

The Village of Pinehurst
Engineering Standards and Specifications Manual



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Village of Pinehurst
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SECTION 1 - PRELIMINARY CONSIDERATIONS & INSTRUCTIONS

1.01 General

The Standard Specifications as contained herein are to be utilized as the minimum standards for all new development within the jurisdiction of the Village of Pinehurst. New development shall include, but is not limited to, commercial building sites, subdivisions, improvements in the Village right-of-way and similar developments. All development projects shall also comply with the most recent version of the Village of Pinehurst "***Pinehurst Development Ordinance***" (PDO) and the Pinehurst Municipal Code of Ordinances, as well as all other applicable State and Federal codes, regulations and laws. Design and development standards for buildings, platted residential sites, and additional items (including but not limited to off-street parking, landscaping, setbacks and buffers, lighting, signage, etc.) are provided in the PDO.

The purpose of these Specifications is to present **minimum** standards for typical conditions encountered. For infrastructure and engineering design matters not specifically covered in this manual, the Project Designer should schedule a pre-design meeting with the Village Engineer to determine specific standards for those items. Failure on the part of the Project Designer to contact the Village Engineer an adequate amount of time prior to plan submittals for special standards and details may result in review and approval delays.

All projects that include construction of storm drainage facilities, streets, fire lanes, or other improvements included within this manual require that the design services be performed by, or under the direct supervision of, a Professional Engineer licensed to practice in the State of North Carolina, or an appropriately licensed professional that is qualified to provide such services. The Village reserves the right to require the Project Designer to submit evidence of professional licensure and authority to design and assume responsibility for proposed improvements. Design plan requirements for public water and public sewer shall be in accordance with the North Carolina General Statutes and Moore County Public Works Standards.

The existence of these Standard Specifications and Construction Details in no way relieves the Project Designer of the responsibility to correctly adapt these standards to the actual site conditions encountered on specific projects. The Project Designer shall review the applicable portions of these specifications and determine that these minimum standards will function correctly for the project.

There may be circumstances whereby the Project Designer may wish to employ additional strength pipe, bedding requirements, reinforcing, etc. In such situations where the designer wishes to propose any changes or modifications to these standards, the Village Engineer should be consulted prior to completion of final design and plan submittal. This will serve to help ensure that the plan review time is minimized. Such approval shall be clearly indicated at one location on the construction drawings and labeled "Exceptions to the Standard Specifications of the Village of Pinehurst."

These standards are available on the Village of Pinehurst website (www.vopnc.org) and periodic updates may also be posted on the website. It shall be the responsibility of the Project Designer to ensure that his/her copy of the manual is current and kept up-to-date.

Projects shall be constructed according to the Standard Specifications in effect at the time the project receives final construction approval by the Village of Pinehurst. The project contractor shall have at least one (1) complete set of approved plans at the job site at all times that work is being performed.

1.02 Submittal Requirements

Persons desiring to construct subdivisions, roadway, sidewalk, storm drainage, or utility extensions within the jurisdiction of the Village of Pinehurst must submit final construction drawings sealed by an appropriately licensed professional in the State of North Carolina.

All plans shall include the Village's standard approval blocks as follows:

- Construction Plan Approval Block on all sheets
- Infrastructure Inspection Notice To Contractor Block on all sheets
- Signed and Sealed Certification Block on the Cover Sheet
- Authorization To Construction Improvements Block on the Cover Sheet

Copies of these blocks are provided in the Appendix of this manual for reference. Digital (AutoCAD) copies may be obtained by contacting the Village Engineer.

The submittal process for subdivisions and site plans (both Minor and Major) are identified in the PDO. For development not subject to subdivision or site plan review (such as a roadway extension within an existing platted area), please consult with the Village Engineer regarding submittal requirements.

The Village's standard Plan Review Fees Worksheet shall accompany all sets of final drawings presented to the Village for approval along with payment of the calculated review fee. This worksheet is available on the Village's website, and shall be signed, sealed, and dated by the North Carolina licensed design professional responsible for the project. No plans shall be reviewed until all plan review fees are paid in full.

The Village's standard Infrastructure Inspection Fees Worksheet shall also accompany all sets of final drawings presented to the Village for Construction Plan Approval. This worksheet is available on the Village's website, and shall be signed, sealed, and dated by the North Carolina licensed design professional responsible for the project. No plans will be granted Final Construction Approval until such time as all required fees are paid in full.

In the event the Village levies re-inspection fees due to dilatory progress or continued poor workmanship by any of the Contractors at the site thus necessitating repeated inspections, all re-inspection fees shall be promptly paid or the Village Engineer may

issue a "Stop-Work" order for all activities at the site until such time as the re-inspection fees are paid in full.

The above worksheets must be submitted in addition to the applicable worksheets and fees required for site plan and subdivision approval by the PDO.

1.03 Plan Requirements

a. Subdivisions:

All plan submittals for subdivision construction should, at a minimum, include the following elements. These elements are in addition to the specific requirements set forth in the PDO. More detailed information is contained in the pertinent sections for each type of infrastructure.

- (1) Plans sealed and signed by an appropriately licensed design professional registered to practice in North Carolina. Plan size shall be 24" x 36" unless otherwise approved by the Village Engineer.
- (2) Plan/profile drawings shall be provided for all street/sidewalk improvements, off-street sanitary sewers, storm sewers and culverts, water mains, sanitary sewer force mains, and for all utility extensions. All plan/profile drawings shall be prepared at a scale of not less than: 1" = 50' Horizontal and 1" = 5' Vertical (existing grades shall be based on field survey).
- (3) Boundary of the tract with all courses and distances indicated. At least one (1) corner of the tract shall be tied to the NC Plane Coordinate System with x, y, & z for that corner specified on the drawings. A tieline giving bearing and distance from the control corner specified to the NCGS monument used shall also be shown on the plans with the monument name and data called out.
- (4) Vicinity Map, scale of drawings, and NC Grid North directional arrow.
- (5) Master Plan(s) showing all improvements and including: existing contour elevations (1-foot intervals) and USGS datum with benchmarks indicated.
- (6) 100-year flood plain limits and notation as to the NFIP-FIRM map/panel/community #, effective/index date.
- (7) Owner, PIN #, and zoning of all properties adjoining the site shall be noted on each adjoining parcel shown in the drawings.
- (8) Tract area and specific data required by the PDO.
- (9) Public & Private Streets
 - Street width - back-to-back of curbs or edge of pavement.

NOTE: Street width shall conform to applicable Village Thoroughfare and Transportation Plans as well as the sections presented in the Standard Details.

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- Right-of-way width.
- Horizontal curve data (centerline only) for each curve including L, delta, R, and other data as requested by the Village Engineer.
- Vertical curve alignment and data including length, g1, g2, K-value and other pertinent data.
- Distances to existing driveways, streets and intersections.
- Typical section for each street showing proposed pavement design and other cross-sectional elements.

(10) Wastewater Facilities

- Pipe material, size, length, slope, invert and top elevations at all manholes, separation from other utilities, existing and proposed ground/cover profile above the pipe segment.
- 100-year flood elevations
- Special construction details - piers, boring, encasement, etc.
- Easement widths
- Location, size, and material of all proposed & existing service laterals
- Location of lots where sewer service backflow valves may be required
- Pump station plans - including:
 - 100-year flood elevation and source of this information
 - site layout plan, proposed lift station easement limits, and access road
 - detailed plan and elevation view of pump station facility
 - electrical equipment and wiring
- Pump station and force main calculations - including:
 - volume and cycle time calculations
 - total discharge head calculations and pump selection curve
 - hydrostatic uplift calculations
 - stream classification

(11) Water Distribution Facilities

- Pipe material, size, location, and separation from other utilities
- Hydraulic modeling data including estimated daily demand (average & max.), C-factors, ISO fire flow computations, ISO modeling, etc.

- Valves, fittings, blow offs including size
- Fire hydrant locations
- Service lateral locations
- Location of lots where pressure reducing valves may be required
- Special details - boring, etc.
- Easement locations and widths (if applicable – NOTE: any proposal to locate a watermain outside of a Public Street Right-of-Way shall have the prior written approval of the Village Engineer.)
- Permanent sampling stations

(12) Storm Drainage and Erosion Control

- Drainage areas and run-off for each section of storm drain pipe
- Off site drainage areas and design volumes
- Invert elevation and top elevations at each structure - catch basin, curb inlet, etc.
- Pipe material, length, slope, etc.
- Exit velocity and details of velocity reduction facilities at each open outlet
- Complete hydraulic calculations
- Special details - open channels, etc.
- Easement widths
- Minimum elevations for building construction
- Erosion control measures and calculations in accordance with NCDEQ standards

(13) Miscellaneous Data

- Owner/developer: name, address, and telephone and fax numbers
- Engineer: name, address, and telephone and fax numbers
- Limits of clearing and land disturbance
- Landscaping including species. Special care should be taken when specifying landscaping that will be installed in any public or private right-of-way to ensure that as the plantings mature, they will not adversely affect sight distances.
- General Notes as required, including a note - "All construction materials and methods shall conform to the **Standard Specifications & Construction Details** of the Village of Pinehurst."

- Summary of quantities of infrastructure improvements in Data Table Format, by project phase if applicable, i.e. linear feet of water mains (by size), sewer mains (by size and material), storm drainage pipe (by size & material), sidewalk (by material), and street (by owner and width)

b. Site Plans

All site plans submittals shall, at a minimum, include the following elements. These elements are in addition to the specific requirements set forth in the PDO.

- (1) Plans sealed and signed by an appropriately licensed design professional, registered to practice in North Carolina. Plan size shall be 24" x 36" unless otherwise approved by the Village Engineer.
- (2) Boundary of the tract with all courses and distances indicated. One corner of the tract shall be tied both horizontally and vertically to the NC Plane Coordinate System with tie line and grid monument data provided to the corner. Total gross area of tract shall be indicated.
- (3) Vicinity map, scale of drawing, and NC Grid North directional arrow.
- (4) Existing and proposed contour elevations at minimum interval of 1-foot. Elevations based on USGS/NCGS Datum with benchmark indicated.
- (5) 100 year flood plain and/or alluvial soils line. A note shall be placed on the plans indicating the NFIP-FIRM map/panel/community #, effective/index date, and soils mapping source information.
- (6) Owner, PIN #, and zoning of all properties adjoining the site shall be noted on each adjoining parcel shown in the drawings.
- (7) Data on Adjoining Streets
 - Street name.
 - Street width and right-of-way dimensions.
 - Existing utilities and storm drainage.
 - Proposed and existing streets, and driveway entrances onto site and adjoining properties.
- (8) Building Site Data
 - Number of buildings and dwelling units in each (for residential site plans).
 - Building "footprint" dimensions and finished ground floor elevation.
 - Front, side and rear yard setbacks.

(9) Parking Data

- Number of parking spaces provided.
- Number of parking spaces required.
- Location and dimensions of parking areas - angle of parking, typical width, length, aisle width, etc.

(10) Storm Drainage and Erosion Control

- Pipe material, size, length, slope, etc.
- Drainage areas and run-off for each storm drain pipe.
- Numbering Plan, Invert elevation, and top elevation for each structure - catch basin, curb inlet. Invert elevations for each flared end section, headwall, etc.
- Exit velocity and details of velocity reduction facilities at each outlet.
- Complete hydraulic calculations, including HGL. All computations to be in neat, legible tabular form.
- Special details as required.
- Easement widths clearly specified on the easement.
- Erosion control measures and calculations in accordance with NCDEQ Standards.

(11) Utilities

- Waterline location and size.
- ISO Fireflow computations for the proposed development and hydraulic modeling to support the proposed sizing of mains.
- Water meter location and size; size of service branch
- Backflow Preventer
- Sewer line location and size
- Sewer service lateral - size and location
- Water and sewer easements
- Fire hydrant locations (on and off site)
- Backflow preventer for fire sprinkler line (if applicable)
- Fire Department Connection (if applicable)

(12) Landscaping

- Clearing limits
- Landscaping plan
- Summary of landscaping requirements as required by the PDO

(13) Signage

- Master sign plan per applicable provisions of the PDO

c. Revisions to Previously Approved Plans:

Revised plans shall be resubmitted and approved by the Village and affected State regulatory agencies (if required) prior to construction of any facilities for which the revisions are proposed. The submittal procedure for revised plans shall be as previously specified for the original submittal. Developers shall consult with the Village Engineer to determine whether a proposed change to previously approved plans warrants a resubmittal, or if the change can be shown on the project Record Drawings without the need for resubmittal.

1.04 Construction of Proposed Improvements

Prior to commencing any phase of construction of the proposed facilities, the Developer shall obtain all permits, encroachments, easements, right of ways, etc., which are required to complete the construction proposed in the approved plans. The appropriate permit numbers and issue dates shall be included in the ATC Improvements block on the cover sheet, and copies of all permits shall be provided to the Village.

Once all permits, easements, and encroachments have been obtained, the Developer shall contact the Village Engineer to schedule a pre-construction conference with Village officials, the Project Designer, and the selected contractor(s). NCDOT Representatives shall also be contacted to attend this meeting if any work is contemplated within NCDOT Rights-of-Way. All Conferences shall be scheduled at least five (5) business days in advance, unless otherwise approved by the Village Engineer.

The Village of Pinehurst will perform periodic inspections of the work in progress to assure compliance with approved plans and Village specifications. Inspections will be performed by Village personnel or by a duly authorized representative of the Village Engineer. Inspections performed by the Village shall be scheduled no less than 48 normal business hours in advance.

No infrastructure work shall be permitted outside of regular business hours per the Pinehurst Municipal Code without prior written approval from the Village Manager. The developer shall reimburse the Village for inspections performed at times other than during the Village's normal business hours at the rates set by the Village Manager and Village Finance Director.

Upon completion of the proposed improvements, the Developer shall request a comprehensive inspection by the Village to establish a list of deficient items, which must be corrected prior to final acceptance. Inspections such as this generally require a minimum of five (5) business days notice for scheduling.

Final acceptance by the Village will occur upon completion and confirmation of the following:

- (1) Correction of all items found to be deficient during the previous comprehensive inspection, including erosion and sediment control measures.
- (2) Submittal of record drawings per Section 1.05. Accuracy of the record drawings will be checked during the final inspection.
- (3) Submittal of certifications by the Project Designer as required by the State Regulatory Agencies per Section 1.05. No certificates of occupancy shall be issued prior to proof of submission of these certifications.
- (4) Submittal by the Developer of evidence from the NCDOT that any improvements constructed in DOT right-of-way have been completed to the satisfaction of the DOT inspector. This in no way relieves the Developer of his obligations to the DOT as outlined in the encroachment agreements.
- (5) Submittal of the letter of warranty and supporting documents as required under paragraph 2.11 of these Specifications and in the Village's Codes and Ordinances.

1.05 Record Drawings & Certifications (As-Built)

Record drawings, which reflect "as-built" conditions, must be submitted and approved prior to final acceptance by the Village of Pinehurst and Moore County Public Works. The record drawings must be labeled "RECORD DRAWINGS" and sealed by the Project Designer. The record drawings submitted to the Village of Pinehurst shall be permanent, reproducible drawings and shall include a PDF copy on a compact disc.

A checklist is contained in the Appendix to assist in development of Record Drawings for submission to the Village Engineer. Record drawings for water and wastewater improvements shall be provided to the appropriate system owner in accordance with current owner requirements.

Upon completion of the improvements, the Project Designer of record shall issue the certifications as required by the NC Department of Environmental Quality. Copies of the certifications shall also be submitted to the Village of Pinehurst.

1.06 Stop Work Orders

The Village Engineer may issue a Stop Work Order (written or verbal with written follow-up) instructing that the Developer/Contractor to immediately cease (any or all) work if such work poses a threat or hazard to the public or to Village owned facilities or is being performed without proper approvals, or a current set of the approved plans onsite. In the event work is undertaken prior to appropriate approvals being secured or is not properly inspected by the Village Representative, the Village Engineer may require removal and reinstallation of all work not properly inspected or approved and may also issue a "Stop Work" order for all other construction at the site until the matter in question has been fully corrected to the satisfaction of the Village Engineer. The Stop Work Order may also include instructions for remedial work or repairs deemed necessary to correct such threats or hazards. In the event that corrective measures are not taken properly or in a timely manner, the Village reserves the right to implement such corrective measures and will pursue any and all legal means to seek reimbursement for any costs to the Village incurred as a result. The Village will not bear any responsibility for consequential damages incurred by the Developer/Contractor or others resulting from issuance of a Stop Work Order, such damages including, but limited to, lost time or liquidated damages, loss of materials, payroll and overhead costs, equipment rental costs, permit costs, fines or legal costs, etc.

SECTION 2 - GENERAL PROVISIONS

2.01 General

All construction shall conform to the requirements and dimensions on the approved construction plans, Village Standard Details, the Code of the Village of Pinehurst, or as stated in these Specifications. The material requirements for stone, concrete, asphalt, and other construction products shall conform in full to the latest edition of the NCDOT "Standards and Specifications" unless otherwise modified by this manual or as directed by the Village Engineer.

2.02 Abbreviations & Definitions

a. ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
A.F.F.	Above Finished Floor
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
APWA	American Public Works Association
AWWA	American Water Works Association
CO	Certificate of Occupancy
°C	Degrees Celsius
°F	Degrees Fahrenheit
DIP	Ductile Iron Pipe
DIPRA	Ductile Iron Pipe Research Association
ETJ	Extraterritorial Jurisdiction
ft	foot
gpd	gallons per day
gpm	gallons per minute
ID	Inside Diameter

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ISO	Insurance Services Office
lbs	pounds
MCPWD	Moore County Public Works Department
MSL	Mean Sea Level
MUTCD	Manual on Uniform Traffic Control Devices
NCDEH	North Carolina Division of Environmental Health
NCDEQ	North Carolina Department of Environmental Quality
NCDOT	North Carolina Department of Transportation
NCDWR	North Carolina Division of Water Resources
NCGS/USGS	North Carolina Geodetic Survey/United States Geodetic Survey
N.C.G.S.	North Carolina General Statutes
NCRLA	North Carolina Registered Landscape Architect
NCPE	North Carolina Registered Professional Engineer
NCPLS	North Carolina Professional Land Surveyor
N.E.C.	National Electric Code
NFPA	National Fire Protection Association
NRCS	Natural Resource Conservation Service (formerly SCS)
OD	Outside Diameter
OSHA	Occupational Safety and Health Administration
P.C.	Point of Horizontal Curvature
ppm	parts per million
psi	pounds per square inch
P.C.	Point of Curvature
P.I.	Point of Intersection

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P.T.	Point of Tangency
PVC	Polyvinyl Chloride
P.V.C.	Point of Vertical Curvature
P.V.I.	Point of Vertical Intersection
P.V.T.	Point of Vertical Tangency
SU	Single Unit Truck (with 20 foot wheelbase and 30 foot overall length)
UL	Underwriters' Laboratories, Inc.
V	Volts
VAC	Voltage - Alternating Current

b. DEFINITIONS

- CERTIFICATE OF OCCUPANCY - Approval granted by the Village for a new or renovated structure to be occupied.
- CODE - The Village of Pinehurst Code of Ordinances, including the Pinehurst Development Ordinance.
- CONTRACTOR - The entity performing the work indicated in the plans. All Contractors performing construction or installation of any public facilities in the Village's jurisdiction shall be properly licensed for the work by the NC Licensing Board for General Contractors in accordance with N.C.G.S. 87. Prior to commencing work, the Contractor shall submit proof of licensure, if requested by the Village. The Contractor shall also submit information including mailing and street address for the firm, ownership information, telephone numbers for contact during regular business hours and emergency telephone numbers for contact during nights, weekends and holidays.
- COUNCIL - The Village Council of the Village of Pinehurst.
- DETAILS - The drawings found within the Village of Pinehurst Engineering Standards and Specifications Manual.
- DEVELOPER – The person or persons investing in and developing land associated with a particular project.
- EASEMENT - An interest in land owned by another that entitles its holder to a specific use.
- FIRE OFFICIAL/FIRE MARSHAL - The Fire Chief, an assistant or other representative duly authorized by the Village.

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- INSPECTOR - The Infrastructure Superintendent, an assistant, or other representative duly authorized by the Village Engineer.
- INVERT - The lowest point in the internal cross section of a pipe or culvert.
- PLANS - The approved design drawings that show the work to be done.
- PROJECT DESIGNER - The design professional retained by the developer, and the person responsible for the preparation of the final construction drawings. All design professionals shall be properly licensed by and in current good standing with their respective licensing board.
- PROJECT ENGINEER – see "PROJECT DESIGNER"
- RIGHT OF WAY - The area which encompasses public streets, sidewalks, and utility strips.
- SPECIFICATIONS - The "Village of Pinehurst Engineering Standards and Specifications" manual.
- SUBBASE - See SUBGRADE
- SUBGRADE - That portion of the roadbed prepared as a foundation for the stone and asphalt or concrete pavement structure.
- VILLAGE - The Village of Pinehurst, North Carolina
- VILLAGE ENGINEER - The individual or consultant, as selected by the Village Council that is responsible for reviewing development plans and applications, determining compliance with the standards herein, and approving any deviations from the standards herein, on a specific project. Additional duties and powers of the Village Engineer are provided in the Pinehurst Development Ordinance.
- VILLAGE MANAGER – The Village Manager appointed by the Village Council of the Village of Pinehurst.
- VILLAGE REPRESENTATIVE – see "Inspector", above.

If an item is not specifically defined in the listing above or elsewhere in this manual, the definition established by the Village Engineer shall govern.

2.03 Insurance Requirements & Damage to Existing Facilities

If work is to be performed within any Village street right-of-way or on Village owned property, the Developer/Contractor shall submit a current and valid certificate of insurance to the Village stating that such coverage is in effect during the project duration. The limits of coverage shall be at a minimum in accordance with the Schedule of Insurances as set by the Village.

Any damages caused to any existing infrastructure due to construction and/or development activities, shall be repaired by the party causing the damage to the full satisfaction of the Village Engineer prior to any further work occurring. If the party in question fails to repair the damages in a timely manner as determined by the Village

Engineer, a Stop-Work order may be issued until all repairs have been satisfactorily made. The Village may also elect to have the repairs done by a third party or Village forces, in which case the party causing the damage shall be liable in full for all repair costs plus an administrative fee determined by the Village. Any such costs shall be paid in full prior to re-initiation of any work associated with the project in question.

2.04 Erosion & Sedimentation Control

a. General Requirements:

Erosion and sedimentation control plans that disturb more than one acre should be submitted directly by the owner to NCDEQ – Land Quality (NCDEQ-LQ Section), Fayetteville Regional Office. Copies of all submittals to and approvals from NCDEQ – LQ shall be provided to the Village at the same time they are submitted to or received from NCDEQ-LQ by the developer or Project Engineer. Erosion and sedimentation control plans for projects that disturb less than one acre shall be submitted to the Village for review.

Temporary and permanent erosion control measures shall be provided in accordance with the erosion control plan approved by either the Land Quality Section, NCDEQ, or the Village of Pinehurst, depending upon the amount of land disturbance proposed. The approved Erosion Control Plan and any Approval Certificates shall be kept on site by the Contractor at all times that work is being performed.

All permanent erosion control measures shall be incorporated into the work at the earliest practicable time, and in no case shall an area remain denuded for more than seven (7) calendar days. Temporary erosion control measures shall be coordinated with permanent erosion control measures and all other work on the project to ensure economical, effective and continuous erosion control throughout the construction and post construction period and to minimize siltation of streams, lakes, reservoirs, and other water impoundments, ground surfaces, roadways, or other property. In the event compliance with the timelines established in this section are not complied with or offsite siltation occurs, including tracking of mud onto public streets, the Village may issue a “Stop-Work” order until such time as all areas have been properly restored and all required erosion control measures installed or properly repaired.

All erosion control measures designed and installed within the Village's jurisdiction shall comply with current NCDEQ regulations and the most recent version of the North Carolina Erosion and Sediment Control Planning and Design Manual.

b. Maintenance:

It shall be the developer's responsibility to ensure that all erosion and sediment control measures are properly maintained throughout construction of the project. In the event

that erosion control measures fail or if mud and sediment travel off-site or into adjacent properties or streets, the developer shall be responsible for all costs associated with clean-up and restoration efforts.

c. Clearing Limits:

All clearing limits shall be clearly identified and staked prior to any construction. The Village shall be given 48-hour notice prior to beginning clearing operations.

2.05 Earthwork

a. General:

Earthwork shall be defined as the removal of soil (including rock) from its natural location and the depositing of such material into the proper fill areas as indicated on the plan.

b. Rock Excavation - by Blasting:

Blasting is not permitted within the jurisdiction of the Village of Pinehurst unless written approval is obtained from the Village Manager. In the event blasting operations are desired, the developer or contractor shall notify the Village Engineer of the request, in writing.

c. Removal of Unstable Material:

Where unstable material, including organic material ("muck"), is encountered in trenches or in roadways, the material shall be completely removed and replaced with suitable material as approved by the Village Engineer or Village Representative and thoroughly compacted. The Village reserves the right to require appropriate geotechnical testing of all materials used to replace unsuitable materials.

2.06 Workzone Safety

The Contractor shall provide for and maintain safety measures necessary for the protection of all persons on the work; and shall fully comply with all laws and regulations and building code requirements to prevent accident or injury to persons on or about the location of the work, including all applicable provisions of OSHA regulations. The Contractor shall protect all trees and shrubs designated to remain in the vicinity of the operations and barricade all walks, roads, and areas to keep the public away from the construction. All trenches, excavations, or other hazards in the vicinity of the work shall be well barricaded, and properly lighted at night.

The Contractor shall be responsible for the entire site and the necessary protection as required by the Village and by laws or ordinances governing such conditions. He shall be responsible for any damage to Village property, or that of others, by the Contractor, his employees, subcontractors or their employees, and shall correct and/or repair such damages to the satisfaction of the Village of Pinehurst and/or other affected parties. He shall be responsible for and pay for any such claims against the Village.

2.07 Maintenance of Traffic & Work Zone Traffic Control

Existing public streets or highways shall be kept open to traffic at all times by the Contractor unless permission to close the streets, or portions thereof, is granted by the Village Representative. The Village of Pinehurst Police Department must also be contacted by the Contractor a minimum of 48 hours before any streets are to be temporarily closed or partially closed. Proper and sufficient barricades, lights, signing and other protective devices shall be required to be installed when deemed necessary by the Police Department or the Village Representative. All traffic control shall conform to the standards set forth in the MUTCD, and any NCDOT amendments to the MUTCD.

Failure to comply will result in issuance of a Stop Work Order as well as fines and penalties as specified in the various Village and/or NCDOT codes, ordinances, and laws.

2.08 Concrete

Concrete shall be only plant-mixed or transit-mixed concrete conforming to ASTM C33 for aggregates and to ASTM C94 for ready-mixed concrete. Any concrete poured that has a slump over 4 inches as per ASTM C143, or has a batched time of more than 90 minutes, will be considered unacceptable and shall be immediately removed. All concrete shall meet the requirements of the most recent edition of the NCDOT "Standard Specifications" for the use intended.

Concrete shall not be deposited on frozen subgrade. Concrete shall not be poured when the air temperature is falling and below 40 degrees F, and the predicted low temperature for the succeeding 24-hour period is less than 32 degrees F. All concrete when placed in the forms shall have a temperature of between 50 and 90 degrees F and shall be maintained at a temperature of not less than 50 degrees F for at least 72 hours for normal concrete and 24 hours for high-early strength concrete, or for as much time as is necessary to secure proper rate of curing and designed compressive strength. The Village Representative may require use of insulating blankets or other measures as deemed appropriate to minimize the possibility of the concrete freezing.

All formwork and subgrades shall be inspected and approved by the Village Engineer or Village Representative prior to placement of any concrete. Any forms or subgrades found to be deficient shall be corrected to the satisfaction of the Village Representative and re-inspected prior to placement of any concrete. All forms shall be properly oiled to ensure clean release when removed. All reinforcing steel and forms shall be fully inspected and approved by the Village Representative prior to placement of any concrete. Concrete shall be air entrained at 5% ($\pm 1\%$). Retarding and accelerating admixtures shall be used only upon prior approval of the Village Representative.

2.09 Installation of Utilities

The Developer shall arrange for the installation of all utilities. Restoration of Village right-of-way disturbed by utility installation shall be the ultimate responsibility of the Developer. The Developer shall provide the Village Engineer a copy of the installation plan and the appropriate Encroachment Agreement for utilities at least ten (10) business days prior to actual installation of utilities taking place.

2.10 Materials

All materials incorporated in work to be accepted by the Village of Pinehurst for maintenance shall be new, first quality material installed in accordance with the manufacturer's instructions or these Specifications, whichever is more stringent.

Shop drawings for items not related to public water or sewer shall be provided by the developer or contractor to the Village Engineer or Village Representative for review and approval prior to acceptance of materials on site. Shop drawings for public water and sewer infrastructure shall be provided to Moore County Public Works for review and approval prior to acceptance of materials on the site.

It is the intent of this Specification to provide materials and construction methods of high standard and quality; and to provide materials free from defects in workmanship and product. Equal materials not specified herein may be submitted for consideration of use in the project provided documentation (shop drawings) and samples are furnished to the Village not less than twenty-one (21) days before their delivery to the construction site. A sufficient number of copies shall be submitted such that the Village may retain three (3) copies. The Village Engineer will issue written approval or disapproval of the proposed alternate materials. The current Village Specifications and/or the latest revisions of the material manufacturer shall apply in all cases where materials are described by these Specifications.

2.11 Warranty Periods and Financial Guarantees

The Developer shall provide a written guarantee on workmanship and materials for a period of at least one (1) year after the date of acceptance by the Village of Pinehurst. Any defects observed within the one (1) year guarantee period shall be repaired and/or replaced to the Village's satisfaction. The guarantee shall apply to street and sidewalk construction, storm sewers and structures (including ditches, drainage channels, etc.), and appurtenances. The guarantee shall apply to any improvements proposed by the approved plans and any revisions of the plans approved by the Village Engineer. The Village Engineer, in consultation with the Village Manager, may elect to require an

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extended warranty period on any or all of the improvements constructed as part of any project.

The Village reserves the right to delay final acceptance and assuming maintenance responsibility for infrastructure (roads, sidewalks, drainage, etc.) if defects observed within the warranty period are not repaired and/or replaced to the Village's satisfaction by the Developer.

