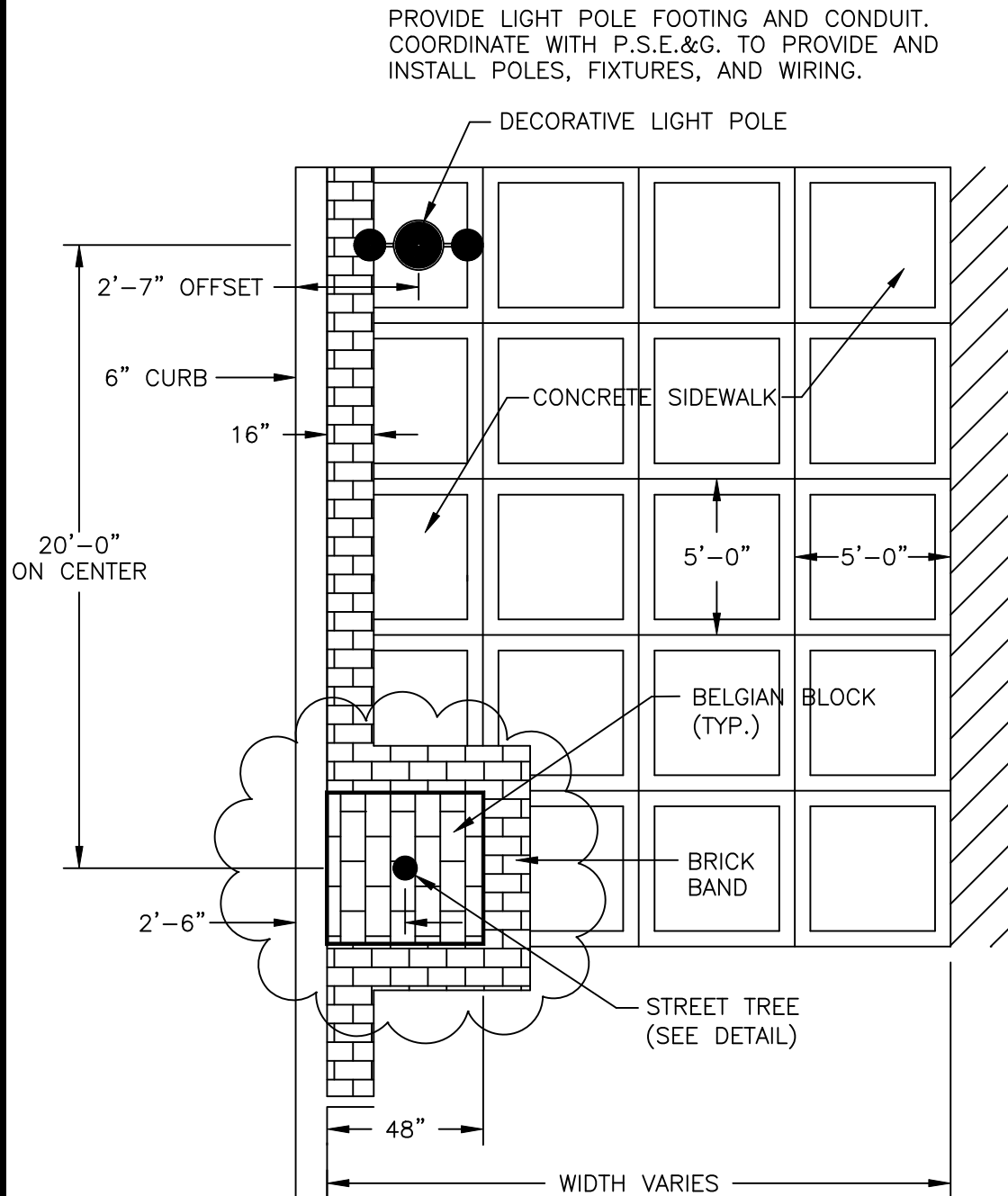
GENERAL NOTES:

THE FORMS AND DIVIDERS SHALL BE OF STEEL OR WOOD AND OF SUFFICIENT STRENGTH TO RESIST SPRINGING OUT OF SHAPE; AS PER SPECIFICATION. WALK SHALL BE OF MONOLITHIC CONSTRUCTION FOUR (4) INCHES THICK. TRANSVERSE SURFACE GROOVES MUST BE PROVIDED AT RIGHT ANGLES TO THE SIDEWALK AND AT INTERVALS EQUAL TO THE WIDTH OF THE SIDEWALK. AFTER THE CONCRETE IS PLACED IT SHALL BE TAMPED SCREENED AND FINISHED TO TRUE GRADE AND SURFACE. THE FINISH SHALL BE MADE WITH A WOOD FLOAT, FOLLOWED BY A BRUSHING WITH A WET SOFT HAIR BRUSH TO A NEAT WORKMANLIKE SURFACE. TRANSVERSE EXPANSION JOINTS 1/2 INCH WIDE SHALL BE PROVIDED AT INTERVALS NO GREATER THAN 20 FEET AND FILLED WITH PREFORMED BITUMINOUS CELLULAR TYPE JOINT FILLER. LONGITUDINAL JOINTS 1/2 INCH WIDE SHALL BE PROVIDED BETWEEN CURBS AND ABUTTING SIDEWALKS AND SHALL BE FILLED WITH PREFORMED BITUMINOUS CELLULAR JOINT FILLER. DRIVEWAY APRON, SIDEWALK AT DRIVEWAY, AND CORNER RAMPS SHALL BE 4500 PSI AIR ENTRAINED CONCRETE, SIX (6) INCHES THICK WITH 6" X 6" 10 GAUGE WIRE MESH REINFORCING.

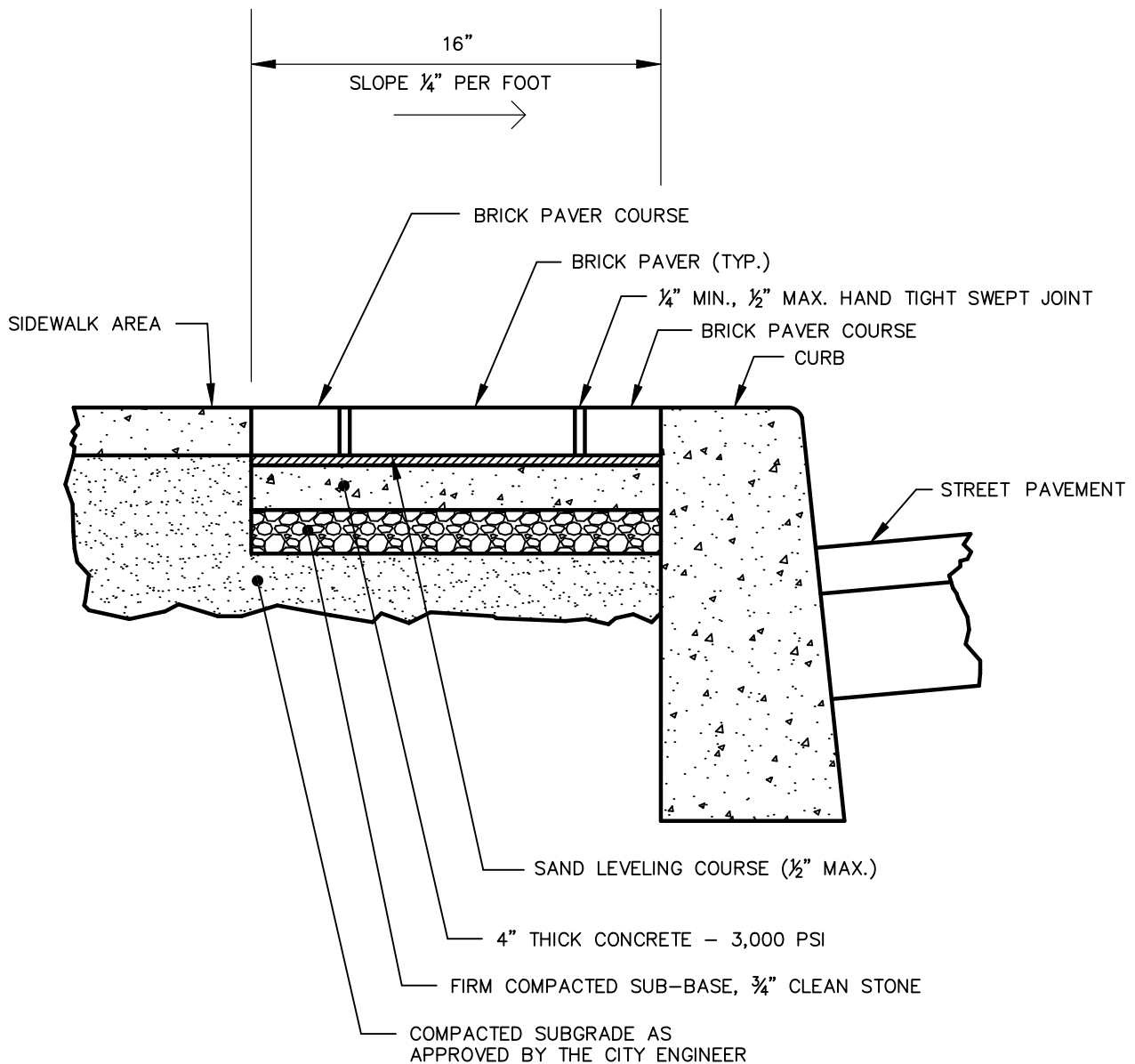
SIDEWALK DETAIL

(NOT TO SCALE)

**STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT**

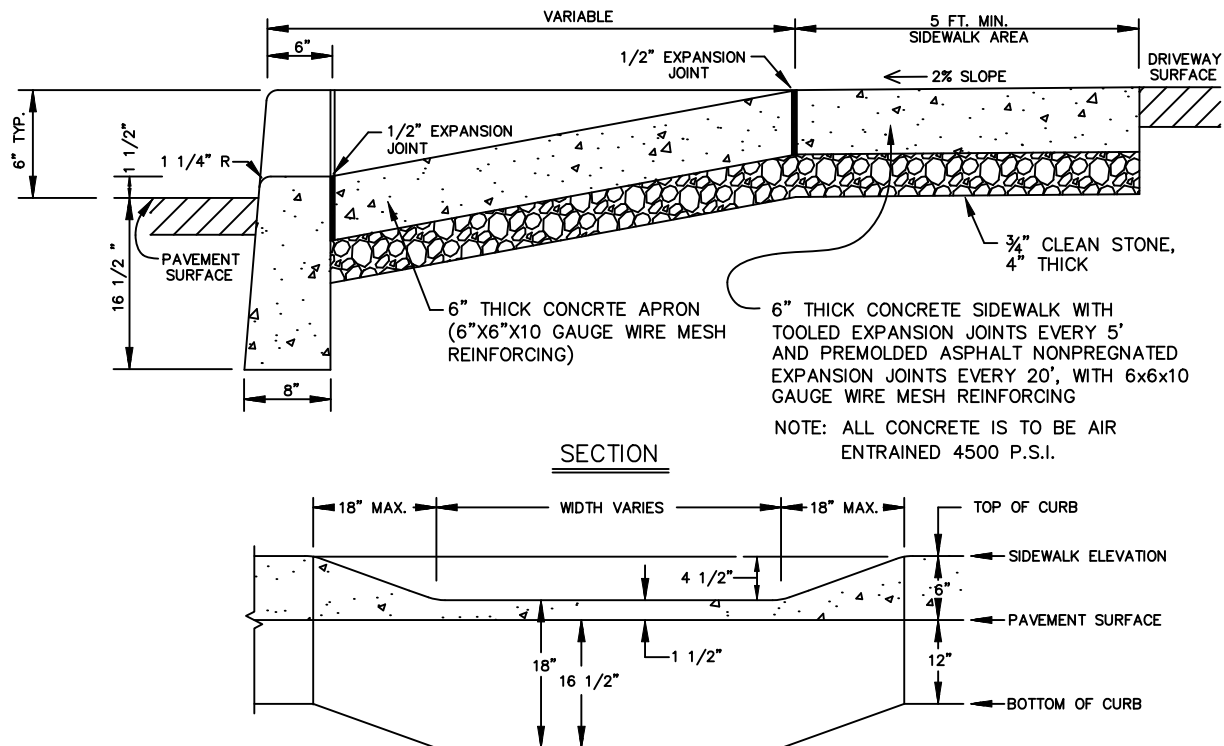


TYPICAL SIDEWALK PAVING PATTERN DETAIL
(NOT TO SCALE)



BRICK PAVER DETAIL

(NOT TO SCALE)



OPEN JOINTS SHALL BE PROVIDED AT INTERVALS OF 20 FEET AND SHALL BE FILLED WITH 1/2 INCH BITUMINOUS CELLULAR COMPRESSION JOINT MATERIAL, RECESSED 1/4 INCH FROM THE FRONT FACE AND TOP OF THE CURB.

EXPANSION JOINTS SHALL ALSO BE INSTALLED WHERE THE CURB IS ADJACENT TO SIDEWALKS AND CATCH BASINS.

CURB AT DRIVEWAYS AND ENTRANCES SHALL BE DEPRESSED SO THAT THE TOP OF THE CONCRETE IS 1 1/2 INCHES MAX ABOVE THE ADJACENT PAVEMENT.

CONCRETE SHALL BE AIR ENTRAINED, 4500 P.S.I. AT 28 DAY TEST.

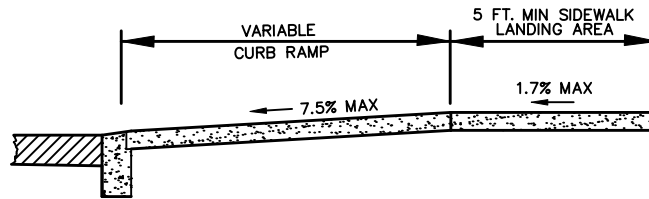
NEW CONCRETE CURB OR SIDEWALK SHALL NOT ABUT EXISTING SLATE CURB OR SIDEWALK UNLESS AUTHORIZED BY THE CITY ENGINEER.

FACE FORMING IS NOT PERMITTED. DOUBLE CURB FORMS MUST BE USED.

DRIVEWAY DEPRESSED CURB DETAIL

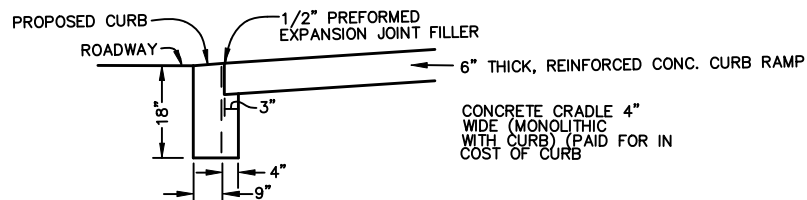
(NOT TO SCALE)

**STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT**



SECTION THROUGH CURB RAMP

N.T.S.



DETAIL OF DROPPED CURB AND CRADLE

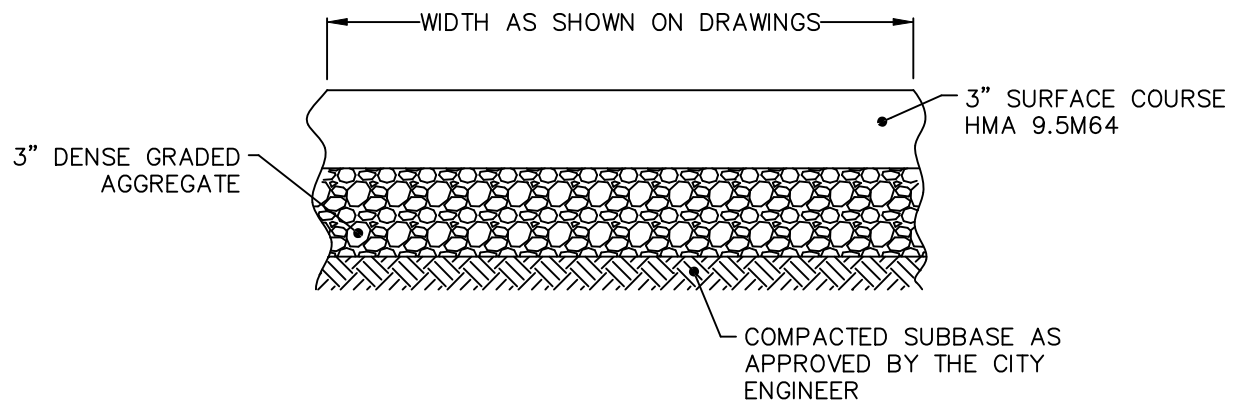
N.T.S.

1. LANDING AREA, APPROACH SIDEWALK TRANSITIONS, AND CURB RAMP SHALL BE KEPT CLEAR OF OBSTRUCTIONS.
2. ALL CURB RAMPS, LANDINGS, FLARED SIDES AND IMMEDIATELY ADJACENT SIDEWALKS SHALL BE 6" THICK WITH 6X6X10 WELDED WIRE FABRIC REINFORCING.
3. THE FLARED SIDES OF A RAMP SHOULD BE 1:10 SLOPE.
4. CURB GUTTERLINE TO BE FLUSH WITH ROADWAY PAVEMENT A MINIMUM OF 5 FEET AT ALL CURB RAMPS.
5. THE PUBLIC SIDEWALK CURB RAMP DELINEATION SHALL HAVE TRUNCATED DOMES, SAFETY RED IN COLOR, 2' X 5' MIN.
6. RAMP AND LANDING TO HAVE MAX 1.7% CROSS SLOPE AS WELL.
7. USE ONLY WHERE INDICATED ON THE PLANS.

