

VILLAGE OF MUKWONAGO  
STANDARD SPECIFICATIONS  
AND DETAIL DRAWINGS  
(Mukwonago Standards)

The Village shall be responsible for hiring an engineering inspector for all projects within the Village. An inspector shall be onsite to verify all activities. On developer projects the full cost of inspection services, whether with Village forces or contracted out, shall be 100% reimbursed by the developer.

A construction schedule shall be approved by the Village prior to any work commencing. Any changes to the approved schedule shall be made in writing and approved by the Engineer, prior to any inspection services commencing, otherwise any costs incurred by the Village or it's representative, will still be borne by the developer.

These Standard Specifications shall be adopted by the Village Board. The Public Works Director or Utilities Director reserve the right to make necessary changes to these documents after they have been formally adopted.

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## SECTION 32 90 00

### PLANTING

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Topsoil.
- B. Permanent seeding. Includes nurse crops.
- C. Sodding.
- D. Fertilizing.
- E. Maintenance.
- F. Mulching.
- G. Restoring utility company trenches.

##### 1.02 REFERENCES

- A. ASNS: American Standard for Nursery Stock, ANSI; Z60.1 by the American Association of Nurserymen.
- B. Technical Standard: Wisconsin Department of Natural Resources (DNR) Storm Water Construction Technical Standards:  
[http://dnr.wi.gov/topic/stormwater/standards/const\\_standards.html](http://dnr.wi.gov/topic/stormwater/standards/const_standards.html).
- C. DNR Specification: Wisconsin Department of Natural Resources Specifications S100-Compost: [http://dnr.wi.gov/topic/stormwater/documents/specifications\\_S100Compost.pdf](http://dnr.wi.gov/topic/stormwater/documents/specifications_S100Compost.pdf).

##### 1.03 DEFINITIONS

- A. Weeds: Bent grass, bermuda grass, bindweed, bird's-foot trefoil, blackberry, brome grass, canada thistle, chickweed, crabgrass, cress, crown vetch, dandelion, foxtail, garlic mustard, horsetail, jimsonweed, johnson grass, lambs quarter, leafy spurge, morning glory, mustard, narrow-leaved cattail, nimble will, nutgrass, nut sedge, perennial sorrel, poison ivy, poison oak, purple loosestrife, quack grass, ragwort, reed canary grass, rush grass, spotted knapweed, sweet clover, tansy, teasel, wild parsnip, or any others listed in Section 23.235 or 66.0407 of Wis. Stats.
- B. Plants: Living trees, shrubs, and herbaceous plants specified in this Section.
- C. Project completed and ready for final payment: General Conditions 15.06.A.1.
- D. Defective: See General Conditions 1.02. Includes plants that are dead, show disease, weakness, or probability of death.
- E. Full growing season: Period from April 15 to November 15.

##### 1.04 SUBMITTALS

- A. Action:
1. Submit the following to the Engineering Department prior to beginning work:
    - a. Seed data including source, species, mix composition, documentation of PLS (pure live seed) testing, percentage by weight, and percentages of purity, germination and weed.
    - b. Starter mix backfill material and fertilizers. Show certified analysis and component product data.
    - c. Product data for PAL-listed soil stabilizer product.
    - d. Anti-desiccant product data.
    - e. Herbicide product data.

- B. Informational:
1. Submit the following to the Engineering Department:
    - a. Name and address of nursery supplying plantings or plugs.
    - b. Description of at least 5 successfully completed projects by proposed installer of similar size and scope as Work in this Project.
    - c. Statement of qualifications for proposed installer's on-site supervisor including similar project summaries with contact names and project descriptions.
    - d. Seed bag certification tags stating seed species, mix composition, documentation of PLS (pure live seed) testing, percentage by weight, and percentages of purity, germination and weed seed for each seed species.
    - e. Plantings and native plant plugs tags or shipping documents identifying source, species, size, and quantities of stock.
  2. Submit the following to the Engineering Department:
    - a. Maintenance instructions listing procedures and timing to be followed by Contractor and Owner for:
      - 1) Native seed and plug Work, submit 3-year plan.
      - 2) Trees, include trunk wrap and stake removal items.

#### 1.05 QUALITY ASSURANCE

- A. Native seed:
1. Mix: True to species. Cultivars and hybrids will not be permitted.
  2. Genotype grown or collected from within a 100-mile radius of Site. If stock is not available from within a 100-mile radius, obtain from source(s) within same EPA Level III Ecoregion as Site.
  3. Installer:
    - a. Specialized in installing native seed work with minimum 5 years experience.
    - b. On-site supervisor: Minimum 5 years experience with native seed work projects.
- B. Commercial herbicide applicator certified and licensed by State of Wisconsin for pesticide application.

#### 1.07 DELIVERY STORAGE AND HANDLING

- A. Ship, store, and handle seed to ensure protection from moisture, heat, rodents, and other conditions that jeopardize viability and cause germination before installation. Discard damaged seeds.
- B. Deliver and store plant plugs to protect from drying winds and direct sunlight. Store plugs in shaded locations and maintain moist packing soil until planting.

- C. Dig and handle plant stock to prevent injuries to trunk, branches, and roots. Prevent tops from drying during transport. Handle plants by earth balls or containers.

#### 1.08 SCHEDULING

- A. Perform permanent turf grass seeding between March 15 and October 1. Outside these dates temporarily stabilize Site following 01 57 13. Dormant seed between November 15 and December 15.
- B. Perform no-mow lawn seeding between March 30 and June 1, or between August 21 and September 21. Outside these dates temporarily stabilize Site following 01 57 13. Dormant seed between November 15 and December 15.
- C. Perform native plant seeding in spring before June 15 or after September 15 and before ground is snow-covered. Between June 15 and September 15 temporarily stabilize Site following 01 57 13.
- D. Plant native plant plugs between March 30 and August 31.
- E. Apply herbicide between April 1 and October 1.

#### 1.09 WARRANTIES

- A. Correction Period: One year that begins on date Project is completed and ready for final payment. Period shall be extended for defective Work that is corrected, or removed and replaced. Follow General Conditions 15.08.
- B. Defects and damage due to animal depredation and weather extremes are excluded from warranty.

#### 1.10 MAINTENANCE

- A. Perform all maintenance for landscaping until Project is completed and ready for final payment. For native plant seeding and plug work, perform initial part of approved 3-year Maintenance Instructions.
- B. After Project is completed and ready for final payment, Owner will perform maintenance procedures presented in approved Maintenance Instructions submitted by Contractor.

#### 1.11 METHODS

- A. Primary Method: Topsoil, seed, fertilizer, and mulch shall be used on all projects within the Village unless otherwise approved by the Public Works and Utilities Departments.
- B. Hydroseed and Mulch: The use of Hydroseed or Mulch is at the Contractor's discretion. Contractor must adhere to specifications for each detailed hereafter. If Hydroseed is used, Contractor shall clean sidewalks and roadways of any excess material immediately after application.
- C. Sodding: Sod is project specific and must be approved by the Public Works and Utilities Department prior to use.
- D. Erosion Mat: Erosion mat is project specific and must be approved by the Public Works, Utilities Department, or Engineer prior to use. Contractor shall follow WDNR Technical Standard 1052.

## PART 2 - PRODUCTS

### 2.01 WATER

- A. Free from impurities harmful to plants.

### 2.02 TOPSOIL

- A. Site-salvaged humus-bearing soil screened before final placement.
- B. Imported: Humus-bearing loam-type soil with a pH level between 6.0 and 7.0, screened before final placement.
- C. Screened: Mechanically screened free of roots, sticks, branches and stones greater than ½ - inch diameter.