Warranty periods for water lines and appurtenances, sanitary sewer lines and appurtenances, lift stations, force mains, controls and related appurtenances shall be coordinated with the appropriate system owner.

SECTION 3 - STREETS

3.01 General

Unless otherwise provided herein, all materials and street construction methods shall at a minimum conform to the applicable requirements as outlined in the ***Standard Specifications for Roads & Structures***, latest edition, as published by the North Carolina Department of Transportation.

Whenever the following terms are used in said NCDOT specifications, the intended meaning of such terms shall be as follows:

"State" or "Commission" shall be replaced by the words "Village or its authorized testing agent."

"Inspection by Commission" shall be replaced by "inspection by Village or its duly authorized representative."

3.02 Design

a. General:

Street design shall conform to the standards and typical sections set forth in the applicable sections of this manual, current NCDOT, AASHTO and MUTCD manuals, and any direction provided by the Village Engineer. Information on specific design criteria is shown in Figure 3-1 at the end of this section. Private streets shall meet in full the same design, construction, and inspection standards as set forth herein for Public Streets.

At intersections in residential areas, all streets shall be rounded with radii not less than:

Curb Radius	- 30 Feet (at back of curb or edge of pavement)
Property Lines	- 20 Feet

In non-residential areas, the curb and right-of-way radii shall be increased as directed by the Village Engineer to accommodate anticipated truck traffic. The NCDOT Roadway Design Manual shall be followed for preliminary design of intersections in non-residential areas.

The minimum clear roadway width (exclusive of gutter width) shall be 20 feet with greater widths as required by the Village Engineer to meet roadway classification standards and traffic conditions. All streets, except those in the Historic Preservation Overlay District, shall have curb & gutter conforming to the standards set forth in Section 4 of this manual unless a waiver is obtained from Village Council.

For areas within the Historic Preservation Overlay District and areas that receive a waiver from Village Council and utilize 'ribbon' asphalt paving, the minimum width of paving shall be 20' with grassed swales provided on the road shoulder in accordance with the standard

details. Alternate types of curb & gutter upon approval by the Village Engineer may be used in the Historic Preservation Overlay District.

A sight triangle easement shall be provided at all intersections of new streets with existing or proposed collector streets, highways, or other major street classifications. Sight triangle easements shall be not less than 10 feet by 70 feet. The 10-foot dimension shall be the setback from the right-of-way of the major street, and the 70-foot dimension shall be measured along the right-of-way of the major street. Such sight triangle easements shall be shown on the final plat for the subdivision. Landscape & planting materials placed within the sight triangle shall be limited to a height of 30 inches at maturity.

Stopping Sight Distance (SSD) shall apply to both Horizontal and Vertical elements of the street geometry and shall at a minimum, meet the criteria set forth in the AASHTO "Greenbook", latest edition. The Village Engineer may increase or modify these requirements on a project-by-project basis.

Intersection Sight Distance (ISD) shall apply to all streets covered by this manual. Intersection sight distance shall at a minimum meet the criteria set forth in the AASHTO "Greenbook", latest edition. The Village Engineer may increase or modify these requirements on a case-by-case basis.

b. Soils Evaluation & Pavement Design:

Pavement design for all new streets shall be based upon subgrade soil conditions, a 20-year (minimum) design life and projected traffic loadings (ADT and percent trucks).

Soils testing work shall be performed by a qualified geotechnical engineering firm. Standard penetration test borings shall be obtained along the centerline of all roadways at intervals not greater than 300 feet, and shall extend a minimum of five feet below proposed subgrade elevations, or in the case of fill sections to a depth of five feet below existing grade. The pavement designs shall be performed by a qualified professional engineer using standard methods developed by the NCDOT, AASHTO, The Asphalt Institute, or other similar methods as may be approved by the Village Engineer.

Two (2) copies of the Laboratory Soil Test Report and the Pavement Design Calculations shall be submitted with the initial design documents.

The final pavement thickness shall be the calculated thickness, but in no case shall the thickness be less than that shown in the standard street section details, or that required by the NCDOT for streets to be maintained by the State, with the most stringent condition governing.

The *minimum* pavement section for local and cul-de-sac Public and Private Streets within the Village's jurisdiction shall be six (6") inches compacted thickness ABC with a two and one-half inch (2-1/2") SF9.5A asphalt surface course overlay, placed in an initial lift of 1-1/2 inches with the final 1-inch lift being placed once all conditions specified in Section 3.03(c) have been met in full.

The *minimum* pavement section for all Public and Private Streets other than local and cul-de-sac streets within the Village's jurisdiction shall be eight (8") inches compacted thickness ABC with a two and one-half inch (2-1/2") SF9.5A asphalt surface course overlay, placed in an initial lift of 1-1/2 inches with the final 1-inch lift being placed once all conditions specified in Section 3.03(c) have been met in full.

The Village may require the use of full-depth asphalt in lieu of ABC base courses or additional thickness pavement sections in certain situations (such as major collector streets, thoroughfares, etc.). In these instances, a signed and sealed pavement design by an appropriately licensed professional engineer shall be submitted to the Village.

A full width asphalt surface course overlay shall be provided as a final wearing surface in all cases where additional lanes, roadway widening, or other improvements to an existing road are required. The overlay shall cover the full width of the street, both the pre-existing section and the new improvements and shall extend at least 50 feet each way beyond the limits of improvements.

3.03 Construction Requirements

a. General:

All roadway subgrade, and storm sewer construction shall be inspected and approved by the Village Representative and all water/sewer construction shall be inspected and approved by Moore County prior to placement of the base course materials.

All streets shall be cleared and graded for the full width of the right-of-way within 50 feet of any street intersection. Additional street clearing and grading shall be as follows:

- (1) Major Thoroughfare - the full width of the right-of-way, generally 90'.
- (2) Principal Arterial - the full width of the right-of-way, generally 80'.
- (3) Major Collector - the full width of the right-of-way, generally 70'.
- (4) Minor Collector - the full width of the right-of-way, generally 65'.
- (5) Minor Commercial - the full width of the right-of-way, generally 65'.
- (6) Major Local, Local & Cul-De-Sac Streets - the full width of the right-of-way on the sidewalk side and a minimum of eight (8) feet from back of the curb on the non-sidewalk side. Right of way for this class of streets is generally 60', unless otherwise noted on the Village's standard details. The Village Engineer may allow lesser right of way widths for minor cul-de-sacs and residential streets on a case-by-case basis.

b. Placement of Aggregate Base Course:

No Base Material shall be placed on any roadway or firelane until the subgrade, stormdrainage system and structures, water & sewer system, and all other conflicting

items have been inspected and approved by the Village Representative and other appropriate review agency.

Aggregate base course shall be placed and compacted in strict conformance with the requirements of the NCDOT. Each layer shall be compacted to a density equal to at least 100 percent of the maximum dry density as determined by AASHTO Method T-180 as modified by the NCDOT.

c. Placement of Bituminous Surface Course:

No Bituminous surface courses shall be placed on any roadway or firelane until all Base Course materials have been placed and approved by the Village Engineer or Village Representative.

For public streets to be conveyed to the Village, the second lift shall be 1-inch nominal thickness and its placement shall be delayed during the period of initial residential or commercial site construction activity and until such time as all defects to the first lift have been completed and approved by the Village Engineer and 75% buildout of the area serviced has been attained. The final lift shall be covered by a financial guarantee posted by the Owner/Developer in an amount approved by the Village Engineer and in accordance with the Pinehurst Development Ordinance.

The contractor shall provide temporary drains through the concrete gutter at all low points to allow the first lift to drain and to eliminate ponding at the low points. Prior to placing the final lift of SF9.5A surface course, the initial course shall be thoroughly cleaned and repaired. Bituminous tack shall be applied prior to surfacing to assure bond between lifts, along gutters and around castings.

3.04 Inspection

a. Proof-Rolling:

Street embankments shall be graded and compacted as noted below. Fill material for roadway embankments shall be free from stones greater than 4 inches in size, construction material debris, frozen material, organic matter or other unstable material. Fill material placed in roadway embankments shall be placed in lifts of 8 inches or less and compacted to a density of not less than 95% of maximum dry density as measured by AASHTO Method T-99. The compaction requirement shall be increased to 100% in the uppermost 12" of subgrade. These compaction requirements shall apply for that portion of the roadway measured from the back of curb and extending on a slope of 1 to 1, limits may be compacted to a density of not less than 90% of maximum dry density as measured by AASHTO T-99.

After all utilities and storm sewers have been installed, the subgrade shall be fine graded and restored to required grade, and then proof rolled, utilizing a fully loaded tandem axle truck having a gross weight not less than 40,000 pounds and with the tires inflated to not

less than 70 psi. The Village Engineer reserves the right to require presentation of weight tickets prepared by a State of North Carolina- Certified "Scalemaster" verifying the loaded weight of the proof roll truck. The Village Engineer, Village Representative or their designee shall witness the proof roll on behalf of the Village.

Should any "pumping" or displacement be observed by the Village during the proof-rolling, the defective area(s) shall be repaired based on the recommendations of an appropriately licensed geotechnical engineer. If deemed appropriate by a licensed geotechnical engineer, geotextile fabric may be utilized below base course material. The geotextile shall be installed in strict accordance to the manufacturer's recommendations with respect to overlap, depth of cover, etc. Prior to installing geotextile fabric, a copy of the manufacturer's literature shall be submitted to the Village, along with the geotechnical engineer's recommendations. The locations of geotechnical fabric shall be indicated on the Record Drawings.

Proof-rolling shall be repeated until there is no evidence of "pumping" or displacement.

b. Compaction Testing - Subgrade:

Upon completion of the proof-rolling, the Developer/Contractor shall furnish to the Village Representative a report from a certified soils testing laboratory. The report shall present the results of a Proctor analysis demonstrating that the subgrade compaction is acceptable in accordance with standard requirements of the NCDOT. The subgrade shall then be inspected by the Village Representative, and upon its acceptance and approval, the stone base course may be placed. However, no stone base may be placed prior to backfilling behind the curb.

One field density (compaction) test shall be required for 3,000 SY of street surface - for each lift of fill material placed into the roadway embankment. The Village Engineer may require additional testing beyond that specified above.

All compaction testing shall be performed by a certified testing laboratory with all results sealed by a North Carolina Professional Engineer with specific experience in Geotechnical Engineering. The cost of such testing shall be borne by the developer.

c. Base Course & Surface Course Inspection Requirements:

Prior to placement of bituminous surface course material, a Proctor analysis shall be furnished on the Aggregate Base Course placed in the roadway. The report shall be prepared by a certified testing laboratory and shall evidence compliance with the compaction requirements. Quarry tickets shall also be presented to the Village Representative to enable a check for yield at the specified final thickness. The base material shall then be inspected by the Village Representative, and upon acceptance and approval, the bituminous surface course may be placed.

The frequency and number of base course field density tests shall be in accordance with requirements of the NCDOT or as may otherwise be directed by the Village Representative or the Village Engineer.

Bituminous surface course material shall be placed and compacted in accordance with NCDOT requirements. Copies of delivery tickets shall be furnished to the Village Representative to enable a check for yield at the specified final thickness.

Should there be a question as to the final thickness of Aggregate Base Course or bituminous surface course, the Village Representative reserves the right to require the Developer/ Contractor to provide random corings by an independent testing laboratory to demonstrate actual thickness of base and surface courses. Core samples shall be taken by a certified testing laboratory and the results shall be presented to the Village Representative. Should the corings reveal insufficient thickness, the Contractor shall provide additional surface course as may be required or shall furnish other remedial measures as may be acceptable to the Village Representative.

The cost of all ABC and asphalt product compaction testing and coring work shall be borne by the Developer.

3.05 Pavement Marking & Signage

The Developer shall be responsible for furnishing and installing all street identification (name) and regulatory signs. Signs materials shall conform to those specified by the Village. In general, all street name, regulatory, and warning signs shall be installed on treated wood posts as specified by the Village. The Developer shall also be responsible for striping and markings required by the Village as part of the project on all public streets constructed and/or modified as part of the development project as follows:

- Stop Bars and Crosswalks - all streets in accordance with the Village's Standard Details and the MUTCD, latest edition.
- Continuous Centerline Striping – double yellow line on all collector, thoroughfare and marginal access streets as designated by the Village.
- Edgelines – 4" white edge lines on all collector, thoroughfare, and marginal access streets as designated by the Village.

a. Pavement Markings - Materials:

Pavement markings shall be made with reflectorized thermoplastic. The thermoplastic marking material shall be applied by fusing to the pavement surface by application of heat. Materials and application methods shall comply fully with the requirements set forth

in latest edition of the ***Standard Specifications for Roads & Structures***, as published by the NCDOT. Use of markings shall conform to the latest edition of the MUTCD, any modifications or clarifications of the MUTCD promulgated by NCDOT, and the direction of the Village Engineer with the most stringent governing. The Village Engineer may require use of alternate methods or materials when determined by the Village Engineer to be in the best interest of the Village.

b. Street Identification Signs:

Street identification signs shall be placed at each intersection and shall clearly identify each street. On Village maintained streets, such signs shall be reflective and comply with standards set by the Village Public Services Director. On State-maintained routes, identification signs shall conform to NCDOT standards. Sign location placement shall be as directed by the Village. All required signs shall be placed by the developer/owner at no cost to the Village.

c. Regulatory Signs:

Regulatory signs shall meet the requirements of the *Manual on Uniform Traffic Control Devices*, latest edition and any modifications thereto established by the NCDOT. Materials shall meet the requirements set forth in the applicable Sections of the *Standard Specifications for Roads & Structures*, latest edition, as published by the North Carolina Department of Transportation. The location and types of regulatory signs shall be indicated on the construction drawings.

d. Sign Posts & Placement:

No signage may be placed in the right-of-way without prior written approval by the Village, including submission of a completed Right of Way Encroachment agreement. On Village maintained routes, regulatory signs shall be mounted on Wolmanized 4 x 4 southern yellow pine (SYP) posts and street signs shall be mounted on Wolmanized 6 x 6 SYP posts. Posts shall be furnished in 9' lengths and driven 2' into the ground.

On NCDOT-maintained routes, signs posts shall be in accordance with NCDOT Standards and specifications unless deviations are approved by both NCDOT and the Village. Sign placement on all routes shall be in accordance with the "Manual on Uniform Traffic Control Devices (MUTCD)", latest edition.

3.06 Private Irrigation Systems

Private irrigation systems proposed to be located within existing or proposed Village right-of-way shall not be installed unless a plan for the proposed system is submitted to the Village for review, and a Right-of-Way Encroachment Agreement is executed by the

Village and the system's owner. The following requirements or features must be indicated on the plan:

- (1) All irrigation systems shall be equipped with a Village-approved backflow preventer located in a freeze-proof enclosure. This requirement shall apply to all systems within the Village limits and Pinehurst ETJ whether supplied by a public water system or by a private water system.
- (2) All backflow preventers, control boxes, and other above ground devices shall be located outside of Village right-of-way. Only sprinkler heads, buried piping and control wiring may be located within the Village right-of-way. No sprinkler heads or other devices shall be installed within 10 feet of curbs or edges of pavement unless otherwise approved by the Village.
- (3) Within the Village right-of-way, all control wiring shall be in electrical conduits and installed with no less than 24" of cover, unless greater cover is required by either the applicable electrical codes or the Village Engineer.
- (4) All irrigation piping crossing beneath Village streets shall be encased in steel or ductile iron casing pipe, extending no less than 10 feet beyond curbs or edges of pavement with no less than 24" of cover. All casings shall meet NCDOT standards & specifications.
- (5) Sprinkler heads shall be located and adjusted so that the spray pattern does not enter the roadway or create a visual obstruction within sight triangles.
- (6) The owner of the irrigation system shall be fully responsible for operation, maintenance and repair of the system. The owner shall also be responsible for any damage to Village streets or utilities (Village or Moore County) resulting from failure of or repair to the irrigation system. The Village shall not be responsible for damage of any kind to private irrigation systems or components located within Village right-of-way for any reason.

In the event that the Village Representative deems that the owner failed to properly install, operate or maintain a private irrigation system within Village right-of-way, he/she will contact the Village Manager, who may revoke permission for the encroachment upon Village right-of-way. Upon revocation of permission to encroach upon Village right-of-way, the encroaching facilities shall be removed by the owner, at the expense of the owner, within 30 calendar days following said revocation. Failure to remove the encroaching facilities within the specified time period shall be cause for the Village to remove the facilities with all costs to the Village being billed to the owner and execution of other remedies as provided for in the Village's Municipal Code.

3.07 Mailboxes

Mailboxes located within Village right-of-way for the purpose of receiving delivery from the US Postal Service shall conform to the requirements set forth by the US Postal

Service. All portions of the mailbox, support or any appurtenance thereto shall be no less than 12" from the back of curb (where streets have curb & gutter) or 24" from the edge of pavement along non-curb & gutter section streets. No brick or other "hardened" structures shall be used to support the mailbox for any installation within a Village-owned right-of-way. The Village reserves the right to require submission of installation details prior to mailbox installation and to require modification or removal of any mailbox structure deemed to constitute a safety hazard.

3.08 Public Utility Encroachments

All public utilities not owned by the Village (including but not limited to water, sewer, natural gas, electric, telecommunications and cable TV) that desire to utilize any portion of the Village's right-of-way or easements for installation of any above or below ground facilities shall be required to execute a Right-of-Way Encroachment Agreement with the Village for each installation unless a "blanket" Agreement has been issued by the Village. The installation shall, at a minimum, comply with the latest edition of the NCDOT "*Policies and Procedures Manual for Accommodating Utilities on Highway Right-of-Ways*" Manual and in accordance with the Standard Details contained in this manual and any Special Provisions issued by the Village as part of the Encroachment Agreement. The Village may require additional depths of bury, alternate materials, or other installation modifications on a case-by-case basis.

Failure to comply fully with all specified conditions shall be grounds for revocation of the Encroachment Agreement and refusal for consideration of any further encroachment requests until the non-compliant installation has been brought into full compliance. Further, the Village may elect pursue all remedies against the encroaching party as allowed under all local, State, and Federal codes, laws, and rules.

3.09 Private Utility and Private Structure Encroachments

No privately owned utilities or structures, including forcemains, pumps, cables, pipes, fences, sheds, or any other associated private utility facility or privately owned structure shall be allowed within any Village right-of-way or easement. In the event such an installation is found, the encroaching party shall promptly and completely remove the facility and restore the easement or right-of-way to the satisfaction of the Village. Failure on the part of the encroaching party to remove the facility within 30 business days shall result in removal by the Village with all costs being born by the encroaching party. Further, the Village shall not be liable for any damages to the encroaching facility or any associated facilities removed by the Village. The Village may also elect to seek other remedies as provided for in various Village, State, and Federal codes and laws.

3.10 Firelanes

All Firelanes shall be installed by the contractor and inspected by the Village in accordance with the Public Street requirements contained in this manual. Fire Lanes shall be provided as required by the Village Fire Marshal.

Fire Lanes shall be at least 20 feet in width, with the edge closest to a building or fire hazard located at least 25 feet away from said hazard, unless otherwise directed by the Fire Marshal. All firelanes shall have a minimum pavement section of 8" ABC stone and 2 inches of SF9.5A asphalt.

Fire Lanes shall be designated by pavement markings and signage as required by the Fire Marshal.

All site plans shall include a fire lane plan and fire lane marking/signage plan for review by the Village Engineer and Fire Marshal.

3.11 Traffic Impact Studies

Where required, all Traffic Impact Studies shall conform to the standards set by the Village Engineer. Any proposed improvements cited in these studies shall be constructed by the Developer/Owner at no charge to the Village in conformance with Village and NCDOT standards and specifications.

It shall be the responsibility of the Developer/Owner to contact the Village in advance to determine the specific study requirements for their proposed project.

3.12 Parking

Parking facilities shall be provided in accordance with the standards set forth in the Village's PDO. The Layout and design of all parking facilities shall conform to the standards and guidelines set forth by ITE for the type of facility being serviced. All parking facilities shall have, at a minimum, the dimensions as outlined on Figure 3-2.

Parking lots shall be designed to provide safe maneuverability of vehicles. A minimum parking stall dimension of 9' x 18' shall be provided. Accessible parking spaces shall be a minimum dimension of 8 feet with a five (5) foot lane adjacent to the space (or minimum lane width of eight (8) feet where van accessibility is required) and properly marked with signage in accordance with the N.C. Building Code and Americans with Disabilities Act (ADA) standards.

Where sidewalks abut an 18 foot deep parking bay, the sidewalk shall be a minimum width of six (6) feet, unless the bay depth is increased to allow use of standard concrete wheelstops to prevent vehicular overhang from obstructing any portion of the sidewalk.

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A minimum pavement structure consisting of 6 inches of ABC and 2 inches of SF9.5A or S9.5A shall be used along the travel aisle on parking facilities for multi-family and non-residential developments. Access drives for these facilities shall also meet this minimum pavement standard. In the event any travel aisle or access drive areas are determined by the Fire Marshal to be 'firelanes', the paving section of those areas shall be increased to meet the firelane paving requirements set forth in this manual.

All minimum stall depths and module widths shall be measured to the face of curb when curb and gutter is used. For non-curb & gutter facilities, the Village Engineer may require additional stall depth and use of concrete wheelstops.

All paved parking facilities shall be striped in accordance with the MUTCD with four (4) inch white lines. All firelane areas within any parking facility shall be marked and signed in accordance with guidance provided by the Fire Marshal. Accessible parking facilities and isles shall be marked in accordance with ADA standards.

FIGURE 3-1

	<u>Horizontal Curve Controls</u>				<u>Vertical Curve Controls</u>		
	Minimum Design Speed (MPH)*	Maximum Superelevation (ft/ft)**	Minimum Radii (ft)	Maximum Grade (%)	Length Crest	Length Sag (ft)	Minimum Length(ft)
Major Streets (Thoroughfares)	Design standards to be determined for each case individually by a Professional Engineer using AASHTO guidelines & the NCDOT Roadway Design Manual with approval by the Village & NCDOT.						
Collector Street – Non-Residential	40	0.04	500	6%	55A	55A	150
Collector Streets – Residential	35	0.04	300	7%	35A	35A	125
Non-Residential Local Streets	30	reverse crown	300	7%	30A	40A	100
Residential Local Streets	30	normal crown	150	8%	30A	30A	100
Cul-de-sacs (600 feet or less)	25	normal crown	100	8%	25A	25A	75

- Notes: 1. The Village Engineer may allow a lower design speed on residential streets. Approval must be given on a case by case basis.
 2. The minimum clear section for local streets shall be 20 feet, exclusive of the gutter section, with 20' required for ribbon paving.
 3. A minimum tangent of 100 feet shall be provided between all horizontal curves with a minimum of 150 feet for collector level and higher classification streets.
 4. The minimum grade for any street shall be 0.5%. The maximum grade allowed for all streets when approaching an intersection shall be limited to 3% for the last 100 feet of pavement prior to the intersection.
 5. The minimum curb radius return shall be 30' with longer returns required as determined by the Village Engineer in non-residential areas and on Major Streets.
 6. Special typical section standards apply in the Historic Preservation Overlay District. Contact the Village Engineer for specific guidance.
 * -Design Speed to be at least 5 mph greater than posted speed except for cul-de-sacs in which case the design speed shall be the posted speed.
 ** - The superelevation tables found in the AASHTO "Greenbook" latest edition will be used for determining the actual "e" for various centerline radii.

**FIGURE 3-2
RECOMMENDED PARKING LOT STALL DIMENSIONS**

DIMENSIONS FOR 90-DEGREE PARKING

APPLICATION		(S) STALL WIDTH (feet)	(C) STALL LENGTH (feet)	(D) STALL DEPTH (feet)	(L) LINEAR DEPTH (feet)	(A) AISLE WIDTH (feet)	(W) MODULE WIDTH (feet)
CUSTOMER, high turnover	STANDARD	9	9.5	18	18	24	60
CUSTOMER AND EMPLOYEE, low turnover	STANDARD	9	9	18	18	24	60

DIMENSIONS FOR 60-DEGREE PARKING

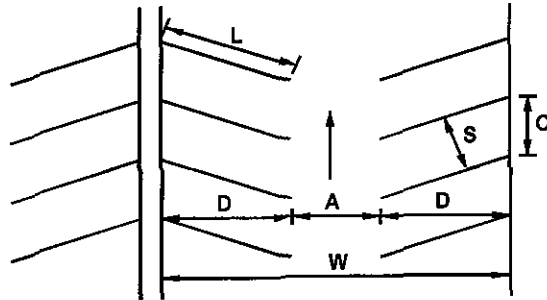
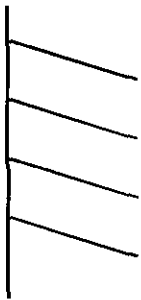
APPLICATION		(S) STALL WIDTH (feet)	(C) STALL LENGTH (feet)	(D) STALL DEPTH (feet)	(L) LINEAR DEPTH (feet)	(A) AISLE WIDTH (feet)	(W) MODULE WIDTH (feet)
CUSTOMER, high turnover	STANDARD	9	11	15.6	18	22.8	54
CUSTOMER AND EMPLOYEE, low turnover	STANDARD	9	10.4	15.6	18	20.8	52

DIMENSIONS FOR 45-DEGREE PARKING

APPLICATION		(S) STALL WIDTH (feet)	(C) STALL LENGTH (feet)	(D) STALL DEPTH (feet)	(L) LINEAR DEPTH (feet)	(A) AISLE WIDTH (feet)	(W) MODULE WIDTH (feet)
CUSTOMER, high turnover	STANDARD	9	13.4	12.7	18	22.6	48
CUSTOMER AND EMPLOYEE, low turnover	STANDARD	9	12.7	12.7	18	21.6	47

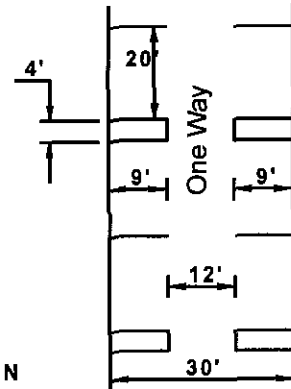
DIMENSIONS FOR PARALLEL PARKING

APPLICATION		(S) STALL WIDTH (feet)	(C) STALL LENGTH (feet)	(D) STALL DEPTH (feet)	(L) LINEAR DEPTH (feet)	(A) AISLE WIDTH (feet)	(W) MODULE WIDTH (feet)
CUSTOMER, *One-Way Only ** Minimum, See Detail	STANDARD	9	20**			12*	30*



PROVIDE 4'-6" OF SPACING BETWEEN ABUTTING PARKING BAYS

NOTE: C = S FOR 90 DEGREE PARKING
D = L FOR 90 DEGREE PARKING



SECTION 4 - CURB & GUTTER, DRIVEWAYS, GREENWAYS, AND SIDEWALKS

4.01 Materials

a. Concrete:

Concrete for curb and gutter, driveways, or sidewalks shall be Portland cement concrete having a 28-day strength of 3,000 psi when tested in accordance with ASTM C39. Detailed specifications for concrete shall conform to the specifications contained in Section 2.08 hereof and with applicable sections of NCDOT "Standard Specifications for Roads and Structures", latest edition.

b. Bituminous Concrete (Asphalt):

Asphalt for driveways shall meet the requirements as set forth in the latest edition of NCDOT's Standard Specifications for Roads and Structures for SF9.5A asphalt. PG64-22 liquid binder may be used.

c. Joint Fillers:

Joint fillers shall be a non-extruding joint material conforming to ASTM D1751.

4.02 Dimensions

The minimum thickness of a sidewalk shall be 4 inches, except at driveway crossings where the sidewalk shall be a minimum of 6" in thickness. Sidewalks shall have a uniform slope perpendicular to the curb or edge of pavement of not less than 1/4-inch per foot and the utility/street tree strip between the sidewalk and the back of curb shall have a slope of not less than 1/4" per foot nor greater than 1/2" per foot toward the back of curb. All sidewalks shall be at least five (5) feet in clear width. All sidewalks shall be within the Village street right of way unless installed within a dedicated and platted Sidewalk Easement that is approved in advance by the Village Engineer.

Curb and gutter shall be standard 24" combination curb and gutter in accordance with the Village's Standard Details. Standard median curb (18-inch) may be used on entrance islands and medians. For a 24" curb, a *back of curb* transition section into and exiting allcatch basins shall be required. The length of the transition section shall be at least five feet (5') on each side of the catch basin. Rolled or valley type concrete curb & gutter shall not be used unless specifically authorized in writing by the Village Engineer. No asphalt 'wedge' curbing shall be permitted within the Village's jurisdiction. Brick curbing, conforming to special standards prepared by the Village, may be used in Commercial

Areas of the Historic Preservation Overlay District or in other areas as determined acceptable by the Village.

4.03 Construction Methods

a. Subgrade:

The subgrade shall be excavated to the required depth to allow placement a minimum of 3" of aggregate base course beneath the curb, and shaped to the proper cross-section. Where tree roots are encountered, they shall be removed to a depth of 1 foot for the full width of the excavation. The subgrade shall be stable and thoroughly compacted, as specified in Section 3.04.

b. Forms:

Forms shall be set and maintained true to the required lines, grades, and cross sectional dimensions as shown on the Standard Details and on the Drawings. Forms shall be constructed with material of such strength and with such rigidity to prevent any appreciable deflection between supports. Straight forms shall be within a tolerance of 1/4 inch in 10 feet from a true line horizontally. Vertical grade control of the forms shall be conducted by use of stringlines tied to adequate offset grade staking. Offsets shall be at least five feet (5') from the proposed back of curb. Forms shall be thoroughly cleaned of all dirt, mortar and foreign material before being used. All inside form surfaces shall be thoroughly coated with commercial quality form oil.

Curbing forms or "stringline" guides shall be carefully placed to assure that the curbing will be constructed to accurate grades and no depressions or "bird baths" are created. Curved sections shall be placed such that the radii are smooth and continuous, without abrupt bends.

c. Expansion, Contraction and Control Joints:

Contraction and control joints shall be cut to a depth equal to at least 1/3 of the total concrete thickness. Contraction or control joint spacing shall be 10 feet maximum for curbing and driveway aprons. Expansion joints for curbing shall be no more than 50 feet on centers, with the joint material extending the full depth of the concrete with the top of the filler 1/8-inch below the finished surface. Expansion and contraction joints shall be spaced such that no final curb section shall be less than 5 feet long (including repair sections). Expansion joints for sidewalks shall be spaced no greater than 50 feet apart. Sidewalks shall be finished to grade and cross-section with a float, troweled smooth, and finished with a broom. Contraction joints shall be no less than 1/8-inch in width and cut at intervals equal to the width of sidewalk.

d. Driveway Aprons:

Where driveway aprons are to be installed in an existing curb, the entire curb and gutter section shall be removed. Saw cutting and removing the curbing, and leaving the existing gutter in place, shall not be allowed. Contraction, control and expansion joints shall be located as previously specified and shown in the Village's Standard Details.