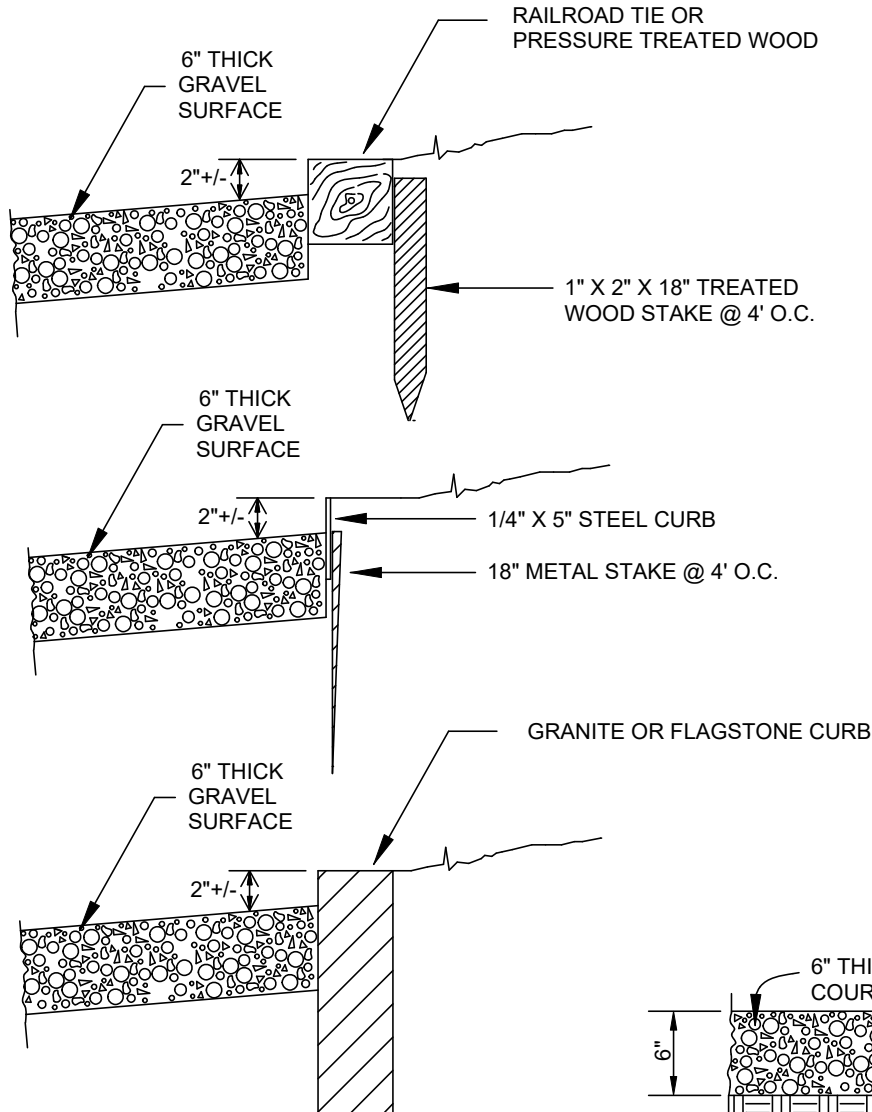
SPECIAL CURB DETAIL

(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**



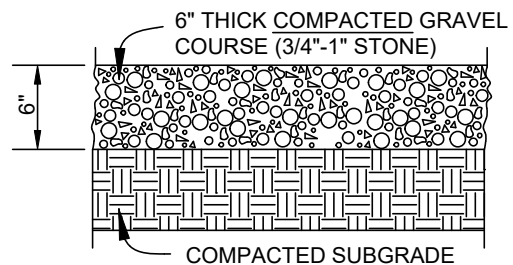
DRIVEWAY PAVEMENT DETAIL/CROSS-SECTION
(NOT TO SCALE)



* NOTE: OTHER EDGING MATERIAL MUST BE APPROVED BY THE CITY ENGINEER

EDGING DETAIL for GRAVEL LOTS

(NOT TO SCALE)



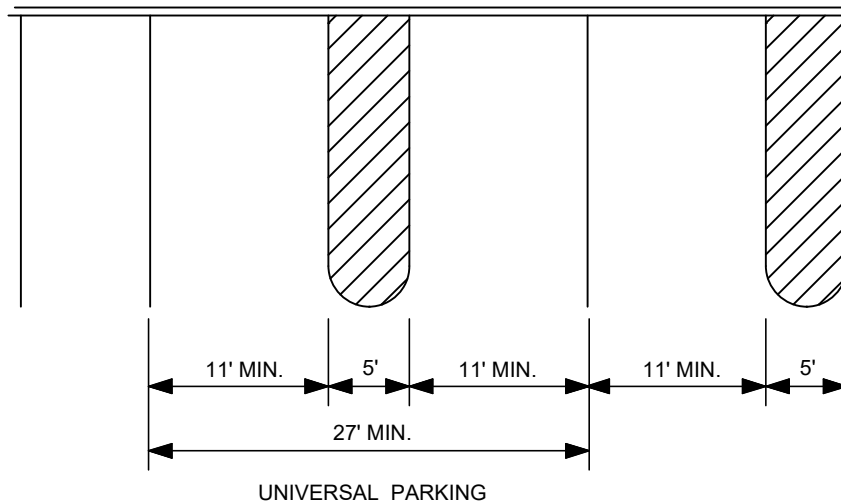
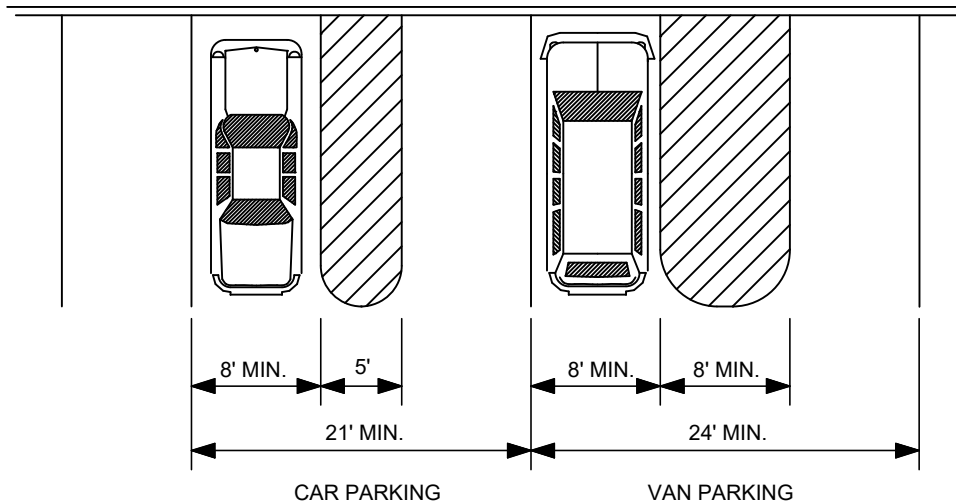
GRAVEL SURFACE DETAIL

(NOT TO SCALE)

EDGING FOR PAVER OR GRAVEL DRIVEWAYS / PARKING AREAS (1-2 FAMILY RESIDENTIAL HOMES)

(NOT TO SCALE)

**STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT**



Capacity of Seating in Assembly Area	Number of Required Wheelchair Locations
4 to 25	1
26 to 50	2
51 to 300	4
301 to 500	6
over 500	6, plus 1 additional space for each total seating capacity increase of 100

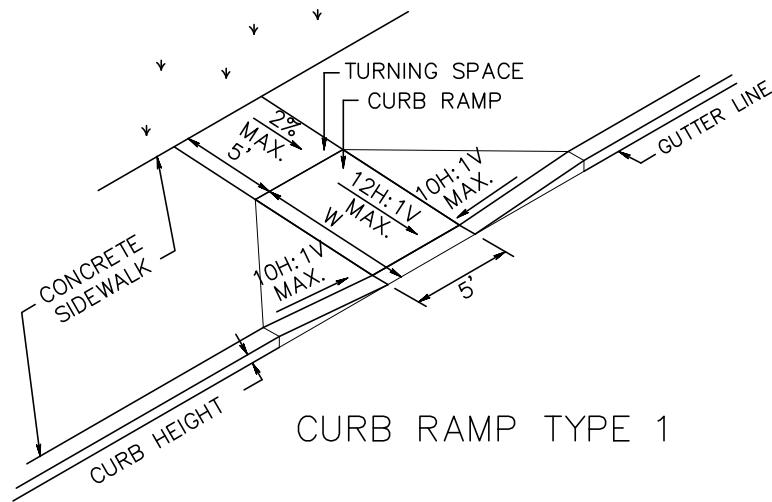
Total Parking In Lot	Required Minimum Number of Accessible Spaces
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1000	2 percent of total
1001 and over	20 plus 1 for each 100 over 1000

BARRIER FREE PARKING SPACE LAYOUT DESIGN

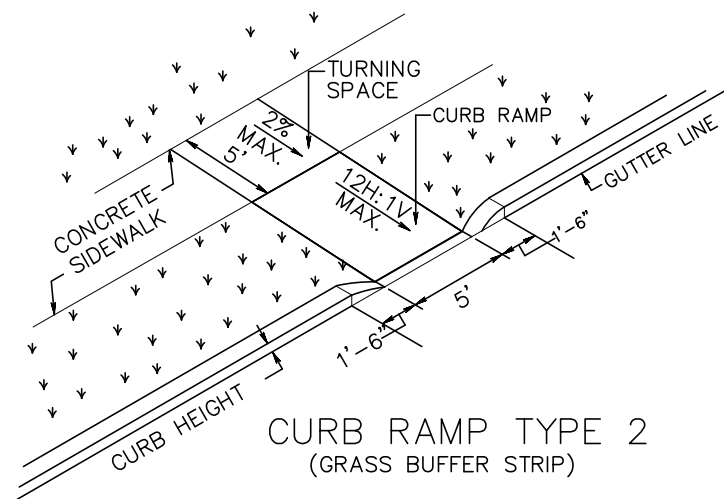
(NOT TO SCALE)

THERMOPLASTIC MATERIAL SHALL BE
USED FOR ALL MARKINGS.

2/28/07



CURB RAMP TYPE 1

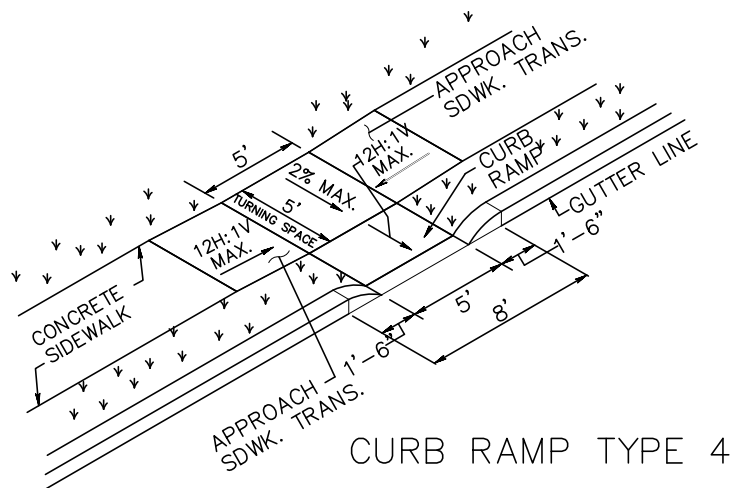
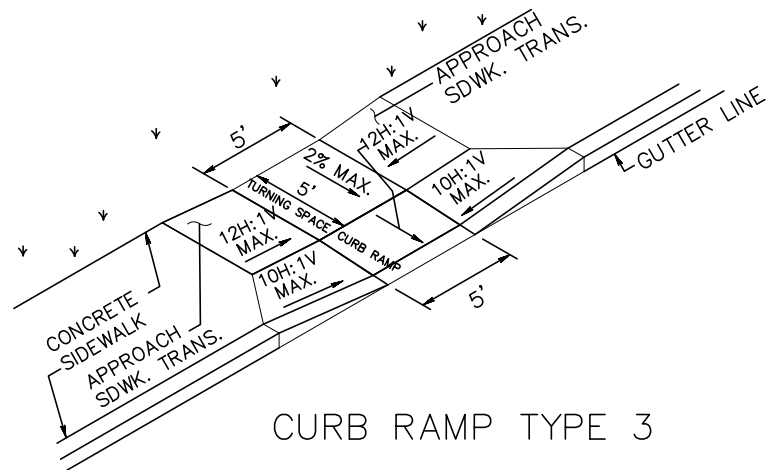


CURB RAMP TYPE 2
(GRASS BUFFER STRIP)

NOTE: ALL CONCRETE WORK WITHIN
5' OF ANY RADIUS CURB SHALL
BE 6" THICK WITH 6X6X10 WIRE
MESH REINFORCEMENT

ADA COMPLIANT RAMP - TYPE 1 AND 2

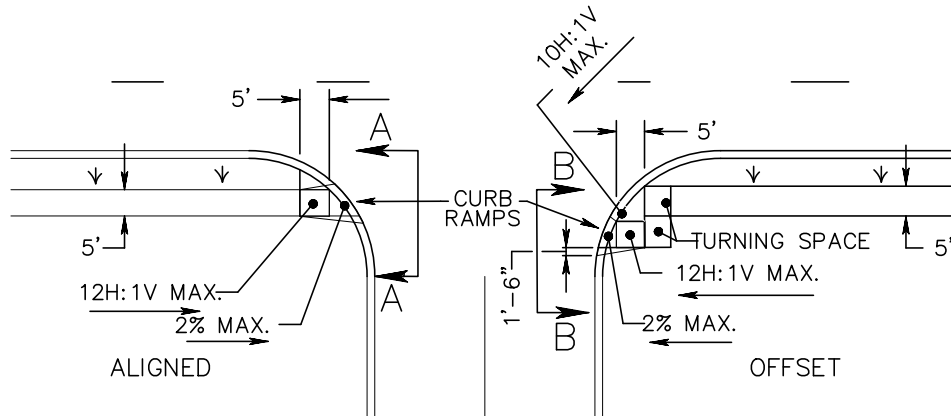
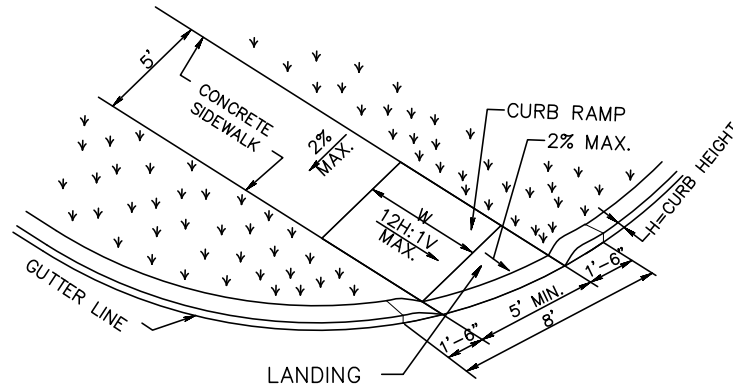
(NOT TO SCALE)



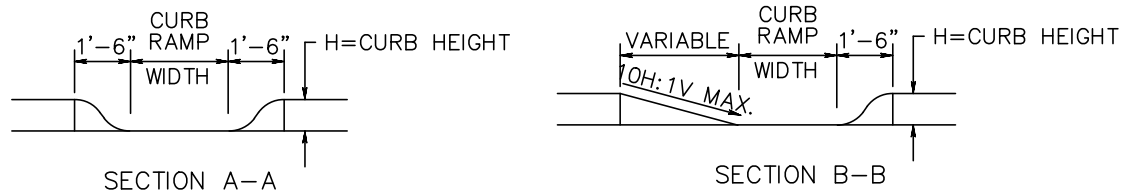
NOTE: ALL CONCRETE WORK
SHALL BE 6" THICK WITH 6X6X10
WIRE MESH REINFORCEMENT

ADA COMPLIANT RAMP - TYPE 3 AND 4

(NOT TO SCALE)



CURB RAMP TYPE 5



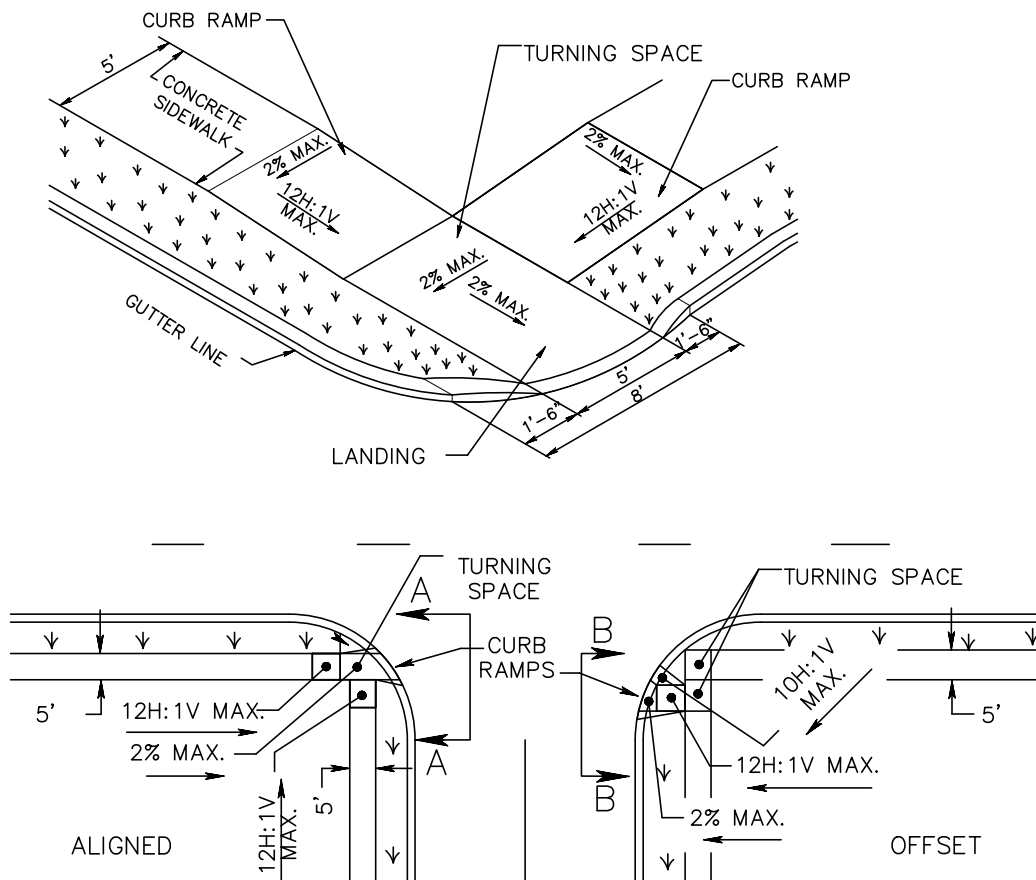
NOTE: CURB RAMP OPENING TO BE FLUSH WITH ROADWAY PAVEMENT.