### 2.03 SEEDING MATERIALS

- A. Follow State Specification 630.
- B. Permanent turf grass seed: Deluxe 50 seed mix by Reinders, Inc., Waukesha, WI, Phone: 262-524-0200, or equivalent as approved by Engineer.
- C. No-mow lawn seed: "No Mow" lawn mix from Prairie Nursery, P.O. Box 306, Westfield, WI 53964, Phone: 1-800-476-9453, or equivalent as approved by Engineer.
- D. Temporary cover crop seed: Follow WDNR Technical Standard 1059.
- E. Native plant seed:
  - 1. ● \_\_\_\_\_ ● Seed Mix from Prairie Nursery, P.O. Box 306, Westfield, WI 53964, Phone: 1-800-476-9453.
  - 2. ● \_\_\_\_\_ ● Seed Mix from JFNew, 1402 Pankratz St., Suite 302, Madison, WI 53704, Phone: 608-240-1453.
  - 3. ● \_\_\_\_\_ ● Seed Mix from Agrecol, 2918 Agriculture Drive, Madison, WI 53718, Phone: 608-226-2544.
  - 4. Or equivalent as approved by Engineer.
- F. Nurse crop seed: Annual oats or annual ryegrass.
- G. Turf grass seed fertilizer:
  - 1. Granular or liquid marked with content analysis.
  - 2. 1-2-1 nitrogen-phosphorous-potassium ratio.
  - 3. At least 50 percent of nitrogen content in organic, slow-release form.
- H. No-mow lawn seed and native plant seed fertilizer: None.
- I. Soil stabilizer: Land application. Follow Technical Standard 1050. Use PAL-listed product(s).
- J. Hydromulch: Hydraulically applied wood fiber or wood fiber blend mulch.
- K. Erosion control mats. Follow WDNR Technical Standard 1052.

### 2.04 SODDING MATERIALS – ONLY ALLOWED IF APPROVED BY PUBLIC WORKS AND UTILITIES DEPARTMENT

- A. Sod:
  1. Dense, well-rooted permanent and desirable grasses, weed free with lush appearance cut in uniform commercial strips. Thickness should be full and uniform, approximately 3/4-inch or more.
  2. If sod is in dry condition before cutting, ensure that sufficient water is applied to sod 12 hours before cutting to provide a sod strip well moistened throughout cutting depth.
- B. Sod fertilizer:
  1. Granular or liquid, marked with content analysis.
  2. 3-1-2 nitrogen-phosphorous-potassium ratio.
  3. At least 50 percent of nitrogen content in organic, slow-release form.

## 2.05 NATIVE PLANT PLUG MATERIALS

- A. Plant plugs: See Drawings for planting schedule and locations.
  1. Size: Minimum 2-1/4 inches in diameter and 4-3/4 inches deep.
  2. Root systems shall be well developed throughout the soil volume, but not overly root bound.
  3. Plant tops should be adequately developed, viable, healthy, and sufficiently hardened for outdoor planting.
- B. Starter mix backfill material: Compost, peat moss and topsoil at a ratio of two parts topsoil to one part compost/peat moss blend by volume.
  1. Compost: Follow DNR Specification S100.
  2. Peat moss: Brown to black color with at least 75-percent partially decomposed stems and leaves.
- C. Fertilizer: None.
- D. Mulch: Shredded hardwood bark from disease-free trees.
- E. Staples: 6-inch U-shaped wire erosion control mat staples.

## PART 3 - EXECUTION

### 3.01 TOPSOIL

- A. Preparation:
  1. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones in excess of 1/2 inch in size.
  2. Scarify subgrade to 6 inches depth by ripping, tilling, disking, or other method where topsoil is scheduled and where equipment used for hauling and spreading topsoil has compacted subsoil.
  3. Minimize compaction during grading operations by utilizing equipment having low unit pressure ground contact and by limiting repeat passes over the same areas in areas to receive topsoil.
- B. Placement depths.
  1. Turf grass seed and sod subgrade: 4 inches.
  2. No-mow lawn seed: 4 inches.
  3. Native seed and native plant plugs: 6 inches.
- C. Installation:

1. Use topsoil in relatively dry state. Place during dry weather.
  2. Fine grade topsoil eliminating rough or low areas. Break down clods and lumps with appropriate equipment that creates uniformly textured soil. Maintain levels, profiles, and contours of subgrade.
  3. Remove stone, roots, and branches exceeding 1/2-inch sieve, and foreign material, and clods that cannot be broken down while spreading.
  4. Manually spread topsoil uniformly around trees, plants and building to prevent damage.
  5. Lightly compact placed topsoil by hand rolling, so as to negate any detrimental differential settling.
  6. Remove surplus subsoil and topsoil from Site. Leave stockpile areas ready to receive landscaping.
- D. For no-mow and native seeding, and native plug planting:
1. Apply soil stabilizer over newly spread topsoil.
  2. Allow weed seeds to germinate and grow to one-foot height after topsoil placement.
  3. Mow weeds to 4 inches high or less 10 days before applying herbicide.
  4. Coat all green growth on germinated weeds with herbicide to kill.
  5. Repeat herbicide application after 14 days if vegetation persists, and a minimum of 7 days before seeding or planting.
- E. Finish grade tolerance: Plus-or-minus 1/2 inch.

### 3.02 TURF GRASS SEEDING

- A. Preparation:
1. Before seeding, disk, harrow, drag, and rake to form a level and loose seed bed. Lightly hand roll topsoil before final raking to eliminate soft spots and mounds.
  2. Notify Engineer to allow inspection after fine grading and before seeding.
- B. Permanent installation:
1. Hydroseed over prepared bed using a sprayed water. Keep contents stirred to allow for uniform distribution. Seeds remaining in water for longer than one hour will be rejected. Add hydromulch and a tackifier to hydroseed tank and apply with seed and fertilizer following manufacturer's instructions to produce mulch coverage rate of uniform maximum 1/4-inch depth.
  2. Sowing rate:
    - a. Turf grass: 4.5 pounds per 1000 square feet. Double rate for dormant seeding.
    - b. Temporary cover crop: Follow WDNR Technical Standard 1059.
  3. Uniformly apply fertilizer and lightly disc or harrow into soil in conjunction with final topsoil preparation, before seeding.
  4. Fertilizer rate: 7 pounds per 1000 square feet.
  5. Place mulch within 2 days after completing seeding. Uniformly spread weed-free straw or hay mulch over designated area to loose depth of 1/2 to 1-1/2 inches. Immediately after spreading, anchor mulch with mulch crimper, spacing 20-inch diameter discs at 8-inch centers. Impress mulch into soil 1/2 to 2-1/2 inches deep in one pass of crimper. Do not use on slopes steeper than 3H:1V.
  6. Protect seeded areas to prevent damage to completed installation.
  7. Place erosion control mats on slopes greater than 3H:1V and other areas shown on Drawings. Follow WDNR Technical Standard 1052.
- C. Maintenance:
1. Water seeded areas as follows:
    - a. First day (after seeding and fertilizing): 1-1/2 inches water.

- b. Days 2-14 (or until complete germination, whichever comes last): 1/2 inches water every other day.
  - c. As needed after complete germination to maintain a uniform stand of healthy grass.
  - d. Natural rain events may substitute for watering, but perform additional watering on rain-event days to achieve stipulated water amounts.
- 2. Lawn areas shall receive at least two 2-inch mowings before acceptance. Do not allow grass height to exceed 4 inches.
  - 3. Reseed areas that show inadequate catch and bare spots exceeding 2 square feet. Bare spots shall not exceed 3 percent of total seeded areas.
  - 4. Correct damage from erosion, gullies, washouts, traffic, or other causes by filling with topsoil, tamping, refertilizing, and reseeding.
  - 5. Protect grass areas during maintenance period.

### 3.03 NATIVE PLANT SEEDING AND NO-MOW LAWN SEEDING

#### A. Preparation:

- 1. Do not seed until topsoil has been chemically treated to eliminate weeds. Follow Article 3.01.
- 2. Before seeding, till under any existing temporary cover crop to a minimum depth of 6 inches.
- 3. Disk, harrow, drag, and rake to form a level and loose seed bed. Lightly roll before final raking of topsoil to eliminate soft spots and mounds.
- 4. Notify Engineer to allow inspection after fine grading and before seeding.