The flow line of the gutter shall be maintained across driveway aprons. Driveway aprons shall be a minimum of 6 inches thick and constructed in accordance with the Village's Standard Details contained in this manual.

4.04 Pedestrian Crossings

Pedestrian crossings, curb cuts and ramps shall be provided at all intersections in accordance with NCGS 136-44.14. Construction, pavement marking, etc. shall conform to the Village's standard details.

4.05 Driveway Criteria

No property shall have more than two (2) driveway cuts or turnouts onto any street. The spacing of all drives shall be as approved by the Village Engineer or Village Representative. The Village Engineer or Village Representative may restrict the location and/or number of driveways to a parcel when felt to be in the best interest of the overall safety of the Village. The edge of all driveways shall be offset at least 10 feet from any adjacent property lines. Greater offsets may be required in multi-family, commercial, and other non-residential zoning districts.

If required by the Village Representative, a minimum 15" RCP shall be installed beneath the driveway to accommodate positive drainage. In addition, sod shall be provided as directed by the Village Representative within the right of way to prevent erosion. Sod shall be 1" below the edge of the roadway.

- a. Residential, Single Family – on curb & gutter streets, all residential driveways shall be installed and inspected in accordance with the standards and specifications contained herein and any direction provided by the Village Engineer or Village Representative. On non-curb& gutter streets, the driveways shall be installed in accordance with the Village's standard details and shall include an asphalt or concrete paved apron that extends at least fifteen (15') feet from the edge of the roadway back into the right of way. Residential driveways shall be at least 12 feet wide and no more than 16 feet wide. The end point of the driveway radii for all residential driveways shall be at least thirty (30') feet back from the tangency point of the radii formed by the nearest street intersection.

- b. Commercial, Institutional, Residential Multi-Family – all driveways in this class shall be fully paved. For sites requiring a Fire Lane, the driveway shall be paved and constructed to meet the Fire Lane requirements set forth in this manual. The arrangement of driveways shall be related to driveways for adjacent sites and nearby street intersections. The end point of the driveway radii for all residential driveways shall be at least one hundred (100') feet back from the tangency point of the radii formed by the nearest street intersection. The Village Engineer may require greater setback distances on a site-by-site basis.

Where two driveways are proposed along a single property frontage to facilitate operations, the minimum distance between the centerlines of the two driveways shall be at least 300 feet, unless otherwise approved by the Village with greater offset distances as required by the Village Engineer and/or NCDOT. A Street-type turnout shall be utilized when the estimated ADT of the site is greater than 100 vehicles/day, large vehicles such as fire apparatus must be accommodated, or as required by the Village Engineer.

4.06 Inspection

No concrete or other paving shall be placed until all forms, subgrades, and base courses have been inspected and approved by the Village Representative. Offset or reference points shall be maintained in place to allow for proper inspection of the forms by the Village Representative. Where machine extruded curbing is used, the "stringline" shall be inspected and approved by the Village Representative prior to placement of any curbing. A minimum of five (5') foot offset shall be used for all hubs, reference points, etc to allow for adequate room to install stringlines while minimizing the disturbance of the reference points.

4.07 Greenways

All greenways shall have a minimum section of 4" compacted thickness stone screenings. Hard surfacing such as asphalt paving may be required by the Director of Parks & Recreation if felt to be in the best interest of the Village. The minimum width of all greenways shall be 6 feet clear width, with a 3' shoulder/swale area on each side, with additional width as required by the Director of Parks & Recreation to meet the requirements of specific sites or areas, such as high pedestrian counts, or to accommodate other needs. All greenways shall be crowned or sloped to provide for proper drainage. The maximum allowable longitudinal gradient shall be 10%. Drainage shall be provided at all crossings and shall accommodate at least the 10-year storm event, with increased drainage requirements as determined by the Village Engineer and the Director of Parks & Recreation. All greenways shall be located within a platted 15' wide (minimum) 'Village of Pinehurst Greenway Easement.' Greenways may be placed in Floodzone areas, provided that a hard surfacing is utilized and that the greenway shall be constructed in such a manner as to not alter the Floodzone elevations.

SECTION 5 - STORM DRAINAGE

5.01 Design

Storm drainage facilities shall be designed to collect and dispose of stormwater generated upon or passing through the project location. The determination of the quantities of water that must be accommodated will be based upon peak flows from storms having the following return periods:

<u>Drainage Structure</u>	<u>Storm Event - Return Frequency</u>
Curb inlets & Gutters	10-year storm ⁽¹⁾
Storm Sewer System Collector	10-year storm
Cross Street Drainage	25 to 100-year storm ⁽²⁾
Roadways in Flood Plain	100-year storm ⁽³⁾

(1) Assuming 50% blockage in sag inlets. Inlets shall also be located just prior to all points of 'rollover' to prevent runoff from running horizontally across the street section. Additional inlets may be required in high pedestrian traffic areas.

(2) Depending upon Street Classification, as determined by the Village Engineer.

(3) Roadways in flood plain areas should withstand the 100-year storm without overtopping or sustaining damage. The roadway embankments shall be fully protected from flows that may occur during a 100-year event. The backwater pool shall also be shown on the plans.

Prediction of the peak flow rates shall be calculated using the procedure in the USDA Soil Conservation Service Method TR-55, the Rational Method, or other calculation methods as approved by the Village Engineer. The size of stormwater culverts shall be determined by utilizing the standard energy equation for inlet control or outlet control.

Calculation submittals shall include analyses of pre and post development run off rates for the 2, 10, 25, and 100-year storm events. All calculations shall be performed under the responsible charge of an appropriately licensed design professional and sealed by that professional. All submittals shall include a full analysis and justification for the determination of C or CN factors, Tc, and other data used in the development of the computations.

For areas up to 100 acres, the Rational Method may be used. Intensity data used in computations (inches/hour) for various return period and duration storms shall be based upon data specific to the Village of Pinehurst. For areas greater than 100 acres, SCS

methods shall be used. If an automated software program other than those specifically developed by SCS/NRCS is used, adequate data regarding the program shall be submitted to the Village Engineer for review and approval.

Design of stormwater collection systems for public and private streets shall include inlet spread/capture computations based upon 'just-full' flow (gravity flow) in accordance with the Manning Equation, and a hydraulic grade line analysis to verify the system performance. Such computations shall be submitted in a neat, tabular format under the seal of the licensed design professional and include a clear numbering/labeling scheme for all structures shown on the plans as part of the proposed system. In the event software programs are used to determine inlet location and spread, such programs shall be approved by the Village Engineer.

All storm drainage facilities shall be designed in a manner such that upstream and downstream properties are not adversely affected. The Village Engineer may also require submission of an engineering analysis of the overall receiving watershed to a point downstream at which the runoff from the site in question is less than ten percent of the total predicted return period event flow for the receiving watershed. The Village may require offsite improvements to be made by the developer down to this point if deemed prudent by the Village to minimize the impact of runoff on downstream properties.

The Village generally requires stormwater management facilities to be included as part of any project such that the post-development runoff rate does not exceed the pre-development rate for a 10-year storm event. Deviations for small projects may be approved by the Village Engineer on a case by case basis. The general design shall follow the standards set forth in the publication 'Elements of Urban Stormwater Design' by H. Rooney Malcolm, PhD., P.E. Alternate types of stormwater management facilities may be allowed on a case-by-case basis. It shall be the responsibility of the designer to contact the Village Engineer in advance to discuss such facilities and the applicable standards. All stormwater management facilities shall be properly maintained by the property owner.

The minimum pipe size to be used shall be 15-inch diameter. The minimum size for a culvert crossing under a public or private street shall be 18 inches. The minimum pipe grade in all cases shall be 0.5% or the slope required to develop a 2.5 fps flow velocity at the design condition and the maximum pipe grade shall be 8% unless special anchoring details are approved by the Village Engineer.

All public storm drainage facilities shall be installed in dedicated street rights-of-way (i.e. pipe inlets and outlets shall be within street rights-of-way). If a property owner/developer desires to extend storm drainage piping to eliminate open channels on private property, such pipes shall be installed and maintained at the property owner's expense, with appropriate computations and plans submitted to the Village Engineer to ensure that such extensions will not adversely affect the performance of the existing system. No off right-of-way extension of any stormdrain system serving a public right-of-way shall be made until such time as all computations and plans for the same have been reviewed and approved. A manhole or junction box shall be provided at the public right-of-way boundary.

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The minimum depth of cover shall be 2 feet below finished subgrade for all traffic bearing areas and 1 foot below finished grade for all non-load bearing areas. High strength pipe may be used upon approval by the Village Engineer in areas that cannot meet the minimum cover requirements.

Minimum widths of storm drainage easements shall be the greater of 1) the width as dictated by the appropriate following configurations listed below; or 2) the width necessary to contain the predicted 100-year water elevation plus two feet in depth:

- 20 feet for single pipes up to and including 36 inches in diameter or open channels up to 36 inches in top width
- 20 feet plus the maximum conduit or channel width (in feet) for single pipes or channels larger than 36 inches wide
- 10 feet from the edge line of the outside conduits where multiple, parallel pipes are installed.

The Village of Pinehurst shall maintain only the storm sewer systems located within Village maintained rights of way and on Village owned property unless a drainage easement meeting the criteria set forth in this manual has previously been offered and accepted by the Village. Storm drainage systems located on private property shall be maintained by the property owner, including those shown within a drainage easement, unless the easement has been accepted by the Village.

Erosion and sedimentation control measures shall be so designed to provide control from the calculated post-development peak rates from a 10-year frequency storm in non-HQW areas and a 25-year storm in HQW areas. Discharge from drainage systems shall not be of such a velocity as to cause damages after leaving the pipe.

At all pipe outlets, flared end sections or head walls shall be provided, with rip-rap or improved vegetated aprons designed to reduce velocity and dissipate energy so that downstream damage does not occur. The Village reserves the right to require use of water quality Best Management Practices (BMP's) at the outlet of all pipes to minimize the impact on sensitive receiving waterways such as wetlands and perennial streams as shown on USGS Quad mapping and NRCS (SCS) Soils mapping. Such BMP's shall be required in water supply watershed districts consistent with the requirements of the Watershed Protection Overlay District of the Village of Pinehurst Development Ordinance. Approved BMP's shall be in accordance with the most recent version of the NCDEQ Stormwater BMP Manual. No BMP shall be allowed within the proposed or platted public or private street right of way. Adequate platted easements shall be provided around all such devices to allow for access and maintenance by the Property or Homeowners Association. Design of these devices shall follow the criteria set forth by NCDEQ and

shall not create a tailwater condition that allows for ponding or sedimentation within any pipe or piping system.

No channel within an easement may have side slopes that exceed 3:1 (H:V) and flatter side slopes are encouraged in all cases. Channels shall be designed to have a minimum velocity of 1.5 fps to avoid siltation and capacity reduction. Maximum acceptable velocities are as shown in Figure 5-1 at the end of this section.

For shoulder section streets, the roadway swales shall be sized to handle a minimum of the 10-year storm without erosion or overtopping. Preference shall be given to utilizing grass-lined swales in lieu of rip-rap for erosion control, and the maximum front and back slopes in these areas shall be 5:1 (H:V) to allow for routine mowing and maintenance, with flatter side slopes encouraged in all cases.

Manholes or structures shall be installed at each deflection of line or grade. No "blind" junction boxes shall be permitted.

Stormwater shall not be allowed to flow across streets. Drainage structures shall be provided to intercept flow prior to the radius point(-s) of an intersection, or the design of the street shall indicate a continuous grade around the radius to allow the flow to continue down the intersecting street. Water shall be picked up before the spread into the street exceeds 4 feet for local residential-class streets. The inlets shall be spaced on other classification streets using the standards set forth in the NCDOT's Hydraulic Design Guidelines, latest edition, as modified by the Village. No curb inlets shall be installed in the curb radius of any intersection unless approved by the Village Engineer.

Storm sewer systems shall not discharge into the front yards of lots, but shall extend to within 20 feet of the rear property line in lots up to 1/2 acre in size and shall extend a minimum of 175 feet from right of way in lots larger than 1/2 acre.

Pipes, drains, flumes or other concentrated stormwater devices shall not discharge across a sidewalk or greenway, but rather shall be piped.

5.02 Pipe Materials

a. General:

All storm sewer pipes to be installed in projects within the public street rights of way belonging (or to be dedicated) to the Village of Pinehurst, within any Private Street right-of-way, under any driveway within the Village, or within the limits of any Fire Lane required by the Village Fire Marshal shall be reinforced concrete pipe (RCP). Approval to use any materials other than RCP may only be granted by the Village Engineer.

b. Reinforced Concrete Pipe (RCP):

RCP shall be as per ASTM C76, Table III, IV, or V with a minimum diameter of 15-inches. All RCP shall be of the highest quality materials, no seconds or lesser quality pipe shall be used. Joints shall be sealed with a plastic cement putty meeting Federal Specification SS-S-00210.

5.03 Materials - Storm Drainage Structures

a. General:

All structures - manholes, curb inlets, catch basins, junction boxes, etc. shall be constructed of concrete brick masonry units or pre-cast concrete. Endwalls and headwalls shall be constructed of reinforced pre-cast concrete, or structural cast-in-place concrete in accordance with NCDOT and Village Standards.

b. Concrete Brick Masonry Units:

Concrete brick masonry units shall be solid units meeting the requirements of ASTM C55, Grade S-II. All such units shall be color tinted in accordance with NCDOT standards and specifications.

c. Pre-cast Concrete Structures:

Pre-cast concrete structures shall meet the requirements of ASTM C478. Structures shall have joints sealed with a pre-formed plastic gasket per Federal Specifications SS-S-00210. Manholes shall be sized in accordance with the requirements set forth in Section 7.03.

d. Mortar:

Mortar shall be proportioned as shown below for either Mix No. 1 or Mix No. 2. All proportions are by volume. Water shall be added only in the amount required to make a workable mixture.

MIX NO. 1: 1 part Portland Cement
 $\frac{1}{4}$ part Hydrated Lime
 $3\frac{3}{4}$ parts Mortar Sand (maximum)

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MIX NO. 2: 1 part Portland Cement
1 part Masonry Cement
6 parts Mortar Sand (maximum)

Portland cement shall be ASTM C-150, Type 1. Hydrated lime shall conform to ASTM C207, Type S. Masonry cement shall meet the requirements of ASTM C91. Mortar sand shall be standard size 4S, per requirements of the NCDOT.

e. Castings:

- (1) General - Samples of casting(s) proposed for use shall be provided to the Village Representative for review and approval. In addition to samples, the names of other users of the castings shall be furnished along with names and telephone numbers of persons whom the Village Engineer may contact for an evaluation of the casting. All manufacturers shall be on NCDOT's Approved for Use status listing. All castings shall meet the requirements of ASTM A48, Grade 30 iron. All castings shall be of domestic origin.
- (2) Curb Inlet Grate, Frame & Hood - Curb inlets shall be of the grate, frame and hood type conforming to NCDOT 840.03, Type E, F and G, based on flow direction. All Curb Inlet grates shall be of a 'bicycle-safe' type as per NCDOT. All castings shall be fully compliant with all NCDOT standards & specifications.
- (3) Grates & Frames - Cast iron grates and frames for yard inlets shall conform to NCDOT 840.16 and be of the size indicated on the approved plans. Grates and frames shall only be used outside of street rights-of-way.
- (4) Manhole Rings & Cover - Cast iron manhole rings and covers shall conform to NCDOT 840.54, with the words "STORM SEWER" cast on the cover. Covers shall have four 1-inch holes. Manhole castings shall be machined to provide a continuous bearing around the full periphery of the frame.
- (5) Manhole Steps - shall be of polypropylene material reinforced with a 1/2 inch diameter reinforcing rod. They shall be designed for a vertical load of 400 pounds and a horizontal pullout load of 1000 pounds, and shall be set 16" on center. Holes for the installation of manhole steps shall not project through the manhole wall, but shall stop a minimum of one inch from the outside wall. Steps shall be at least 10 inches clear width and shall project at least 4 inches from the wall into which they are embedded. Steps in precast concrete structures shall be installed by the manufacturer.

f. Portland Cement Concrete:

Portland cement concrete used for storm drainage structures, endwalls, etc. shall conform to the technical requirements presented in Section 2.0 of these Specifications. Concrete shall be 4,000 psi minimum at 28 days for all precast concrete structures.

g. Reinforcing Steel:

Reinforcing steel shall be new billet steel conforming to ASTM A615 for grade 60. Reinforcing steel shall be deformed per ASTM A305.

5.04 Miscellaneous Materials

a. Riprap:

Riprap shall be large aggregate of the size and class shown on the approved drawings. Riprap shall be supplied from a quarry certified by and in good standing with NCDOT.

b. Erosion Control Materials

Any erosion control materials proposed for use shall be approved in advance by the Village Engineer and/or NCDEQ. Adequate information shall be submitted to the Village Engineer to allow for a complete evaluation to determine the suitability of the material in the intended. Such information shall include technical data, samples/swatches, and other data deemed necessary for evaluation.

c. Geotechnical Fabrics

Any geotechnical fabrics/materials proposed for use shall be approved in advance by the Village Engineer. Adequate information shall be submitted to the Village Engineer to allow for a complete evaluation to determine the suitability of the material in the intended. Such information shall include technical data, samples/swatches, and other data deemed necessary for evaluation.

5.05 Construction Methods

a. Trenching & Bedding for Storm Sewers:

The trench shall be excavated to the line and grade indicated on the Drawings and in accordance with OSHA standards. The trench bottom shall provide a firm and uniform support for the pipe. Where bell and spigot type pipe is used, recesses shall be excavated to receive the pipe bell.

Where the foundation is found to be of poor supporting value, the pipe foundation shall be conditioned by undercutting the unacceptable material to the required depth as directed by the Village Representative, and backfilling with stone or other approved material. Where necessary, surface water shall be temporarily diverted in order to maintain the pipe foundation in a dry condition. The flow of water from such temporary diversions shall be directed into suitable erosion control devices.

b. Pipe Laying:

Concrete pipe culverts shall be laid carefully with bells or grooves upgrade and ends fully and closely joined. Joints of concrete pipe shall be made with cement mortar or with plastic gasket material as specified. Where mortar is used, the joint shall be thoroughly wetted before making the mortar joint. Before succeeding sections of pipe are laid, the lower portions of the bell or groove of the pipe shall be filled on the inside with cement mortar of sufficient thickness to bring the inner surface of the abutting pipes flush and even. After the pipe is laid, the remainder of the joint shall be solidly filled with mortar and sufficient additional mortar used to form a bead or ring around the outside of the joint. The inside of the joint shall be wiped and finished smooth. Pipe which is not true to alignment, or which shows any settlement after laying, shall be taken up and re-laid.

Multiple-barrel culvert installations shall be fully bedded and encased with #67 washed stone, up to the pipe crown. Stone shall be placed evenly on each side and tamped firm to fully support the pipe without displacement. Following the initial stone backfill, a layer of Village-approved geotextile shall be placed across the stone backfill to prevent migration of soil backfill and subgrade materials into the bedding and haunching stone. Installation of this separation layer shall be in accordance with the manufacturer's recommendations and any direction provided by the Village Engineer.

No pipe may enter through the corner of any pre-cast 'waffle box.'

c. Backfilling:

The storm sewer trench shall be backfilled with approved material free from large stones or clods in 6-inch layers, loose measurement, and compacted to 95% of maximum dry density (AASHTO T-99), where the trench is within an area to be paved, or where the trench is immediately behind the curb. In streets the compaction requirement shall be increased to 100% of maximum dry density within 12" of subgrade. The backfilling shall be done on both sides of the pipe simultaneously to prevent displacement of the pipe. The backfilling shall be done on both sides of the pipe simultaneously to prevent displacement of the pipe. The backfill materials shall be moistened when necessary in the opinion of the Engineer, to obtain maximum compaction. Water settling or puddling shall not be permitted. Backfill in trenches not within the limits to be paved may be compacted in 12-inch layers after backfill is one foot above the top of the pipe.

All trash, forms, debris, etc., shall be removed from the trench before backfilling. Backfilling around structures shall be done symmetrically and thoroughly compacted in 6-inch layers with mechanical tampers to the specified 95% density.

d. Masonry Structures:

Excavations shall be made to the required depth, and the foundation on which the brick masonry is to be laid shall be approved by the Village Representative. The brick shall be laid so that they will be thoroughly bonded into the mortar by means of the "shove-joint" method. Buttered or plastered joints will not be permitted. The headers and stretchers shall be so arranged as to thoroughly bond the mass. Brickwork shall be of alternate headers and stretchers with consecutive courses breaking joint. All mortar joints shall be at least 3/8 inches in thickness. The joints shall be completely filled with mortar. No spalls or bats shall be used except for shaping around irregular openings or when unavoidable to finish out a course. Competent bricklayers shall be employed on the work and all details of construction shall be in accordance with approved practice and to the satisfaction of the Village Representative.

Steps as shown on the plans shall be placed in all catch basins and inlets when they are greater than four (4) feet in depth. The steps shall be set in the masonry as the work is built up, thoroughly bonded, and accurately spaced and aligned.

Inverts in the structures shall be shaped to form a smooth and regular surface free from sharp or jagged edges. They shall be sloped adequately to prevent sedimentation within the structure.

The castings shall be set in full mortar beds. All castings when set shall conform to the finish grade shown on the Drawings. Any castings not conforming shall be adjusted to the correct grade.

e. Concrete Construction:

The forming, placing, finishing and curing of Portland cement concrete shall be performed in strict accordance with all applicable requirements as contained in the **Standard Specifications for Road & Structures**, latest edition, as published by the NCDOT, and as modified by the Village Engineer.

f. Installation of Pre-cast Concrete Structures:

Pre-cast concrete manholes, junction boxes, etc. shall be installed level and plumb upon a firm, dry foundation, approved by the Village Representative. The Village reserves the right to require the use of bedding stone under pre-cast structures when, in the opinion of the Village Engineer, poor subgrade conditions are encountered. Structures shall be backfilled with suitable materials, symmetrically placed and thoroughly compacted so as to prevent displacement. Castings shall be set in full mortar beds to the required finished grade.

FIGURE 5 - 1

MAXIMUM PERMISSIBLE VELOCITIES IN LINED CHANNELS (1)

Cover	Slope range (% Grade)	PERMISSIBLE VELOCITY (See Note 1)	
		Erosion Resistant Soils (ft. per sec)	Easily Eroded Soils (ft. per sec)
Bermuda grass	0-5	8	6
	5-10	7	5
	over 10	6	4
Bahia			
Buffalo grass	0-5	7	5
Smooth Brome	5-10	6	4
Blue Grama	over 10	5	3
Grass Mixtures	0-5 (See Note 1)	5	4
Reed Canary grass	5-10	4	3
Lespedeza Sericea			
Weeping Lovegrass			
Redtop	0-5 (See Note 2)	3.4	2.5
Alfalfa			
Common Lespedeza	0-5 (See Note 4)	3.5	2.5
Sudan grass (See Note 3)			

NOTES:

1. Do not use on slopes steeper than 10 percent except for vegetated side slopes in combination with a stone, concrete, or highly resistant vegetative center section.
2. Do not use on slopes steeper than 5 percent except for vegetated side slopes in combination with a stone, concrete, or highly resistant vegetative center section.
3. Annuals -- use on mild slopes or as temporary protection until permanent covers are established.
4. Use on slopes steeper than 5 percent is not recommended.

SECTION 6 - WATER DISTRIBUTION AND WASTEWATER COLLECTION

6.01 System Ownership

The water distribution and wastewater collection systems that serve the Village of Pinehurst are owned and operated by Moore County, with the exception of portions within CCNC that are owned and operated by the Town of Southern Pines and isolated areas owned and operated by private entities. All water main extensions, water distribution facilities, wastewater collection system extensions, and wastewater collection system facilities (including lift stations) within the Village limits and ETJ shall comply with current NCDEQ regulations, and the most recent version of the Moore County Public Works (MCPW) Department Standards and Specifications Manuals. Copies of the MCPW Manuals are available at www.moorecountync.gov or by calling 910-947-6315. For the purposed of this section, all references to Moore County or Moore County Public Utilities shall be modified to the Town of Southern Pines.

Additional requirements for water and sewer infrastructure installed within the Village's jurisdiction are specified herein. In the event of a discrepancy between the MCPW Standards and the Village Standards noted herein, the more stringent standard shall govern.

Water and sewer requirements for "Rural" areas noted within the MCPW Manuals do not apply to the Village's jurisdiction. In addition, references to the "Fire Marshal" in the MCPW Manuals shall refer to the Village of Pinehurst Fire Marshal for water system infrastructure installed within the Village's jurisdiction.

Water and sewer systems within the Village's jurisdiction that are intended to be privately maintained are required to meet the standards set forth in the MCPW Manuals and herein.

6.02 Inspection Responsibilities

Inspections of all public water and sewer facilities that will become part of the public utility system owned and operated by Moore County will be performed by MCPW staff during construction. The Developer shall contact MCPW for determination of and payment of inspection fees to Moore County for this infrastructure.

Inspections of private water and sewer facilities that will not become part of the public utility system owned and operated by Moore County will be performed by the Village of Pinehurst during construction. The applicable fees shall be calculated using the Village's Infrastructure Inspection Fees worksheet, and all fees shall be paid prior to construction plan approval.

Privately-maintained service laterals installed on the customer's side of the water meter or sewer clean-out assembly shall be inspected by the Village as part of the building permitting process.

6.03 Water Distribution System Design

In addition to the water distribution system design requirements contained within the MCPW Standards and Specifications Manuals, the following requirements shall apply to development within the Village's jurisdiction.

a. Available Fire Flow

The Developer/Engineer shall be responsible for contacting MCPW (910-947-6315) to determine the Available Fire Flow at the point of connection to the MCPW water system, and to confirm whether the system can meet the Needed Fire Flow for the proposed development. MCPW, in coordination with the Village Fire Marshal will provide fire flow information to the Developer/Engineer based on actual field data (hydrant tests) in the vicinity of the proposed development.

b. Needed Fire Flow Calculations

The Developer/Engineer shall submit information to the Village on the development's Needed Fire Flow and calculations to confirm that the Needed Fire Flow is available to service the development. The calculations shall be signed and sealed by a licensed North Carolina Professional Engineer.

Needed Fire Flow calculations shall be based on the ISO formula within the most recent edition of the NFPA "Fire Protection Handbook". For further information on the ISO formula and its proper application, refer to the Handbook or contact the Village Fire Marshal at 910-295-5575.

Pursuant to Appendix B (Fire Flow Requirements For Buildings) of the Village-adopted State of North Carolina Fire Code tables, the **minimum** fire-flow requirements for one- and two-family dwellings having a fire-flow calculation area which does not exceed 3,600 square feet shall be **1,000 gallons per minute (gpm)** while maintaining a minimum system pressure of 20 psi at all points in the existing distribution system.

Pursuant to Appendix B (Fire Flow Requirements For Buildings) of the Village-adopted State of North Carolina Fire Code tables, fire flow for buildings other than one- and two-family dwellings, and for one- and two-family dwellings having a fire-flow calculation area in excess of 3,600 square feet shall not be less than **1,500 gpm** while maintaining a minimum system pressure of 20 psi at all points in the existing distribution system.

Greater amounts shall be provided where required by the ISO formula and/or the Fire Code tables unless otherwise modified by the Village Fire Marshal. The Needed Fire Flow calculations shall be reviewed by the Village Engineer and Village Fire Marshal and provided to MCPW for hydraulic modeling.

c. Fire Suppression Booster Pumps

If booster pumps are required to be installed on a fire suppression system, the Developer/Engineer shall contact the Village's Fire Marshal to determine the additional requirements that apply. The booster pumps should be clearly noted on the construction plans if they are required.

d. Pipe Materials

New water mains installed within the jurisdictional limits of the Village of Pinehurst shall be either Ductile Iron Pipe (DIP) or C-900 Polyvinyl Chloride (PVC) pipe. All new water mains located within the VC and HD Zoning Districts shall be DIP. Water mains shall be designed and manufactured in accordance with ANSI, AWWA, and MCPW standards.

In some instances, High-Density Polyethylene (HDPE) pipe may be allowed when installation by directional drilling is required. In these instances, the Developer/Engineer shall provide a written request for approval from the Village Engineer, with proposed specifications for the HDPE pipe to be used, and an explanation as to why the use of HDPE is necessary.

e. Fire Hydrant Locations

Fire hydrants in the Village's jurisdiction shall be located at each street intersection. In addition, the maximum distance between fire hydrants, measured along street centerlines, shall not exceed 500 feet. In all cases, all parts of all buildings shall be within 300 feet of a hose run from a fire hydrant.

Hose run lengths shall be measured along a route not closer than 20 feet from the building(s). All fire hydrants shall have full vehicular access via durable, all weather paved surface meeting the specifications contained within this Manual and shall not be located within the anticipated "collapse zone" of any building or structure. Supplemental hydrant locations shall be as directed by the Village Fire Marshal.

A hydrant shall also be located within 50 feet of all automatic fire sprinkler system connections. The Fire Sprinkler System connection, also known as the "Fire Department Connection" (FDC) shall be a 5-inch "Storz" connection, located outside of the anticipated collapse zone of the building/structure to be served. The

Fire Marshall shall determine the final location for all FDC's. The Storz connections shall be installed in accordance with the Village's Standard Details. All piping for the fireline from the water supply main into the building and for that serving the FDC shall be DIP meeting the specifications contained herein unless otherwise approved in writing by the Village.

6.04 Cutting and Replacement of Existing Pavements

Open-cutting of existing bituminous pavement may be permitted on certain Village-maintained streets with prior written approval from the Village. Where bituminous pavements are allowed by the Village to be open-cut, the pavement shall be restored in conformance with the Village's standard details to the satisfaction of the Village Representative.