NOTE: ALL CONCRETE WORK WITHIN 5' OF THE ANY RADIUS CURB SHALL BE 6" THICK WITH 6X6X10 WIRE MESH REINFORCEMENT

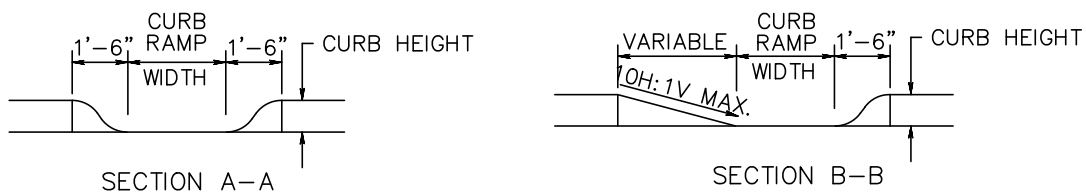
ADA COMPLIANT RAMP - TYPE 5

(NOT TO SCALE)

STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT



CURB RAMP TYPE 6



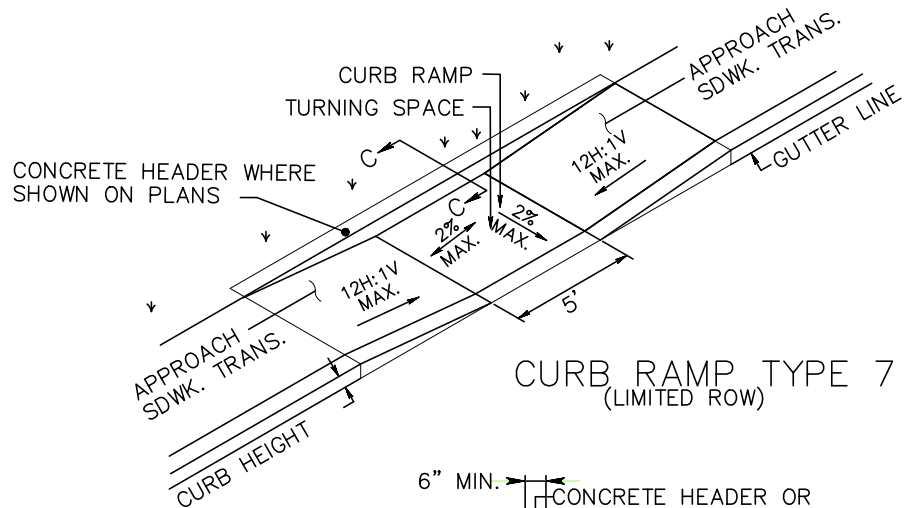
NOTE: ALL CONCRETE WORK
WITHIN 5' OF ANY RADIUS CURB
SHALL BE 6" THICK WITH 6X6X10
WIRE MESH REINFORCEMENT

NOTE: CURB RAMP OPENING TO BE
FLUSH WITH ROADWAY PAVEMENT.

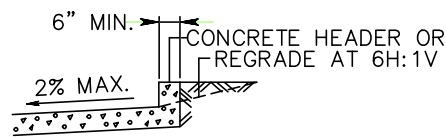
ADA COMPLIANT RAMP - TYPE 6

(NOT TO SCALE)

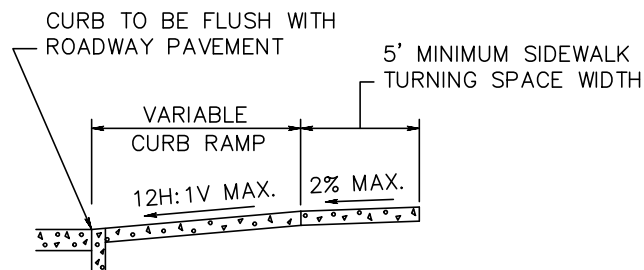
STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT



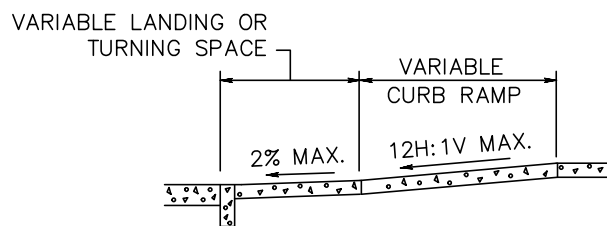
CURB RAMP TYPE 7
(LIMITED ROW)



SECTION C-C



SECTION THROUGH CURB RAMPS 1 THROUGH 4



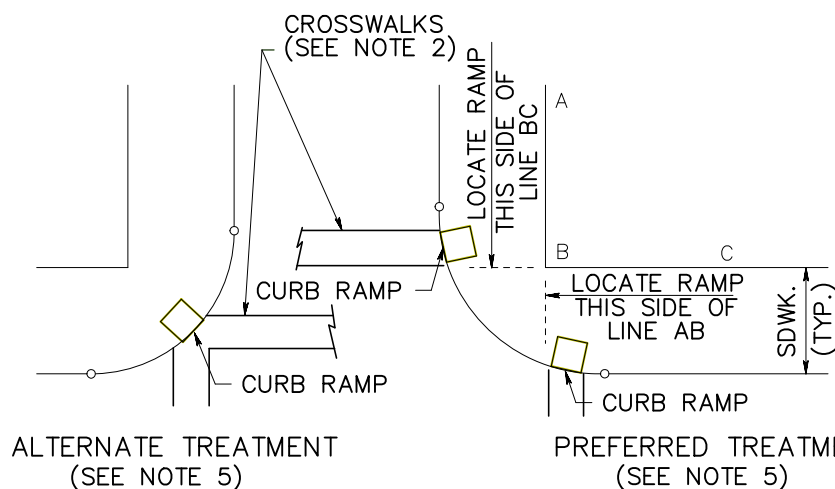
SECTION THROUGH CURB RAMPS 5 AND 6

NOTE: ALL CONCRETE WORK
WITHIN 5' OF ANY RADIUS CURB
SHALL BE 6" THICK WITH 6X6X10
WIRE MESH REINFORCEMENT

ADA COMPLIANT RAMP - TYPE 7 & SECTIONS

(NOT TO SCALE)

STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT



LOCATION OF CURB RAMP TYPES 1, 2, 3, 4, & 7 FOR CROSSING PARALLEL AND PERPENDICULAR TO HIGHWAY

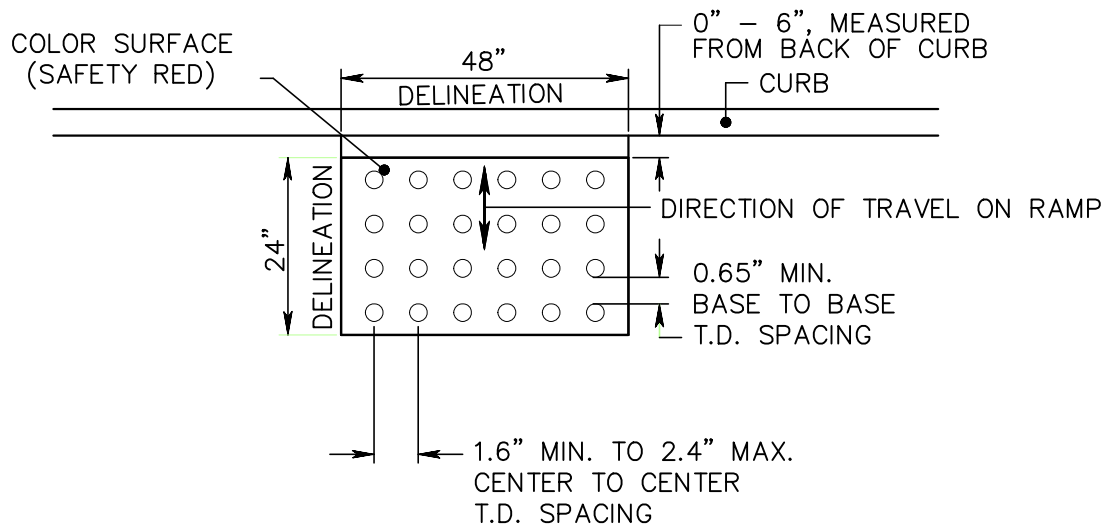
NOTES:

1. KEEP TURNING SPACE, APPROACH SIDEWALK TRANSITIONS, AND CURB RAMP CLEAR OF OBSTRUCTIONS THAT PROTRUDE ABOVE THE SURFACE.
2. CROSSWALKS AND STOP LINES MAY BE MARKED OR UNMARKED, SEE PLANS.
3. CONSTRUCT CURB RAMP TYPES 1, 2, 3, 4, & 7 PERPENDICULAR TO CURBLINE, AS SHOWN.
4. IF A CURB RAMP IS REQUIRED, THE LOCATION OF THE DETECTABLE WARNING SURFACE MUST BE AT THE BOTTOM OF THE RAMP AND WITHIN THE REQUIRED DISTANCE FROM THE BACK OF CURB.
5. IF A STANDARD DETECTABLE WARNING (DWS) SURFACE IS NOT AVAILABLE TO FIT THIS APPLICATION, AND THEREFORE ONE WILL NEED TO BE CUSTOMIZED. THE DWS SHOULD COVER THE ENTIRE WIDTH OF THE RAMP. THE ROWS OF DOMES ON THE DWS SHOULD FOLLOW THE DIRECTION OF TRAVEL OF THE RAMP SO PEDESTRIANS WHO USE MOBILE DEVICES CAN TRACK BETWEEN THE DOMES.

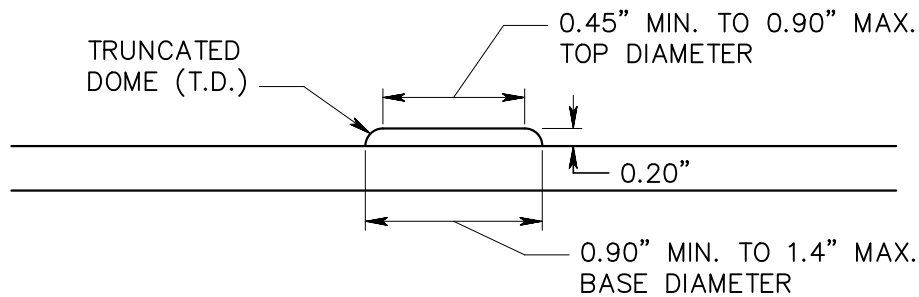
ADA COMPLIANT RAMP - SAMPLE INTERSECTION SCHEMATIC

(NOT TO SCALE)

**STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT**



PLAN VIEW



ELEVATION

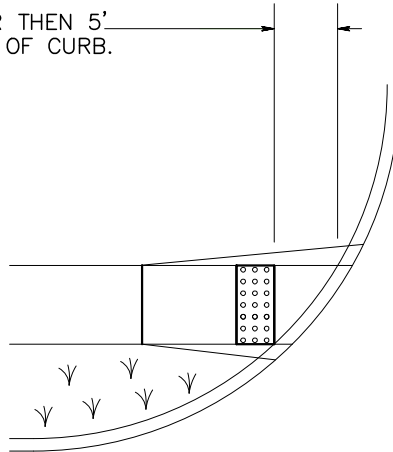
DETECTABLE WARNING SURFACE

COLOR SAFETY RED

ADA COMPLIANT RAMP - DETECTABLE WARNING SURFACE DETAIL

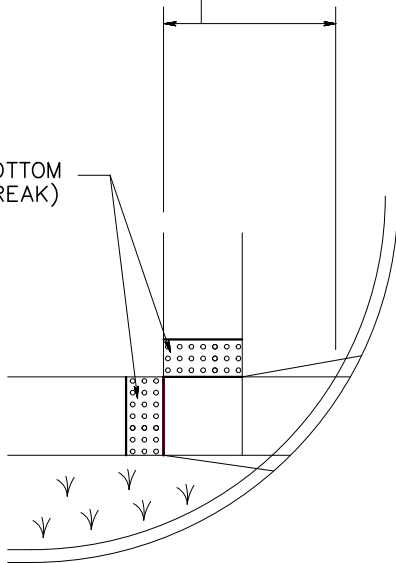
(NOT TO SCALE)

NO GREATER THEN 5'
FROM BACK OF CURB.

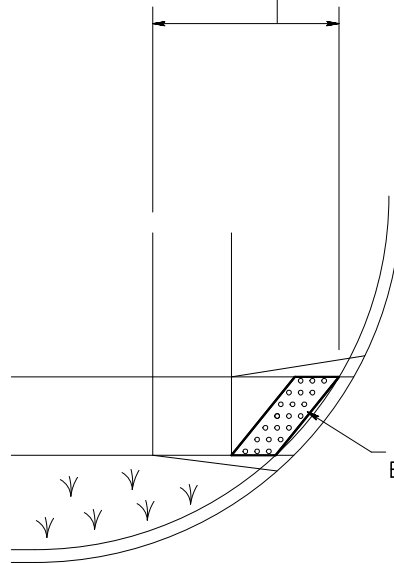


ONE OR BOTH ENDS OF THE BOTTOM
GRADE BREAKS ARE GREATER
THAN 5' FROM BACK OF CURB.

(PLACE NEXT TO BOTTOM
OF GRADE BREAK)



PREFERRED TREATMENT

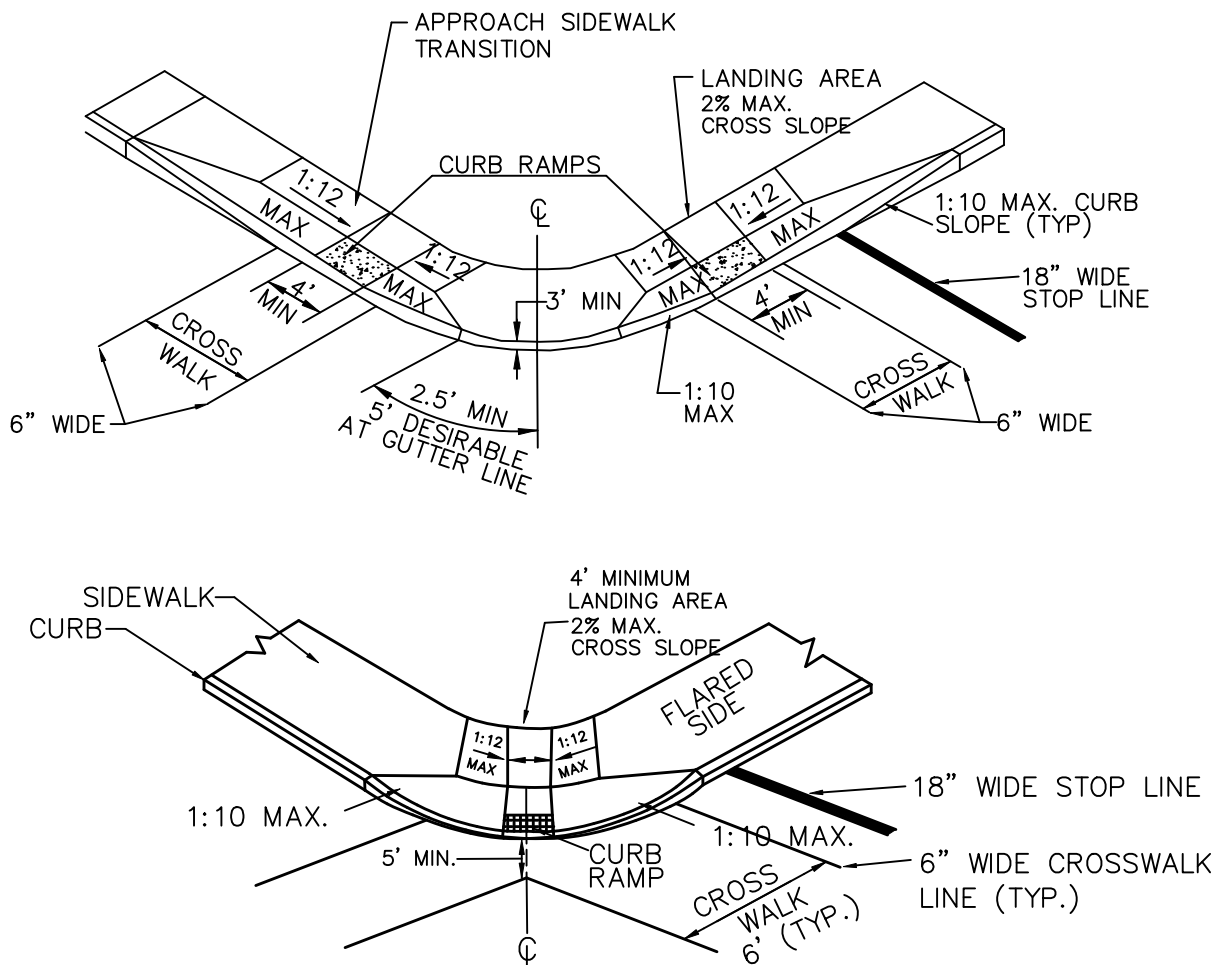


ALTERNATE TREATMENT

PLACEMENT OF DETECTABLE WARNING SURFACE FOR CURB RAMP TYPE 5 AND 6

ADA COMPLIANT RAMP - WARNING SURFACE PLACEMENT

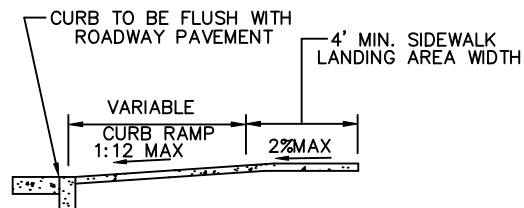
(NOT TO SCALE)



LANDING AREA, APPROACH SIDEWALK TRANSITIONS, AND CURB RAMP SHALL BE KEPT CLEAR OF OBSTRUCTIONS

DEPRESSED CURB AT GUTTERLINE SHALL BE FLUSH WITH ROADWAY PAVEMENT A MINIMUM OF 4' WITH 5' PREFERRED AT ALL CURB RAMPS.