#### B. Permanent installation:

- 1. Hydroseed over prepared bed using a sprayed water. Keep contents stirred to allow for uniform distribution. Seeds remaining in water for longer than one hour will be rejected.
- 2. Seed sowing rates:
  - a. Native plant seed: Follow manufacturer's recommendations.
  - b. No-mow lawn seed: Follow manufacturer's recommendations. Double rate for dormant seeding.
  - c. Nurse crop:
    - 1) Annual oats: 1.5 pounds per 1000 square feet if seeded before June 15. 3 pounds per 1000 square feet if seeded after September 15.
    - 2) Annual ryegrass: 0.2 pounds per 1000 square feet if seeded before June 15. 0.6 pounds per 1000 square feet if seeded after September 15.
  - d. Temporary cover crop: Follow WDNR Technical Standard 1059.
  - e. Calibrate equipment used to deliver seed to specified seeding rates.
- 3. Fertilizer: None.
- 4. Place mulch within 2 days after seeding. Maximum mulch depth shall be 1/4 inch. Uniformly spread weed-free straw or hay mulch the designated area to a loose depth of 1/2 to 1-1/2 inches. Immediately after spreading, anchor mulch with mulch crimper, spacing 20-inch diameter discs at 8-inch centers. Impress mulch into soil 1-1/2 to 2-1/2 inches deep in one pass of crimper. Do not to use on slopes steeper than 3H:1V.
- 5. Protect seeded areas to prevent damage to completed installation.
- 6. Place erosion control mats on slopes greater than 3H:1V and where shown on Drawings. Follow WDNR Technical Standard 1052.

#### C. Maintenance:

1. For no-mow lawn seed, and native plant seed placed before June 15, water as follows; natural rain events may substitute for watering, but perform additional watering on rain event days to achieve stipulated water amounts:
  - a. First day (after seeding and mulching): 1-1/2 inches water.
  - b. Days 2 - 45: 1/2-inch water every other day.
  - c. As needed after germination to maintain uniform stand of healthy vegetation.
2. Do not water native plant seed placed after September 15.
3. Achieve 90-percent vegetation with native species or nurse crop species, as verified by Engineer. At no time during maintenance period shall more than 10 percent of seeded area be dominated by weed species.
4. Reseed areas that show inadequate germination and bare spots exceeding 25 square feet. Bare spots shall not exceed 3 percent of total seeded areas.
5. Correct damage resulting from erosion, gullies, washouts, traffic, or other causes by filling with topsoil, tamping, refertilizing, and reseeding.
6. Chemically treat areas dominated by weed species at least two times before reseeding. Follow Article 3.01.
7. Protect seeded areas during maintenance period.

### 3.04 SODDING

#### A. Preparation:

1. Ensure area is free from stones, roots, and undesirable materials. Loosen soil to at least one inch deep.
2. Apply fertilizer uniformly over soil before sodding then work fertilizer into soil while preparing.

#### B. Installation:

1. Moisten earth bed to loosened depth if not already sufficiently moist. Place sod within 24 hours of being cut in strips of commercial size where possible (no pieces smaller than 18 by 24 inches). Stagger joints and place tightly against previously laid strip. Roll sod or lightly tamp with wooden or metal tampers.
2. Stake every 18 to 36 inches along length of strips on slopes steeper than 4H:1V and in drainage components. Stakes should hold sod firmly in place. Lay sod perpendicular to direction of slope so end joints alternate.
3. Clear excess soil from sod surface.
4. Repair and re-sod damage resulting from erosion, gullies, washouts or other causes.
5. Protect sodded areas during maintenance period. Maintain sodded areas by watering for at least 30 days to prevent drying and shrinking. Re-sod and maintain areas that dry out or fail to establish.

### 3.05 NATIVE PLANT PLUG INSTALLATION

#### A. Preparation:

1. Before planting, till under any existing temporary cover crop to at least 6 inches deep.
2. Disk, harrow, drag, and rake to form a level and loose seed bed. Lightly roll topsoil before final raking to eliminate soft spots and mounds.
3. Notify Engineer to allow inspection after fine grading and before planting.

#### B. Installation:

1. Install plugs in auger-drilled holes that are within plus 0.75 and minus 0.25 inches of plug diameter and depth.
2. Space plant plugs one-foot apart.

3. In wetland or shoreline areas with potential for high wave action, secure plugs in place with 8-inch U-shaped wire erosion control blanket staples.

C. Maintenance:

1. Care for plants after planting. This includes watering, weeding, and other Work necessary to keep plants neat and healthy.
2. Perform watering at 10 to 14-day intervals between May 15 and October 15. Intervals may lengthen or shorten depending upon weather conditions.
3. At the end of the first full growing season after planting, at least 75 percent of individual plugs installed shall be present as live individuals and 75 percent of species installed shall be present and alive.
4. Survival percentages shall be established by sampling of one square meter quadrants located at regular intervals along transects. The quantity of quadrants shall be as needed to represent 0.2 percent of the total planting area in each planting zone, and there shall be at least one randomly located transect in each planting zone.

END OF SECTION

SECTION 33 05 00

COMMON WORK RESULTS FOR UTILITIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Bedding, cover and backfill.
- B. Location aids.
- C. Insulation.
- D. Polyethylene film wrap.
- E. Connections between dissimilar pipes.
- F. Excavation in pavement.
- G. Excess excavated material.
- H. Trench surface restoration.

1.02 RELATED SECTIONS

- A. 32 90 00 - Planting.
- B. 33 11 00 - Water Utility Distribution Piping.
- C. 33 30 00 - Sanitary Sewerage.
- D. 33 40 00 - Storm Drainage.
- E. 34 71 00 - Roadway Construction.

1.03 SUBMITTALS

- A. Action:
  - 1. Submit to Public Works and Utilities Department:
    - a. Product data.
    - b. Mechanical trench compaction reports.
- B. Informational:
  - 1. Submit documentation showing permits have been obtained from Owner and from Regulatory Agencies for excess material disposal sites to Public Works and Utilities Department prior to beginning any work.

PART 2 - PRODUCTS

2.01 UTILITY PIPE AND APPURTENANCE MATERIALS

- A. Water Utility Distribution Piping: Follow 33 11 00.

B. Sanitary Sewerage: Follow 33 30 00.

C. Storm Drainage: Follow 33 40 00.

## 2.02 BEDDING AND COVER MATERIALS

A. Crushed stone chips: Follow SWS 8.43.2.

B. Sand: Follow SWS 8.43.2 Table 35.

C. Around and over Underground Facilities: Granular backfill.

D. Polyethylene pipe embedment: 3/8 inch crushed stone chips. Follow SWS 8.43.2.

E. Cover: Same material as bedding.

## 2.03 BACKFILL

A. Granular: Granular Backfill shall be used on new installation and mainline reconstruction projects. Follow SWS 8.43.4.

B. Spoil: Spoil Backfill shall meet the gradation of granular backfill per SWS 8.43.5. Approval required from Public Works and Utilities Department before Spoil Backfill may be used. Follow SWS 8.43.5.

C. Aggregate slurry: To be used for existing spot repairs. Follow SWS 8.43.8.

## 2.04 LOCATION AIDS

A. Warning tape:

1. "Terra Tape Standard" by Reef Industries, Inc. or "Shieldtec" standard non-detectable tape by Empire Level Manufacturing Corporation.
2. Tape shall read:
  - a. Water: "CAUTION WATER LINE BURIED BELOW".
  - b. Sanitary: "CAUTION SEWER LINE BURIED BELOW".
  - c. Storm: "CAUTION SEWER LINE BURIED BELOW".
3. Color: Follow State Statutes 182.0175 and American National Standards Institute (ANSI) Uniform Color Code:
  - a. Water: Blue.
  - b. Sanitary: Green.
  - c. Storm: Brown.
4. Width: 3 inches.