Open-cutting of existing concrete pavement may also be permitted with prior written approval from the Village at existing private driveways within the Village's right-of-way. Concrete pavement shall be restored in conformance with the Village's standard details to the satisfaction of the Village Representative.

The pavement shall be cut to true neat lines, in such a manner as not to damage the pavement outside of the cutting line. The cut pavement shall be removed from the site and properly disposed of by the Developer.

After completion of the trenching and pipe laying conditions, the backfill shall be filled to the required subgrade depth, from which point the remaining depth shall be backfilled with ABC stone, compacted in two lifts. Unless otherwise approved by the Village, the base course shall remain for a minimum of four (4) days prior to placement of paving to allow for further natural settlement. When final settlement is obtained, a portion of the ABC shall be removed to accommodate the final pavement section. All materials and pavement placement methods shall be in strict accordance with this Manual and NCDOT standard specifications for roadways.

No open-cutting of State-maintained roadways shall be performed within the Village's jurisdiction without written approval from NCDOT. The Developer is responsible for contacting and obtaining the necessary approvals from NCDOT prior to open-cutting a State-maintained road.

6.05 Fencing and Landscape Buffers For Water and Sewer Facilities

Any fencing installed at water and sewer facilities (lift stations, wells, storage tanks, etc.) shall comply with the requirements listed within the most recent version of the Pinehurst Development Ordinance (PDO). Landscape buffers installed at said facilities shall also comply with the requirements listed within the most recent version of the PDO.



Appendix

Standard Approval Blocks

As-Built Checklist

Standard Details

BLOCKS TO BE INCLUDED ON ALL SHEETS

"Construction Plan Approval Block"

Village of Pinehurst Construction Plan Approval	
<p>All Construction Methods and Materials shall be in accordance with the Village of Pinehurst, Moore County Public Utilities, and NCDOT Standards and Specifications. In the event of a conflict between standards, the more stringent shall govern unless a written waiver is issued by the Village Engineer. Utility Installations and other Public Facilities, including streets, sidewalks, and handicap ramps, have been approved by the Village of Pinehurst and shall be so installed unless a change is authorized by prior written approval. Public Sanitary Sewer and Utility Easements shall be recorded prior to final acceptance and/or issuance of a Certificate of Occupancy by the Village.</p>	
Plan Approval Number	_____
Engineering	_____
Fire Department	_____
Planning	_____
Moore Co. Public Utilities	_____

"Infrastructure Inspection Notice to Contractor Block"

<u>INFRASTRUCTURE INSPECTION NOTICE TO CONTRACTOR</u>
<p>This is to advise you that the Village of Pinehurst is now requiring a minimum of Forty-eight (48) hours of notice when requesting an Engineering Inspection. Inspection requests may be made by calling the Public Services Department at 295-5021. <u>Items requiring an Engineering Inspection include, but are not limited to:</u></p> <ol style="list-style-type: none">1. Subgrade inspection/proof rolling (streets, sidewalks, firelanes, etc.) Density tests from an approved geotechnical engineering firm may be required.2. Placement and inspection of base course materials including proof-rolling. Density tests from a Village-approved geotechnical engineering firm may be required/accepted by the Village.3. Placement and compaction of pavement materials including concrete and asphalt surface courses. Includes stringlines/grade control, paving & rolling operations, material inspections.4. Installation of water and sewer mains and services including pressure testing, pipe laying, chlorination of water mains, bacterial testing, mandrel pulls, etc. necessary to meet the Village's Utility ordinances. <u>NOTE: The Contractor shall also contact Moore County Public Utilities Department Engineering Division at 947-6315 to schedule utility inspections as required by MCPUD.</u>5. Installation of formwork and placement of concrete (sidewalks, curb & gutter, etc.) within the public right of way.6. Installation of storm drainage systems (pipes, trenches, catch basins, frames/grates, outlet protection, etc.) <p>Failure to schedule the required inspections shall be grounds for rejection of all work not inspected and issuance of a stop-work order until the project is in compliance</p>

BLOCKS TO BE INCLUDED ON THE COVER SHEET

"Certification Block"

These improvements shall be constructed in accordance with the following drawings and with the Standard specifications of the Village of Pinehurst.

I, _____, certify that the Standard Specifications of the Village of Pinehurst have been thoroughly checked and found to be applicable to this project. All exceptions to the applicable Village standards have been previously approved by the Village of Pinehurst and said exceptions are shown on Sheet(s) _____ of these drawings.

**PROFESSIONAL
SEAL**

By: _____

Date: _____

"Authorization to Construct Improvements Block"

AUTHORIZATION TO CONSTRUCT IMPROVEMENTS

PART 1 - Record of Permits Issued by Other Regulatory Agencies

Water System Extension: Permit # _____ Issue Date: _____

Wastewater Collection System Extension: Permit # _____ Issue Date: _____

Land Disturbing Permit: Permit # _____ Issue Date: _____

VILLAGE OF PINEHURST

AS-BUILT CHECKLIST

Upon completion of construction and prior to acceptance of new infrastructure or issuance of a certificate of occupancy by the Village, a signed and sealed as-built set of construction drawings shall be prepared and submitted to the Village for review and approval. The following check list is provided as a guide to indicate the items that are expected to be included on the as-built drawings. This checklist should be included with the as-built submittal, and each blank should be initialed by the applicant as being included on the as-builts or marked N/A if not applicable to the project.

All Final As-built Submittal Packages shall contain:

____ 1 set of signed and sealed plan sheets - 24" X 36"

____ 1 digital signed and sealed copy on a CD or flash drive in pdf format

1. AS-BUILT INFORMATION

Submitted by _____

Phone # _____

Transmittal Date _____

2. SITE DATA (Tabular Form)

Page # _____

____ A. Acreage in total tract

____ B. Average lot size

____ C. Total number of lots

____ D. Total linear footage of infrastructure chart, Page # _____

____ Streets (List individually in lengths)

____ Water mains (Identify size and length)

____ Sewer mains (Identify size and length)

- _____ Number of valves (For each size)
- _____ Number of fire hydrants
- _____ Number of manholes
- _____ Other (Any additional appurtenances)

3. GENERAL INFORMATION

Page # _____

- _____ A. Copy of recorded plat or deed of easements, indicating easements and right of way
- _____ B. Boundary of tract by courses and distance with references
- _____ C. Tie to N.C. grid coordinate system (x,y,z). All sets shall be tied to grid with monument noted.
- _____ D. 500 scale vicinity map
- _____ E. Scale of drawings and bar scale
- _____ F. North arrow
- _____ G. Location of benchmark with M.S.L. elevations
- _____ H. Seal and signature of North Carolina registered professional on each sheet that performed as-builts
- _____ I. All easements identified and dimensioned
- _____ J. Statement designating drawings are "as-built" on each sheet

4. STREETS (Public or Private)

Page # _____

- _____ A. Horizontal alignment with radii, P.C.'s, and P.T.'s of all curves
- _____ B. Vertical alignment with centerline grades, vertical curve lengths and station and elevation of all PVC's and PVT's and centerline profile.
- _____ C. Dimensioned right of way and street widths
- _____ D. Pavement section
- _____ E. Typical cross section

5. STORM DRAINAGE

Page # _____

- _____ A. Outline of 100 year flood plain (FEMA and/or culvert backwater profile)
- _____ B. Pipe material
- _____ C. Structure invert and top elevations

- _____ D. Pipe size
- _____ E. Pipe slope and distance
- _____ F. Size of riprap dissipation pad
- _____ G. Statement of stormwater velocity at all outlets
- _____ H. Show permanent stormwater best management practice
- _____ I. A separate, recorded easement dedication plat for utility extensions outside right of way
- _____ J. Maintenance agreement responsibility statement

6. WATER SYSTEM

Page # _____

- _____ A. Pipe material labeled
- _____ B. Pipe size labeled
- _____ C. Separation from sanitary and storm sewer shown on plans
- _____ D. Locations with distance references (2 each per appurtenance)
 - _____ Valves
 - _____ Fire hydrants
 - _____ Blow-offs
 - _____ Meters
 - _____ Air release valves
- _____ E. Certification by a licensed NC Professional Engineer of construction in accordance with the water extension permits
 - _____ Certification on the plans
 - _____ A separate certification sheet is provided
- _____ F. A separate, recorded easement dedication plat for utility extensions outside right of way

7. SANITARY SEWER SYSTEM

Page # _____

- _____ A. Pipe material labeled
- _____ B. Pipe size labeled
- _____ C. Manhole top elevations
- _____ D. Invert in and out elevations
- _____ E. Pipe slope
- _____ F. Locations with distance references (2 each appurtenance)

- _____ Clean outs
- _____ Air release valves
- _____ Manholes
- _____ Force main valves

- _____ G. Horizontal control (angles at manholes)
- _____ H. 100-year flood plain elevation
- _____ I. Certification by NC Professional Engineer of construction in accordance with sanitary sewer extension permits

- _____ Certification on the plans
- _____ A separate certification sheet shall be provided

_____ J. A separate, recorded easement dedication form for utility extensions outside right of way

Village of Pinehurst Use Only

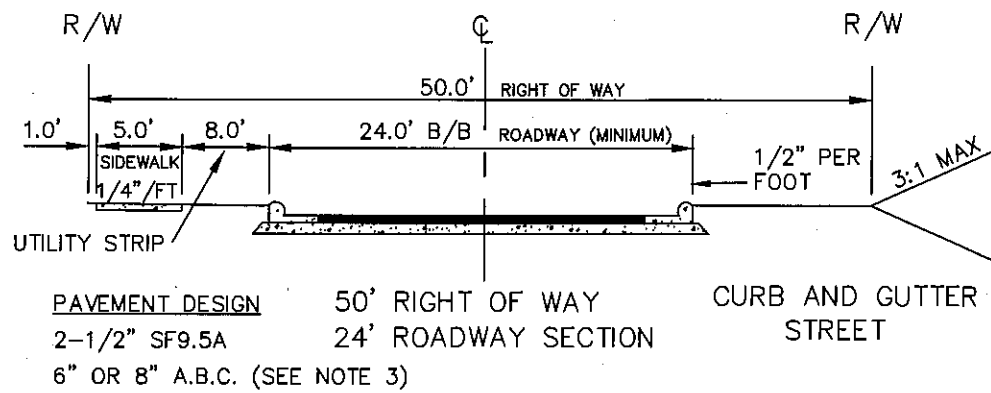
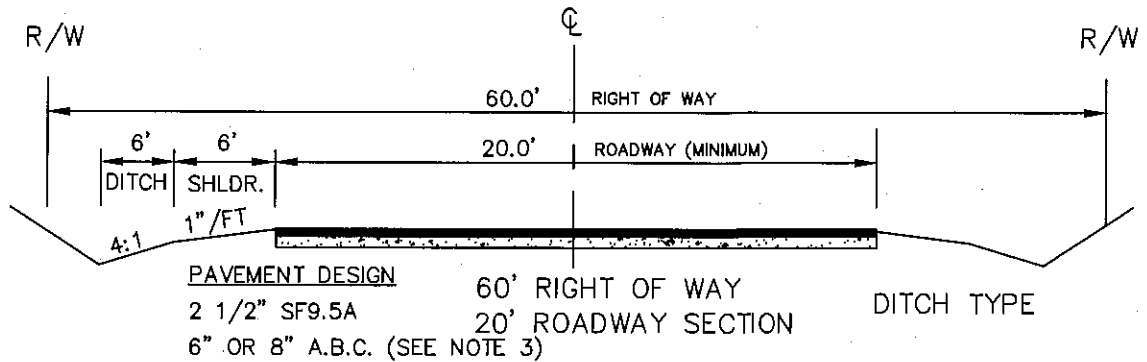
As-Builts Reviewed by _____ Date _____

Approved _____

Returned _____



STANDARD DETAILS



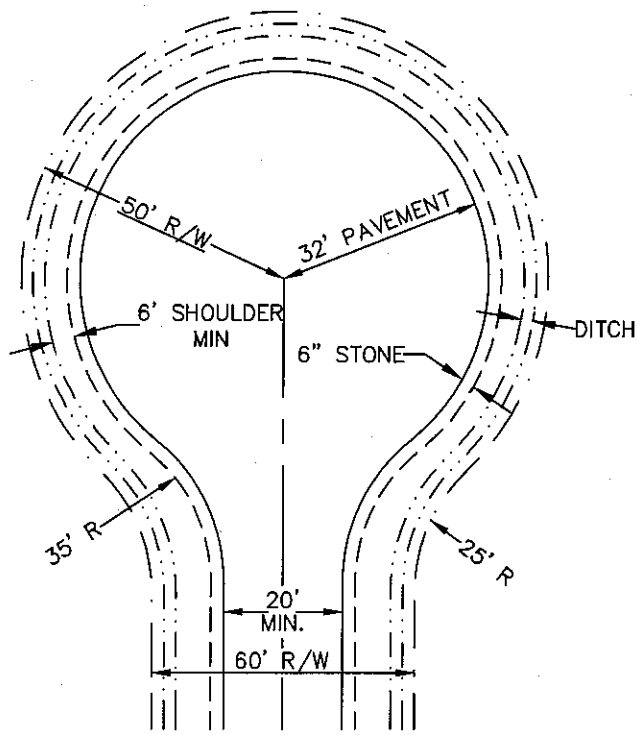
NOTES:

1. NORMAL CROWN OF 1/4" PER FOOT UNLESS OTHERWISE DIRECTED BY VILLAGE ENGINEER.
2. THE VILLAGE COUNCIL MAY WAIVE THE REQUIREMENT FOR CURB AND GUTTER IN AREAS OUTSIDE OF "OLD TOWN" (HISTORIC PRESERVATION OVERLAY DISTRICT). PROPER DRAINAGE MEASURES SHALL BE INCORPORATED INTO THE ROADWAY DESIGN IN THESE AREAS AND APPROVED BY THE VILLAGE.
3. THE MINIMUM PAVEMENT SECTION FOR LOCAL AND CUL-DE-SAC PUBLIC AND PRIVATE STREETS SHALL BE 6" ABC. ALL OTHERS SHALL HAVE 8" MINIMUM ABC.

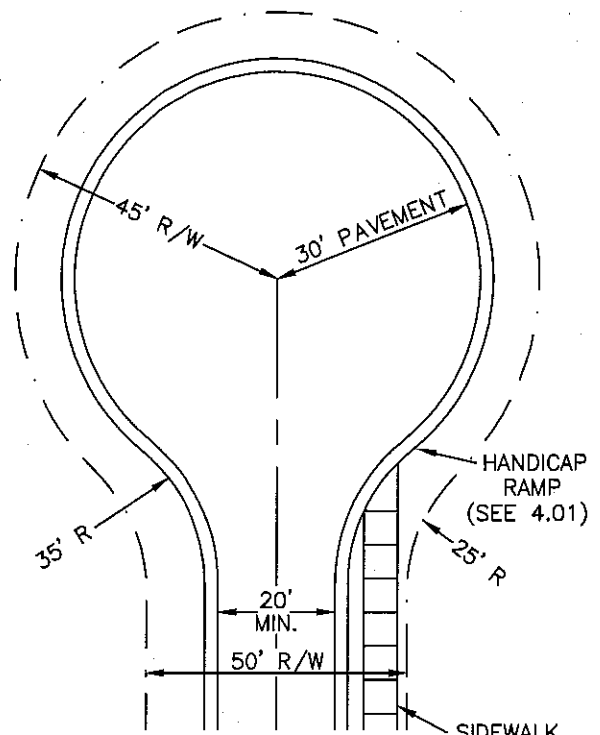
REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE		DWG NO. 3.01	SHEET 1 OF 1

TYPICAL SECTIONS
 LOCAL RESIDENTIAL
 STREETS





DITCH TYPE



CURB AND GUTTER

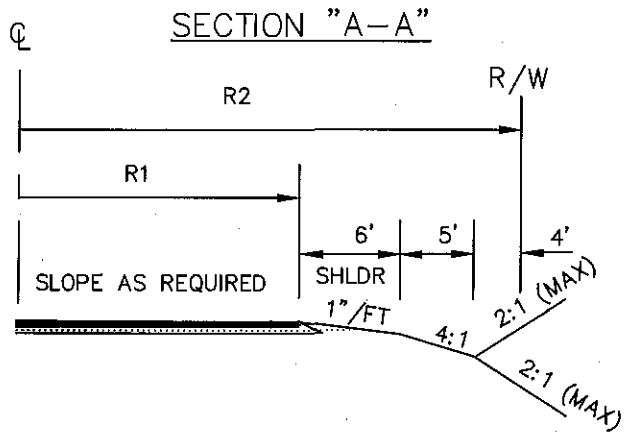
NOTES:

1. CURB AND GUTTER STREETS SHALL BE 24" STANDARD CURB AND GUTTER. (SEE DETAIL 4.03).
2. THE CROWN FOR PAVEMENT SHALL BE 1/4" PER FT FROM THE CENTER OF THE CUL-DE-SAC.
3. MAXIMUM CUL-DE-SAC LENGTH IS 500'.

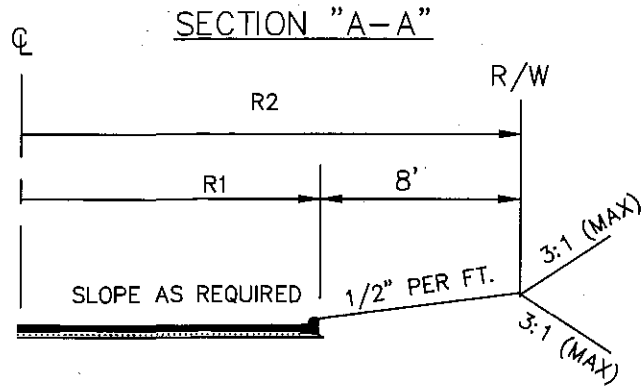
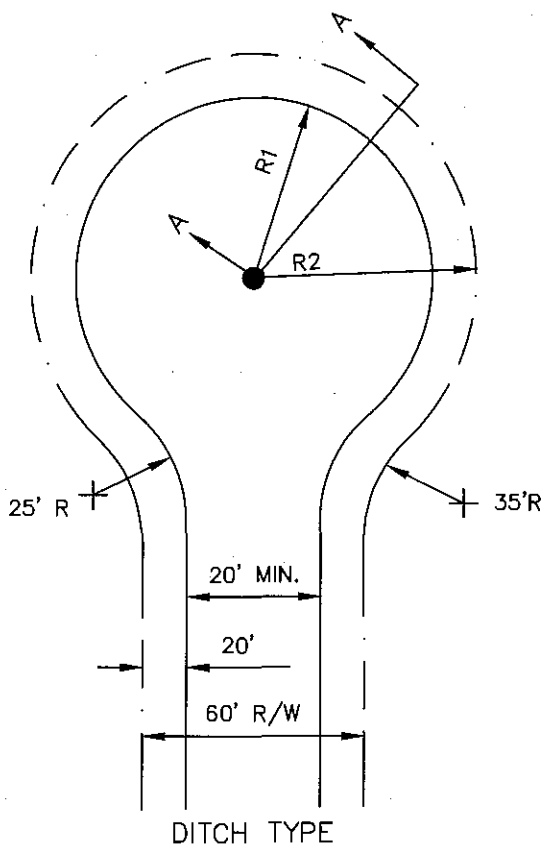
REV	DESCRIPTION	DATE	APPROVED BY
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NOT TO SCALE		DWG NO. 3.02-A	SHEET 1 OF 1

CUL-DE-SAC
LOCAL RESIDENTIAL
DETAIL

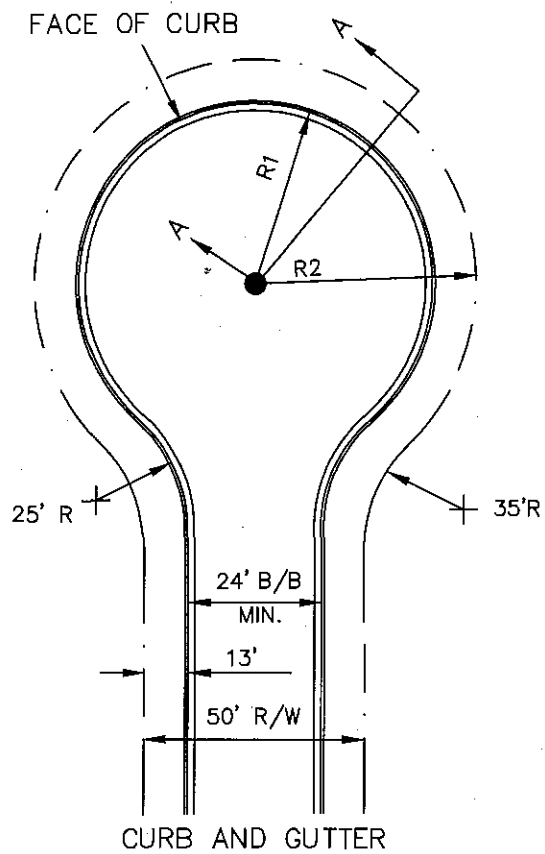




TYPE	R1	R2
RESIDENTIAL	32'	50'



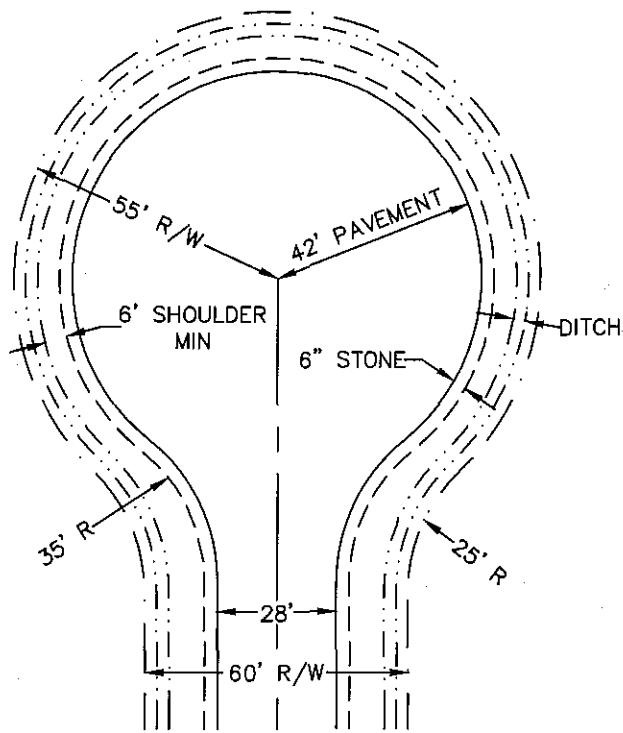
TYPE	R1	R2
RESIDENTIAL	32'	45'



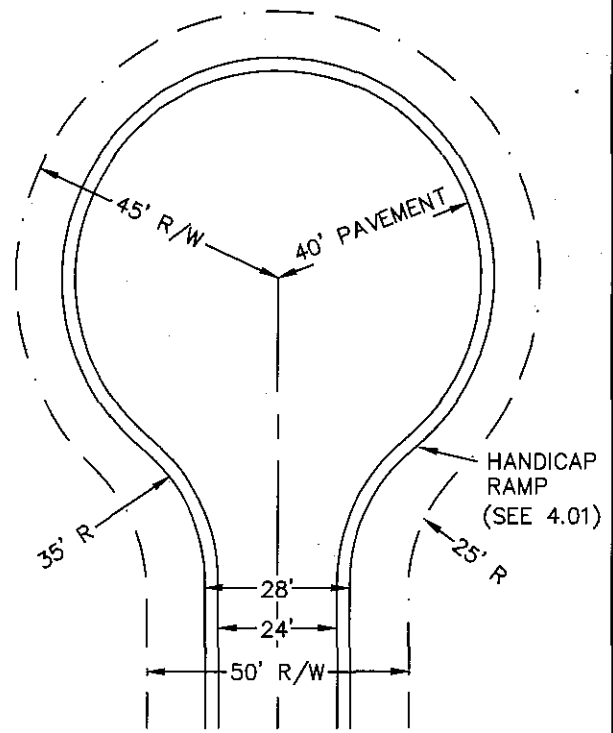
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△		12/15	MSA
NOT TO SCALE		DWG NO. 3.02-B	SHEET 1 OF 1

TYPICAL SECTIONS
RESIDENTIAL
CUL-DE-SAC





DITCH TYPE



CURB AND GUTTER

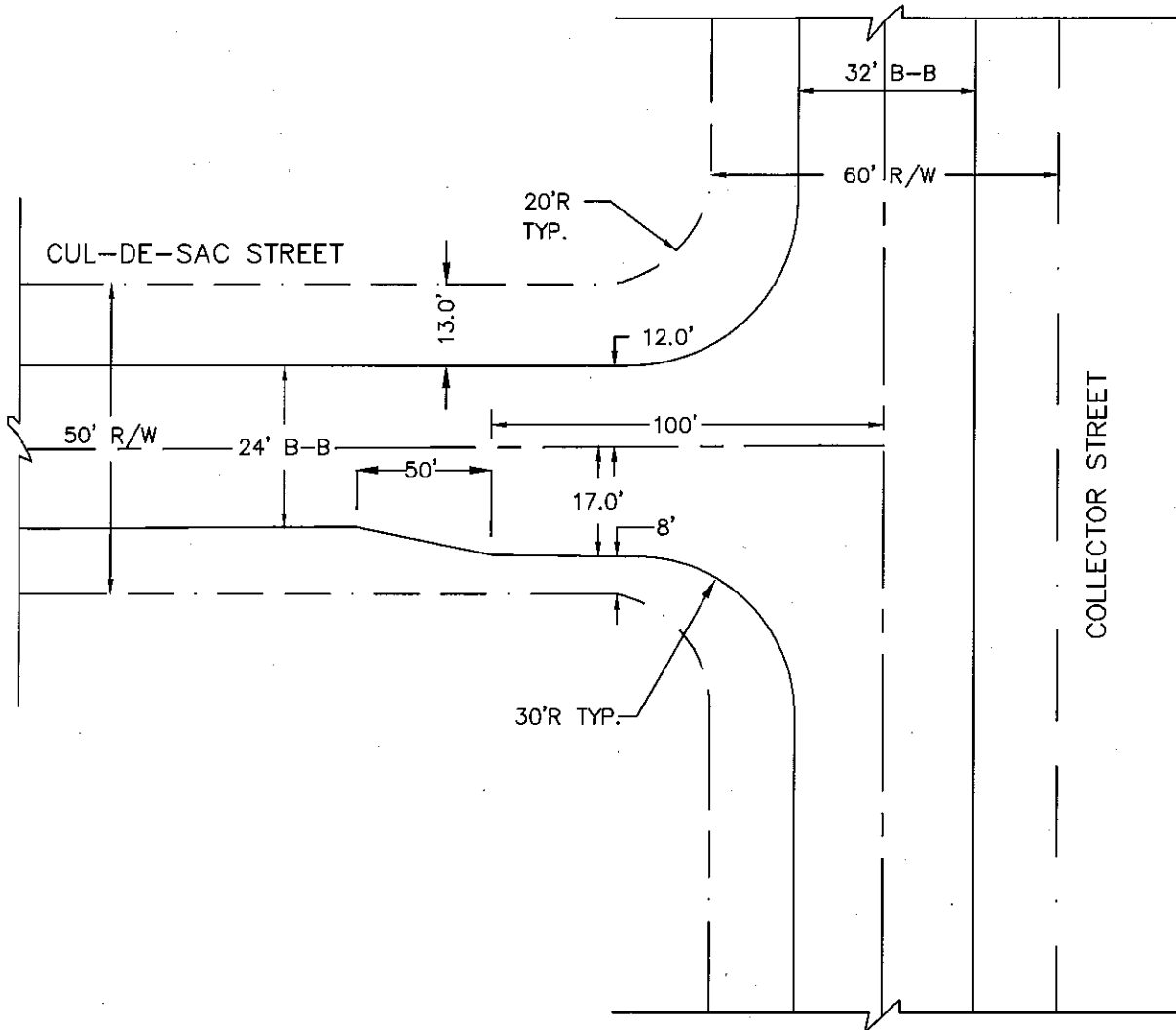
NOTES:

1. CURB AND GUTTER STREETS SHALL BE 24" STANDARD CURB AND GUTTER. (SEE DETAIL 4.03)
2. THE CROWN FOR PAVEMENT SHALL BE 1/4" PER FT FROM THE CENTER OF THE CUL-DE-SAC.
3. MAXIMUM CUL-DE-SAC LENGTH IS 500'.
4. ALTERNATIVE CUL-DE-SAC DESIGNS, INCLUDING ISLANDS SHALL BE SUBMITTED TO THE VILLAGE OF PINEHURST FOR APPROVAL PRIOR TO PLAN SUBMITTAL.
5. PAVEMENT SECTION SHALL CONFORM WITH THE DESIGN REQUIREMENTS FOR COMMERCIAL STREETS.
6. THE CROWN FOR PAVEMENT SHALL BE 1/4" PER FT FROM THE CENTER OF THE CUL-DE-SAC.
7. THE TYPICAL SECTION DIMENSIONS SHOWN ARE MINIMUMS AND MAY BE INCREASED BY THE VILLAGE ENGINEER.

REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE		DWG NO. 3.03	SHEET 1 OF 1

COMMERCIAL
CUL-DE-SAC
DETAIL



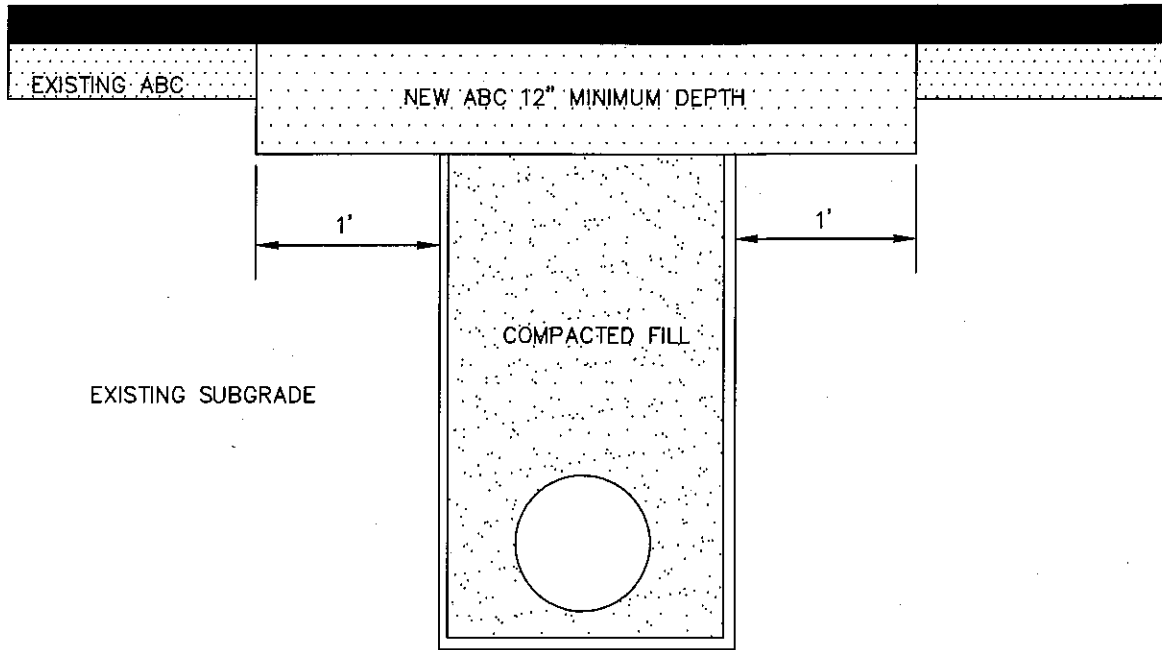


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△		12/15	MSA
NOT TO SCALE		DWG NO. 3.04	SHEET 1 OF 1

CURB & GUTTER CUL-DE-SAC
INTERSECTION W/
COLLECTOR ROAD



ASPHALT PAVEMENT PATCH



NOTES:

1. THE PAVEMENT SHALL BE DEFINED BY A STRAIGHT EDGE, PREFERABLY A MACHINED SAW CUT; TACKED.
2. THE TRENCH SUBGRADE MATERIAL SHALL BE BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED TO A DENSITY OF AT LEAST 95% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-99 AS MODIFIED BY NCDOT.
3. THE FINAL 1' OF FILL SHALL CONSIST OF ABC MATERIAL COMPACTED TO A DENSITY EQUAL TO 100% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-180 AS MODIFIED BY NCDOT. BITUMINOUS BASE OR BINDER MAY BE SUBSTITUTED IF APPROVED BY THE VILLAGE ENGINEER.
4. THE ENTIRE THICKNESS/VERTICAL EDGE OF THE CUT SHALL BE TACKED.
5. THE SAME DEPTH OF PAVEMENT MATERIAL WHICH EXISTS SHALL BE REINSTALLED, BUT IN NO CASE SHALL THE ASPHALT BE LESS THAN 2" THICK.
6. THE ASPHALT PAVEMENT MATERIAL SHALL BE INSTALLED AND COMPACTED THOROUGHLY TO ACHIEVE A SMOOTH LEVEL PATCH.

REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE		DWG NO. 3.06	SHEET 1 OF 1

ASPHALT
PAVEMENT
PATCH



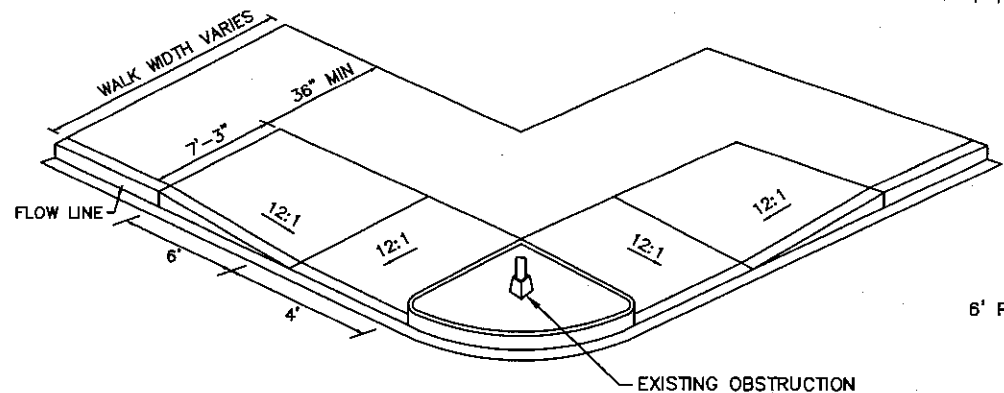
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				12/15	MSA
SHEET 1 OF 1					

ROADWAY
PLAN SYMBOL
(ACC)
FOR PROPOSED
ACCESSIBLE RAMP

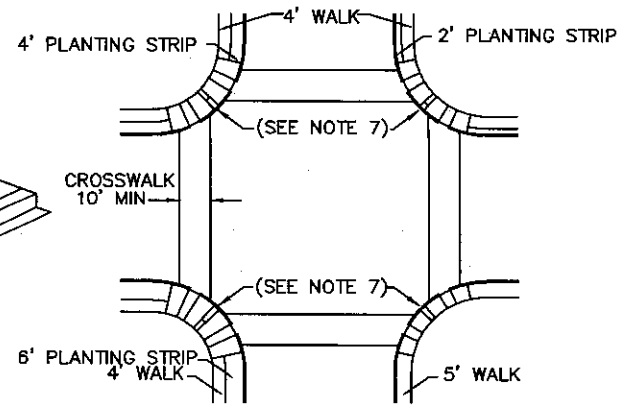
NOTES:

1. RAMP AND WING SLOPES SHALL NOT BE STEEPER THAN 12:1.
2. GUTTER FLOW LINE AND PLAN PROFILE SHALL BE MAINTAINED THROUGH THE RAMP AREA.
3. THE SURFACE OF THE RAMP SHALL BE FLUSH WITH THE FLOWLINE OF THE CURB AND GUTTER.
4. THE RAMP OPENING (AT THE FULLY DEPRESSED CURB) SHALL BE LOCATED WITHIN THE PARALLEL BOUNDARIES OF THE CROSSWALK MARKINGS. THE RAMP CENTERLINE SHALL BE LOCATED AT THE CORNER RADIUS CENTERLINE UNLESS OTHERWISE DIRECTED BY THE ENGINEER. DIAGONAL CURB RAMPS SHALL HAVE A SEGMENT OF STRAIGHT CURB AT LEAST 24 INCHES LONG LOCATED ON EACH SIDE OF THE WING SLOPE AND WITHIN THE CROSSWALK MARKINGS.
5. THE WING AND RAMP SURFACES SHALL BE 360D PSI CONCRETE WITH A SIDEWALK FINISH IN ACCORDANCE WITH CURRENT EDITION NCDOT STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES.
6. DRAINAGE STRUCTURES, MAST ARMS, LIGHT POLES AND OTHER OBSTRUCTIONS SHALL NOT BE PLACED IN LINE WITH RAMPS. LOCATION OF THE RAMP SHALL TAKE PRECEDENCE OVER LOCATION OF OBSTRUCTIONS EXCEPT WHERE EXISTING OBSTRUCTIONS ARE BEING UTILIZED IN THE NEW CONSTRUCTION.
7. AT ALL LOCATIONS, NOT LESS THAN 2 FEET OF FULL HEIGHT CURB SHALL BE PLACED BETWEEN THE RAMPS.

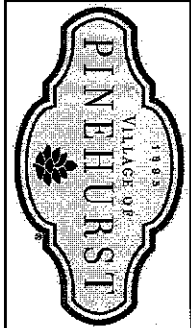
STANDARD PLACEMENT
OF ACCESSIBLE RAMP
& GENERAL NOTES



PLACEMENT FOR OBSTRUCTED CORNER RADIUS OR CORNER RADIUS LESS THAN TEN FEET

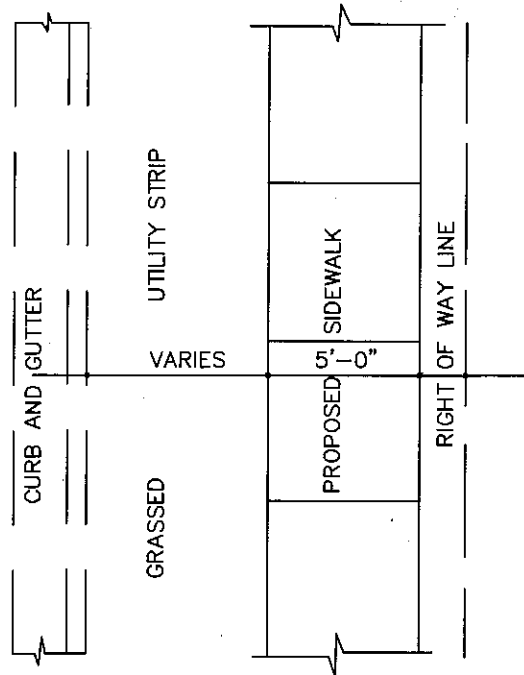


FOR TYPICAL LOCATION OF ACCESSIBLE RAMPS AND PEDESTRIAN CROSSWALKS ON STATE SYSTEM STREETS (SEE NCDOT STANDARD DRAWINGS)

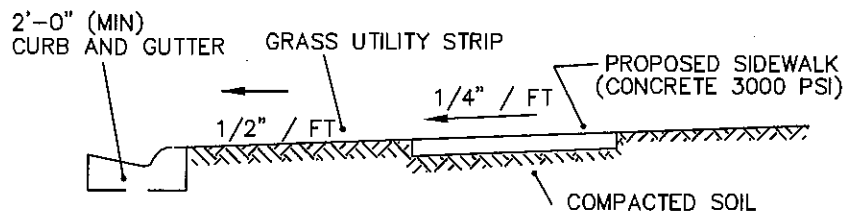


NOTES:

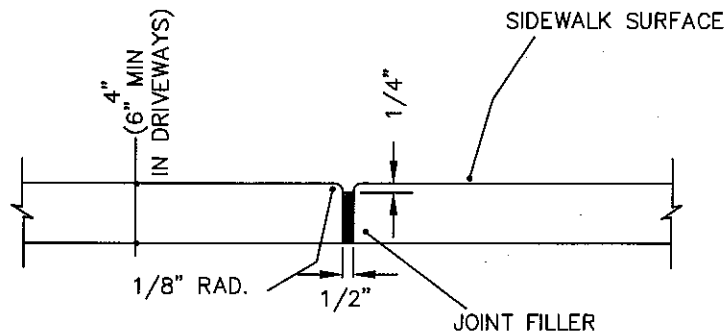
1. TRANSVERSE EXPANSION JOINT TO BE A MAXIMUM OF 50 FT. (90' - EXTRUDED CURB).
2. ALL CONCRETE TO BE FINISHED WITH CURING COMPOUND.



PLAN VIEW



TYPICAL SECTION



TRANSVERSE EXPANSION JOINT

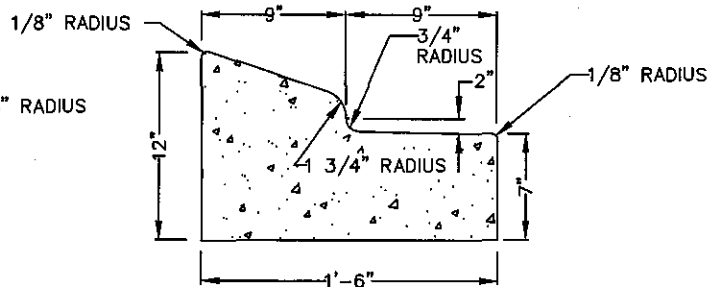
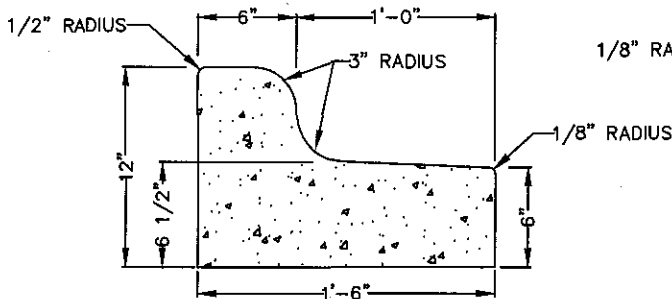
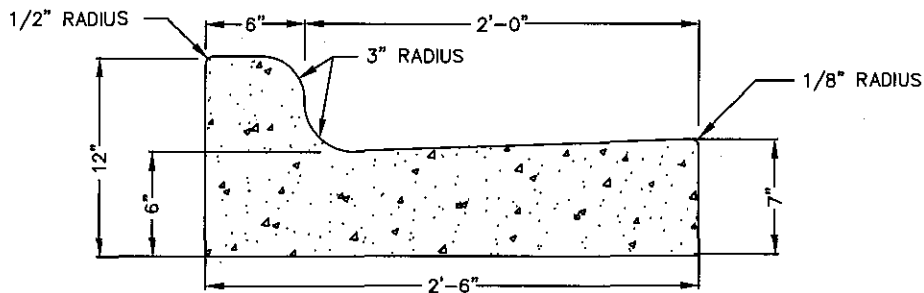
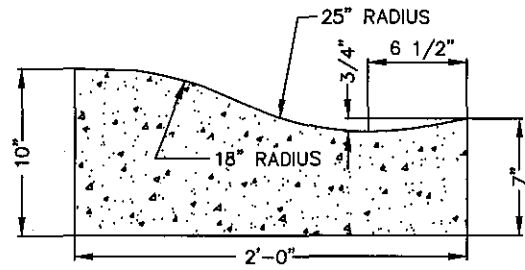
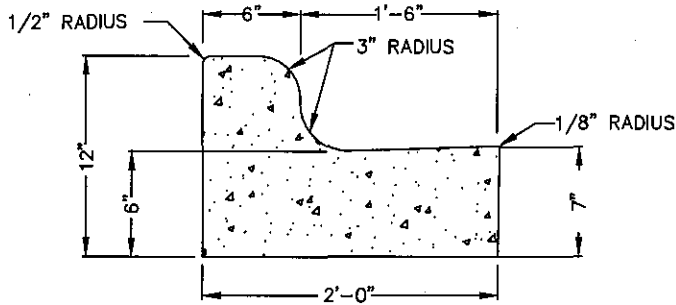
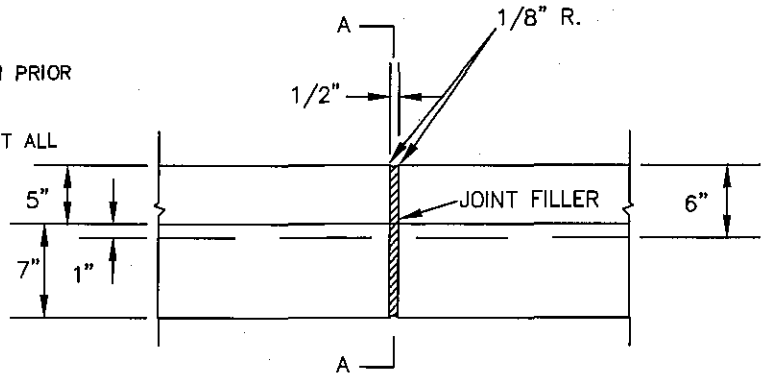
REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE	DWG NO. 4.02	SHEET 1 OF 1	

STANDARD
CONCRETE
SIDEWALK



NOTES:

1. 2'-0" VALLEY GUTTER TO BE USED ONLY WITH PRIOR APPROVAL FROM VILLAGE ENGINEER.
2. MAINTAIN 50' MAXIMUM BETWEEN JOINTS OR AT ALL RIGID OBJECTS.



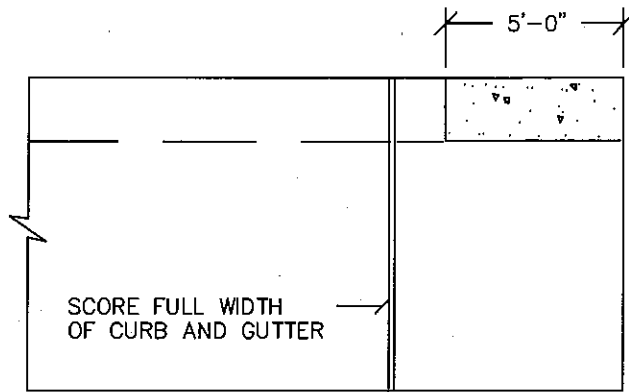
TO BE USED IN MEDIANS WHEN LANES ARE SLOPED FROM ISLAND.

TO BE USED IN MEDIANS ONLY.

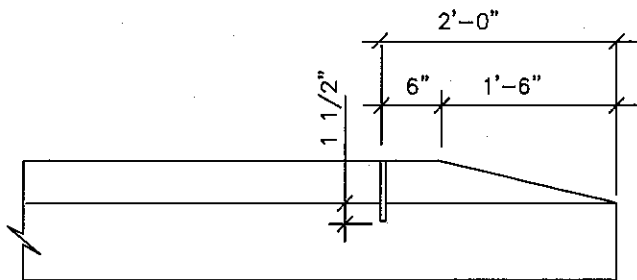
REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE		DWG NO. 4.03	SHEET 1 OF 1

CURB
AND
GUTTER

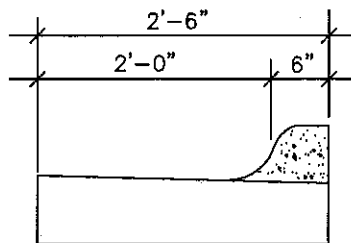




PLAN



FRONT



END

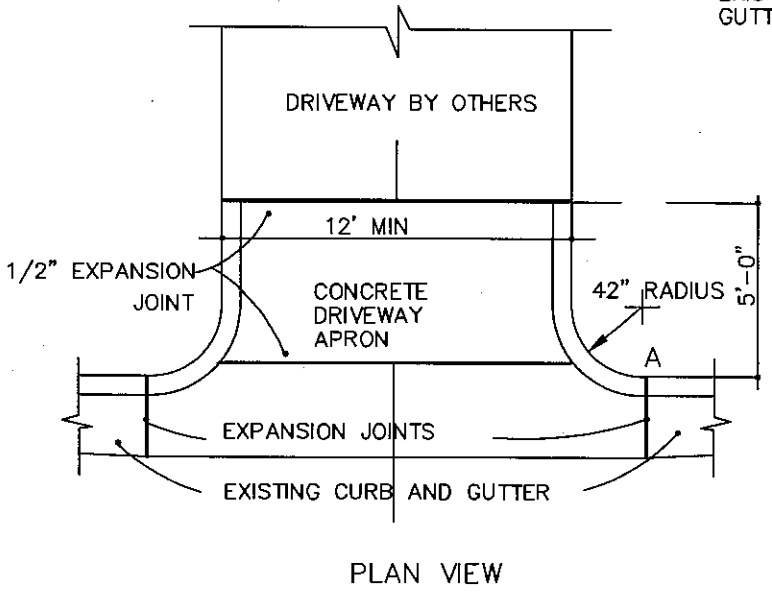
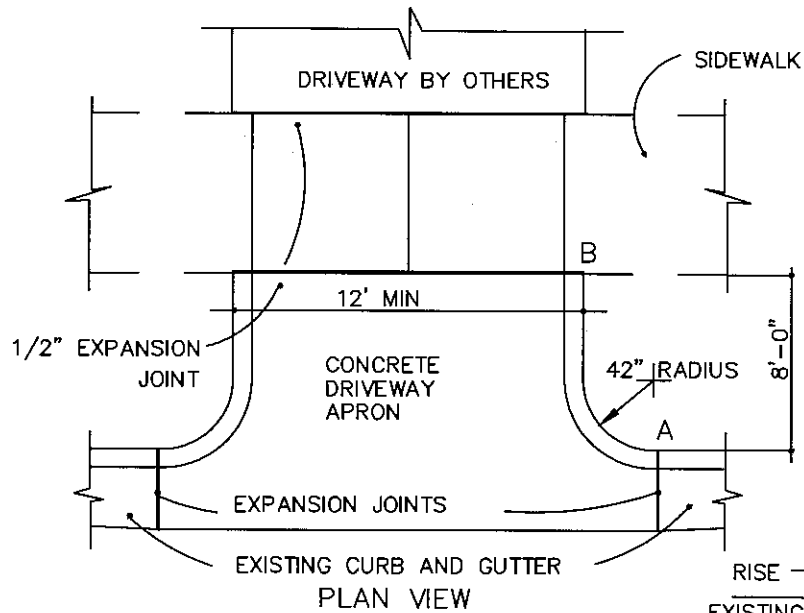
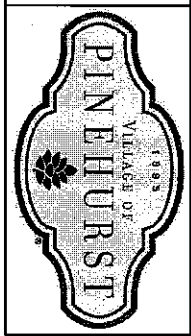
REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE		DWG NO. 4.04	SHEET 1 OF 1

STANDARD METHOD
ENDING CURB
AND GUTTER



NOT TO SCALE	DWG NO.	4.05	SHEET	1 OF 1
	REV	DESCRIPTION	DATE	APPROVED BY
		12/15	MSA	

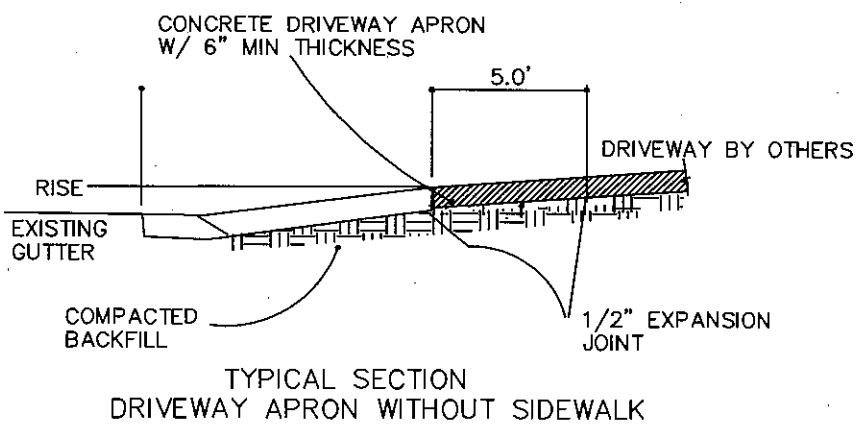
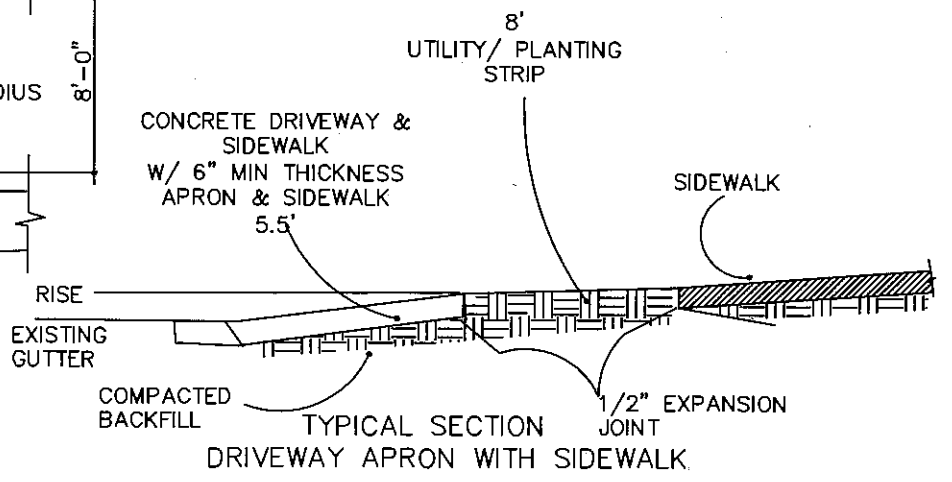
RESIDENTIAL DRIVEWAY APRON

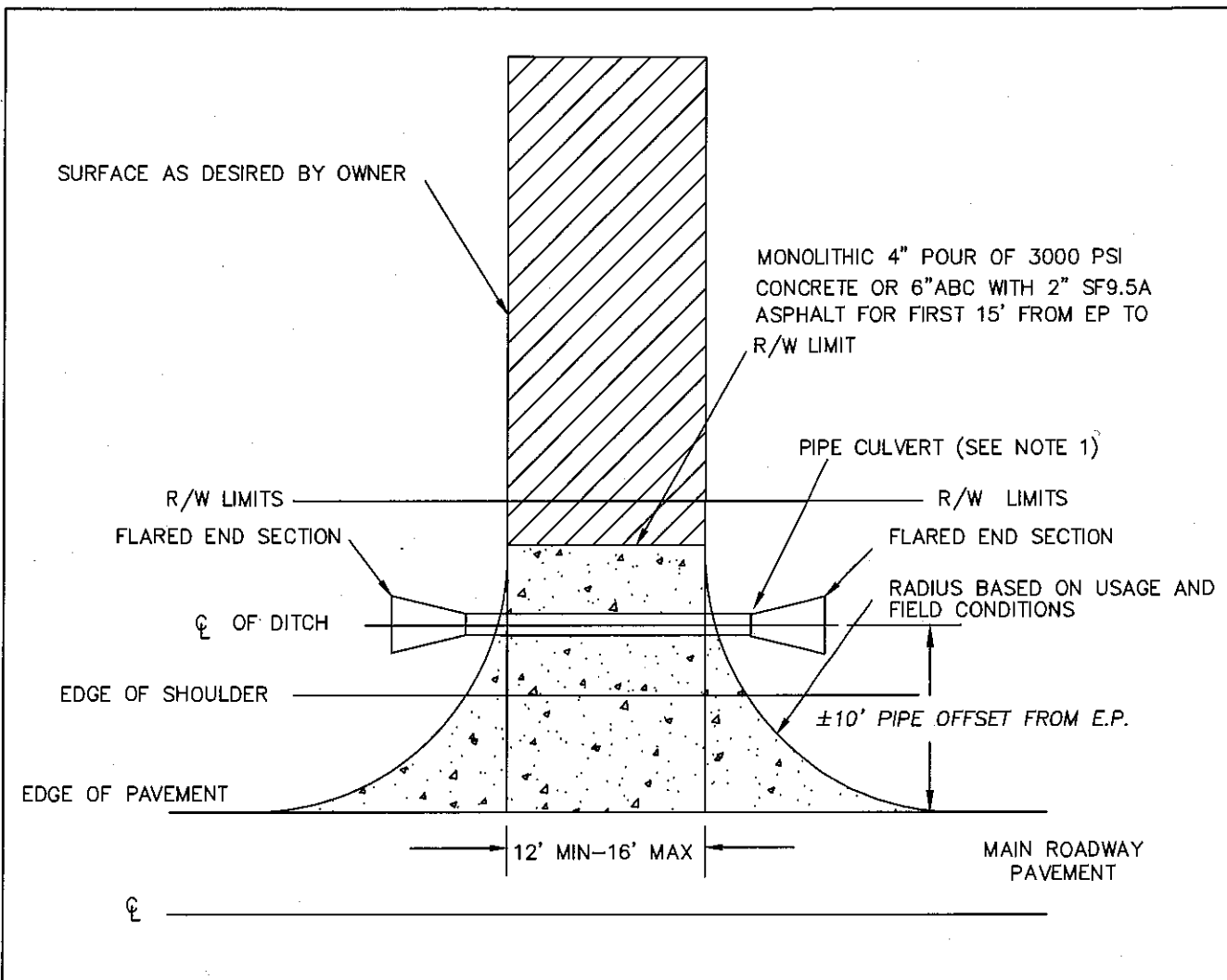


MONOLITHIC POUR

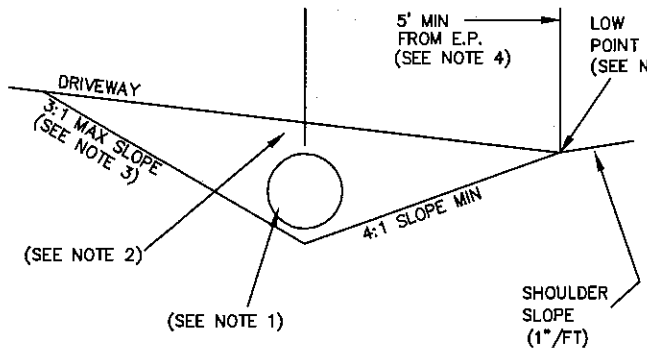
NOTES:

1. RESIDENTIAL DRIVEWAY TO BE 12' TO 18' IN WIDTH.
2. COMMERCIAL AND INDUSTRIAL DRIVEWAY TO BE A MAXIMUM OF 30' WIDE.
3. ALL CONCRETE SHALL BE 3000 PSI.
4. CURB RADIUS SHALL NOT RISE MORE THAN 1 INCH.
5. IF CUT IS WITHIN 5' FROM A JOINT THEN THE CUT SHALL BE MADE TO THAT JOINT.





WITH UNPAVED ROADSIDE DITCH



NOTES:

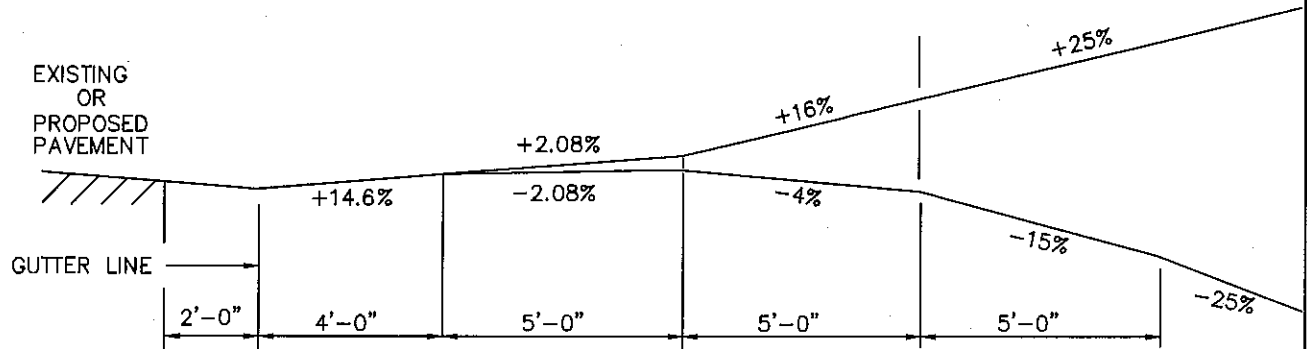
1. IF REQUIRED BY THE VILLAGE, PIPE TO BE RCP, 15" MINIMUM, AND SIZED TO CARRY THE DESIGN FLOW OF THE DITCH.
2. 6" MINIMUM COVER OVER PIPE.
3. STEEPER SLOPES CAN BE ALLOWED WHERE SPECIAL STABILIZATION IS PROVIDED IN ACCORDANCE WITH EROSION AND SEDIMENTATION CONTROL ORDINANCE.
4. USE 5' VERTICAL CURVE FOR TRANSITION.
5. IF REQUIRED BY THE VILLAGE INFRASTRUCTURE SUPERINTENDENT, SOD SHALL ALSO BE PLACED ALONG FRONTAGE WITHIN THE VILLAGE RIGHT-OF-WAY. FINISHED GRADE OF SOD TO BE 1" BELOW EDGE OF ROADWAY.

REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE		DWG NO. 4.06-A	SHEET 1 OF 1

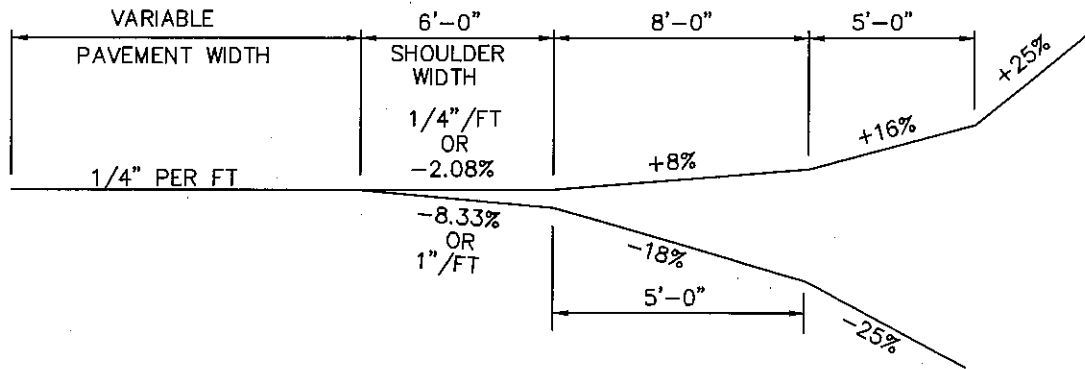
RESIDENTIAL
DRIVEWAY APRON
ON NON C&G STREETS



DRIVEWAY GRADES




A) CURB & GUTTER, SIDEWALK SECTION



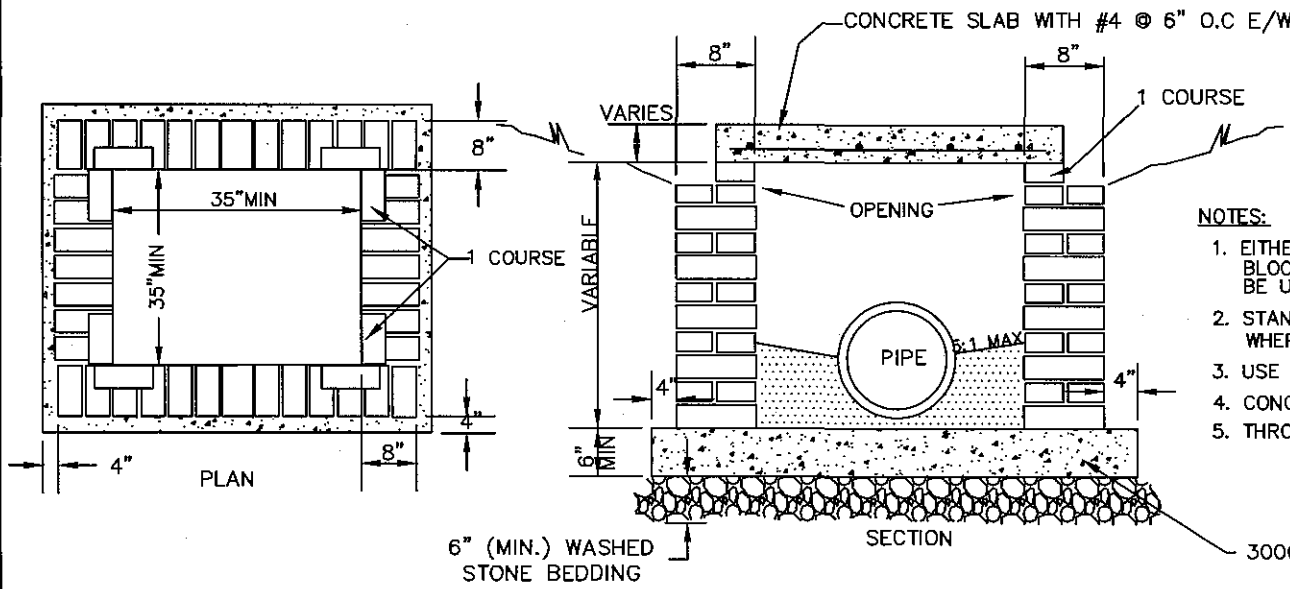
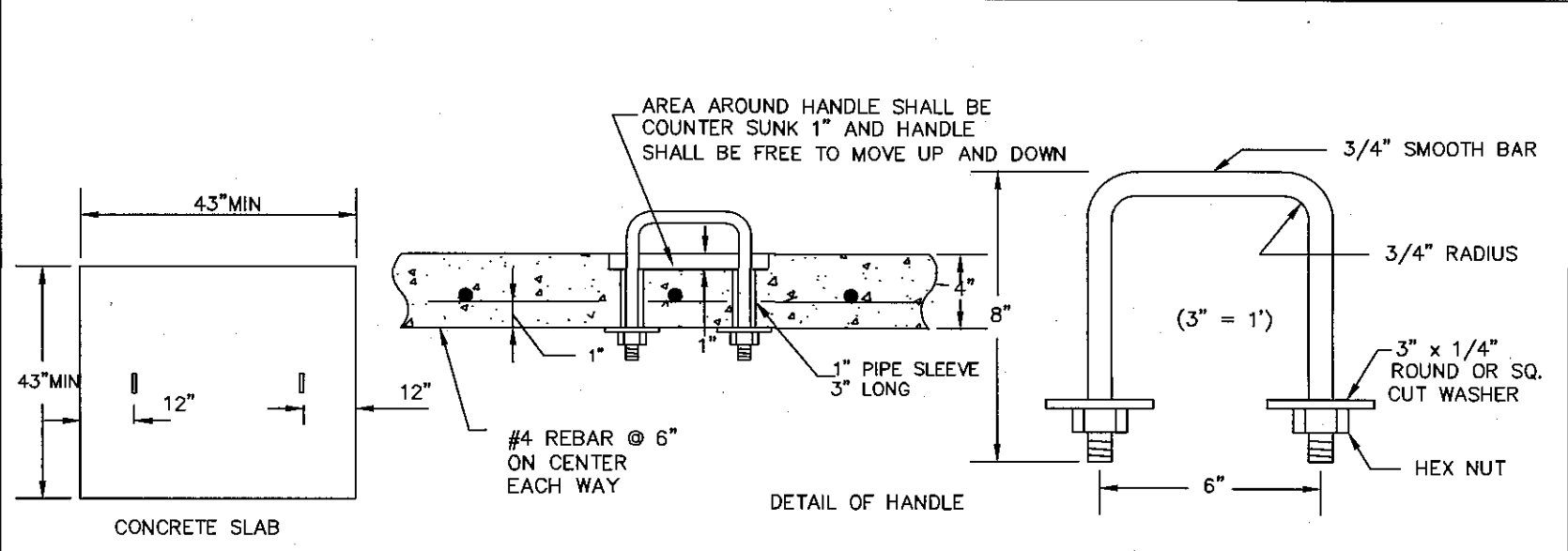
B) SHOULDER SECTION

NOTES:

1. IF THE SLOPE BETWEEN THE TOP OF CURB AND GUTTER AND A POINT 30 FEET FROM THE CURB AND GUTTER EXCEEDS 20%, THIS SLOPE CAN BE ADJUSTED TO A MAXIMUM OF 8.33% (1"/FT) UP OR 4.17% (1/2"/FT) DOWN.

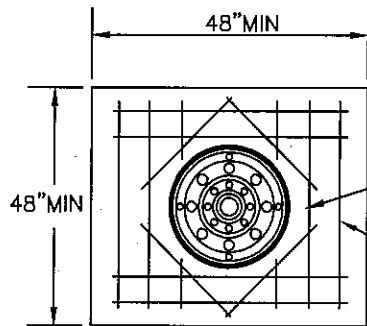
REV	DESCRIPTION	DATE	APPROVED BY	TYPICAL DRIVEWAY SECTIONS NON C&G	
		12/15	MSA		
NOT TO SCALE		DWG NO. 4.06-B	SHEET 1 OF 1		

NOT TO SCALE	DWG NO. 5.01-A	SHEET 1 OF 1	REV	DESCRIPTION	DATE	APPROVED BY
					12/15	MSA



- NOTES:**
1. EITHER SOLID CONCRETE BRICK, SOLID BLOCK, OR PRECAST CONCRETE MAY BE USED.
 2. STANDARD STEPS REQUIRED @ 16" O.C. WHERE DEPTH EXCEEDS 5'.
 3. USE MIN 3000 PSI CONCRETE MIX.
 4. CONCRETE WALLS TO BE 6" THICK.
 5. THROAT OPENING TO BE 5" MIN, 7" MAX.

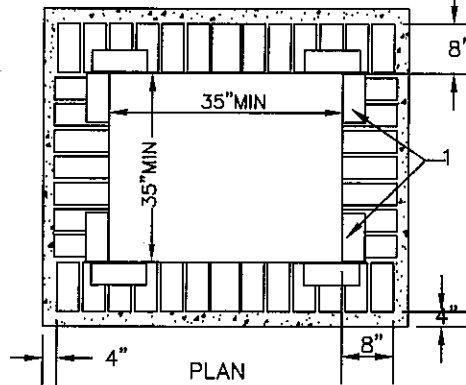
STANDARD YARD
INLET WITH
CONCRETE SLAB LID



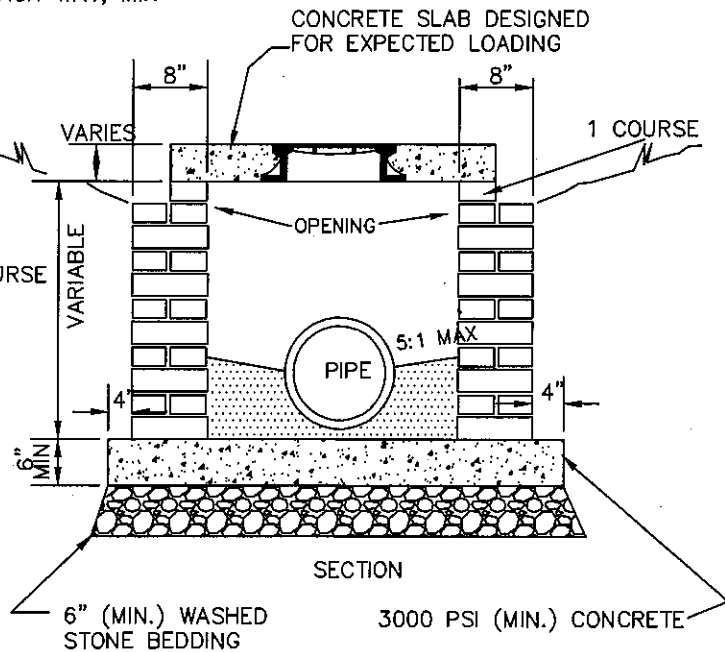
CONCRETE SLAB

STD. MANHOLE RING AND COVER. RING TO BE CAST IN FLUSH TO TOP OF SLAB

#4 REBAR, 6" ON CENTER EACH WAY, MIN



PLAN



SECTION

6" (MIN.) WASHED STONE BEDDING

3000 PSI (MIN.) CONCRETE

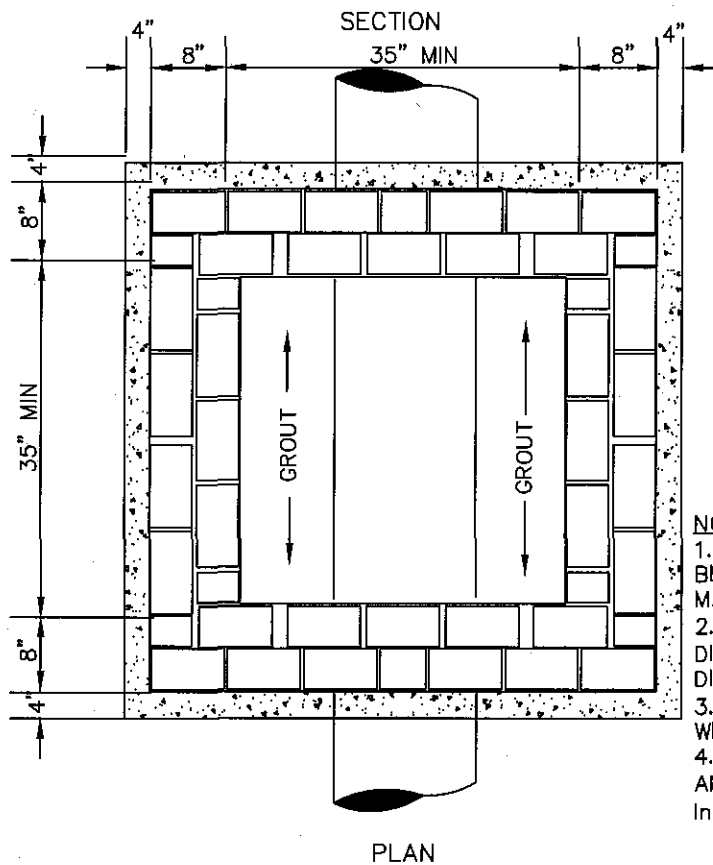
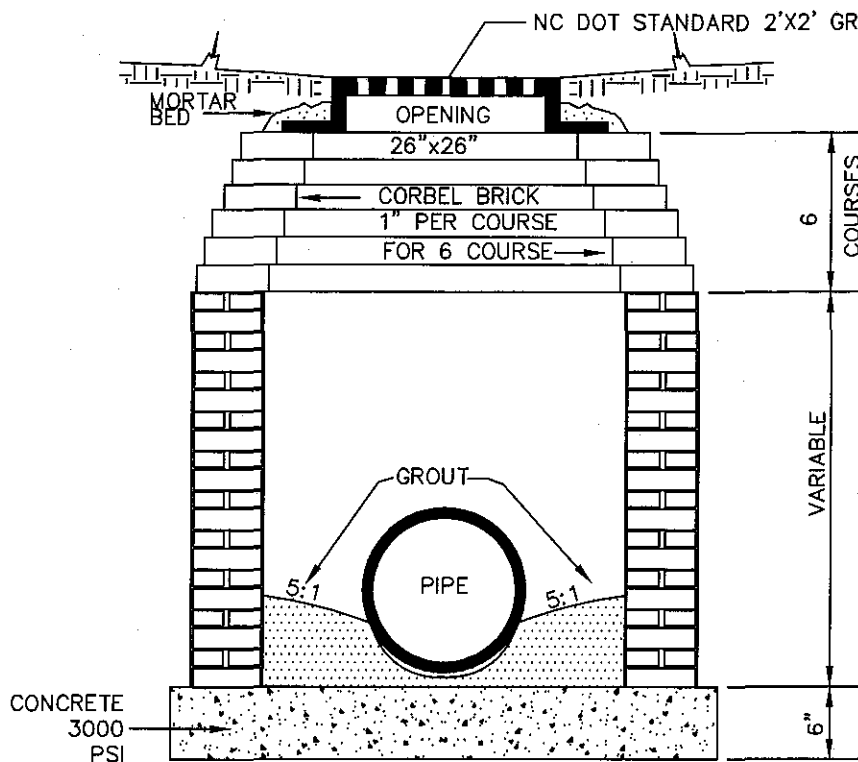
NOTES:

1. EITHER SOLID BRICK, SOLID BLOCK, OR PRECAST CONCRETE MAY BE USED.
2. STANDARD STEPS REQUIRED @ 16" O.C. WHERE DEPTH EXCEEDS 3'.
3. USE MIN 3000 PSI CONCRETE MIX
3. INSIDE DIMENSION FOR 24" PIPE AND GREATER USE PIPE DIA. PLUS 12".

REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE	DWG NO. 5.01-B	SHEET 1 OF 1	

STANDARD JUNCTION BOX





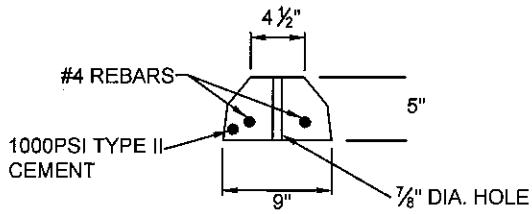
NOTES:

1. EITHER SOLID CONCRETE BRICK, SOLID BLOCK OR PRECAST CONCRETE BOX MAY BE USED.
2. FOR 24" R.C.P. AND LARGER USE PIPE DIA. PLUS 12" FOR MINIMUM INSIDE DIMENSION.
3. STANDARD STEPS REQUIRED @ 16" O.C. WHERE DEPTH EXCEEDS 3 FEET.
4. WHERE TRAFFIC WHEEL LOADS ARE ANTICIPATED, USE NCDOT 840.35 (Shaped Invert AS PER 5.02) & 840.22/840.24

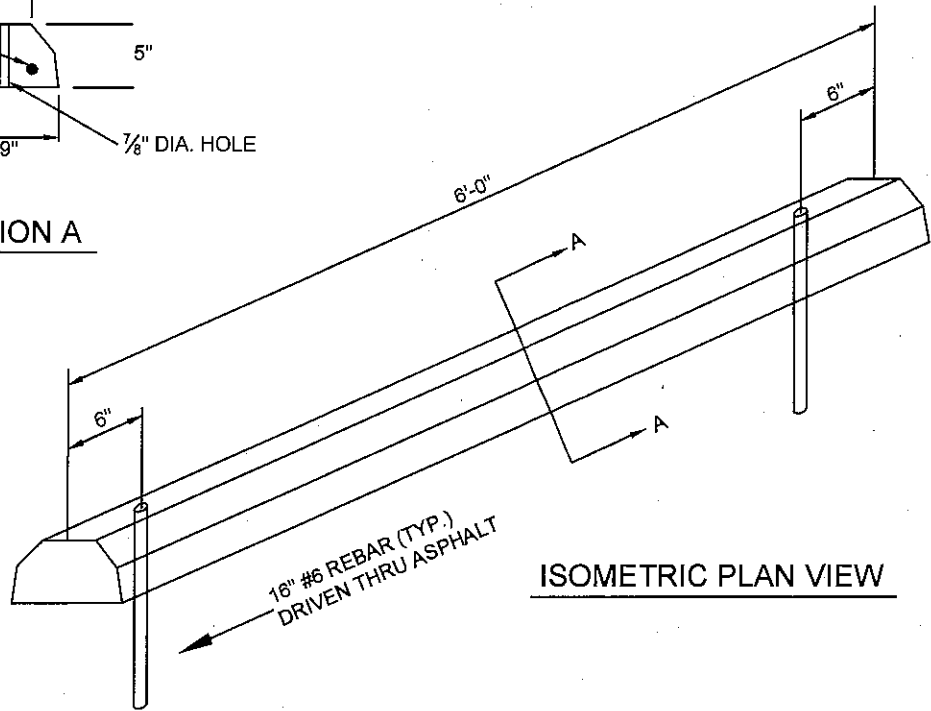
REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE	DWG NO. 5.02	SHEET 1 OF 1	

STANDARD YARD
INLET WITH GRATE
AND FRAME





SECTION A



ISOMETRIC PLAN VIEW

WHEEL STOP

NOT TO SCALE

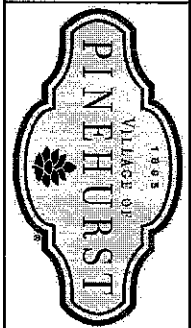
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△		12/15	MSA
NOT TO SCALE		DWG NO. 5.02-A	SHEET 1 OF 1

WHEEL STOP

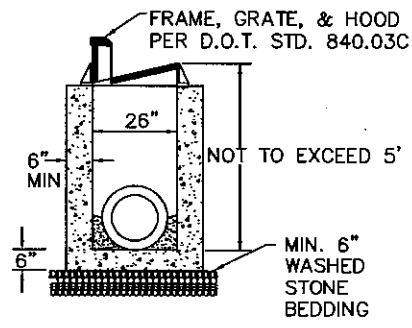
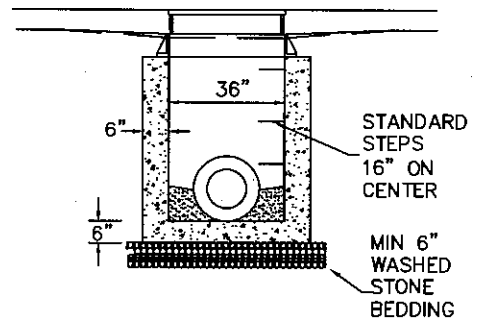


NOT TO SCALE DWG. NO. 5.03-A SHEET 1 OF 1	REV	DESCRIPTION	DATE	APPROVED BY
	△		12/15	MSA

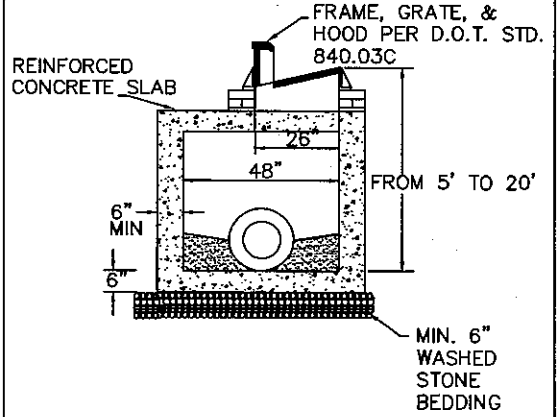
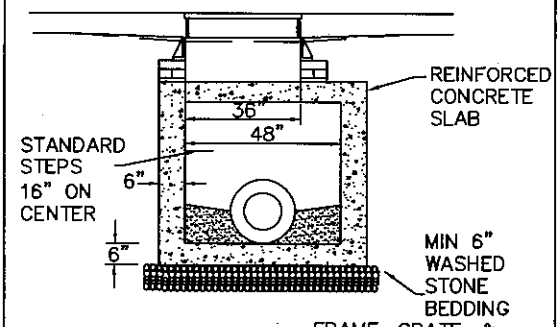
PRECAST CONCRETE CATCH BASIN



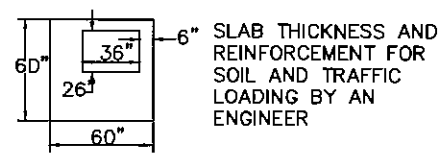
SHALLOW TYPE (5 FEET OR LESS IN DEPTH)



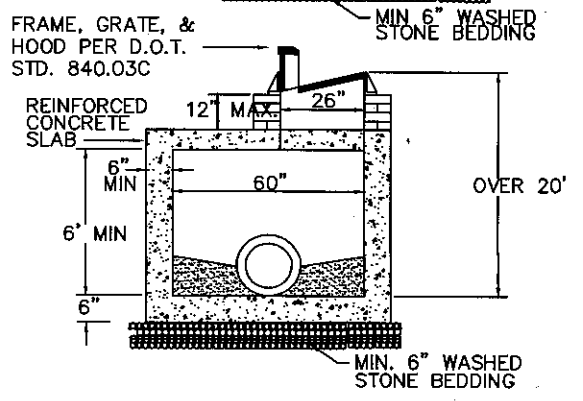
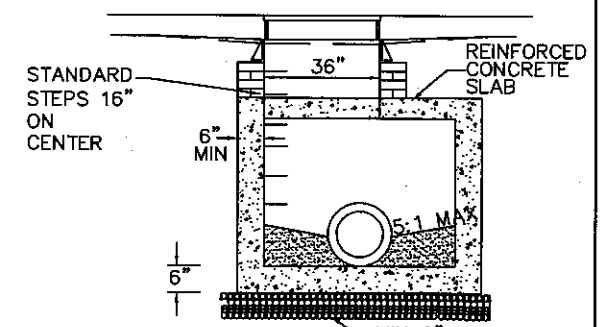
INTERMEDIATE TYPE (4'X4') (5 FEET TO 20 FEET IN DEPTH)



SLAB DETAIL

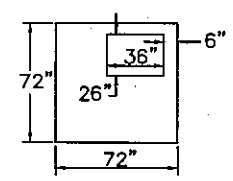


DEEP TYPE (5'X5') (OVER 20 FEET IN DEPTH)



SLAB DETAIL

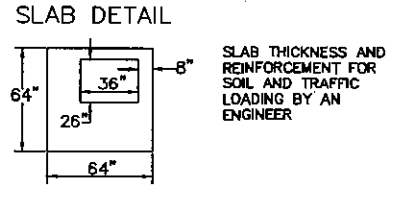
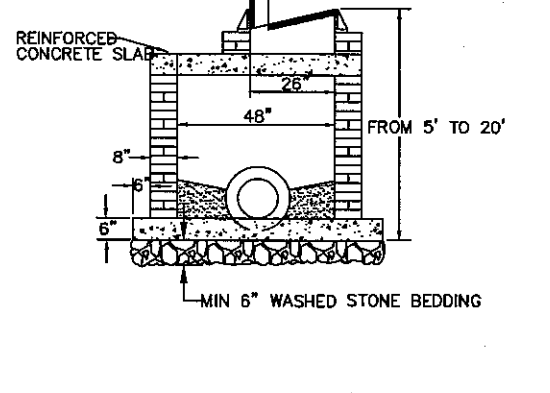
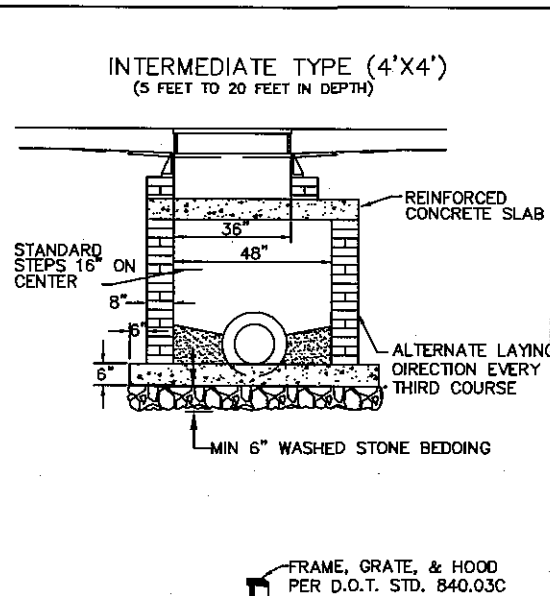
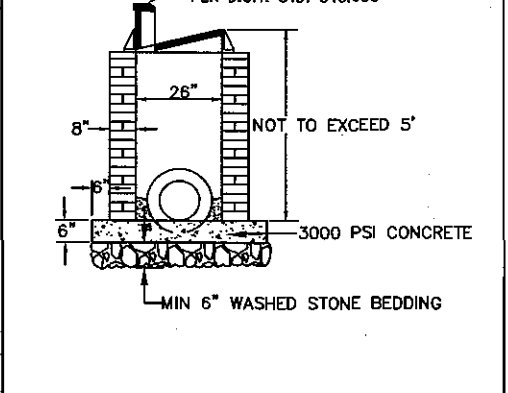
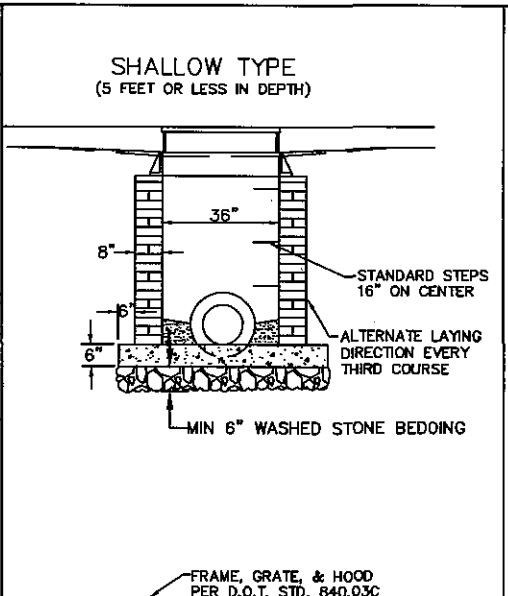
SLAB THICKNESS AND REINFORCEMENT FOR SOIL AND TRAFFIC LOADING BY AN ENGINEER



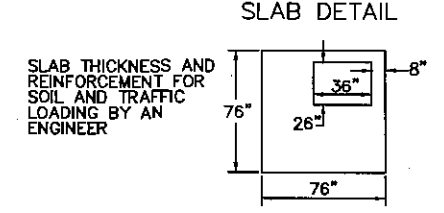
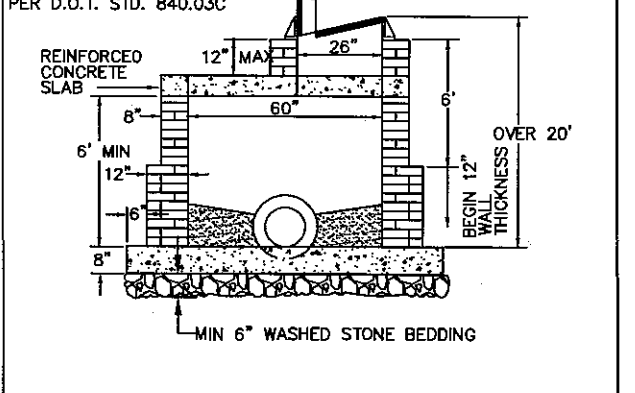
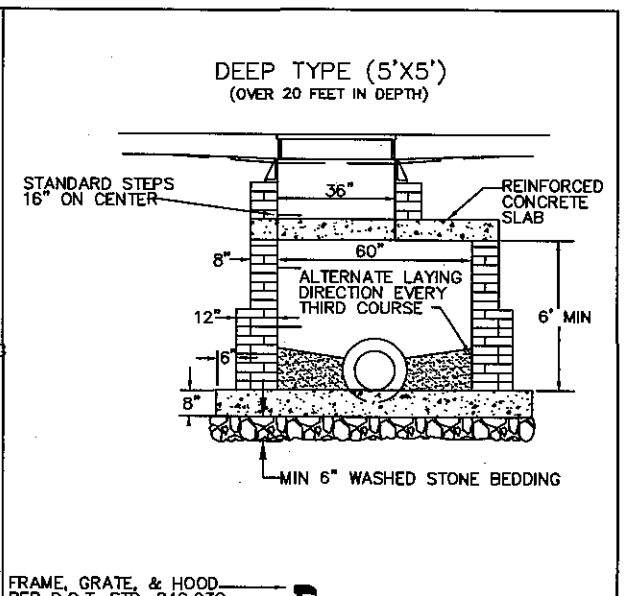
NOTES:

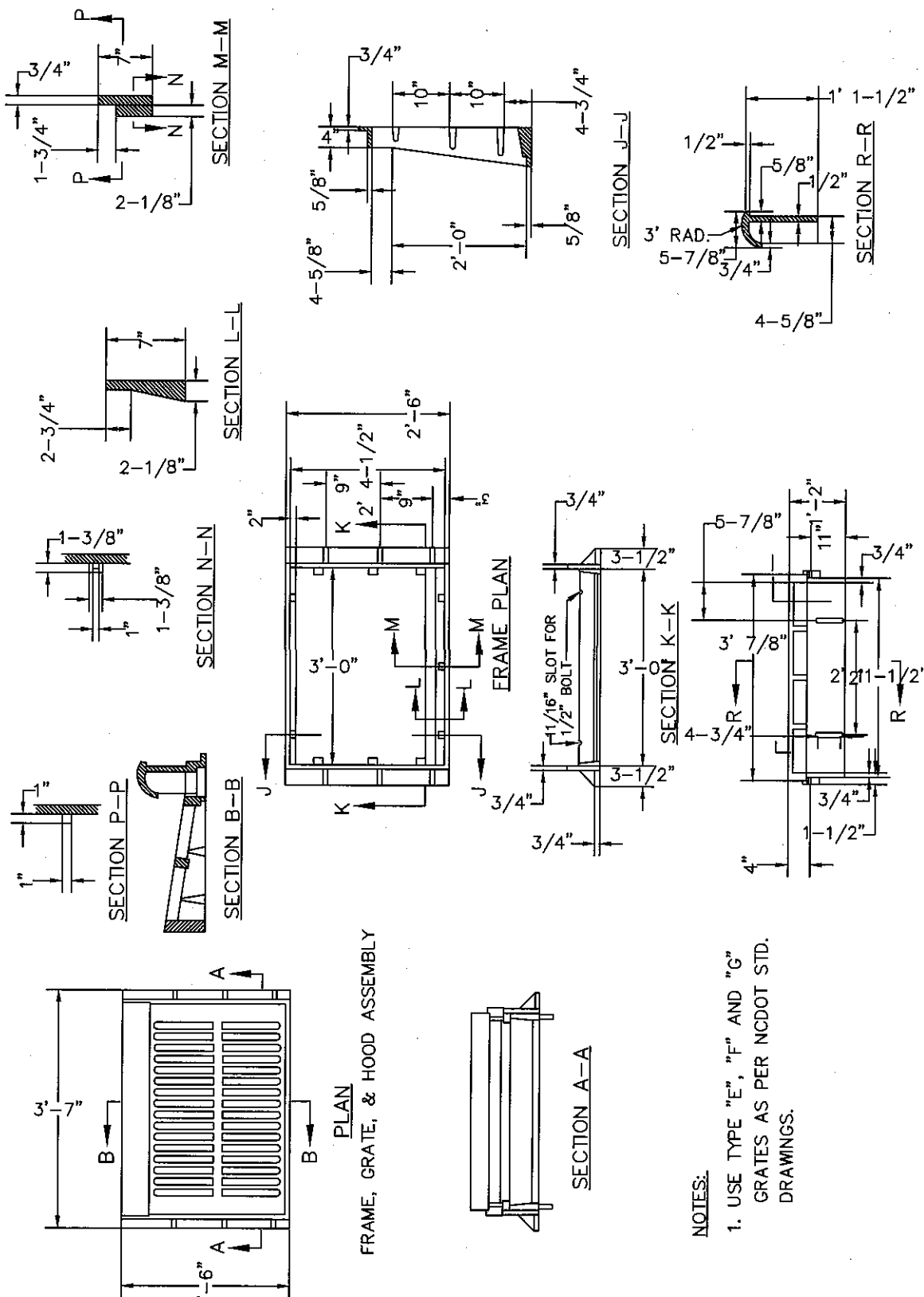
1. CONCRETE SHALL BE 4000 PSI MIN FOR ALL PRECAST CONCRETE CATCH BASINS.
2. PRECAST CONCRETE STRUCTURES MAY ONLY BE INSTALLED TO DEPTHS CERTIFIED AS ACCEPTABLE BY THE MANUFACTURER.
3. "WAFFLE" BOXES ARE ACCEPTABLE FOR SHALLOW TYPE CATCH BASINS.

NOT TO SCALE	DWG NO. 5.03-B	SHEET 1 OF 1	REV	DESCRIPTION	DATE	APPROVED BY
					12/15	MSA



NOTES:
1. OVER 8' IN DEPTH, 12" WALL THICKNESS TO 6' FROM TOP OF WALL AND 8" BOTTOM SLAB SHALL BE USED.





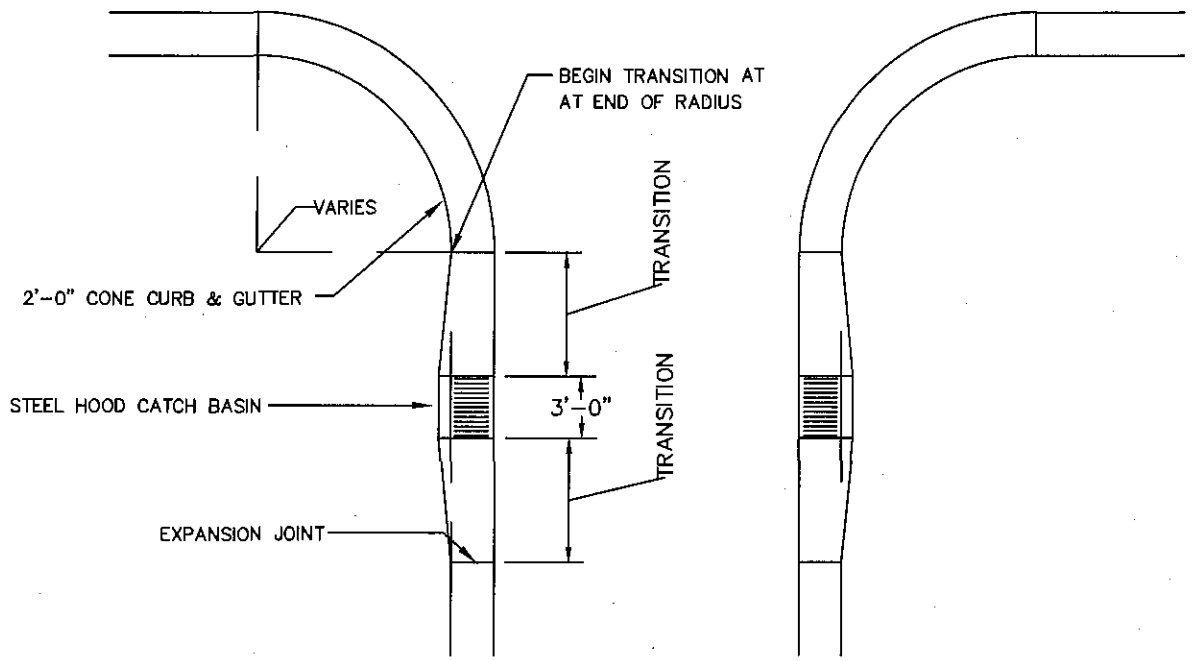
FRAME, GRATE, & HOOD ASSEMBLY

NOTES:
 1. USE TYPE "E", "F" AND "G"
 GRATES AS PER NCDOT STD.
 DRAWINGS.

REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE	DWG NO. 5.04	SHEET 1 OF 1	

FRAME, GRATE AND
 HOOD FOR
 CATCH BASIN





PLAN

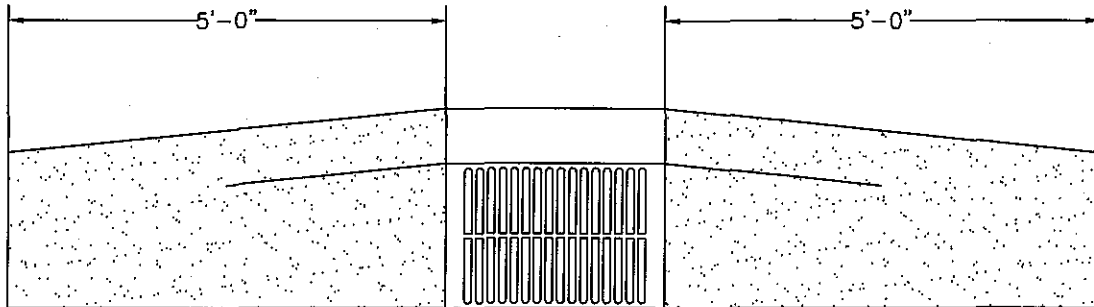
NOTES:

- 1. WHERE 2'-6" CURB AND GUTTER IS USED, CATCH BASINS MAY BE LOCATED AT END OF RADIUS.
- 2. RADIUS AT INTERSECTION MAY VARY.

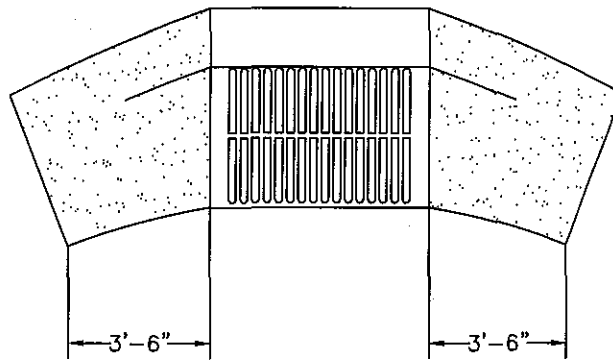
REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE		DWG NO. 5.05-A	SHEET 1 OF 1

CATCH BASIN
PLACEMENT
AT INTERSECTIONS





PLAN FOR TANGENT SECTION



PLAN FOR RESIDENTIAL CUL-DE-SAC

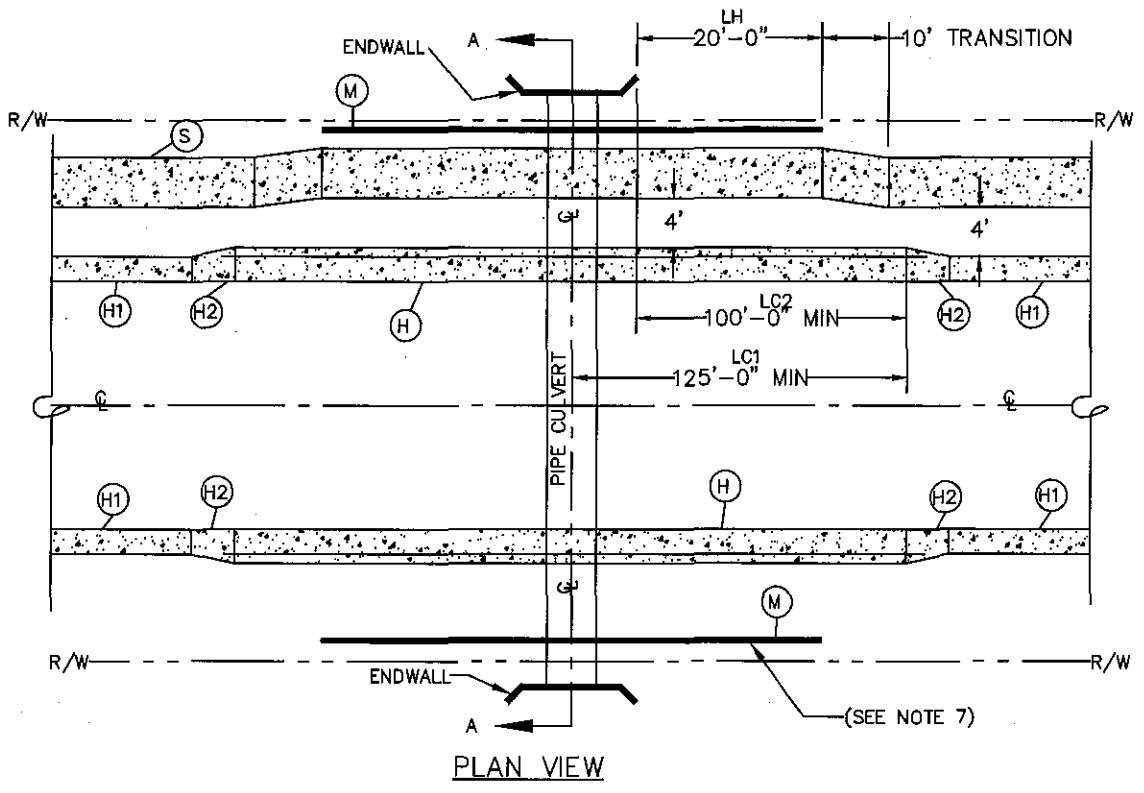
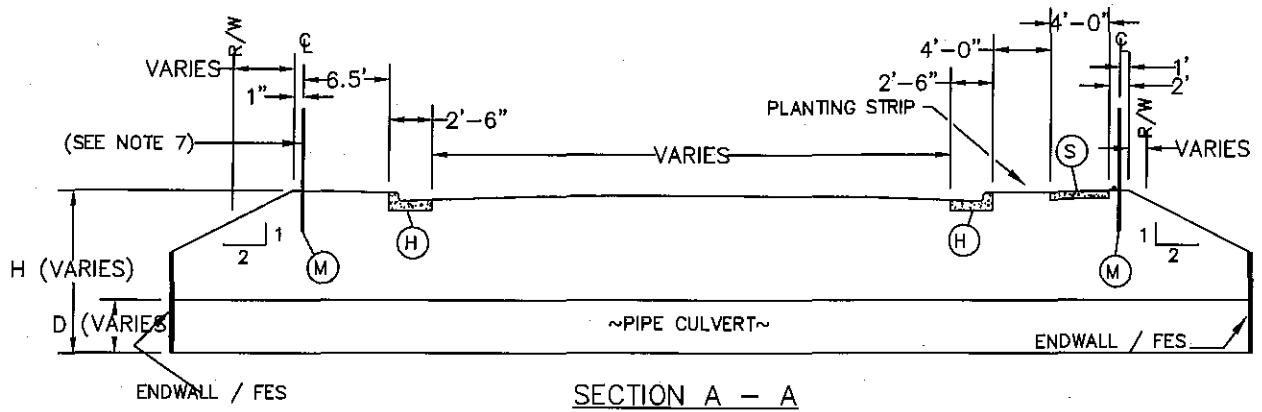
NOTES:

1. TRANSITION FROM VALLEY GUTTER TO 2'-6" SECTION TO BE MADE OVER 10' LENGTH.

REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE	DWG NO. 5.05-B	SHEET 1 OF 1	

CATCH BASIN
FRAME IN
VALLEY CURB





- (H) 2'-6" CURB AND GUTTER.
- (M) HANDRAIL.
- (S) 4'-0" SIDEWALK.
- (H1) 2'-0" VALLEY GUTTER.
- (H2) CURB TRANSITION 2'-6" CURB AND GUTTER TO 2'-0" VALLEY GUTTER.

- LH = DISTANCE FROM END OF WINGWALL TO END OF HANDRAIL.
- LC1 = DISTANCE FROM \bar{C} OF CULVERT TO END OF 2'-6" CURB AND GUTTER.
- LC2 = DISTANCE FROM END OF WINGWALL TO END OF 2'-6" CURB AND GUTTER.

REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE DWG NO. 5.06-A SHEET 1 OF 1			

CULVERT CROSSINGS AT
RESIDENTIAL AND
COMMERCIAL STREETS




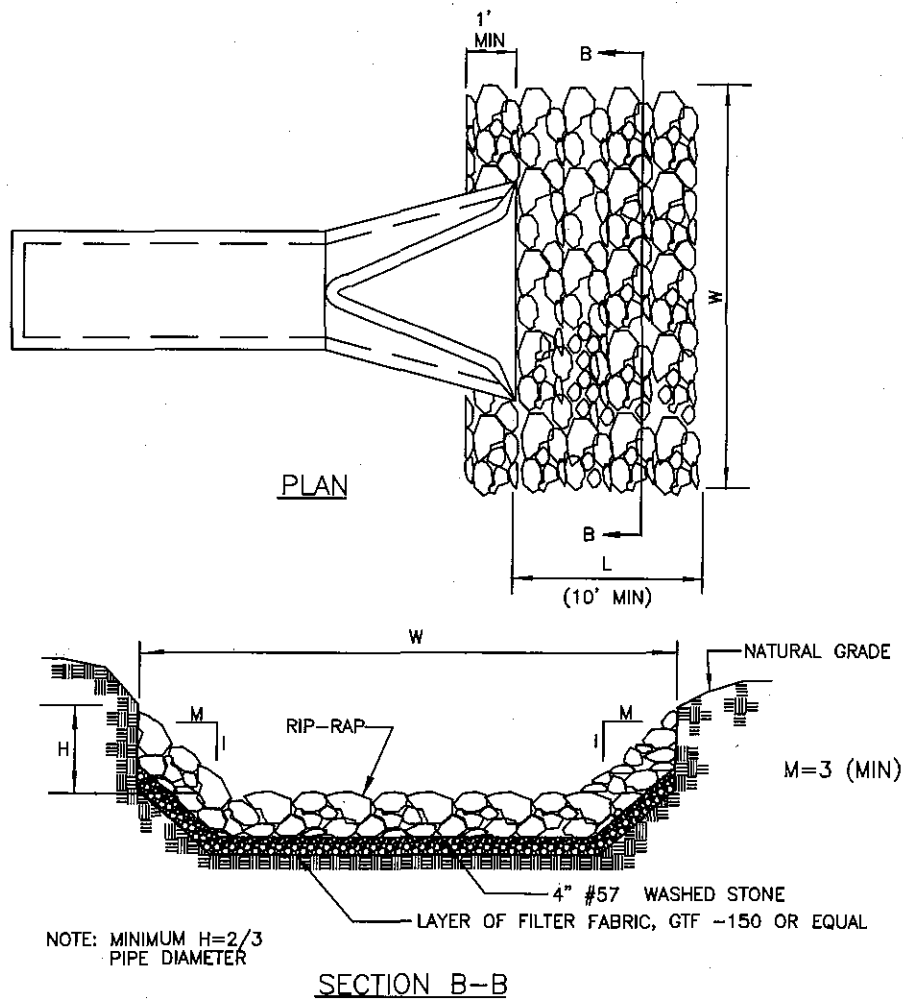
NOTES:

1. UNLESS OTHERWISE DETERMINED BY THE VILLAGE ENGINEER, THE MEASURES ILLUSTRATED SHALL BE USED WHEN CULVERT DIAMETER, D, IS GREATER THAN OR EQUAL TO 24 INCHES AND WHEN THE DIFFERENCE IN ELEVATION BETWEEN THE CULVERT INVERT AND THE TOP OF SLOPE, H, IS GREATER THAN OR EQUAL TO 5 FEET.
2. INSTALLATION OF 2'-6" CURB AND GUTTER MAY NOT BE REQUIRED WHEN AN ADEQUATE CLEAR ZONE IS PROVIDED FOR VEHICLES WITH A MAXIMUM OF 6:1 SLOPE (SEE TABLE 1).
3. INSTALLATION OF HANDRAIL MAY NOT BE REQUIRED WHEN A 10-FOOT PEDESTRIAN CLEAR ZONE IS PROVIDED BEHIND THE SIDEWALK WITH A MAXIMUM OF 6:1 SLOPE. WHERE NO SIDEWALK IS REQUIRED, INSTALLATION OF HANDRAIL MAY NOT BE REQUIRED WHEN A 15-FOOT PEDESTRIAN CLEAR ZONE IS PROVIDED BEHIND THE CURB WITH A MAXIMUM OF 6:1 SLOPE.
4. FOR CULVERT CROSSINGS WITHOUT ENDWALLS, LH AND LC2 SHALL BE MEASURED FROM THE OUTSIDE OF THE NEAREST WALL OF THE CULVERT BARREL.
5. FOR MULTIPLE BARREL CULVERT CROSSINGS, LC1 SHALL BE MEASURED FROM THE CENTERLINES OF THE OUTBOARD CULVERT BARRELS.
6. WHEN NECESSARY, AS DETERMINED BY THE VILLAGE ENGINEER, MEASURES ADDITIONAL TO THOSE ILLUSTRATED MAY BE REQUIRED.
7. INSTALLATION OF HANDRAIL IS REQUIRED ON THE SIDEWALK SIDE OF STREET IF SIDEWALK IS ONLY REQUIRED ON ONE SIDE OF STREET. INSTALLATION OF HANDRAIL IS REQUIRED ON BOTH SIDES OF STREET IF SIDEWALK IS REQUIRED ON BOTH SIDES OR IF NO SIDEWALK IS REQUIRED.
8. DESIGN ADT IS CALCULATED ASSUMING A TRIP GENERATION OF 13 DAILY TRIPS PER SINGLE FAMILY DWELLING UNIT.
9. ALL CULVERT CROSSINGS WITHOUT HEADWALLS SHALL HAVE FLARED END SECTIONS.

TABLE 1.
CLEAR ZONE DISTANCES
LOCAL, COLLECTOR, AND COMMERCIAL STREETS

DESIGN ADT	CLEAR ZONE FROM EDGE OF PAVEMENT	
	TANGENT SECTION	CURVE (WITHIN 125' OF CULVERT)
UNDER 750	10'	15'
750 - 1500	12'	18'
1501 - 6000	14'	21'
OVER 6000	16'	24'

REV	DESCRIPTION	DATE	APPROVED BY	CULVERT CROSSINGS AT RESIDENTIAL AND COMMERCIAL STREETS	
△		12/15	MSA		
NOT TO SCALE		DWG NO. 5.06-B	SHEET 2 OF 2		



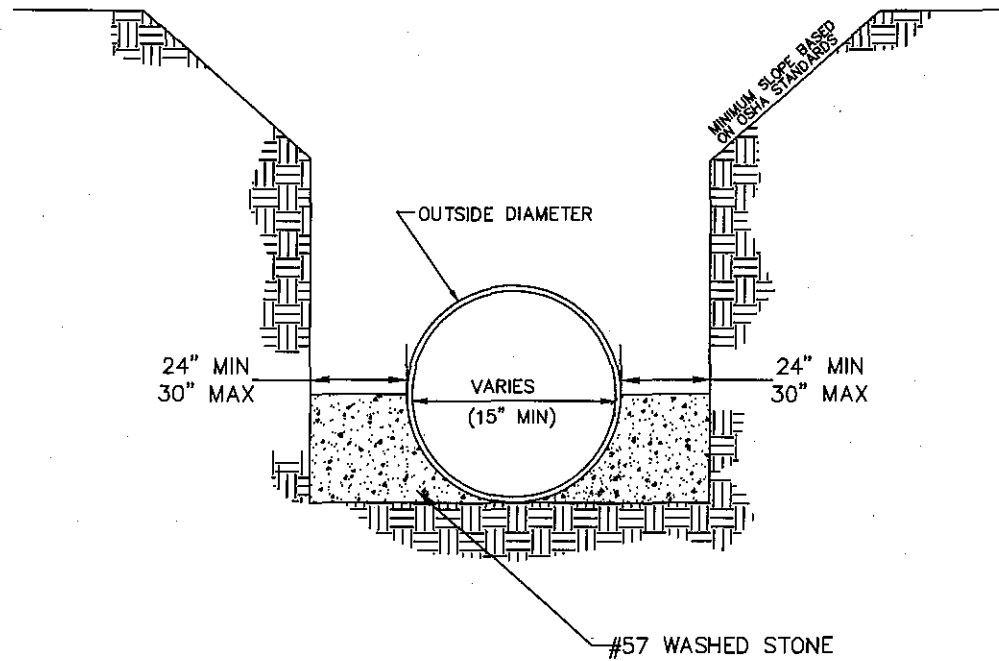
NOTES:

1. CLASS OR MEDIAN SIZE OF RIP-RAP AND LENGTH, WIDTH AND DEPTH OF APRON TO BE DESIGNED BY THE ENGINEER.
2. NO BENDS OR CURVES IN THE HORIZONTAL ALIGNMENT OF THE APRON WILL BE PERMITTED.
3. RIP-RAP SHOULD EXTEND UP BOTH SIDES OF THE APRON AND AROUND THE END OF THE PIPE OR CULVERT AT THE DISCHARGE OUTLET AT A MAXIMUM SLOPE OF 3:1 AND A HEIGHT NOT LESS THAN TWO THIRDS THE PIPE DIAMETER OR CULVERT HEIGHT.
4. THERE SHALL BE NO OVERFLOW FROM THE END OF THE APRON TO THE SURFACE OF THE RECEIVING CHANNEL. THE AREA TO BE PAVED OR RIP-RAPPED SHALL BE UNDERCUT SO THAT THE INVERT OF THE APRON SHALL BE AT THE SAME GRADE (FLUSH) WITH THE SURFACE OF THE RECEIVING CHANNEL. THE APRON SHALL HAVE A CUTOFF OR TOE WALL AT THE DOWNSTREAM END.
5. THE WIDTH OF THE END OF THE APRON SHALL BE EQUAL TO THE BOTTOM WIDTH OF THE RECEIVING CHANNEL. MAXIMUM TAPER TO RECEIVING CHANNEL 5:1.
6. ALL SUBGRADE FOR STRUCTURE TO BE COMPACTED TO 95% OR GREATER.
7. THE PLACING OF FILL, EITHER LOOSE OR COMPACTED IN THE RECEIVING CHANNEL SHALL NOT BE ALLOWED.

REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE	DWG NO. 5.07	SHEET 1 OF 1	

RIP-RAP
APRON
AT CULVERTS





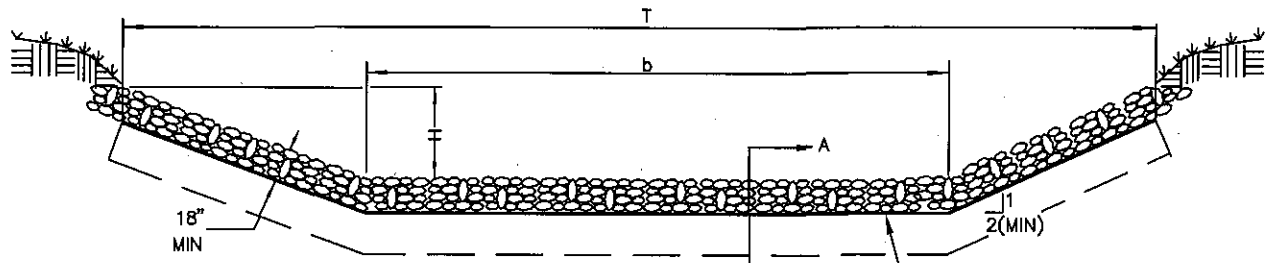
NOTES:

1. A MINIMUM OF 24" FROM OUTSIDE DIAMETER OF PIPE TO SIDE OF TRENCH MUST BE ALLOWED FOR COMPACTION OF FILL MATERIAL. BACKFILLING OF TRENCHES SHALL BE ACCOMPLISHED IMMEDIATELY AFTER THE PIPE IS LAID. THE FILL AROUND THE PIPE SHALL BE PLACED IN LAYERS NOT TO EXCEED 6". UNDER NO CIRCUMSTANCES SHALL WATER BE PERMITTED TO RISE IN UNBACKFILLED TRENCHES AFTER THE PIPE HAS BEEN PLACED. COMPACTION REQUIREMENTS SHALL BE ATTAINED BY THE USE OF THE MECHANICAL TAMPS ONLY. EACH AND EVERY LAYER OF BACKFILL SHALL BE PLACED LOOSE AND THOROUGHLY COMPACTED INTO PLACE.
2. ALL BACKFILL MATERIAL SHALL HAVE AN IN PLACE COMPACTED DENSITY OF 95% OF STANDARD PROCTOR. THE FINAL 2' BELOW FINISHED GRADE SHALL BE 100%.
3. ALL TRENCHING OPERATIONS SHALL MEET OSHA STANDARDS.
4. BACKFILL MATERIAL BENEATH ROADWAY SHALL BE SELECT BACKFILL MATERIAL.
5. HAUNCHING SHALL BE WITH #57 OR #67 WASHED STONE UNLESS OTHERWISE APPROVED BY THE VILLAGE ENGINEER.

REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE		DWG NO. 5.08	SHEET 1 OF 1

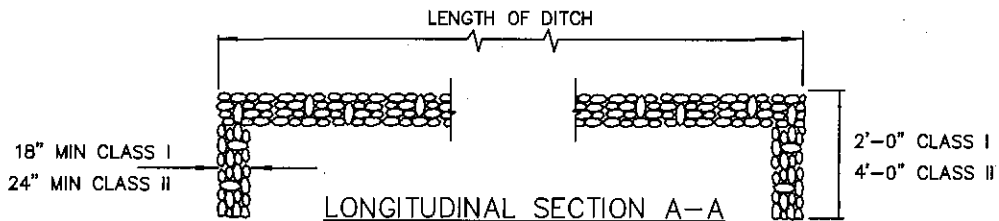
TRENCH DETAIL
FOR STORM
DRAIN PIPES





DETAIL

FILTER FABRIC AND 4" #5 WASHED STONE UNDER RIP-RAP



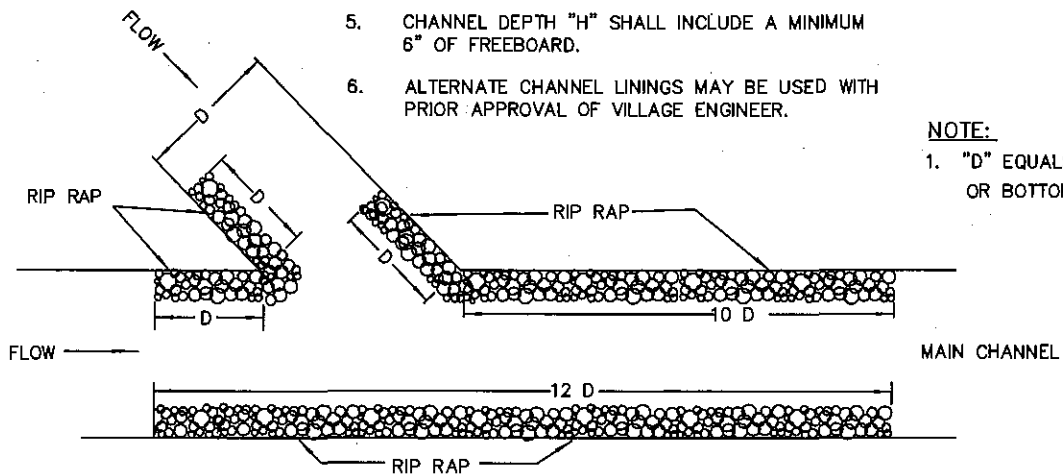
LONGITUDINAL SECTION A-A

GENERAL NOTES:

1. IF BEDROCK IS ENCOUNTERED WITHIN THE LIMITS OF THE TOEWALL, BEGIN TOEWALL ON THE BEDROCK OR AS DIRECTED BY THE ENGINEER.
2. WHERE ONLY ONE SIDE REQUIRES RIP-RAP CLASS I OR II, LIST STATION AND SIDE OF SAME.
3. CHANNEL AND RIP-RAP SIZE TO BE DESIGNED BY THE ENGINEER.
4. DEPENDING ON SOIL CONDITIONS, WASHED STONE AND FILTER FABRIC MAY BE NECESSARY UNDER RIP-RAP.
5. CHANNEL DEPTH "H" SHALL INCLUDE A MINIMUM 6" OF FREEBOARD.
6. ALTERNATE CHANNEL LININGS MAY BE USED WITH PRIOR APPROVAL OF VILLAGE ENGINEER.