CURB RAMP SHALL HAVE DETECTABLE WARNING SURFACE, SAFETY RED IN COLOR, 2' X 4' MIN.



SECTION AT CURB RAMP

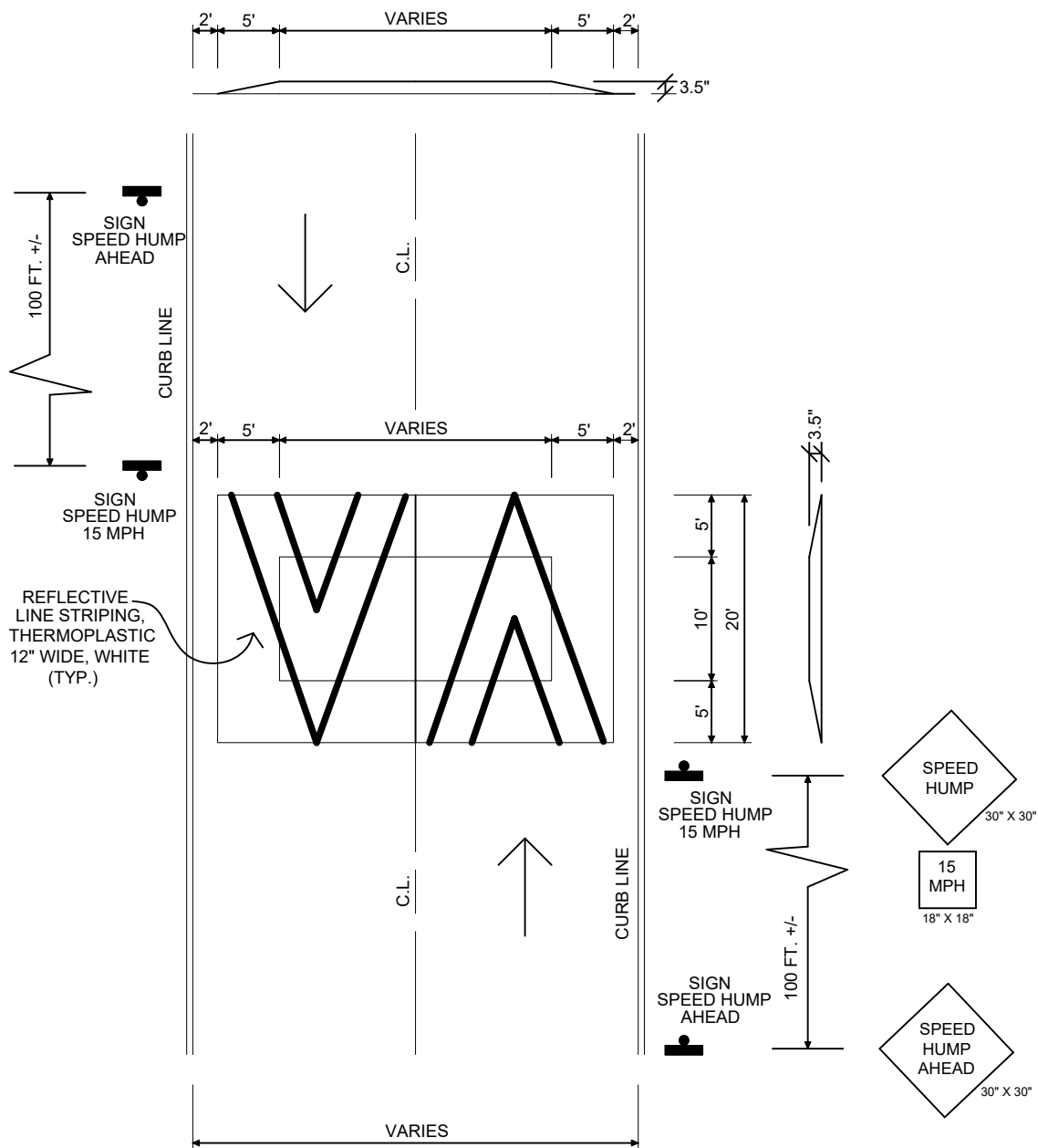
ADA RAMPS - TYPICAL LAYOUT

(NOT TO SCALE)

12/20

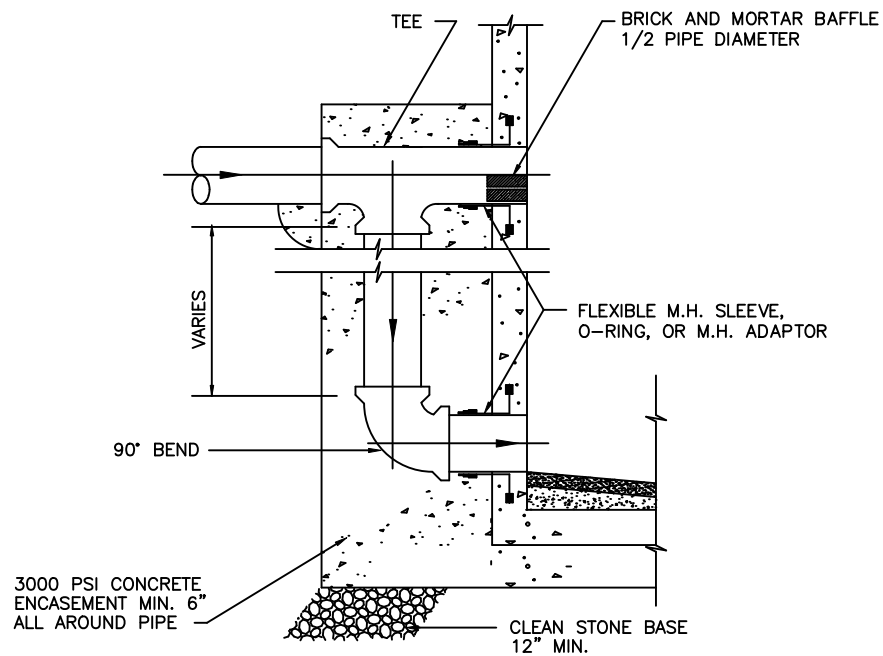
28

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**



SPEED HUMP DETAIL

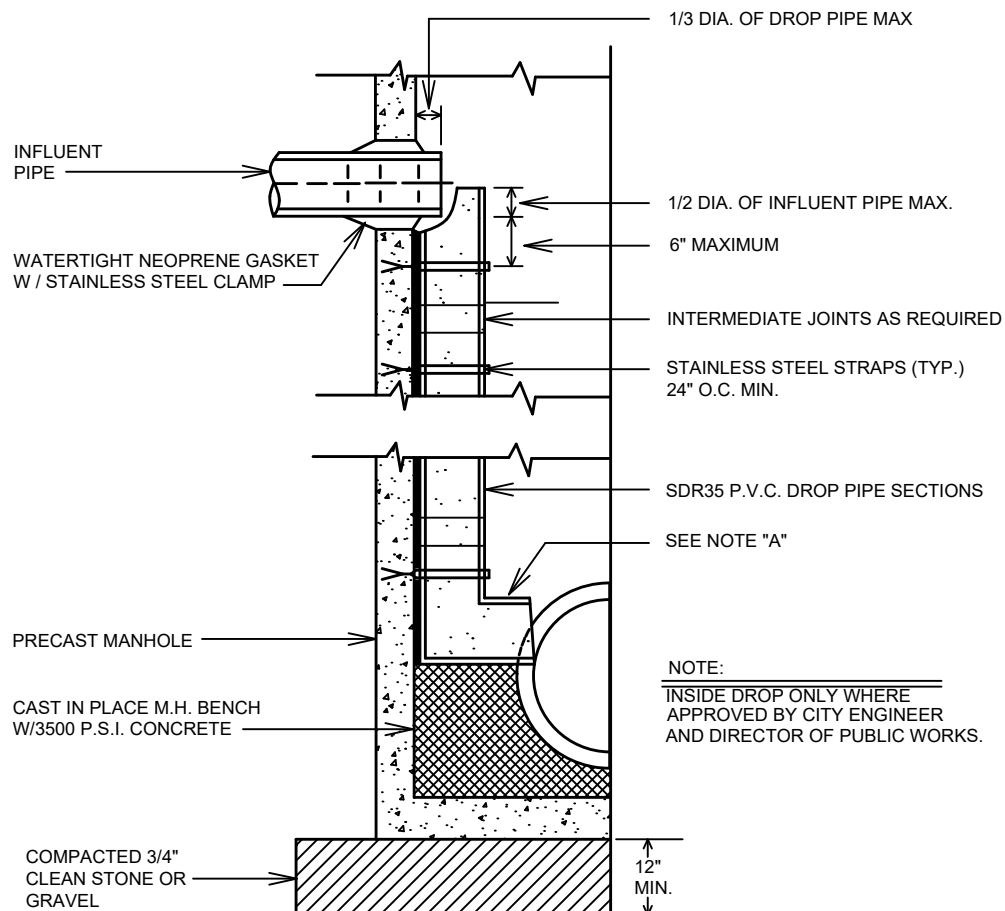
(NOT TO SCALE)



NOTE: SEE STANDARD SANITARY MANHOLE DETAIL

STANDARD OUTSIDE DROP CONNECTION DETAIL

(NOT TO SCALE)

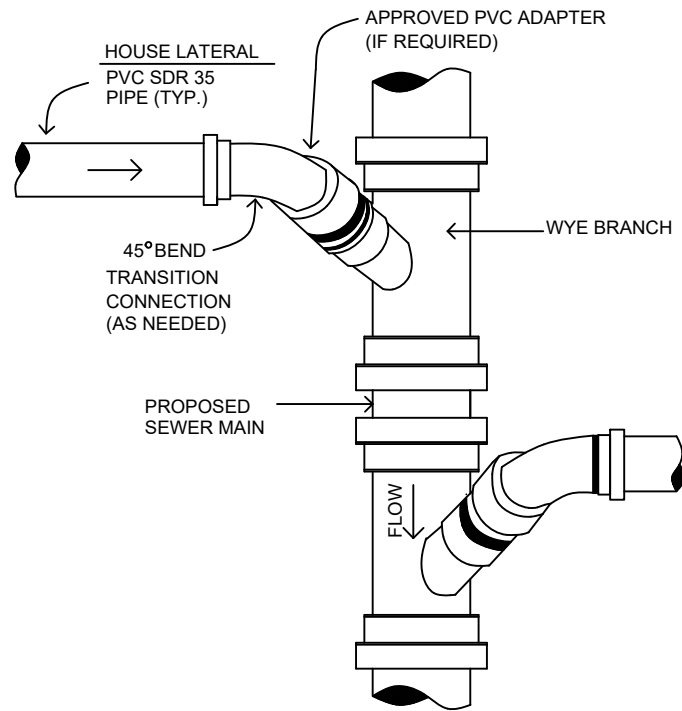


INSIDE DROP CONNECTION DETAIL

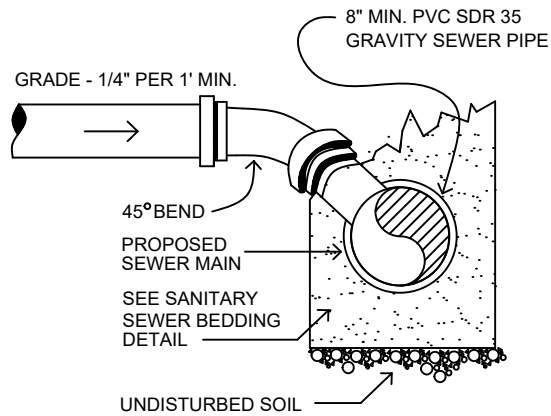
(NOT TO SCALE)

- A. INSIDE DROP CAN ONLY BE USED WHERE APPROVED BY CITY ENGINEER AND DIRECTOR OF PUBLIC WORKS.
- B. SOFFIT OF DROP PIPE ELBOW AT CHANNEL FACE IS EQUAL TO THE SOFFIT OF THE INFLUENT INTERCEPTOR PIPE. BENCH ELEVATION AT CHANNEL TO PROVIDE 3" MIN. CONCRETE COVER OVER ELBOW (3" MIN. ABOVE INFLUENT INTERCEPTOR SOFFIT ELEV.) CHANNEL EDGE ON EACH SIDE TO BE SAME ELEVATION.
- C. INFLUENT PIPE SECTION INTO MANHOLE MUST BE DUCTILE IRON.
- D. NOMINAL DIAMETER OF P.V.C. DROP SECTION TO BE EQUAL TO INFLUENT PIPE I.D. PLUS 2 INCHES (MINIMUM).
- E. STAINLESS STEEL STAPS TO BE ANCHOR BOLTED TO MANHOLE WALL IN A MANNER TO ALLOW FOR FUTURE REMOVAL. FIRST STRAP TO BE PLACED A MAXIMUM DISTANCE OF 6 INCHES BELOW THE INLET PIPE INVERT. REMAINING STRAPS TO BE A MIN. OF 24" ON CENTER AND WITHIN 6" BELOW ANY REQUIRED INTERMEDIATE JOINTS.
- F. ALL JOINTS ON DROP SECTION TO BE RUBBER GASKET OR FRICTION TYPE (SOLVENT CEMENT JOINTS PROHIBITED).

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**



PLAN

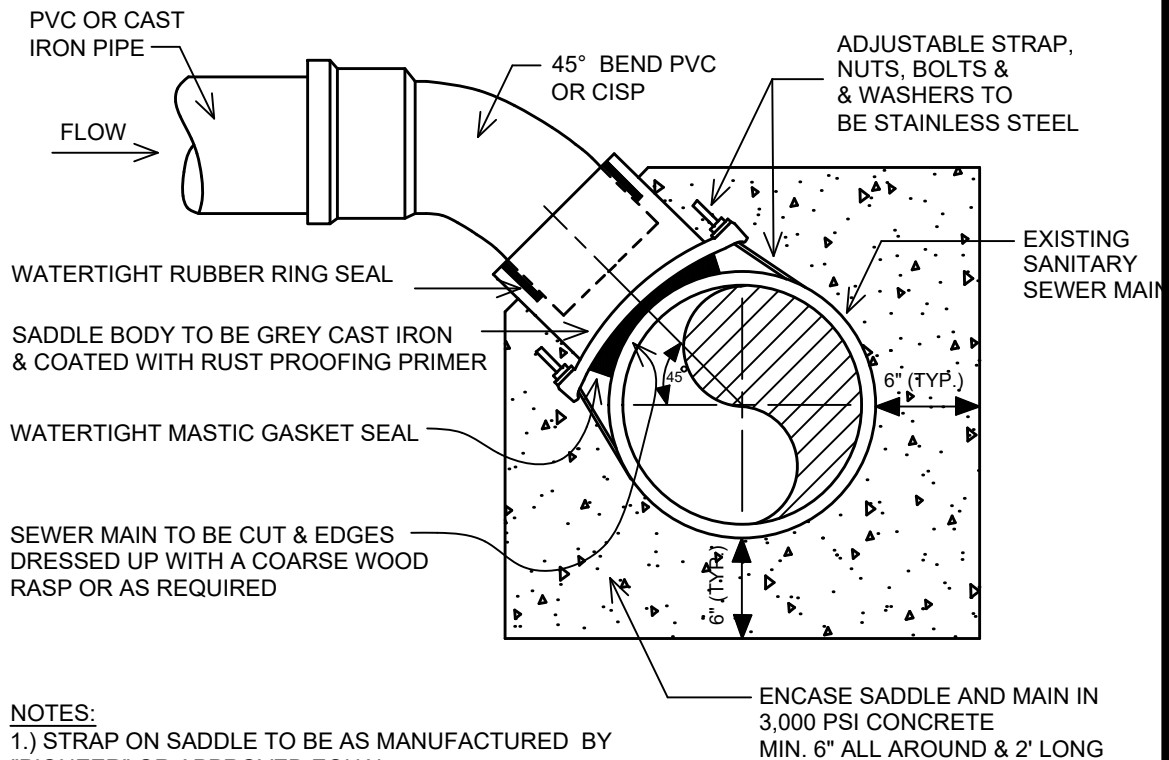


SECTION

SANITARY SEWER LATERAL DETAIL **(FOR NEW PIPE INSTALLATION ONLY)**

(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**



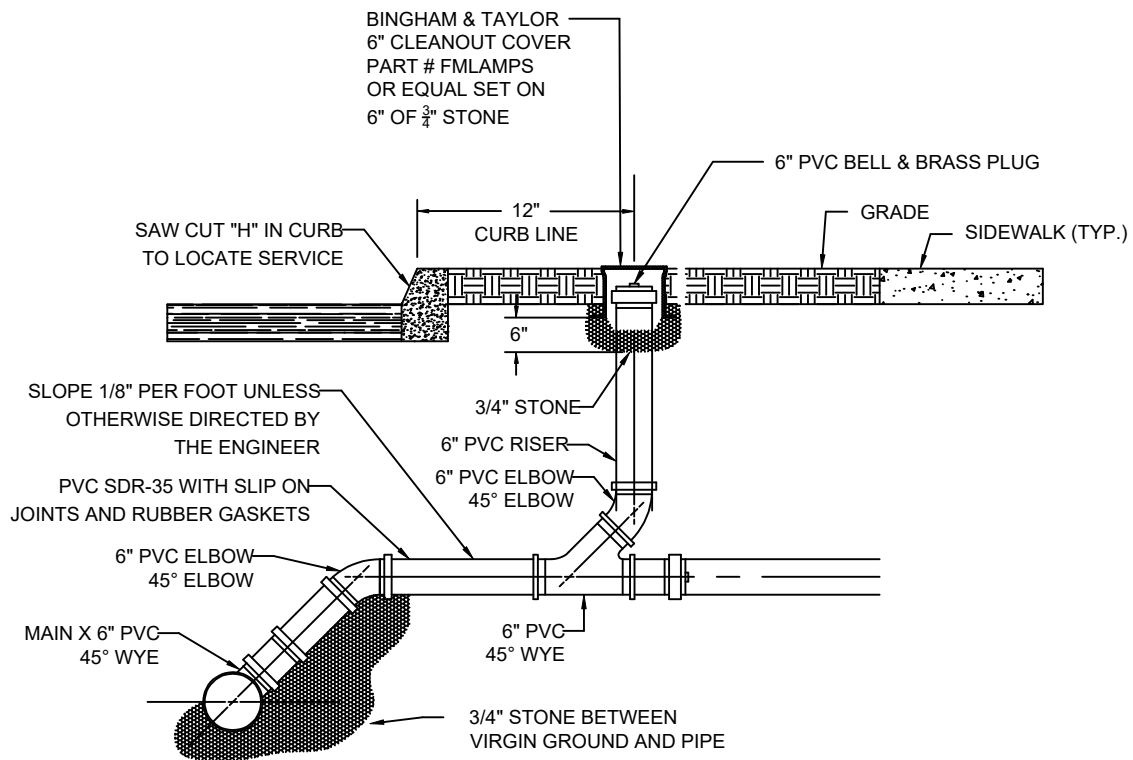
NOTES:

- 1.) STRAP ON SADDLE TO BE AS MANUFACTURED BY "PIONEER" OR APPROVED EQUAL.
- 2.) STRAP ON SADDLE TO BE USED ON EXISTING MAINS ONLY WHERE A WYE BRANCH LATERAL CONNECTION IS NOT AVAILABLE.
- 3.) CONFIRM EXISTING HOUSE LATERAL MATERIAL, PROVIDE ADAPTOR AS REQUIRED.