B. Tracer wire:

1. Follow SWS 2.11.0.
2. For open-cut: Direct-burial-rated insulated AWG #10 copper conductor.
3. For trenchless installation:
  - a. Aircraft cable, nylon-coated stainless-steel, 3/8-inch diameter.
4. Splices: Copperhead Dry Conn 3-way direct bury lug or approved equal.
5. Color:
  - a. Water: Blue.
  - b. Sanitary: Green.
  - c. Storm: Brown

- C. Location boxes for tracer wire access.
  - 1. Buried:
    - a. SnakePit Test Station, by Copperhead Industries, or approved equal.
- D. Grounding anode rod to have a minimum of 1.5 pounds of magnesium and 12 gauge wire lead.
- E. Marker flag: Follow 33 11 00.
  - 1. HYDRAFINDER or approved equal.
  - 2. 5 feet long.
  - 3. Fiberglass, red and white, fully wrapped/taped.
  - 4. Spring load action.

## 2.05 SURFACE RESTORATION

- A. Pavement: Follow 34 71 00.
  - 1. Asphalt pavement: Follow WisDOT Standard Specification 460.
  - 2. Concrete pavement: Follow WisDOT Standard Specification 415.
- B. Lawn: Follow SWS 2.7.4 Type C. Follow 32 90 00.
- C. Curb and gutter: Follow WisDOT Standard Specification 601. Follow 34 71 00.
- D. Concrete sidewalk: Follow WisDOT Standard Specification 602. Follow 34 71 00.
- E. Temporary seeding: Follow WDNR Technical Standard 1059.

## 2.06 INSULATION

- A. Follow SWS 8.50.0.

## 2.07 POLYETHYLENE FILM WRAP

- A. Follow SWS 8.21.0.
- B. Hydrants, Valves, and Fitting shall be wrapped in a single layer 8-mil thickness, and secured with tape.

## PART 3 - EXECUTION

### 3.01 CONNECTING DISSIMILAR PIPE MATERIALS

- A. Follow pipe manufacturers' recommendations and design details.

### 3.02 EXCAVATION IN PAVEMENT

- A. Pavement sawing: Follow State Specifications 690.3 cut depth: Full pavement thickness.  
.
- B. Sealed surface pavement: Cut evenly along excavation edges before removal to avoid excess removal or ragged, uneven edges.
- C. Utility trench cut locations: Follow SWS File No. 1 Drawing.

- D. Bridging: Furnish and install trench bridging over open trenches crossing roadways when requested by Engineer. Use steel plates, composite timber construction, or prefabricated structural steel members. Do not fabricate structural steel bridging on job Site. Design to support HS-20 wheel loading. Secure installed bridging against shifting. Do not leave bridging in roadway during winter months without Engineer's approval.

### 3.03 UTILITY PIPE AND APPURTENANCE INSTALLATION

- A. Water Utility Distribution Piping: Follow 33 11 00.
- B. Sanitary Sewerage: Follow 33 30 00.
- C. Storm Drainage: Follow 33 40 00.

### 3.04 POLYETHYLENE FILM WRAP

- A. Follow SWS 4.4.4.
- B. All ductile iron or cast iron.
  - 1. Mains.
  - 2. Laterals.
  - 3. Fittings.

### 3.05 LOCATION AIDS

- A. Tracer wire:
  - 1. SWS 2.11.0.
  - 2. Tape maximum of 10-foot spacing at crown of pipe.
  - 3. Test detector wire continuity prior to acceptance of pipe installation.
- B. Install tracer wire at:
  - 1. Water mains.
    - a. Every hydrant. Extend detector wire through a test station box that is to be located adjacent to the hydrant.
  - 2. Sanitary and Storm Sewers, laterals.
    - a. Every manhole.
    - b. Sanitary wires should be brought to the surface in a test station box adjacent to the manhole. Do not place wires below the frame.
    - c. Every sanitary and storm lateral. Extend detector wire to end of lateral at right of way and bring to surface in a test station box.
- C. Grounding anode rod:
  - 1. Install at every hydrant using wire connector extended from main.
  - 2. Install at every curb stop box using wire connector extended from main.
- D. Demonstrate continuity of tracer wires to Engineer. Provide a temporary above-ground wire between adjacent location boxes. Connect ohm meter in a series loop with tracer wire and above-ground wire. Circuit resistance shall not exceed 5 ohms.
- E. Test locating. Contact Owner to locate all utilities.
  - 1. After completion of continuity test.
  - 2. Before acceptance for use.

3.06 EXCAVATED MATERIAL

- A. Surplus excavated shall be disposed at Contractor's cost. Follow submittal requirements for each disposal site utilized. After delivery to the designated location, such material shall be graded level by Contractor.

3.07 INSULATION

- A. Follow SWS 4.17.2 and SWS Drawing File No. 48 when requested by Engineer or when depth of cover is less than 7 feet over sanitary sewer, water main and force main or where storm sewers cross over water main or laterals.

3.08 BEDDING AND COVER

- A. Follow SWS 3.2.6(b) Class B, except use 6 inches of bedding material.

3.09 TRENCH BACKFILLING AND CONSOLIDATION

- A. Material:
  - 1. From 5 feet behind existing or future back-of-curb or edge-of-pavement to and including paved areas and driveways:
    - a. Granular. Follow 34 71 00.
    - b. Aggregate slurry. Use in private utility trenches or where shown or as directed by Engineering Department.
  - 2. Around and over Underground Facilities: Granular backfill.
- B. Consolidation:
  - 1. Mechanically compact trench backfill. Follow SWS 2.6.14(b) except Contractor shall furnish and pay for compaction testing services deemed necessary by the Engineering Department.

3.10 SURFACE RESTORATION

- A. Pavement: Follow 34 71 00.
- B. Lawn: Follow 32 90 00.
- C. Curb and gutter: Follow 34 71 00
- D. Concrete sidewalk: Follow 34 71 00
- E. Temporary seeding: Follow WDNR Technical Standard 1059..

3.11 CLEARING AND GRUBBING

- A. Follow SWS 2.1.2. Cleanly prune damaged trees.

3.12 CLEANUP

- A. Clean dirt and construction material from haul roads:
  - 1. At end of each working day.
  - 2. As needed during the day to avoid creating hazards or complaints.
  - 3. As requested by Owner.

END OF SECTION

SECTION 33 11 00

WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Water mains, control and distribution appurtenances.

1.02 RELATED SECTIONS

- A. 01 33 00 - Submittal Procedures.
- B. 33 05 00 - Common Work Results for Utilities.

1.03 REFERENCES

- A. Wisconsin Administrative Code Chapters:
  - 1. NR 105 - Surface Water Quality Criteria and Secondary Values for Toxic Substances.
  - 2. NR 106 - Procedures for Calculating Water Quality Based Effluent Limitations for Point Source Discharges to Surface Waters.
- B. ASTM International.
  - 1. ASTM C478 Standard Specification for Precast Reinforced Concrete Manhole Sections.
  - 2. ASTM C858 Standard Specification for Underground Precast Concrete Utility Structures.
  - 3. ASTM C913 Standard Specification for Precast Concrete Water and Wastewater Structures.
  - 4. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
- C. American Water Works Association (AWWA):
  - 1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
  - 2. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
  - 3. AWWA C150 - Thickness Design of Ductile-Iron Pipe.
  - 4. AWWA C151 - Ductile-Iron Pipe Centrifugally Cast.
  - 5. AWWA C502 - Dry Barrel Fire Hydrants.
  - 6. AWWA C504 - Rubber Seated Butterfly Valves.
  - 7. AWWA C509 - Resilient Seated Gate Valves for Water Supply Service.
  - 8. AWWA C550 - Protective Interior Coatings for Valves and Hydrants.
  - 9. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 4 In. Through 12 In. for Water Distribution.
  - 10. AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 14 In. Through 48 In.

1.04 SUBMITTALS

- A. Action:
  - 1. Submit to Water Utility and Engineering Department:
    - a. Product data.
    - b. Water main safe sample test reports.

## PART 2 - PRODUCTS

### 2.01 LEAD REDUCTION

- A. Products and parts thereof with wetted surfaces in contact with drinking water shall meet or exceed the requirements of Public Law 111-380-Reduction of Lead in Drinking Water Act, which is an amendment to the Safe Drinking Water Act.