NOTE:

1. "D" EQUALS DIAMETER OF PIPE OR BOTTOM WIDTH OF CHANNEL.



CHANNEL INTERSECTIONS

REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE		DWG NO. 5.09	SHEET 1 OF 1

RIP-RAP
LINED
DITCHES



EASEMENT REQUIREMENTS FOR OPEN STORM DRAINAGE CHANNELS	
AREA IN ACREAGE	EASEMENT REQUIREMENT
0-45 AC.	20'
	20'
	20'
45-120 AC.	30'
120-500 AC.	40'
500 AC.+	(SEE NOTE)

EASEMENT REQUIREMENTS FOR STORM DRAIN PIPE	
PIPE SIZE	EASEMENT REQUIREMENT
15"	20'
18"	20'
24"	20'
30"	20'
36"	20'
42"	25'
48"	30'
54"+	30'MIN (VARIES)

NOTES:

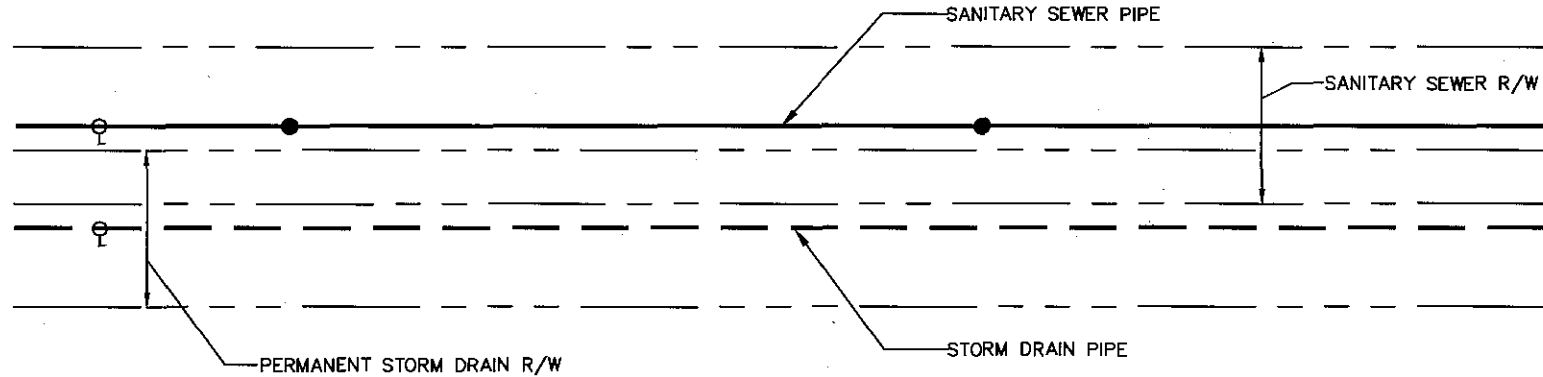
1. FOR STREAMS CARRYING 500 ACRES OR MORE OF SURFACE RUNOFF, THE EASEMENT REQUIREMENT IS TO BE THE WIDTH OF THE STREAM FROM TOP OF BANK TO TOP OF BANK, PLUS (+) 10' ON EACH SIDE OF STREAM. (40' MINIMUM WIDTH)
2. FOR OPEN CHANNELS, THE MINIMUM EASEMENT MUST CONTAIN THE WIDTH OF THE STREAM FROM TOP OF BANK TO TOP BANK.

REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE		DWG NO. 5.10	SHEET 1 OF 1

MINIMUM DRAINAGE EASEMENT
REQUIREMENTS FOR STORM DRAIN PIPES
AND OPEN CHANNELS

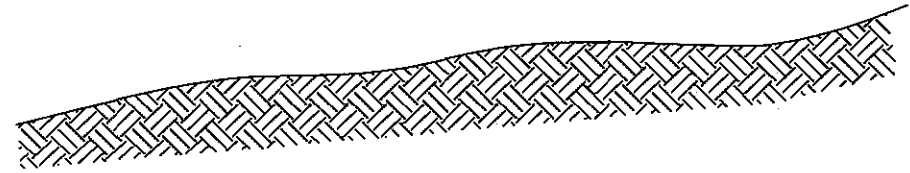


REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE	DWG NO. 5.11	SHEET 1 OF 1	

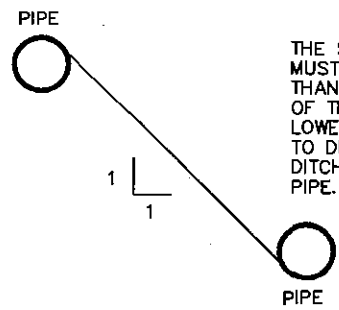


THE SANITARY SEWER AND STORM DRAINAGE RIGHTS OF WAY MAY OVERLAP; HOWEVER, THE PIPE AND ASSOCIATED STRUCTURES MUST NOT BE IN THE OTHER UTILITY'S RIGHT OF WAY. THE SANITARY SEWER RIGHT OF WAY WIDTHS SHALL BE AS OUTLINED IN THE UTILITY OWNER'S STANDARDS. THIS DETAIL DOES NOT APPLY TO STORM DRAINAGE UTILIZING OPEN CHANNEL FLOW.

PLAN VIEW



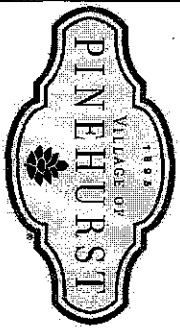
THE VERTICAL SEPARATION GUIDELINE WILL BE USED UP TO THE POINT WHERE THE TWO RIGHTS OF WAY ADJOIN EACH OTHER.

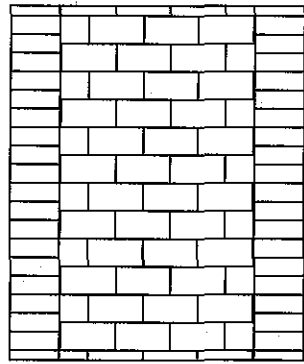


THE SANITARY SEWER AND STORM DRAINAGE PIPES MUST BE NO CLOSER TOGETHER HORIZONTALLY THAN THE VERTICAL DISTANCE BETWEEN THE TOP OF THE HIGHER PIPE AND THE BOTTOM OF THE LOWER PIPE. A MAINTENANCE CREW MUST BE ABLE TO DIG DOWN TO THE LOWER PIPE SLOPING THE DITCH ON A 1:1 SLOPE AND NOT EXPOSE THE HIGHER PIPE.

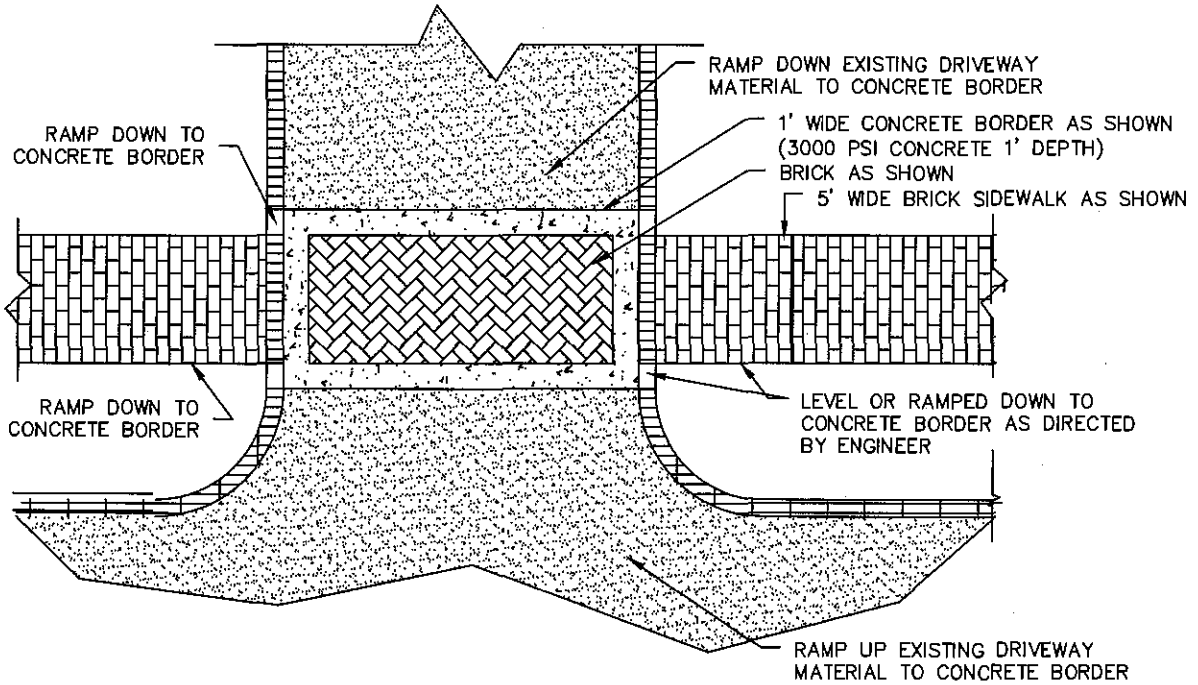
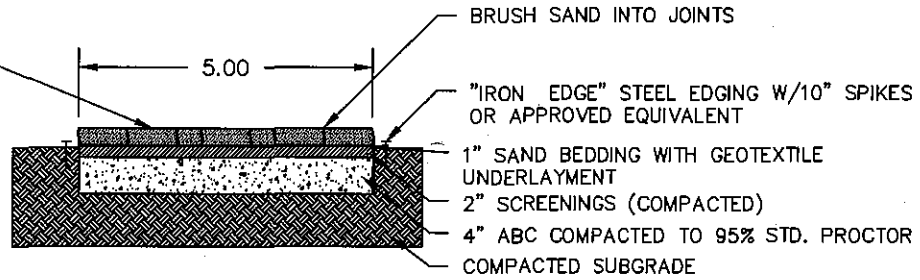
PROFILE VIEW

OVERLAPPING STORM
DRAIN / SANITARY
SEWER EASEMENTS





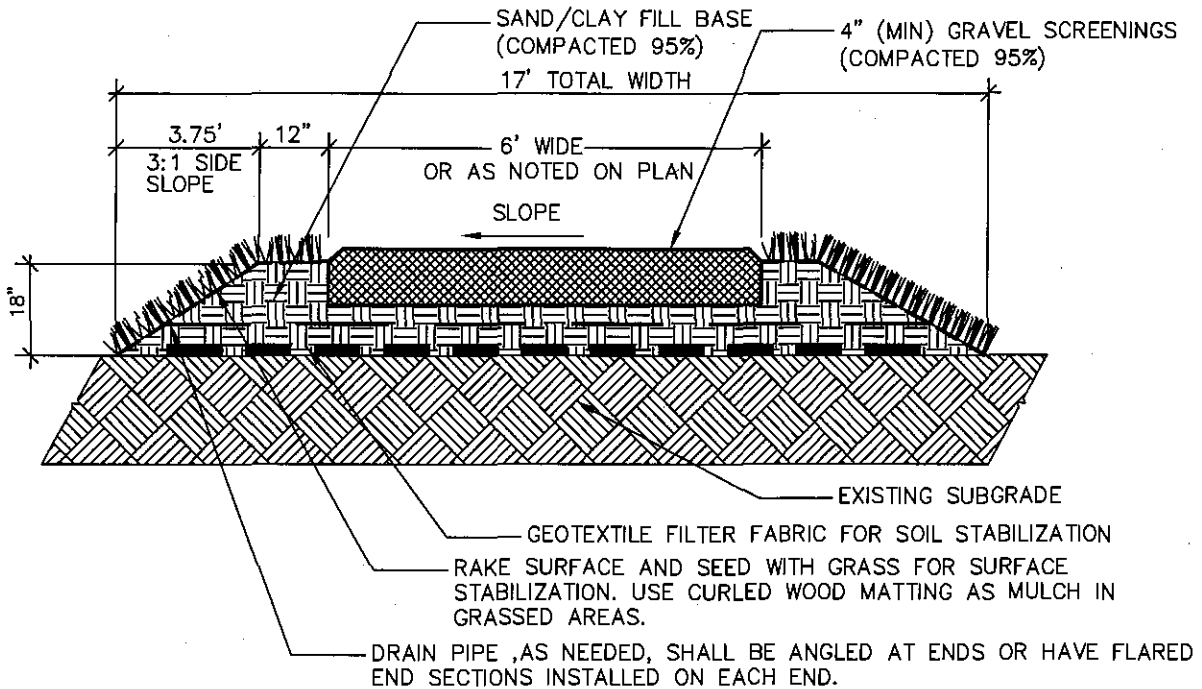
4" x 8" "PINEHALL
PATHWAY" BRICK PAVER
OR APPROVED EQUAL



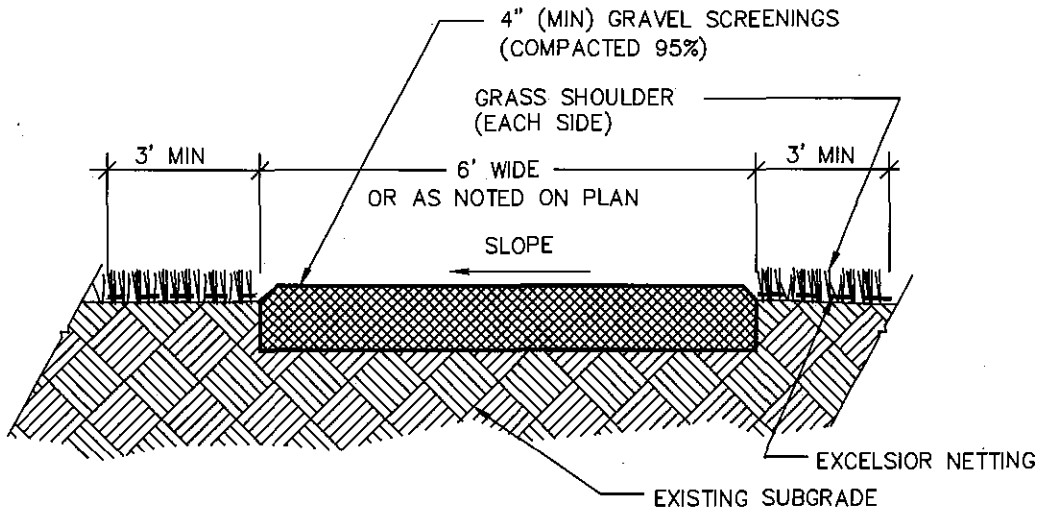
REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE		DWG NO. 5.12	SHEET 1 OF 1

BRICK
SIDEWALK





- * FINISHED TRAIL SURFACE TO BE A MAXIMUM OF 1" ABOVE FINISHED SOIL GRADE.
- * STONE SCREENINGS SHALL VARY IN SIZE FROM 1/64" TO 1/8" WITH A UNIFORM DISTRIBUTION OF SIZES. A SAMPLE OF SCREENINGS SHALL BE SUBMITTED TO THE OWNER FOR APPROVAL PRIOR TO USE IN CONSTRUCTION.
- * PROVIDE A MAXIMUM CROSS SLOPE OF 1.5% TO THE LOW SIDE OF TRAIL FOR SURFACE DRAINAGE.

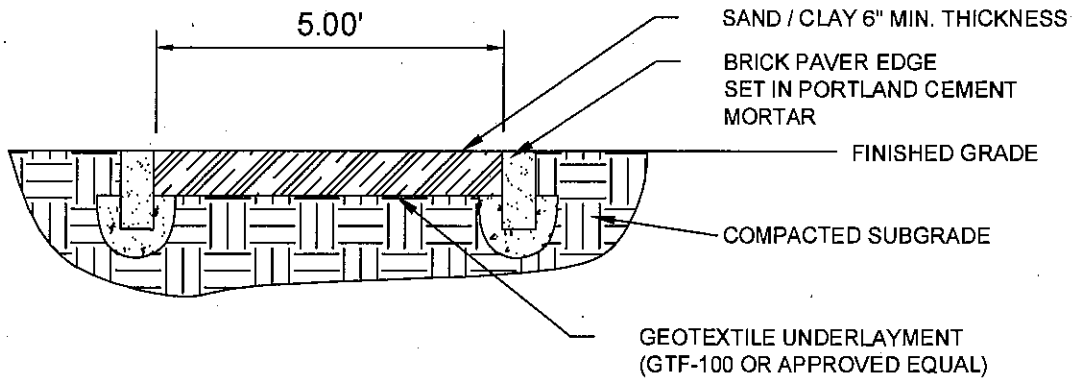
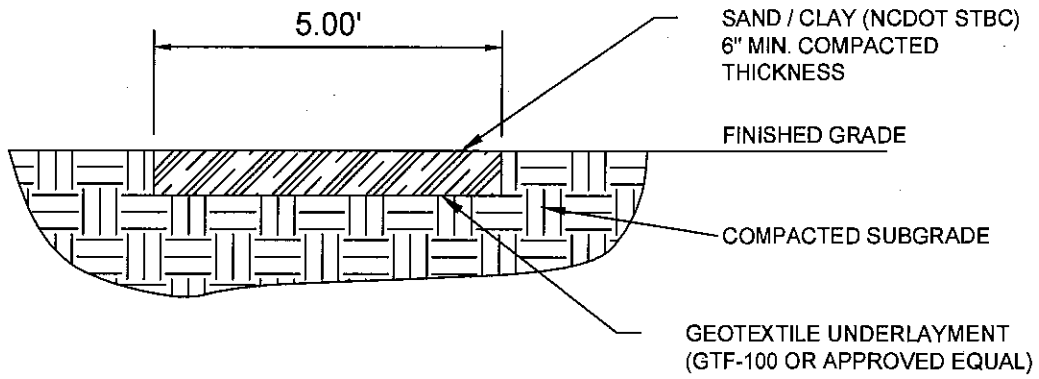


- * FINISHED TRAIL SURFACE TO BE A MAXIMUM OF 1" ABOVE FINISHED SOIL GRADE.
- * ROOT PRUNE AREA WHERE TRAIL IS TO BE LOCATED AND COMPACT LOOSENEED SOIL TO 2" MIN BELOW EXISTING GRADE. INSTALL GRAVEL SCREENINGS AND COMPACT TO A MIN DEPTH OF 3" THICK AND 1" ABOVE GRADE.
- * STONE SCREENINGS SHALL VARY IN SIZE FROM 1/64" TO 1/8" WITH A UNIFORM DISTRIBUTION OF SIZES. A SAMPLE OF SCREENINGS SHALL BE SUBMITTED TO THE OWNER FOR APPROVAL PRIOR TO USE IN CONSTRUCTION.
- * PROVIDE A MAXIMUM CROSS SLOPE OF 1.5% TO THE LOW SIDE OF TRAIL FOR SURFACE DRAINAGE.

REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE		DWG NO. 5.13	SHEET 1 OF 1

GREENWAY





REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA
NOT TO SCALE	DWG NO. 5.14	SHEET 1 OF 1	

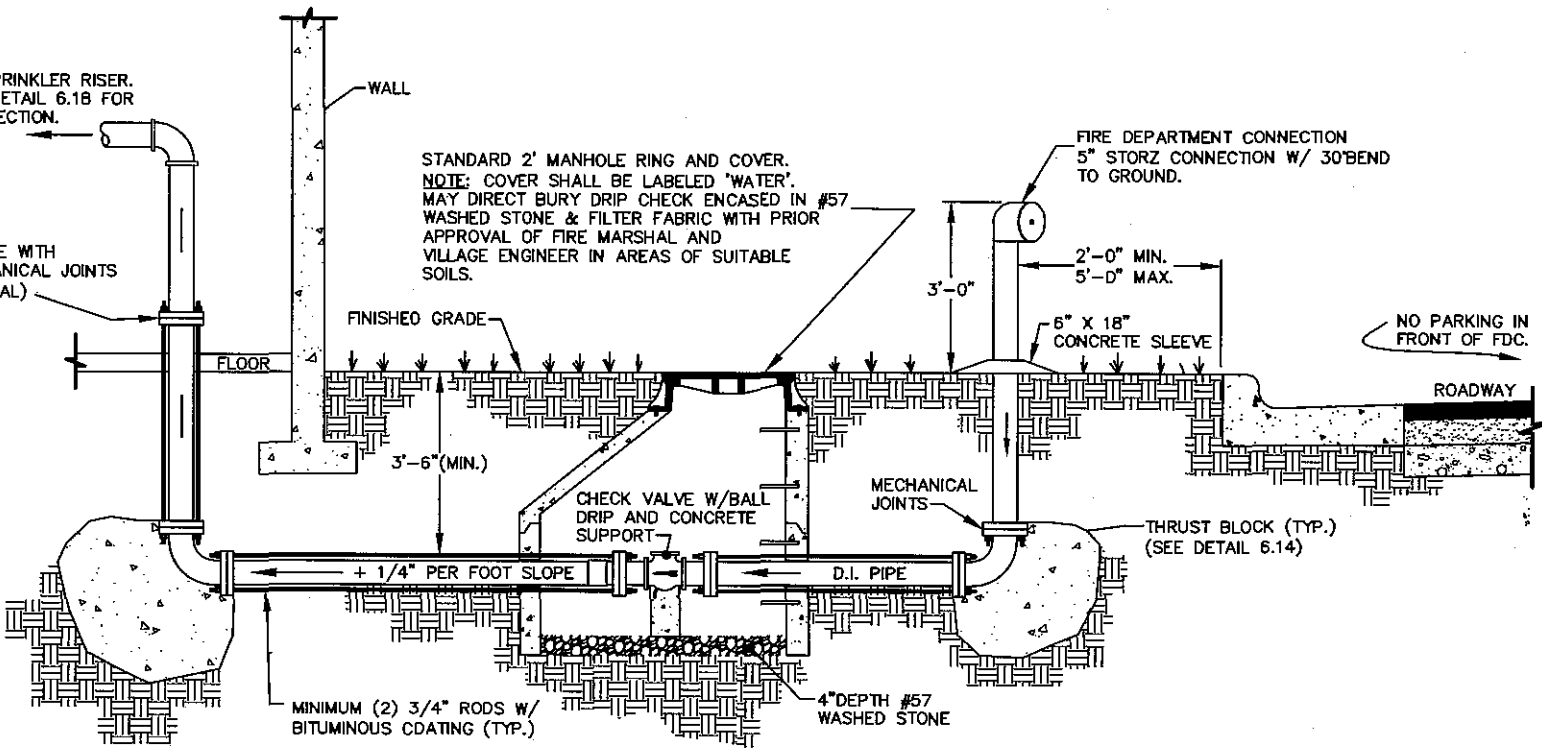
OLD TOWN
SAND-CLAY
SIDEWALKS



REV	DESCRIPTION	DATE	APPROVED BY
△		12/15	MSA/FF
DWG. NO. 6.17		SHEET 1 OF 1	

TO SPRINKLER RISER.
SEE DETAIL 6.18 FOR
CONNECTION.

D.I. PIPE WITH
MECHANICAL JOINTS
(TYPICAL)



STANDARD 2' MANHOLE RING AND COVER.
NOTE: COVER SHALL BE LABELED 'WATER'.
MAY DIRECT BURY DRIP CHECK ENCASED IN #57
WASHED STONE & FILTER FABRIC WITH PRIOR
APPROVAL OF FIRE MARSHAL AND
VILLAGE ENGINEER IN AREAS OF SUITABLE
SOILS.

FIRE DEPARTMENT CONNECTION
5\"/>

2'-0\"/>

6\"/>

NO PARKING IN
FRONT OF FDC.

ROADWAY

CHECK VALVE W/BALL
DRIP AND CONCRETE
SUPPORT

MECHANICAL
JOINTS

THRUST BLOCK (TYP.)
(SEE DETAIL 6.14)

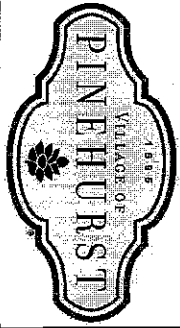
MINIMUM (2) 3/4\"/>

4\"/>

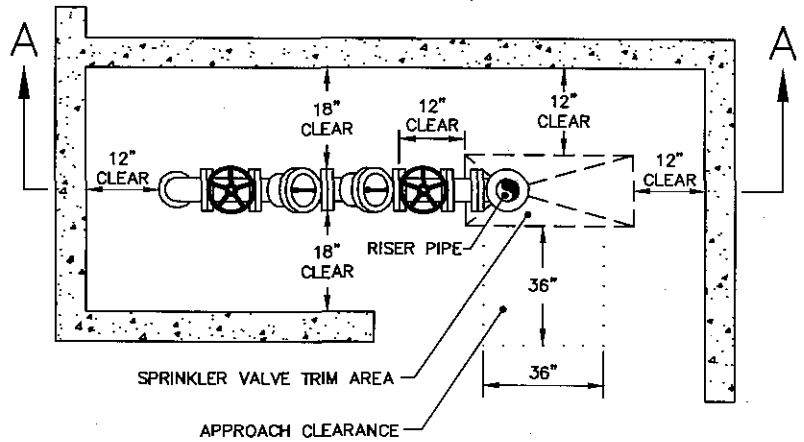
NOTES:

- 1) ALL FDC'S SHALL BE WITHIN 50 FEET OF A FIRE HYDRANT.
- 2) ALL FDC'S SHALL BE LOCATED OUTSIDE 'COLLAPSE ZONE'
AS REQUIRED BY FIRE MARSHAL.
- 3) ON SHOULDER SECTIONS, FDC SHALL BE 5'(MIN) FROM TOP OF BACKSLOPE.

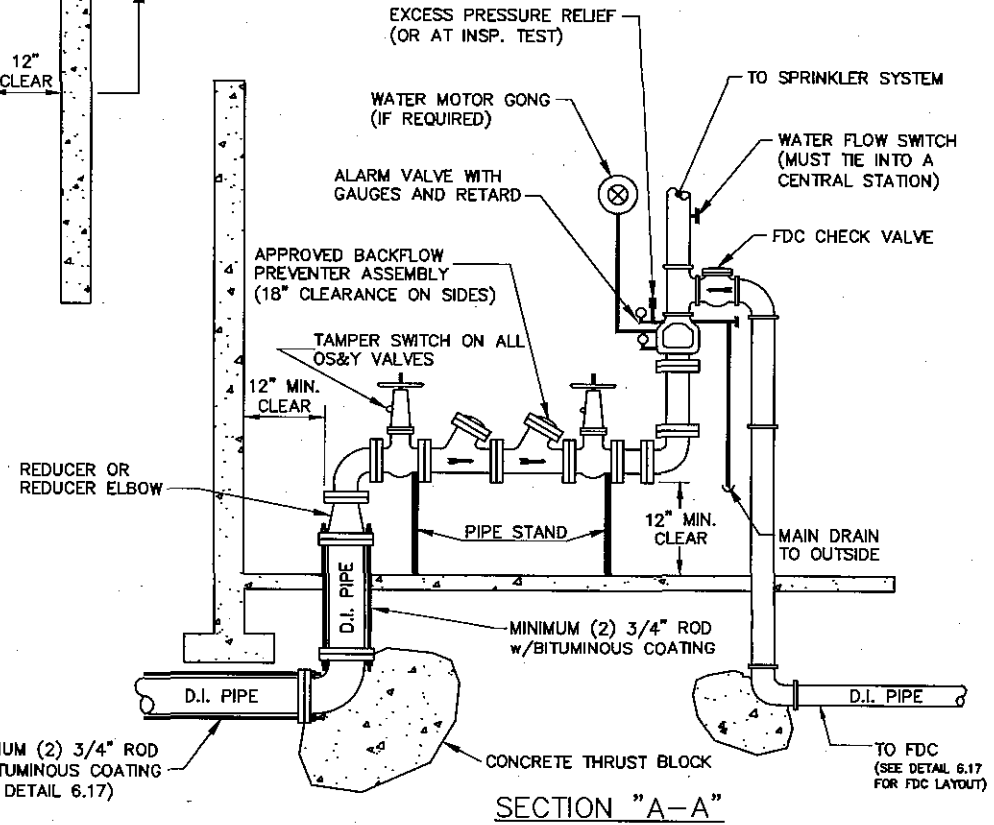
FIRE DEPARTMENT
 CONNECTION
 (FDC) LAYOUT
 DETAIL



REV	DESCRIPTION	DATE	APPROVED BY
12/15			MSA/FF
DWG NO. 6.18			
			SHEET 1 OF 1



TOP VIEW



SECTION "A-A"

- NOTES:
1. ALL BACKFLOW PREVENTERS SHALL BE MOUNTED HORIZONTALLY UNLESS OTHERWISE APPROVED IN WRITING BY THE VILLAGE ENGINEER.
 2. ALL FITTINGS SHALL BE FULLY WRAPPED WITH 6 MIL(MIN.) PE FILM PRIOR TO PLACEMENT OF CONCRETE BLOCKING.

STANDARD
SPRINKLER
RISER