90° STRAP-ON SADDLE ASSEMBLY DETAIL

(NOT TO SCALE)

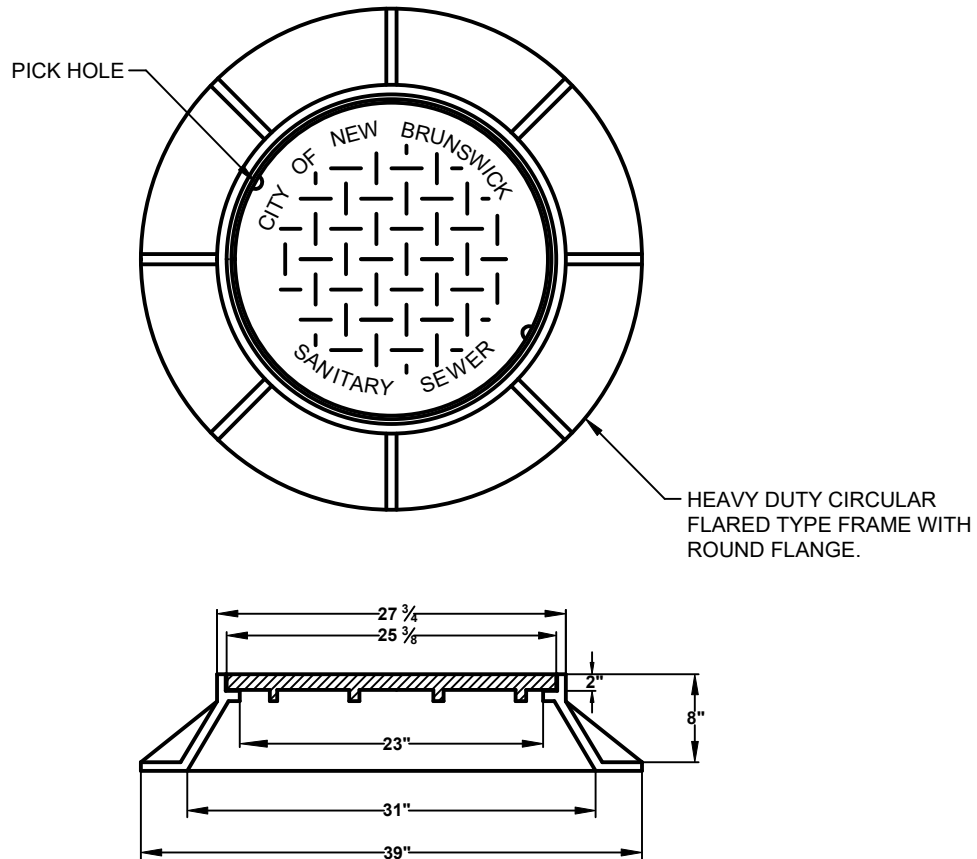
**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**



SANITARY SEWER CLEANOUT DETAIL

(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**



NOTES:

1. FRAMES AND COVERS SHALL BE CAMPBELL FOUNDRY CO. CATALOG NO. 1202B OR APPROVED EQUAL.
2. FOR USE WITHIN PUBLIC RIGHT-OF-WAY ONLY.

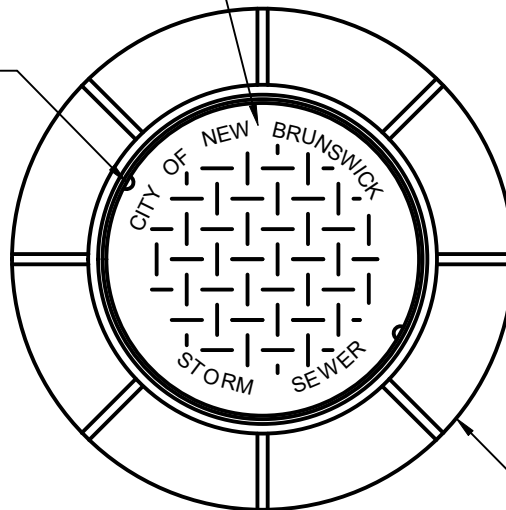
SANITARY SEWER MH FRAME AND COVER

(NOT TO SCALE)

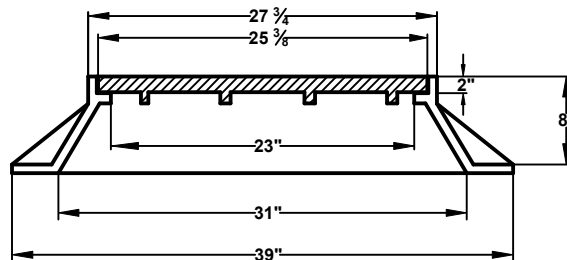
**STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT**

MH COVER TO HAVE A MIN.
OF (6) 3/4" HOLES.

PICK HOLE



HEAVY DUTY CIRCULAR
FLARED TYPE FRAME WITH
ROUND FLANGE.



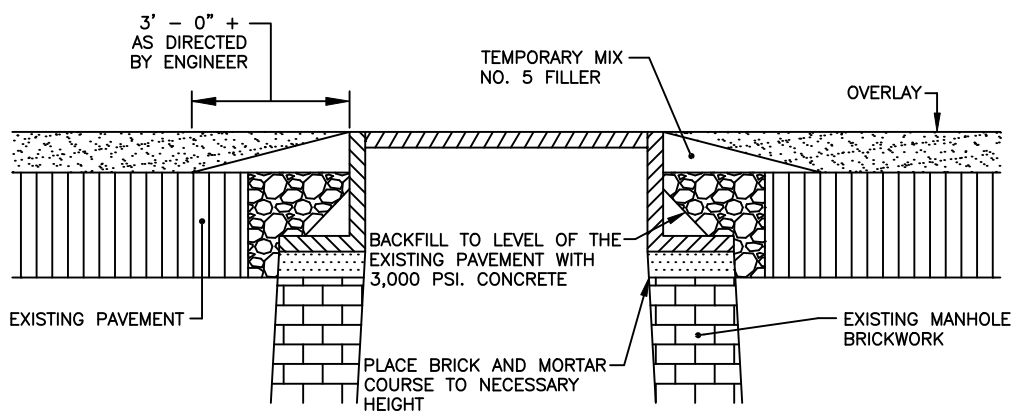
NOTES:

1. FRAMES AND COVERS SHALL BE CAMPBELL FOUNDRY
CO. CATALOG NO. 1202B OR APPROVED EQUAL.
2. FOR USE WITHIN PUBLIC RIGHT-OF-WAY ONLY.

STORM SEWER MH FRAME AND COVER

(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**

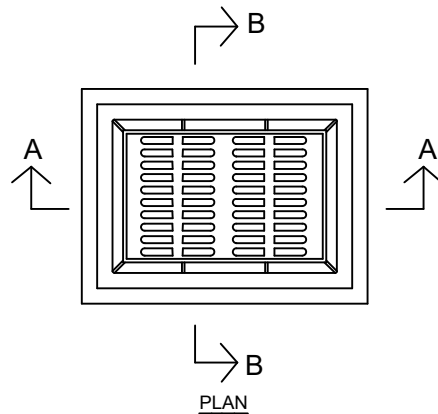


NOTE:
ALL MATERIALS MUST CONFORM TO THE NEW
JERSEY DEPARTMENT OF TRANSPORTATION
STANDARD SPECIFICATIONS FOR ROAD AND
BRIDGE CONSTRUCTION, LATEST EDITION.

RAISING EXISTING MANHOLE HEADS

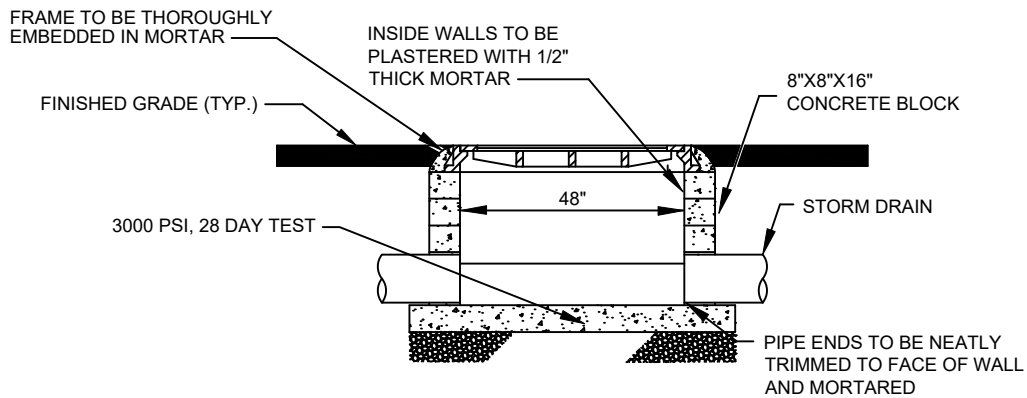
(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**

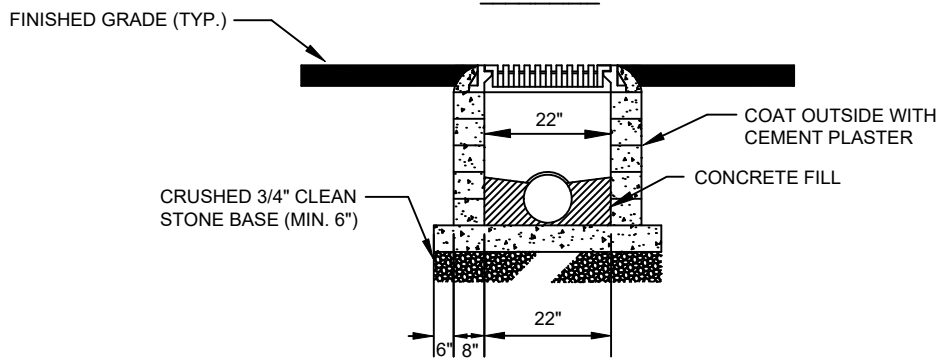


NOTES:

1. CASTING SHALL BE CAMPBELL FOUNDRY CO. PATTERN NO. 3405 OR APPROVED EQUAL.
2. GRATE MUST BE "BICYCLE SAFE".
3. GRATE TO BE EMBOSSED WITH "DUMP NO WASTE - DRAINS TO WATERWAY".



SECTION A-A

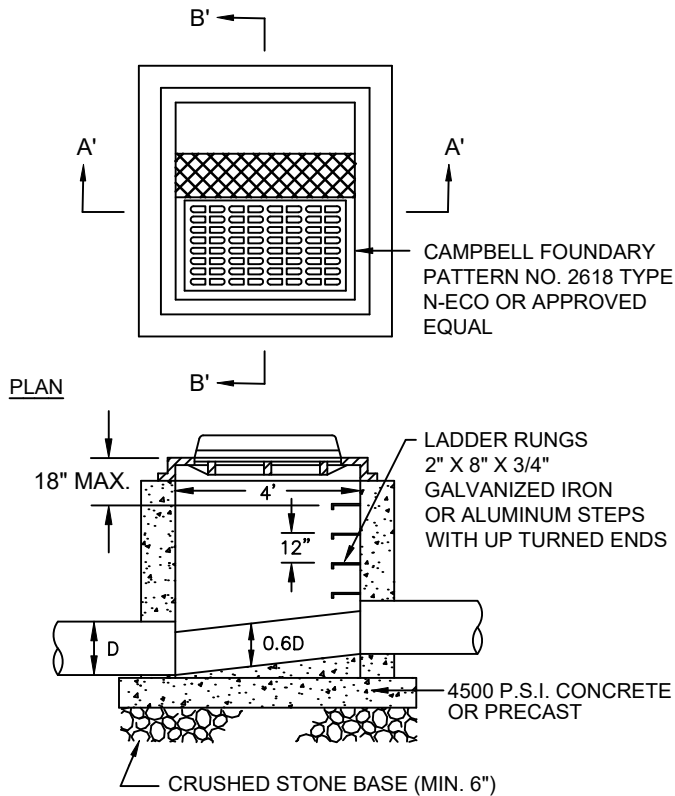


SECTION B-B

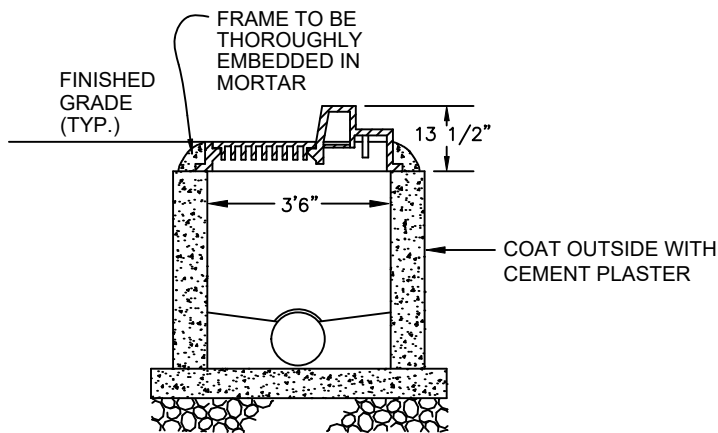
TYPICAL INLET DETAIL TYPE "A"

(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**



SECTION A'-A'



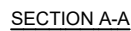
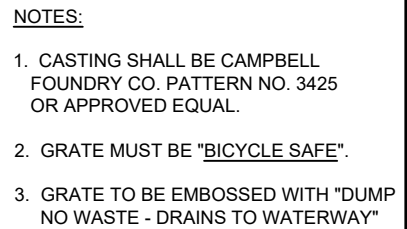
SECTION B'-B'

TYPICAL INLET DETAIL-TYPE "B"

(NOT TO SCALE)

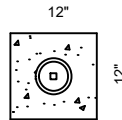
NOTES:

1. FOOTING TO BE N.J.D.O.T., CLASS "C"
2. INVERT TO BE CLASS "C" CONCRETE
3. IF WALL CONSTRUCTION IS OTHER THAN CONCRETE, THE WALLS SHALL BE PLASTERED BOTH INSIDE AND OUTSIDE WITH 1/2" THICK CEMENT PLASTER.
4. FRAME AND GRATE TO BE NO. 2618 TYPE N-ECO AS MANUFACTURED BY CAMPBELL FOUNDRY CO. OR APPROVED EQUAL.
5. PROVIDE ALUMINUM LADDER RUNGS @ 12" CENTER TO CENTER.
6. WHEN ADDITIONAL DEPTH IS SCHEDULE WALLS BELOW THE DEPTH OF 8'-0" MEASURED FROM THE INLET GUTTER TO THE INVERT, SHALL BE 12" THICK. THE FOUNDATION DIMENSIONS SHALL BE INCREASED TO 12" WIDTH AND TO 12" IN DEPTH.
7. CURB HEAD HEIGHT IS VARIABLE (4-8" DEPENDANT ON SITE CONDITIONS).
8. GRATE MUST BE "BICYCLE SAFE"
9. CURB HEAD MUST BE EMBOSSED WITH "DUMP NO WASTE - DRAINS TO WATERWAY".