### 2.02 WATER MAIN PIPE AND APPURTENANCES

- A. Pipe, 3-inch and larger. Provide one type from following:
  - 1. Ductile iron:
    - a. For 3-inch diameter: Follow AWWA C151, thickness Class 53 with cement lining.
    - b. For 4-inch diameter and larger: Follow AWWA C151 Class 52 with cement lining.
    - c. Tyton gasketed joint pipe.
    - d. Cable bond connectors.
    - e. Follow SWS 8.18.0.
  - 2. PVC:
    - a. For 4 through 60-inch diameter: Follow AWWA C900, CIOD Class 235 pressure pipe with DR 18 or less.
    - b. Integral elastomeric bell and spigot joints.
    - c. Follow SWS 8.20.0.
- B. Butterfly valves:
  - 1. Follow AWWA C-504 and SWS 8.28.0. All valves 16-inch or larger shall be butterfly valves manufactured by M&H (450), Mueller Line Seal, Clow (2810-F5365). Valves shall have non-rising stems, epoxy coating, stainless steel bolts, mechanical joint ends, turn counterclockwise to open, and a 2-inch square operating nut.
- C. Resilient seated gate valves:
  - 1. Follow AWWA C509 or C515 including:
    - a. Nonrising stem.
    - b. Mechanical joint.
    - c. Actuator: wrench nut.
    - d. Opens counterclockwise.
    - e. Stem seals: O-ring.
    - f. Epoxy interior and exterior coating following ANSI/AWWA C550.
    - g. Stainless steel bolts.
    - h. 2-inch square operating nut.
    - i. Follow SWS 8.27.0.
  - 3. American Flow Control Series 2500 (formerly Waterous).
  - 4. Kennedy 8571 or 7571
  - 5. Clow C-509 Series, Clow C2640.
  - 6. Mueller 2360 or 2361.
- D. Valve enclosures:
  - 1. Boxes:
    - a. Cast iron assembly, 668 style, cover marked "WATER".
    - b. American Made Manufacturers: Tyler 6850, East Jordan 8550
    - c. Follow SWS 8.29.0.
    - d. Valve box adapters: Adaptor, II
    - e. If operating nut is greater than 7-feet in depth, operating nut shall be brought up to within 4-feet of finished grade, plus or minus 6-inches.

- E. Hydrant assembly.
1. Follow AWWA C502 and SWS 8.26.0:
    - a. Bury depth: 6'-6" minimum.
    - b. Opens counterclockwise.
    - c. Break-flange.
    - d. 5-1/2 inch minimum main valve opening, two National Standard 2-1/2 inch hose nozzle and 5 - inch Storz pumper nozzle.
    - e. Paint:
      - i. Public: red.
      - ii. Private: yellow.
    - f. Mechanical joint connection.
    - g. Barrel extensions: Same manufacturer as hydrants.
  2. Mueller Centurion A-423.
  3. Hydrant lead:
    - a. PVC: Follow AWWA C150 SDR 18 or less.
    - b. 6-inch, unless noted otherwise.
    - c. Shall use two Mega-lugs. One on the hydrant and one on the hydrant valve.
    - d. Provide Clow F1217 or Tyler C-153 anchoring tee which shall be secured to the hydrant.
    - e. At least one continuous length of pipe shall be used between hydrant and valve. If length between valve and hydrant is greater than 20-feet, all joints shall be restrained in manner approved by the Utilities Department.
  4. Marker Flag:
    - a. "HYDRAFINDER" or approved equal.
    - b. 5 feet long.
    - c. Fiberglass, red and white.
    - d. Springload action.
- F. Fittings: Follow SWS 8.22.0.:
1. Joints:
    - a. Buried: Mechanical.
    - b. In structures: Flanged.
  2. Pressure rating:
    - a. Full body: 250 PSI.
    - b. Compact: 350 PSI.
  3. Material:
    - a. Ductile iron:
      - 1) Class 52 wall thickness.
      - 2) Bituminous exterior coating following ANSI/AWWA C110(C153)/A21.10.
      - 3) Cement lined and bituminous coated interior following ANSI/AWWA C104/A21.4.
      - 4) Cor-Blue tee bolts.
- G. Service lines, valves and fittings.
1. Lines.
    - a. Size: 1 1/4" for HDPE Service, 1" for Copper Service
    - b. 2 inch and smaller shall follow SWS 8.24.0 and:
      - 1) Type K copper tubing. Use compression fittings.
      - 2) Polyethylene (HDPE) SDR 9 CTS. Stainless steel stiffeners to be used.
    - c. 3 inch and larger: Follow 33 11 00 2.02.A.
  2. Corporation valves for HDPE:
    - a. Must withstand 150 PSI pressure test.

- b. Use compression fittings with stainless steel stiffeners
    - c. Mueller B-25008, Ford FB1000, A.Y. McDonald 74701-22-BQ.
  - 3. Curb valves for HDPE:
    - a. Must withstand 150 PSI pressure test.
    - b. Use compression fittings with stainless steel stiffeners.
    - c. A.Y. McDonald 76104-22-Q, Mueller B25155-Q, Ford B44-XXX-MQ.
  - 4. Curb boxes:
    - a. American Made CISB Buffalo style.
    - b. Tyler 101F.
  - 5. Stainless steel curb stem extension rod with floating guide ring under top box section and stainless hardware to be used, installed within 24-inches of final grade.
- H. PVC main tapping saddle for service lines 2-inch and smaller:
- 1. Double strap.
  - 2. Epoxy-coated ductile iron, stainless steel, or brass.
  - 3. Romac 202NS, Smith-Blair 317, or Ford FCD202.
- I. Tapping sleeves with gate valve 16-inch and under:
- 1. Stainless steel with ductile iron flange.
  - 2. Flange accessories need stainless steel hardware.
- J. Air release assemblies:
- 1. In valve box: Follow SWS 4.12.0
  - 2. In vault: Follow SWS 4.11.0. and 8.39.0, except provide HS20 load-rated flat top slab.
- K. Restrained joints:
- 1. Strapping following SWS 4.9.0 with number and size of retaining rods recommended by pipe restraint manufacturer for the type and size of pipe used.
  - 2. EBAA Iron Megalug, Tyler Series 2000, and Ford Series 1400.
  - 3. In addition to Megalugs, hardwood or solid concrete block buttresses may be used.

## 2.03 INCIDENTAL CONSTRUCTION

- A. Follow 33 05 00 for:
- 1. Bedding.
  - 2. Cover.
  - 3. Backfill.
  - 4. Location aids.
  - 5. Trenchless utilities.
  - 6. Insulation.
  - 7. Polyethylene film.
  - 8. Surface restoration.

## PART 3 - EXECUTION

### 3.01 WATER MAIN INSTALLATION

- A. Follow SWS Part IV.
- B. The minimum depth of cover between finished grade and the top of the water main pipe shall be 6' 6".
- C. For ductile iron, provide electric continuity using strapping or metallic retainer glands.