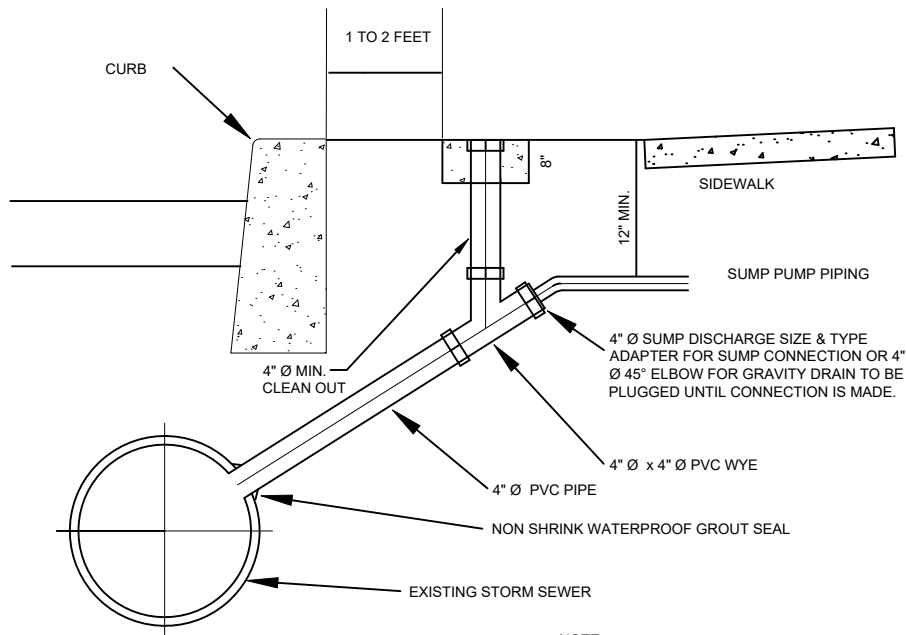
**STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT**

CONCRETE MARKER
& ENCASEMENT



PLAN VIEW OF CLEAN OUT

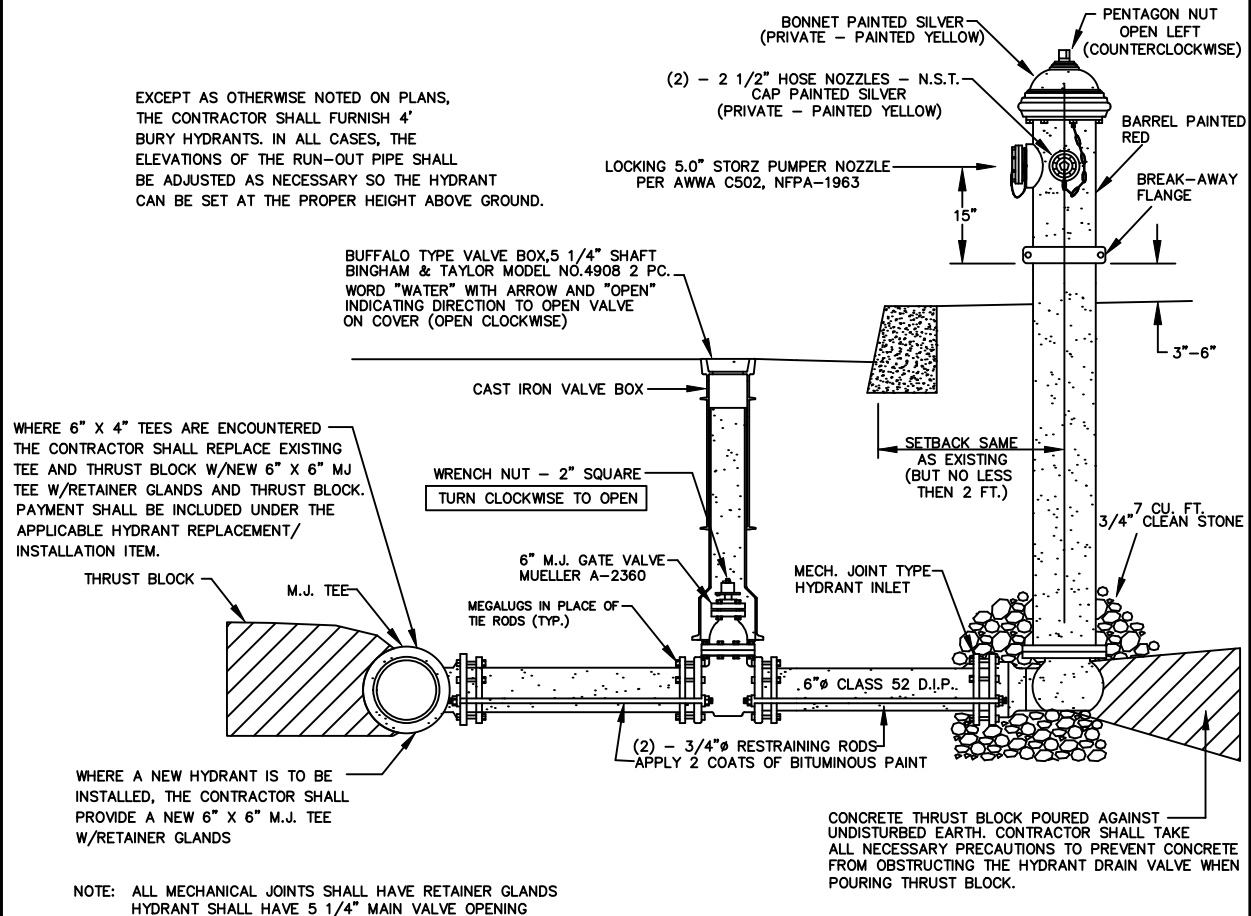
JAY R. SMITH MANUFACTURING
COMPANY MODEL 1610 FLAT STRAINER
WITH 2" DEEP BODY AND 4" OUTLET
WITH 4" Ø SOCKET x MPT PVC
ADAPTOR, OR EQUAL.



NOTE:
ALL PVC PIPE TO BE SDR-35 WITH GASKETED JOINTS

BASEMENT DRAINAGE CONNECTION

(NOT TO SCALE)

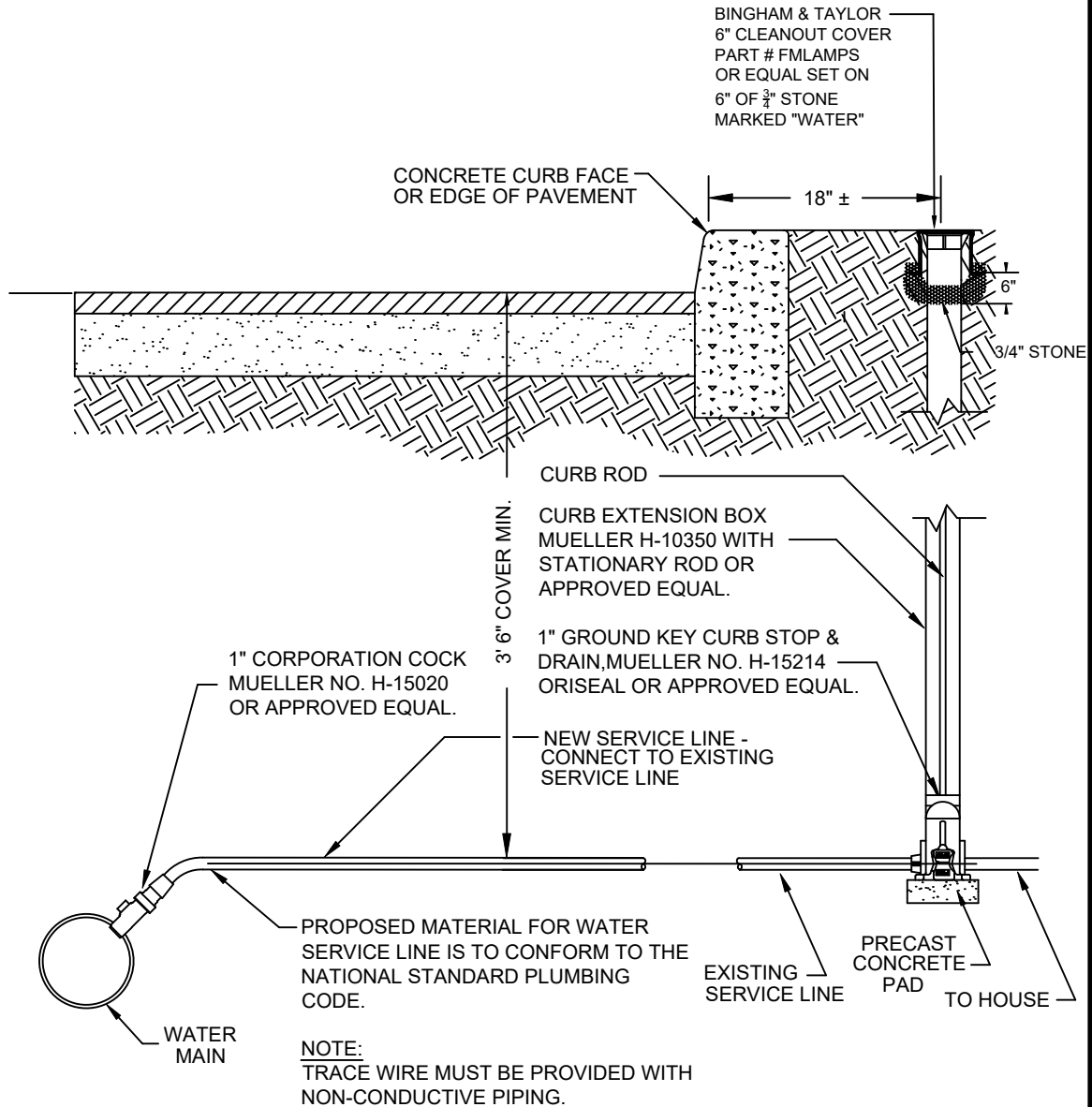


FIRE HYDRANT REPLACEMENT / INSTALLATION DETAIL

(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**

Rev. 5/20



TYPICAL SERVICE CONNECTION DETAIL

(NOT TO SCALE)

**STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT**

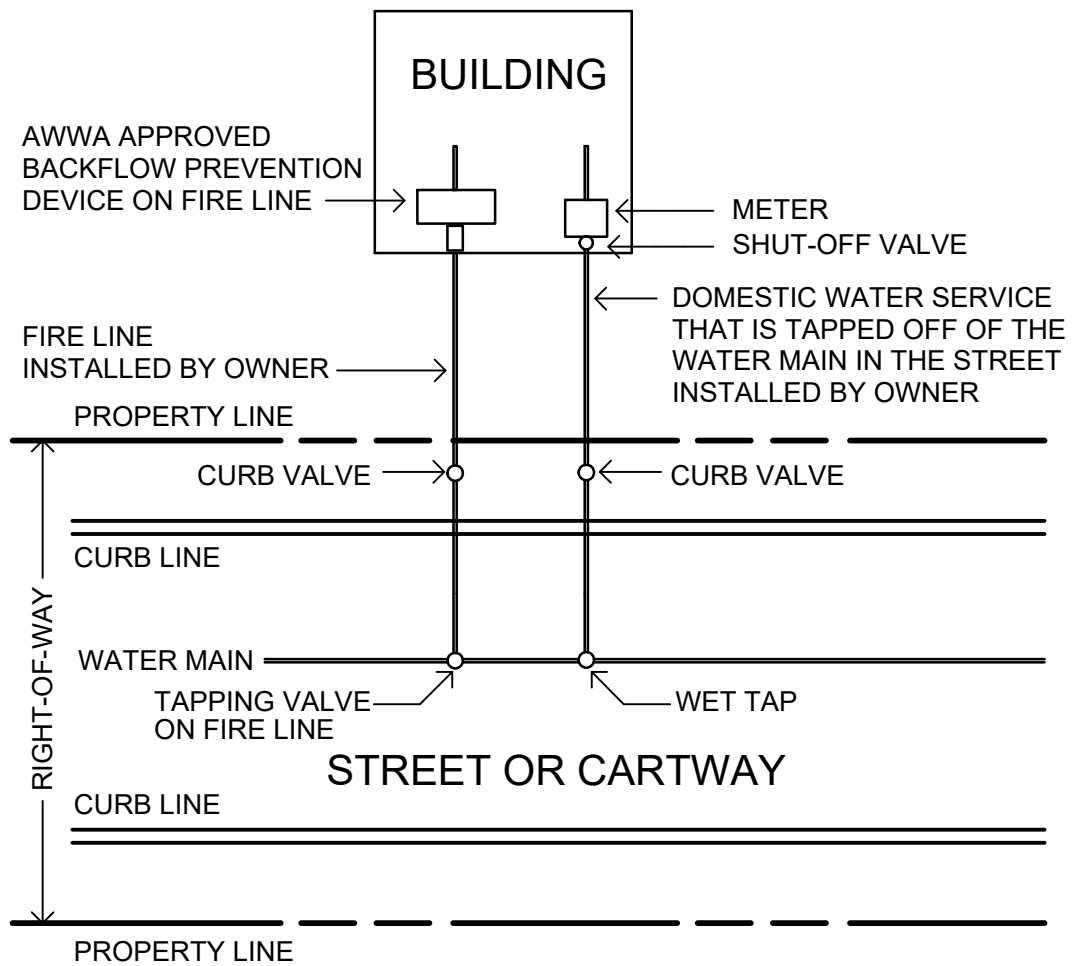
MINIMUM LENGTH (FT) TO BE RESTRAINED ON EACH SIDE OF FITTING(S)									
TYPE	PIPE SIZE								
	4"	6"	8"	10"	12"	14"	16"	18"	20"
TEES, VALVES AND DEAD ENDS	34	49	54	78	92	106	120	134	148
90° BEND	27	37	49	59	69	79	89	97	107
45° BEND	12	16	21	25	29	33	37	41	45
22-1/2° BEND	6	8	10	12	14	16	18	20	22
11-1/4° BEND	3	4	5	6	7	8	9	10	11

NOTES:

1. ALL FITTINGS SHALL BE MECHANICAL JOINT TYPE AND SHALL BE INSTALLED WITH MEG-A-LUGS (OR EQUAL).
2. RESTRAIN ALL PIPE WITHIN THE LENGTH SHOWN ON THE TABLE MEASURED FROM THE POINT OF CONNECTION.
3. WHERE TWO OR MORE FITTINGS ARE TOGETHER, USE FITTINGS WHICH YIELD THE GREATEST LENGTH OF RESTRAINED PIPE.
4. FOR PIPE ENCASED IN POLYETHELENE, INCREASE THE GIVEN VALUE BY A FACTOR OF 1.5.
5. USE TWO 45 DEGREE BENDS FOR A 90 DEGREE BEND WHERE POSSIBLE. INCREASE THE GIVEN VALUE BY A FACTOR OF 1.5.
6. ISOLATION VALVES SHALL BE TREATED AS DEAD ENDS WITH RESTRAINT ON BOTH SIDES OF THE VALVE.
7. IF LARGER PIPES ARE PROPOSED, THEN DESIGN ENGINEER SHALL PROVIDE CALCULATIONS FOR PROPER RESTRAINT LENGTH.

THRUST RESTRAINT TABLE

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**

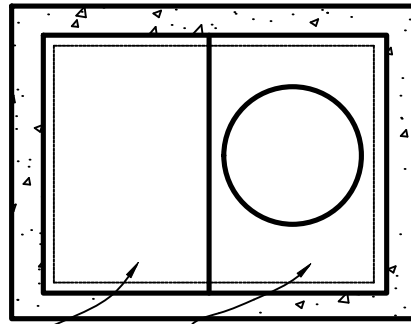


FIRE PREVENTION & METERING REQUIREMENTS DETAIL

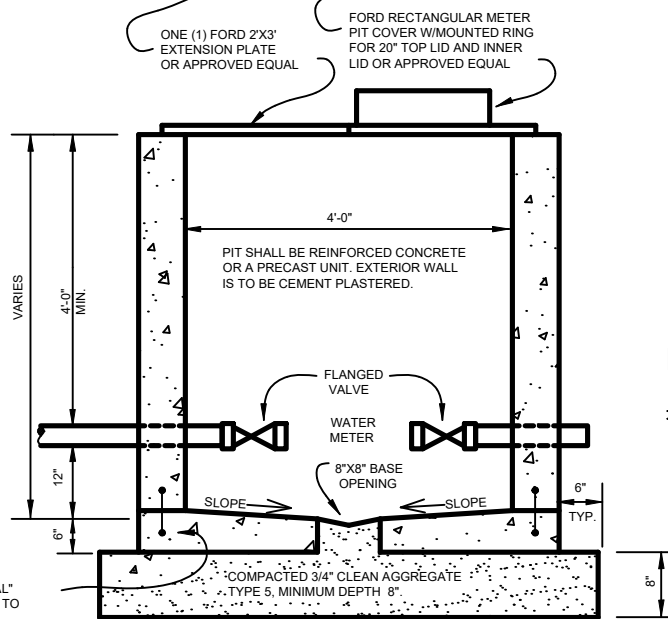
(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**

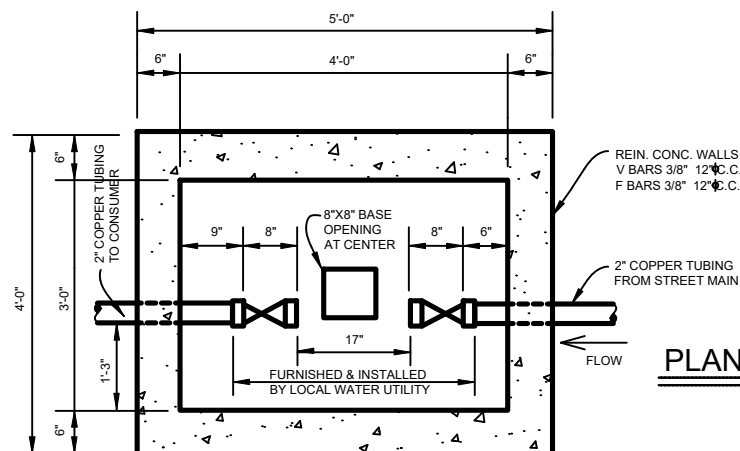
- NOTES:
- 1.) ABOVE 2" SIZE (FOR DOMSTIC OR FIRE SERVICE) OWNER SHALL FURNISH AND INSTALL METER (DETECTOR CHECK METER FOR FIRE SERVICE); MODIFY PIT DIMENSIONS AS REQUIRED.
 - 2.) METER PIT TO BE INSTALLED IN SIDEWALK AREA; STREET LOCATIONS REQUIRE APPROVED MODIFICATIONS BY CITY ENGINEER.
 - 3.) METER PIT AND ALL APPURTENANCES SHALL BE FURNISHED & INSTALLED BY CONTRACTOR UNLESS NOTED OTHERWISE.