- D. PVC pipe:
  1. Remove beveled pipe end at connections to mechanical joint or flanged fittings.
  2. Use tapping saddles for services.
- E. Butterfly valve actuators and boxes installed toward curb.
- F. Set valve boxes to ½-inch below finished surface grade. Provide ring cut on top end.
- G. Hydrants:
  1. Secure hydrant valves directly to main lines with the following:
    - a. Mechanical joint anchoring type hydrant tees.
  2. Provide minimum 6-foot cover over lead.
  3. Position centerline of lowest hydrant outlet nozzle 18-23 inches above finish grade.
  4. Hydrants located in non curb and gutter or ditchline roadways shall position centerline of lowest hydrant outlet nozzle 18-23 inches above edge of gravel shoulder elevation and breakaway shall be supported.
  5. Hydrants located in non curb and gutter or ditchline roadways shall be installed on level, paved surface that may require the installation of a retaining wall with minimum 3-foot clearance around hydrant.
  6. Maximum of one barrel extension.
- H. Buttresses: Follow SWS 4.3.13.
- I. Services:
  1. Wet tap service connections at normal operating system pressure.
  2. Direct taps into PVC water main not allowed. Saddles only.
  3. Direct taps in ductile iron allowed.
  4. Lateral locations on Drawings are tentative. Actual locations shall be marked by property owners with wooden stakes. Contact Engineer if stake not found.
  5. For 2 inch and smaller follow SWS Part V and:
    - a. Provide curb valve and box at right-of-way line.
    - b. Provide 2 by 6 inch hardwood marker at curb box location from invert of service to 2 feet above finished grade.
    - c. Provide 10-foot long tailpiece. Follow SWS Drawing File No. 51 drawing.
  6. For 2-1/2 inch and larger follow SWS Part IV and V and:
    - a. Provide tee connection.
    - b. Anchor valve to tee with anchor tee or strapping.
    - c. Provide plug and buttress.
    - d. Provide 2 by 6 inch hardwood marker at end of service from invert of service to 2 feet above finished grade.
- J. Pressure test before services 2-inch and smaller are installed. Follow SWS 4.15.0.
- K. Disinfect pipelines following SWS 4.3.12 and 4.16.0.
- L. After performing pressure test, bacteriological water sampling and laboratory testing shall be done following SWS 4.16.0 by: Contractor with Wisconsin DNR-certified independent laboratory. Two safe water test results shall be taken greater than 24-hours apart and shall be received in hand prior to continuing work. Contractor to provide both the Water Utility and Engineering Department with a copy of the results. Testing shall be observed by Village Representative.
- M. Water wasted from pipeline that may reach bodies of surface water may not contain any substances in concentrations that adversely affect the water following Wisconsin

Administrative Code NR 105 and 106. For chlorine, no total residual chlorine may be measured in water being discharged to a surface water. Advise Utility and Engineer of proposed discharge schedule to arrange DNR-required measurements. Water may be allowed to be flushed to sanitary sewer, with Utility approval. All water shall be metered at Contractor's cost.

- N. Connections to existing mains and services: Make after all services are installed, tests passed, and safe sample report is received by Utility and Engineer.
- O. Restrained joints: Follow manufacturer's recommendations for length of pipe to be restrained in each direction from horizontal bends, vertical bends or offsets, tees, reducers and dead ends. Two forms of restraints shall be used.
- P. Operation of valves and flushing: Only Village personnel shall initiate flushing. All valves shall only be operated by Village personnel.
- Q. Water main shall be a minimum of 8-inch diameter for single family residential development and a minimum of 12-inch diameter for development greater than single family residential. The Village, at it's discretion, may require a main size that is larger than the minimum.

### 3.02 INCIDENTAL CONSTRUCTION

- A. Follow 33 05 00 for:
  - 1. Connecting dissimilar pipe materials.
  - 2. Excavation in pavement.
  - 3. Bedding.
  - 4. Cover.
  - 5. Backfill.
  - 6. Location aids.
  - 7. Insulation.
  - 8. Polyethylene film.
  - 9. Excess excavated material.
  - 10. Surface restoration.

END OF SECTION

SECTION 33 30 00

SANITARY SEWERAGE

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Sanitary sewer mains, force mains and maintenance and collection appurtenances.

1.02 RELATED SECTIONS

- A. 33 05 00 - Common Work Results for Utilities.

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM):
  1. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
  2. ASTM C361 - Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
  3. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
  4. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
  5. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series).
  6. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
  7. ASTM D2513 - Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings.
  8. ASTM D2657 - Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.
  9. ASTM D3034 - Standard Specification for Type PSM Poly(VinylChloride) (PVC) Sewer Pipe and Fittings.
  10. ASTM D3251 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
  11. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
  12. ASTM F679 - Standard Specification for Poly(Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings.
- B. American Association of State Highway and Transportation Officials (AASHTO):
  1. AASHTO M198 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
  2. AASHTO T99 - Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop.
- C. United States Department of the Interior-Bureau of Reclamation. Standard Specifications for Reinforced Concrete Pressure Pipe.
- D. American Water Works Association (AWWA):
  1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
  2. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
  3. AWWA C151 - Ductile-Iron Pipe Centrifugally Cast.

4. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 4 In. Through 12 In. for Water Distribution.
5. AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 14 In. Through 48 In.

#### 1.04 SUBMITTALS

##### A. Action:

1. Submit to Engineering Department:
  - a. Product data.
  - b. Sanitary sewer main video inspection records.
  - c. Submittals designed and sealed by manufacturer's Wisconsin-licensed professional engineer:
    - 1) Manhole Shop Drawings showing details, dimensions, materials, jointing methods, pipe connections and reinforcement consistent with Drawings. Do not start manhole production before Engineer's approval.
    - 2) Shop Drawings showing details of special pipe features indicating alignment and grade, laying dimensions, fabrication, fitting, and special details, with plan view detailing pipe invert elevations, bends, and other critical features. Show station numbers for fittings consistent with Drawings. Do not start pipe and fittings production before Engineer's approval.
    - 3) Summary of criteria used in manhole design including, as minimum, material properties, loadings, load combinations, and dimensions assumed. Include certification from manufacturer that precast manhole design is in full accordance with ASTM C478 and design criteria specified herein.

##### B. Informational:

1. Submit to Engineering Department:
  - a. Certificates by independent testing laboratory contracted by manufacturer, showing concrete pipes meet applicable standards when tested following ASTM C497, ASTM C361 and Bureau of Reclamation Standard Specifications for Reinforced Concrete Pressure Pipe.

#### PART 2 - PRODUCTS

##### 2.01 GRAVITY SANITARY SEWER

##### A. Pipe. If not shown on Drawings, use one type from following:

1. Polyvinyl chloride and fittings solid wall:
  - a. 4 through 15 inch: Type PSM, Follow ASTM D3034, SDR 35.
  - b. 18 through 21 inch: Type PSM, Follow ASTM F679, 12454C.
  - c. Follow SWS 8.3.0 and 8.10.0.

##### B. Pressure-rated pipe. If not shown on Drawings use one type from following:

1. Polyvinyl chloride pipe:
  - a. 4 through 12 inch: Follow AWWA C900 SDR18 or less.
  - b. 14 through 20 inch: Follow AWWA C900 SDR 18 or less.
2. Fittings for PVC and ductile iron pipe shall follow SWS 8.22.0 and:
  - a. Joints:
    - 1) Buried: Mechanical.
    - 2) In structures: Flanged.
  - b. Pressure rating:
    - 1) Full body: 250 PSI.

- 2) Compact: 350 PSI.
  - c. Material:
    - 1) Ductile iron class 52 wall thickness.
    - 2) Bituminous exterior coating following ANSI/AWWA C110/A21.10.
    - 3) Cor-Blue tee bolts.
- C. Bulkhead and Plug: Follow SWS 3.2.25.
- D. Structures:
  - 1. Manholes:
    - a. Follow SWS 3.5.0. and SWS 8.39.0.
    - b. Follow ASTM C478.
    - c. If not shown on Drawings: 48-inch inside diameter (minimum).
  - 2. Steps:
    - a. Follow SWS 3.5.4.(g).
    - b. Do not locate over pipe penetrating manhole wall. Follow SWS Drawing File No. 13.
  - 3. Frame:
    - a. Neenah R-1661.
  - 4. Cover: "T" sealing, concealed pick hole, no vents, sanitary lid. Follow SWS Drawing File No. 14B, approximate weight 108 pounds.
  - 5. Combination external/internal rubber sleeves for frame/chimney seal:
    - a. Cretex External X-85.
    - b. Adaptor, Inc.
  - 6. Pipe to manhole connection: Follow SWS 3.5.7.
  - 7. Frame and chimney sealants: PenngROUT or Mastic. Follow SWS 8.42.0.
  - 8. Flat decks - HS20 loading.
  - 9. Grade adjusters for castings:
    - a. Cretex Pro-Ring with M1 adhesive or approved equal.
    - b. Do not use bricks, stones, wood, nor pieces thereof.
  - 10. External joint wrap:
    - a. Mac Wrap (Mar Mac Construction Products Inc.).
    - b. Ez – Wrap (Press-Seal Corp.).
    - c. Cretex Wrap (Cretex Specialty Products).
- E. Risers:
  - 1. Follow SWS 3.2.26.
  - 2. For flexible riser to flexible main greater than 6 feet in height, or main greater than 16 feet deep, see Drawings.
- F. Laterals:
  - 1. Follow SWS 5.3.10 and SWS 5.3.11 and same material as main.
  - 2. 6 inch.
  - 3. Connection to main: Wyes.
  - 4. Adapt pressure rated pipe to SDR35 with manufactured (molded) fittings.
  - 5. Romac tapping saddle.
- G. Repair Coupling:
  - 1. Strong Back RC Series

## 2.02 SANITARY SEWER FORCE MAIN

- A. Pipe. If not shown on Drawings, use one type from following:
  - 1. PVC, with integral elastomeric bell-and-spigot joints, and one of following:
    - a. Follow AWWA C900 for 6 through 12-inch diameter. Class 150 pressure pipe with DR 18 or less. Follow SWS 8.51.0.