ROOF PLAN



ELEVATION VIEW

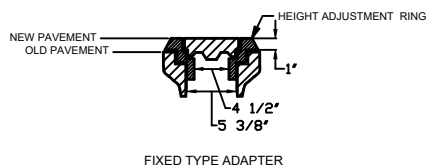
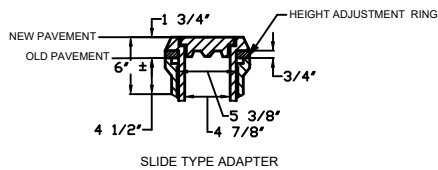


PLAN VIEW

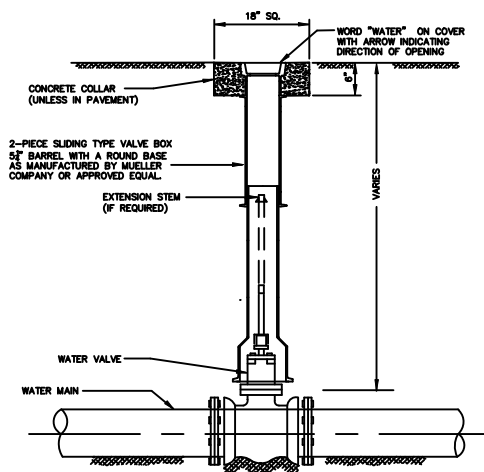
2" DIAMETER PIPE WATER METER PIT DETAIL

(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**



RAISE EXISTING VALVE BOX



NOTES:

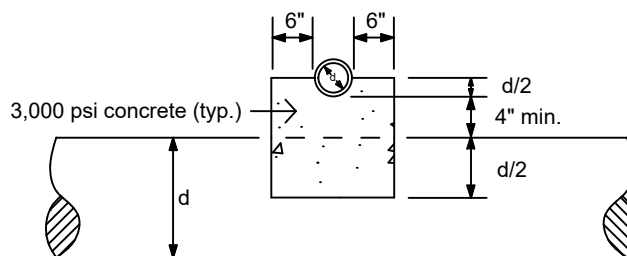
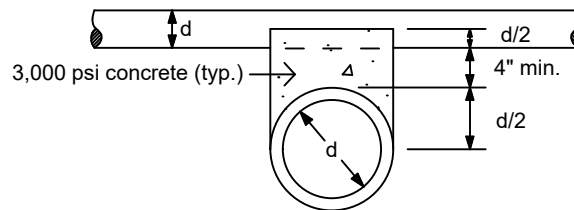
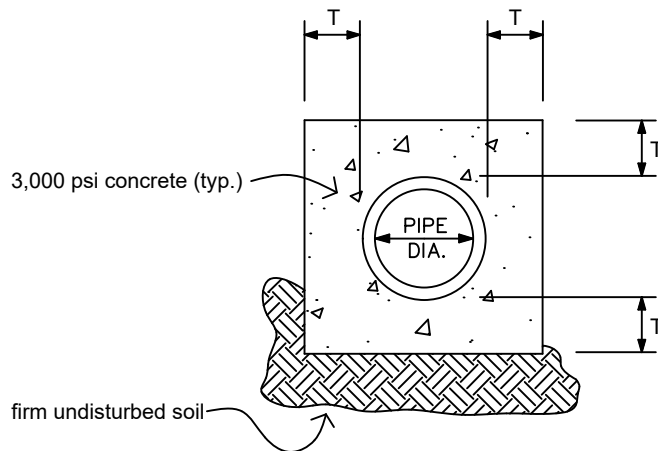
1. ALL GATE VALVES SHALL BE BRONZE DOUBLE DISK GATE VALVE MANUFACTURED IN ACCORDANCE WITH AWWA C-500. GATE VALVES SHALL BE AS MANUFACTURED BY THE MUELLER CORP. OR EQUAL.
2. IF SPECIFIED ON THE DRAWINGS THE VALVE SHALL BE RESTRAINED TO FULL LENGTHS OF PIPE ON BOTH ENDS.
3. ALL VALVES ON STUB ENDS SHALL BE RESTRAINED TO A FULL LENGTH OF PIPE ON EACH SIDE OF THE VALVE UNLESS OTHERWISE SPECIFIED.
4. ALL VALVES SHALL BE CLOCKWISE TO OPEN.
5. IF AN OPERATING NUT IS MORE THAN 4.5 FEET BELOW THE GROUND SURFACE A VALVE STEM EXTENSION MUST BE INSTALLED TO BRING IT BETWEEN 3.5 FEET AND 4.5 FEET FROM THE GROUND SURFACE.
6. VALVE STEM EXTENSIONS SHALL BE ATTACHED TO THE OPERATING NUT BY PIN CONNECTION AND HAVE A GUIDE RING. THEY SHALL BE AS MANUFACTURED BY BINGHAM AND TAYLOR OR EQUAL.

WATER VALVE BOX DETAILS

(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**

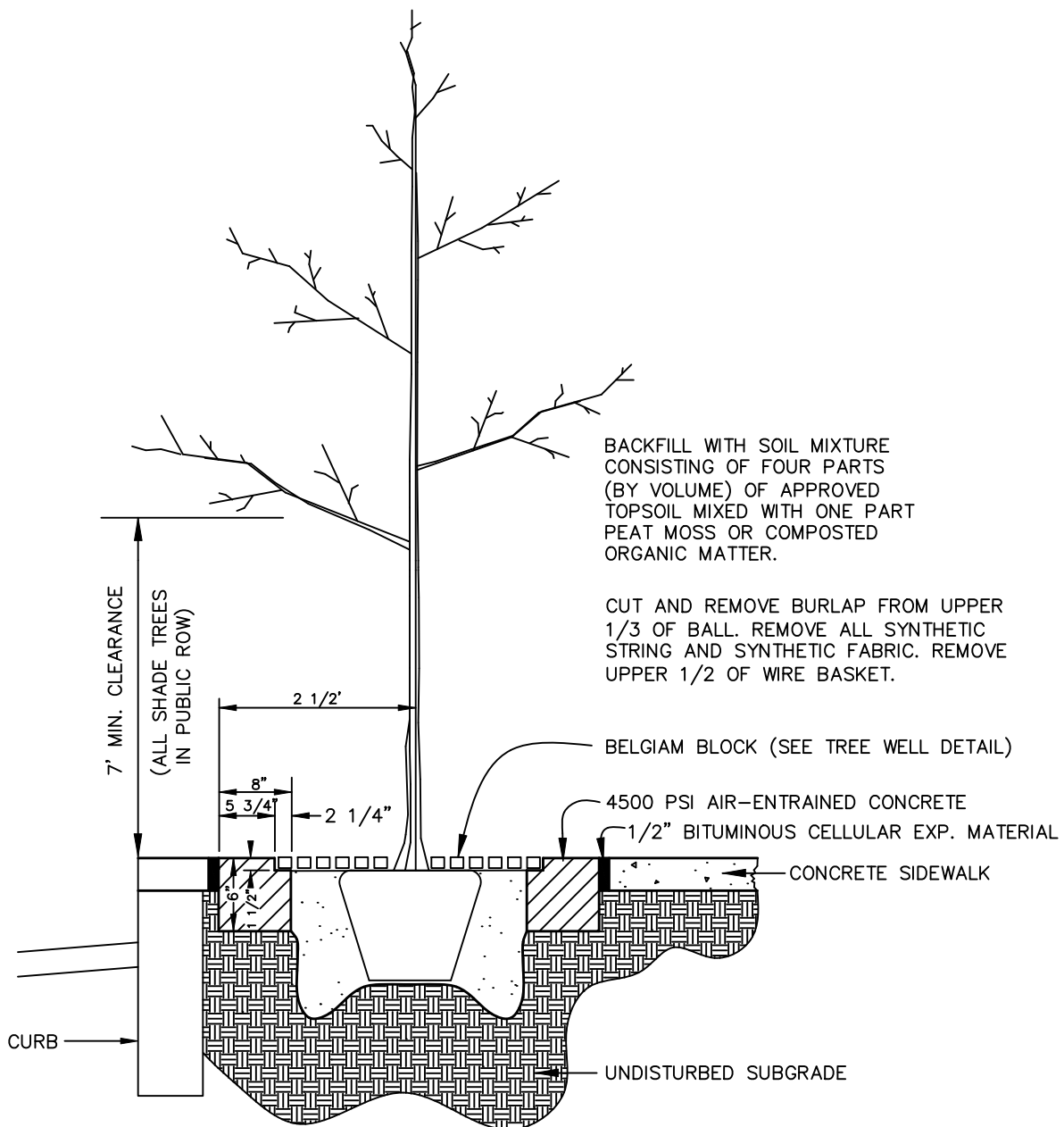
DIMENSIONS														
DIA.	6"	8"	10"	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"
T	5"	5.5"	5.5"	6"	6"	6"	6"	6"	6"	7"	8"	9"	10"	12"



CONCRETE ENCASEMENT & CRADLE DETAIL

(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**

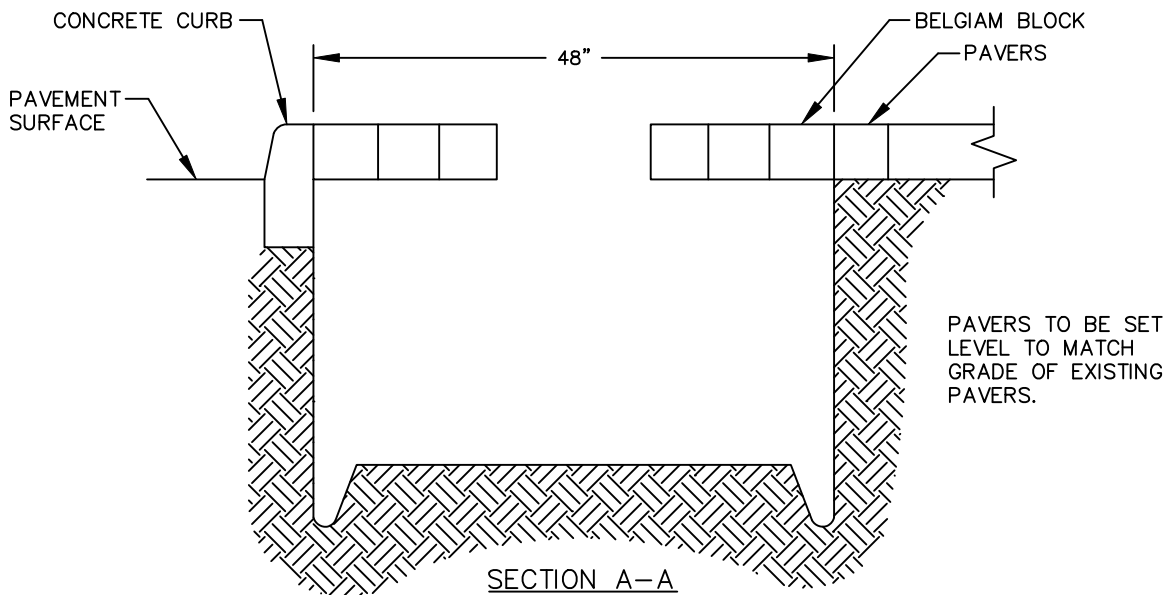
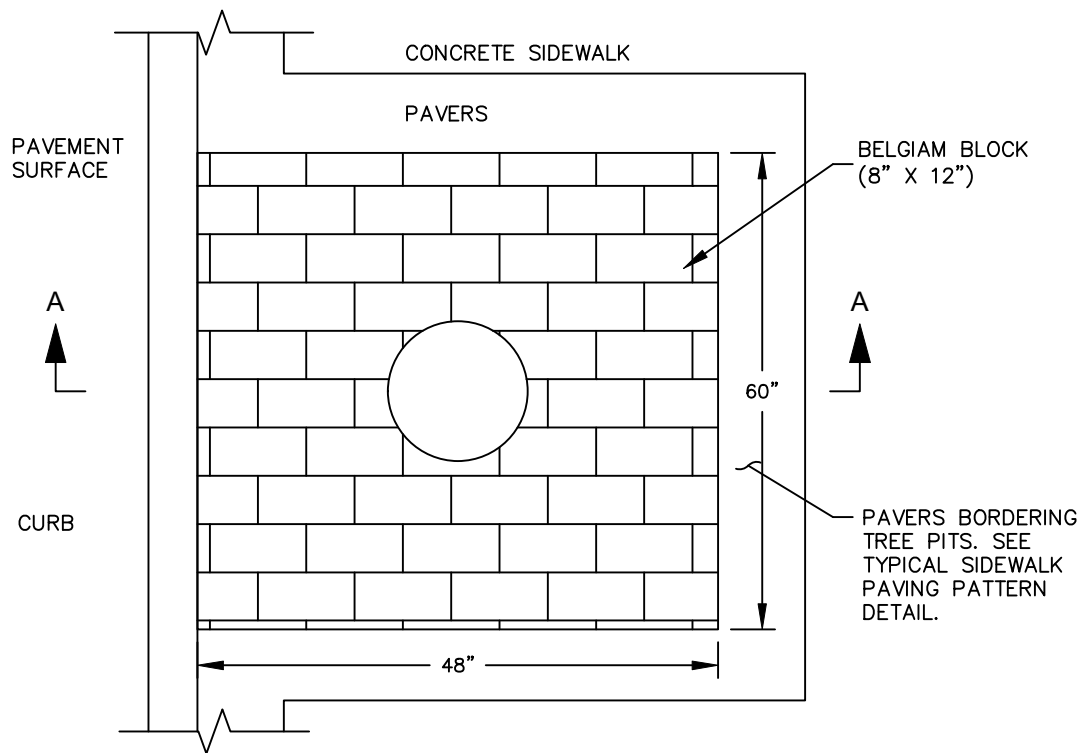


TREE GRATE PLANTING DETAIL

(NOT TO SCALE)

USE OF TREE GRATE ONLY PERMITTED
IF APPROVED BY CITY ENGINEER.

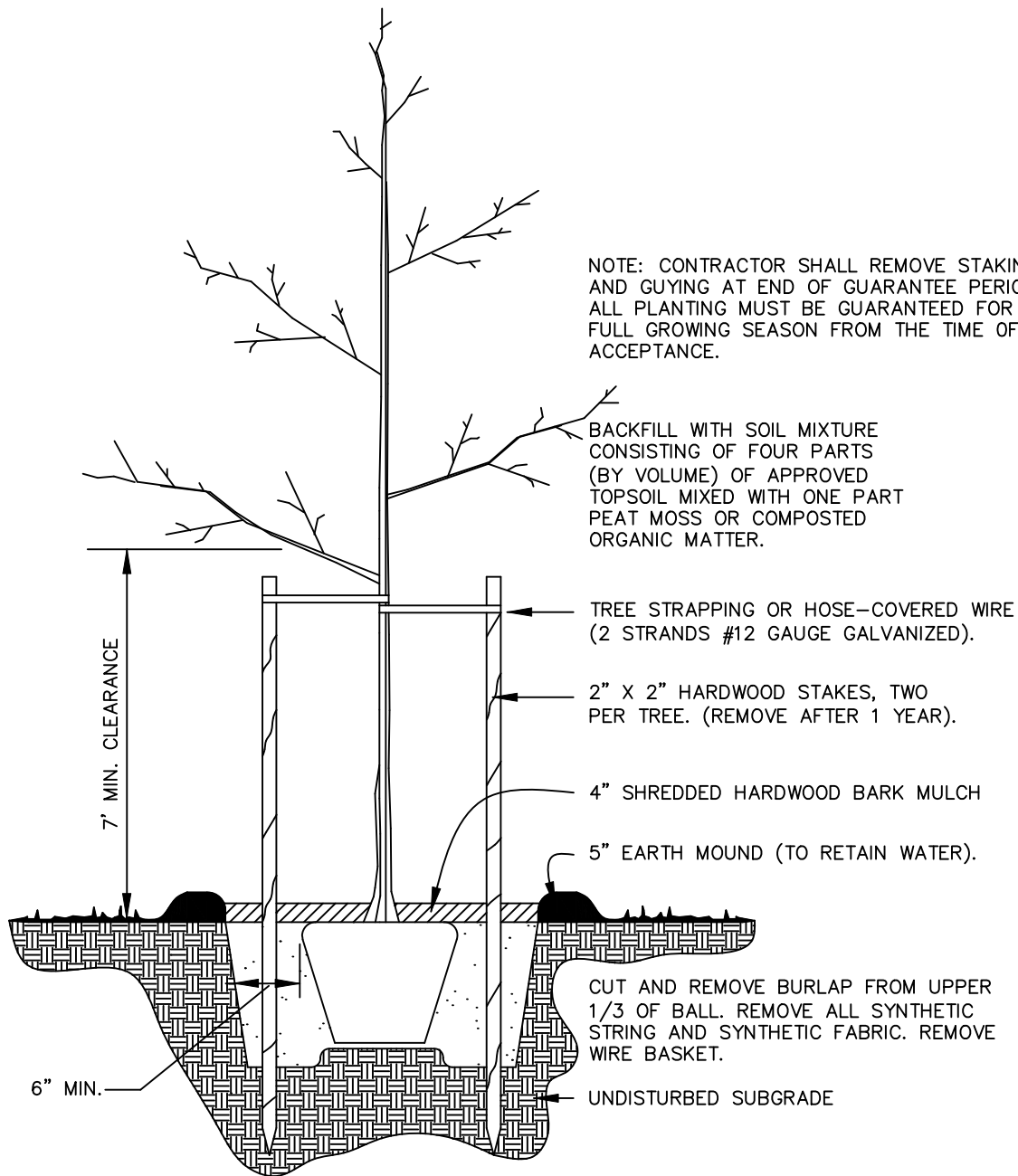
2/28/07



TREE WELL DETAIL

(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**



SHADE TREE PLANTING DETAIL

(NOT TO SCALE)

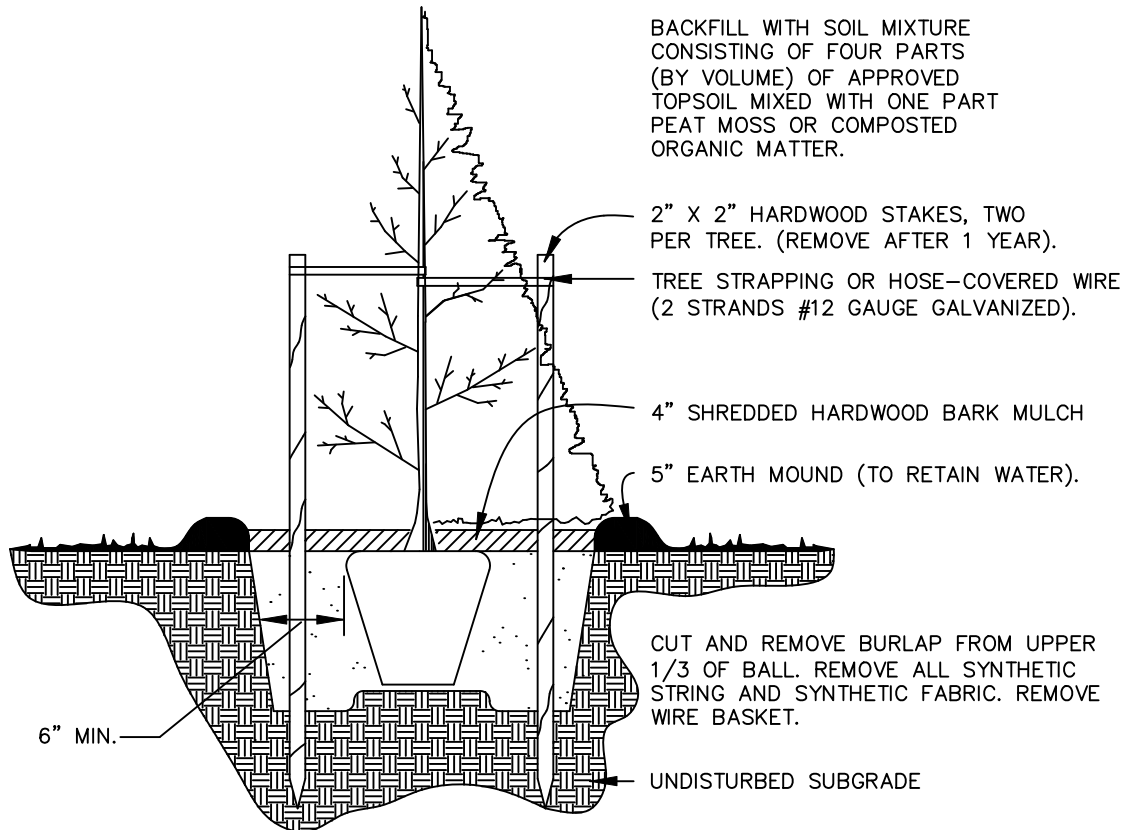
FOR STREET TREE PLANTING DETAIL, SEE TREE GRATE PLANTING DETAIL.