- b. Follow AWWA C905 for 14 through 36-inch diameter. CIOD pressure pipe rated 235 PSI with DR18 or less. Follow SWS 8.51.0.
    - c. Follow ASTM D2241 with Plastics Pipe Institute hydrostatic design stress of 200 PSI and SDR of 26 or less.
  - 2. High density polyethylene (HDPE):
    - a. Follow SWS 8.51.3.
    - b. Material designation: PPI PE3408/3608.
    - c. Material classification: Type III, Class C, Category 5, Grade P36.
    - d. Cell classification: 345464C following ASTM D3350.
    - e. DR9.
    - f. DIPS.
- B. Fittings for ductile iron and PVC pipe: Follow SWS 8.22.0.
  - 1. Joints:
    - a. Buried: Mechanical.
    - b. In structures: Flanged.
  - 2. Pressure rating:
    - a. Full body: 250 PSI.
    - b. Compact: 350 PSI.
  - 3. Material:
    - a. Ductile iron:
      - 1) Class 52 wall thickness.
      - 2) Bituminous exterior coating following ANSI/AWWA C110/A21.10.
      - 3) Buried: Cor-Blue tee bolts. Exposed: Stainless steel.
      - 4) All metallic fittings shall be wrapped.
- C. Restrained joints:
  - 1. Strapping following SWS 4.9.0.
  - 2. EBAA Iron Megalug, Tyler Series 2000, Ford Series 1400.
  - 3. All metallic fittings shall be wrapped.
- D. Fittings for polyethylene pipe:
  - 1. Follow ASTM D3261.
  - 2. Pressure class:
    - a. Molded fittings: Match pipe.
    - b. Fabricated fittings: Increase pressure rating one class.
  - 3. Butt fused or flanged.
  - 4. Exposed: Molded flange adaptor with ductile iron or stainless steel backup ring and stainless steel bolts.
  - 5. Buried: Molded mechanical restrained joint adaptor with stainless steel internal stiffener and ductile iron or stainless steel backup ring with Cor-Ten hardware.
  - 6. All metallic fittings shall be wrapped.
- E. Plug valves:
  - 1. Manufacturers: DeZurik Series 100, Val-Matic Cam-Centric, no equal or substitution permitted.
  - 2. Valve boxes:
    - a. Cast iron, size DD, cover marked "SEWER".
    - b. American Made Manufacturers: Tyler 6860S.
    - c. Follow SWS 8.29.0.
    - d. Valve box adaptors: Adaptor, Inc.
  - 3. Actuator: Rotary gear type for valves 8 inches and larger.
  - 4. Valve stem extenders: To be used on depths greater than 7-Feet.
    - a. Securely attached to valve operator.

- b. Extend to 4 feet (plus-or-minus 6 inches) below finished grade.
  - c. For 6 feet and longer provide solid shaft.
  - d. Stainless steel.
5. All metallic fittings shall be wrapped.

F. Structures:

- 1. Valve manholes:
  - a. Follow SWS 3.5.0 and follow SWS 8.39.0.
  - b. Follow ASTM C478.
  - c. If not shown on Drawings: 48-inch inside diameter (minimum).
- 2. Frame: Follow SWS Drawing File No. 14A. Approximate weight 385 pounds.
  - a. Neenah 1661.
- 3. Cover: "T" sealing, concealed pick hole, no vents. Follow SWS Drawing File No. 14B, approximate weight 108 pounds.
- 4. Combination external/internal rubber sleeves for frame/chimney seal:
  - a. Cretex External X-85.
  - b. Adaptor, Inc.
- 5. Pipe to manhole connection: Follow SWS 3.5.7.
- 6. Frame and chimney sealants: PenngROUT or Mastic. Follow SWS 8.42.0.
- 7. Flat decks - HS20 loading.
- 8. Grade adjusters for castings:
  - a. Cretex Pro-Ring with M1 adhesive, or approved equal.
  - b. Do not use bricks, stones, wood, nor pieces thereof.
- 9. External joint wrap:
  - a. Cretex Wrap.
  - b. EZ-Wrap.
  - c. Mac Wrap.

G. Air release assemblies:

- 1. In valve box: Follow SWS 4.12.0 except include:
  - a. Valve stem extenders.
  - b. Lid: Plain or "SEWER".
  - c. Drain stop: Female iron pipe inlet and copper outlet. Ford 11-444SWM.
  - d. Drain stop: A.Y. McDonald 6105 with A.Y.

2.03 INCIDENTAL CONSTRUCTION

A. Follow 33 05 00 for:

- 1. Bedding.
- 2. Cover.
- 3. Backfill.
- 4. Location aids.
- 5. Trenchless utilities.
- 6. Insulation.
- 7. Polyethylene film.
- 8. Surface restoration.

PART 3 - EXECUTION

3.01 GRAVITY SANITARY SEWER INSTALLATION

- A. Before starting, bulkhead and/or plug the connection to existing sewer. Leave in place until new sewer has been cleaned and accepted.
- B. Follow SWS Part III.

- C. Set manhole frames to ½-Inch below finished grade after placement of curb and gutter and before asphalt placement. Frame shall not be adhered to chimney.
  - D. Chimney:
    - 1. Height: 4 to 14 inches.
    - 2. No steps in chimney.
    - 3. Maximum of 30 inches between top of frame and top step.
  - E. Laterals. Follow SWS Part V and:
    - 1. 1/4 inch per foot minimum slope.
    - 2. Provide test station box with tracer wire brought to surface at end of lateral at right of way.
    - 3. Lateral locations on Drawings are tentative. Actual locations shall be marked by property owners with wooden stakes. Contact Engineer if stake not found.
    - 4. Laterals not allowed to be connected into manholes.
    - 5. Tapping saddles to be used for new lateral connection into existing main.
    - 6. Lateral connections at the main shall be at the 2 or 10 o'clock positions.
  - F. Before testing, repair or replace piping, valves, fittings, structures or other parts of system which have visible defects or leakage even if leakage or pressure loss may be below allowable limits.
  - G. Air test: Follow SWS 3.7.3.
  - H. Go-No-Go Test: Follow SWS 3.2.6(i)4.
  - I. Manhole chimney seals:
    - 1. Prepare chimney, cone, and frame following seal manufacturer's requirements.
    - 2. Install combination external/internal Cretex or Adaptor seals.
  - J. Manhole vacuum test:
    - 1. Follow SWS 3.7.6.
    - 2. Test after backfilling.
  - K. Use external joint wrap on all manhole joints.
  - L. Televising mains and record video. Televising exclusive to The Expeditors, Inc. Use self-propelled crawler camera. Follow 33 01 30.16. Follow SWS 7.1.2. Perform after (before paving):
    - 1. Manhole benches installed.
    - 2. Pipework successfully tested.
  - M. Convey copy of video record to Engineer. Furnish on USB flashdrive.
- 3.02 SANITARY SEWER FORCE MAIN INSTALLATION
- A. Follow SWS Part IV (Delete 4.3.12.).
  - B. Before testing, repair or replace piping, valves, fittings, structures or other parts of system which have visible defects or leakage even if leakage or pressure loss may be below allowable limits.
  - C. Pressure test. Follow SWS 4.15.2 except test at pipe pressure rating or 150 PSI whichever is less.