2/28/07

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**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**

NOTE: CONTRACTOR SHALL REMOVE STAKING AND GUYING AT END OF GUARANTEE PERIOD. ALL PLANTING MUST BE GUARANTEED FOR ONE FULL GROWING SEASON FROM THE TIME OF FINAL ACCEPTANCE.



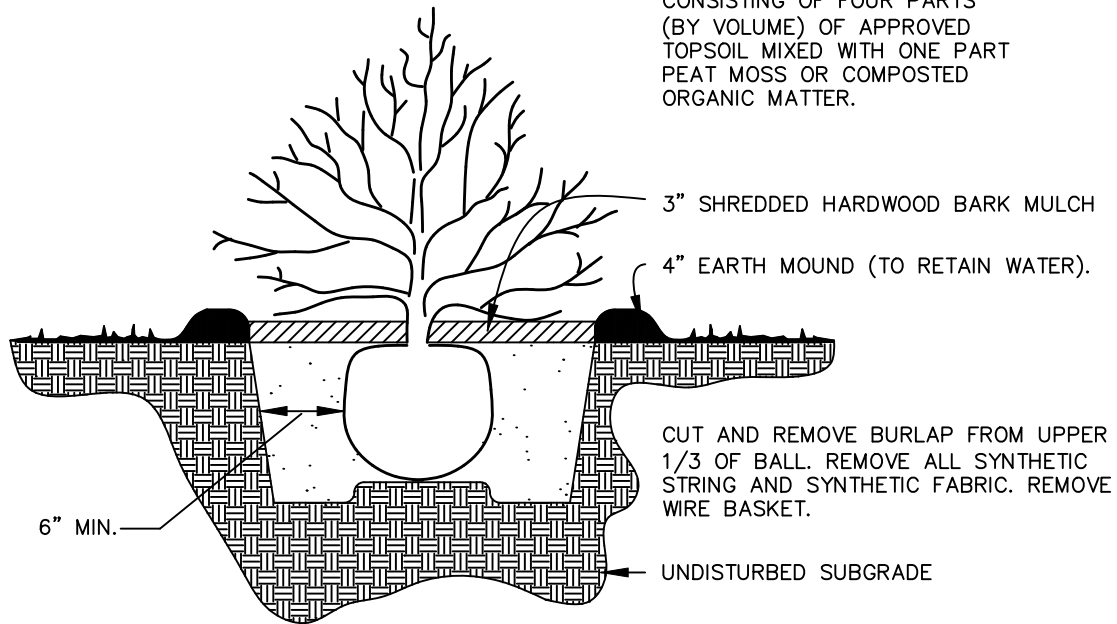
CONIFER / ORNAMENTAL PLANTING DETAIL

(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**

NOTE: ALL PLANTING MUST BE GUARANTEED FOR ONE FULL GROWING SEASON FROM THE TIME OF FINAL ACCEPTANCE.

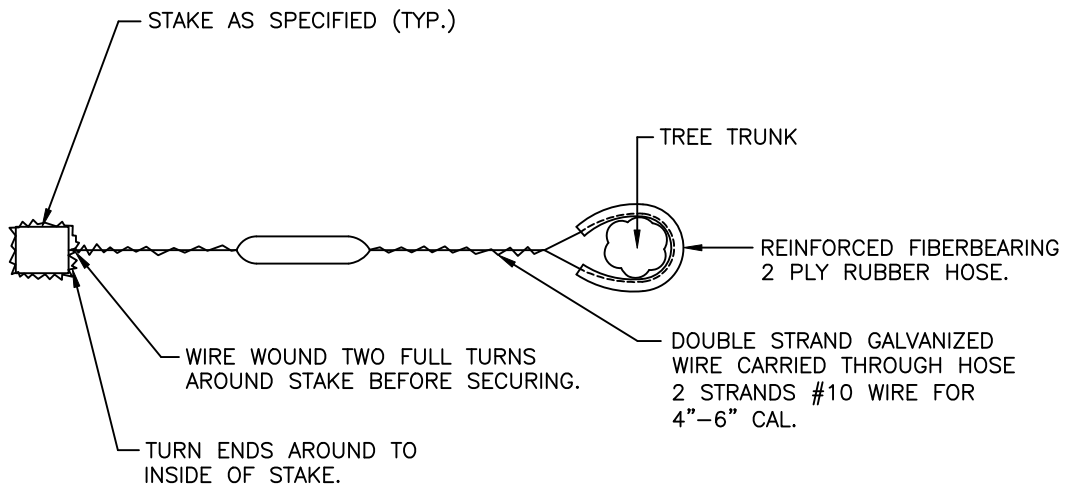
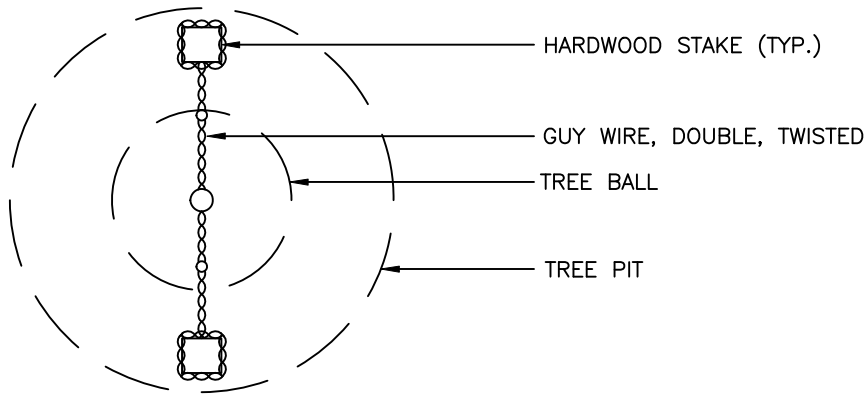
BACKFILL WITH SOIL MIXTURE CONSISTING OF FOUR PARTS (BY VOLUME) OF APPROVED TOPSOIL MIXED WITH ONE PART PEAT MOSS OR COMPOSTED ORGANIC MATTER.



TYPICAL SHRUB PLANTING DETAIL

(NOT TO SCALE)

STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT



GUY WIRE DETAIL

(NOT TO SCALE)

**STANDARD DETAILS
CITY ON NEW BRUNSWICK
ENGINEERING DEPARTMENT**

$\frac{3}{4}$ " FROSTPROOF YARD
HYDRANT BY CAMPBELL,
MODEL CHY-3 OR EQUAL

FURNISH STAINLESS STEEL
PADLOCK WITH 10 KEYS,
MIN. $\frac{1}{4}$ " SHANK

$\frac{3}{4}$ " WATTS HOSE CONNECTION
BRASS VACUUM BREAKER WITH
SET SCREW OR EQUAL

EXISTING GRADE

3'

6"

CONCRETE 2'X2' SQUARE
SPLASH PAD

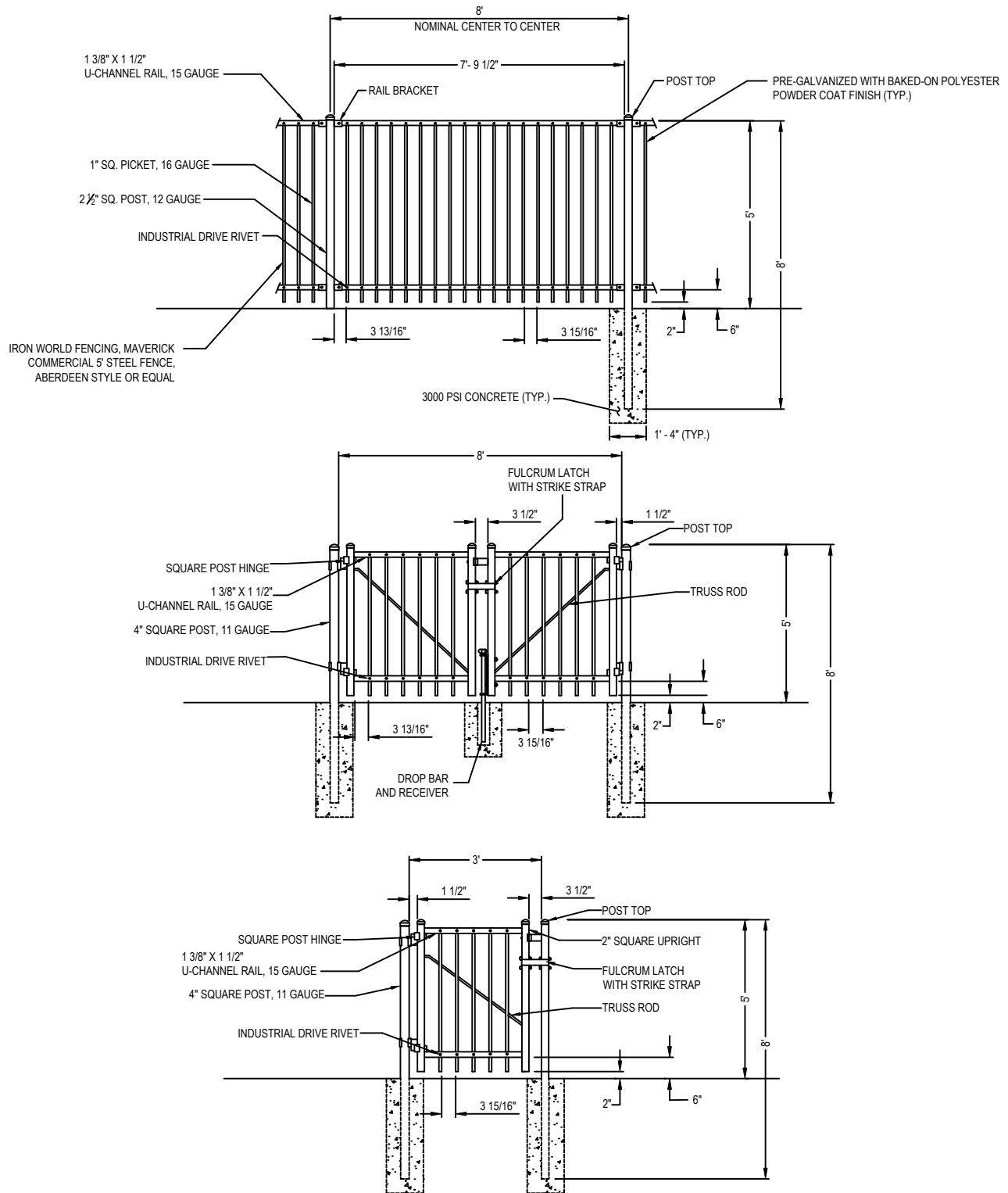
INSTALL $\frac{1}{2}$ CY OF TYPE 57
STONE AT WEEP HOLE AREA

$\frac{3}{4}$ " SERVICE LINE

NON-FREEZE POST HYDRANT DETAIL

(NOT TO SCALE)

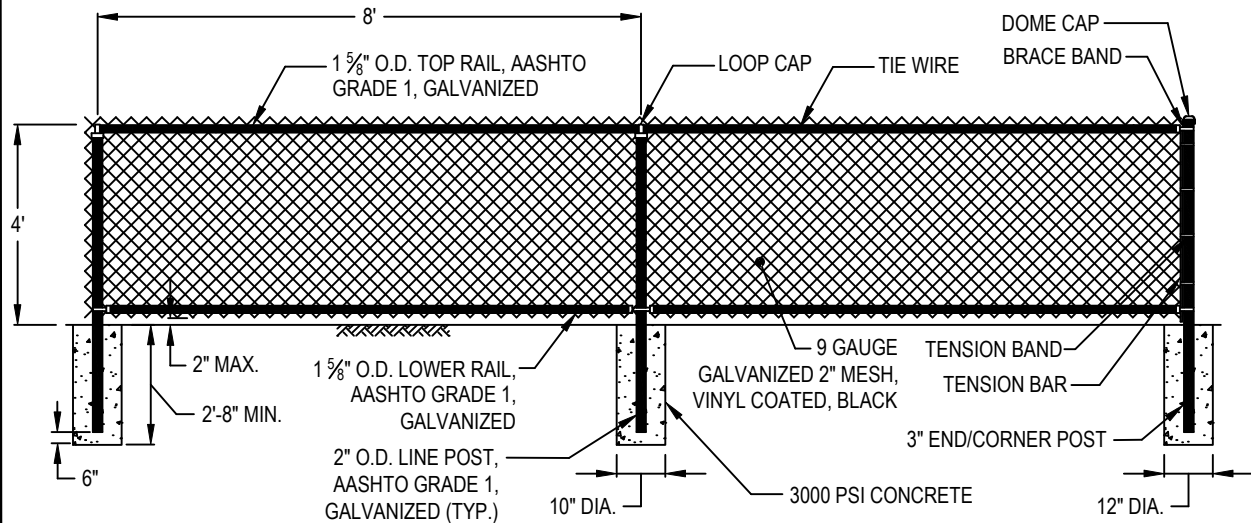
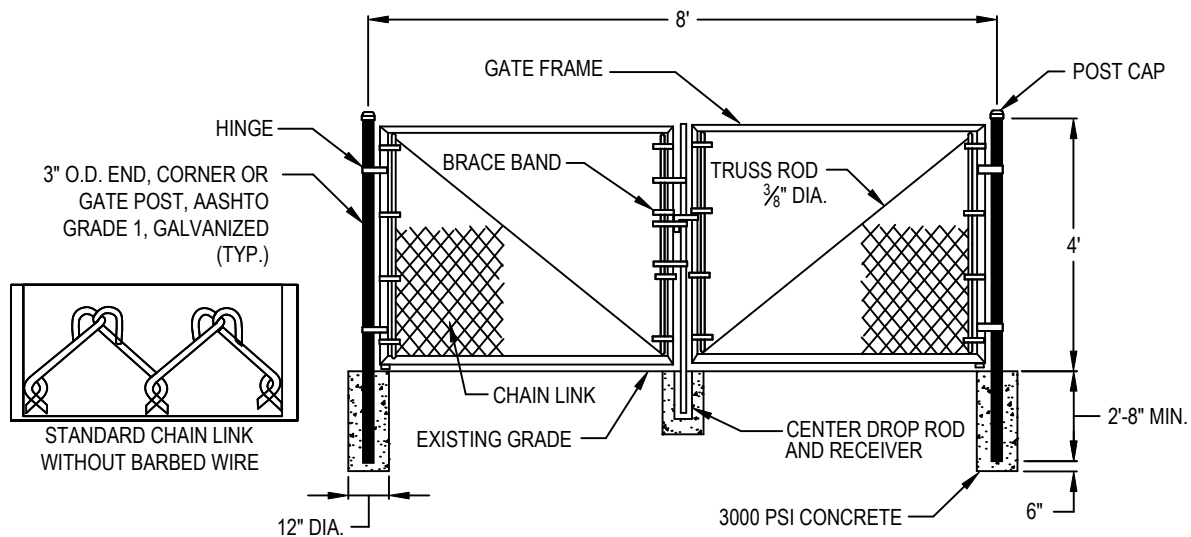
**STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT**



ORNAMENTAL STEEL FENCE AND GATE DETAILS

(NOT TO SCALE)

**STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT**



NOTE:
CHAIN-LINK FENCE, POSTS, RAILS, TIES, BANDS, BARS, RODS AND
OTHER FITTINGS AND HARDWARE SHALL CONFORM TO AASHTO M 181
FOR TYPES, GRADES AND CLASSES

CHAIN LINK FENCE AND SWING GATE DETAIL

(NOT TO SCALE)

STANDARD DETAILS
CITY OF NEW BRUNSWICK
ENGINEERING DEPARTMENT