- D. Set manhole frames to ½-Inch below finish grade after placement of curb and gutter and before asphalt placement.
  - E. Chimney:
    - 1. Height: 4 to 14 inches
    - 2. Include no steps.
  - F. Manhole chimney seals.
    - 1. Prepare chimney, cone, and frame following seal manufacturer's requirements.
    - 2. Install combination external/internal Cretex or Adaptor seal.
  - G. Use external joint wrap on manhole joints more than 10 feet below finish grade.
  - H. Polyethylene:
    - 1. Butt-fuse joints following ASTM D2657 and manufacturer's recommendations.
    - 2. Connect to flanged pipe with molded flange adaptor with ductile iron backup ring.
    - 3. Install following ASTM D2321, SWS, and manufacturer's recommendations.
    - 4. Provide embedment material from 6 inches below pipe to 12 inches above top of pipe and compact to 85 percent Standard Proctor density following AASHTO T99.
  - I. Protect cut ends and bell fittings with factory-supplied, field-applied touchup coating.
  - J. PVC pipe:
    - 1. Remove beveled pipe end at connections to mechanical joint or flanged fittings.
    - 2. Use tapping saddles for services.
- 3.03 INCIDENTAL CONSTRUCTION
- A. Follow 33 05 00 for:
    - 1. Connecting dissimilar pipe materials.
    - 2. Excavation in pavement.
    - 3. Bedding.
    - 4. Cover.
    - 5. Backfill.
    - 6. Location aids.
    - 7. Insulation.
    - 8. Polyethylene film.
    - 9. Excess excavated material.
    - 10. Surface Restoration.

END OF SECTION

SECTION 33 40 00

STORM DRAINAGE

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Storm sewer and storm water facility mains, maintenance and collection appurtenances.
- B. Underdrains.

1.02 RELATED SECTIONS

- A. 33 05 00 - Common Work Results for Utilities.

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM):
  1. ASTM C76 - Standard Specification for Reinforced concrete Culvert Storm Drain, and Sewer Pipe.
  2. ASTM C361 - Standard Specifications for Reinforced Concrete Low-Head Pressure Pipe.
  3. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
  4. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
  5. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
  6. ASTM C506 - Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain and Sewer Pipe.
  7. ASTM C507 - Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.
  8. ASTM C698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil using Standard Effort.
  9. ASTM A760 - Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains.
  10. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
- B. American Association of State Highway and Transportation Officials (AASHTO):
  1. AASHTO M252 - Standard Specification for Corrugated Polyethylene Drainage Pipe.
  2. AASHTO M294 - Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500- mm (12- to 60-in.) Diameter.
  3. AASHTO Section 30 - Standard Specification for Highway Bridges, Division II, Section 30, Thermoplastic Pipe.
  4. AASHTO M36 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated dfor Sewers and Drains.
- C. United States Department of the Interior - Bureau of Reclamation. Standard Specifications for Reinforced Concrete Pressure Pipe.
- D. American Water works Association (AWWA):
  1. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated fittings 4 In. Through 12 In. for Water Distribution.

2. AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated fittings 14 In. Through 48 In.

#### 1.04 SUBMITTALS

##### A. Action:

1. Submit the following to the Village Engineer:
  - a. Product data.
  - b. Storm sewer main video inspection records.
  - c. Submittals designed and sealed by manufacturer's Wisconsin-licensed professional engineer:
    - 1) Manhole and catch basin Shop Drawings showing details, dimensions, materials, jointing methods, pipe connections and reinforcement consistent with Drawings. Do not start manhole production before Engineer's approval.
    - 2) Shop Drawings showing details of special pipe features indicating alignment and grade, laying dimensions, fabrication, fitting, and special details, with plan view detailing pipe invert elevations, bends, and other critical features. Show station numbers for fittings consistent with Drawings. Do not start pipe and fittings production before Engineer's approval.
    - 3) Summary of criteria used in manhole design including, as minimum, material properties, loadings, load combinations, and dimensions assumed. Include certification from manufacturer that precast manhole design is in full accordance with ASTM C478 and design criteria specified herein.

##### B. Informational:

1. Submit the following to the Village Engineer:
  - a. Certificates by independent testing laboratory contracted by manufacturer, showing concrete pipes meet applicable standards when tested following ASTM C497, ASTM C361 and Bureau of Reclamation Standard Specifications for Reinforced Concrete Pressure Pipe.

### PART 2 - PRODUCTS

#### 2.01 STORM SEWER

##### A. Main lines:

1. Concrete pipe.
  - a. Joints: Rubber-gasket following ASTM C443.
  - b. Reinforced concrete pipe (RCP): Follow ASTM C76 and SWS 8.6.0.
  - c. Nonreinforced concrete pipe: Follow SWS 8.5.0.
  - d. Reinforced concrete horizontal elliptical pipe: Follow ASTM C507 and SWS 8.6.0.
  - e. Reinforced concrete arch pipe: Follow ASTM C506 and SWS 8.6.0.
2. Corrugated metal pipe: Follow SWS 8.14.0.
3. Corrugated aluminum pipe: Follow SWS 8.15.0.
4. Polyvinyl chloride (PVC):
  - a. Solid wall.
  - b. Integral elastomeric bell and spigot joints.
  - c. For 6 through 12-inch diameter: Follow AWWA C900, Class 150 pressure pipe with DR18 or less.
  - d. For 14 through 24-inch diameter: Follow AWWA C905, CIOD pressure pipe rated 235 PSI with DR18 or less.
  - e. Follow SWS 8.20.0.

5. High density polyethylene (HDPE):
    - a. Follow AASHTO M252 and M294-96(s).
    - b. Joints:
      - 1) Follow AASHTO requirements for soil tightness.
      - 2) Bell and spigot pipe end.
      - 3) Double bell couplings.
    - c. Smooth interior.
    - d. Double wall.
  6. Anti-Seepage Collars.
- B. Sump lines and sump line cleanouts:
1. Follow SWS 8.10.0.
  2. PVC SDR 35.
- C. Structures:
1. Manholes: 48-Inch minimum diameter. Follow SWS 3.5.0 and SWS 8.39.0.
  2. Follow ASTM C478.
  3. Catch basin frame and cover: Neenah R-3067 with Type L grate.
  4. Catch basin: Follow SWS 3.6.0 for precast.
  5. Manhole frame and cover: Neenah R-1661, non-rocking, vented cover.
  6. Inlet and catch basin mortar: Follow State Specifications 519.2.3.
  7. Grade adjusters for castings:
    - a. Cretex Pro Ring, with approved adhesive.
    - b. Do not use bricks, stones, wood, nor pieces thereof.
- D. Apron endwalls: Follow State Specifications 520 through 525 for apron endwalls and same material as pipe.
- E. Pipe grates: Follow SWS 8.16.0.
1. Grate shall be hinged on top.

## 2.02 UNDERDRAINS

- A. Follow State Specifications 612.

## 2.03 INCIDENTAL CONSTRUCTION

- A. Follow 33 05 00 for:
1. Bedding.
  2. Cover.
  3. Backfill.
  4. Location aids.
  5. Insulation.
  6. Polyethylene film.
  7. Surface restoration.

## PART 3 - EXECUTION

### 3.01 STORM SEWER INSTALLATION

- A. Follow SWS Part III.
- B. Set manhole frames to 1/2-inch to 3/4-inch below finished grade after placement of curb and gutter and before asphalt placement. Set casting flanges onto a full bed of mortar.

- C. Set inlet frames to binder grade after placement of curb and gutter. Casting flanges shall not be adhered to the adjusting ring.
- D. Sump lines:
  - 1. Pitch to inlet or manhole.
  - 2. Bed and cover PVC following SWS 3.2.6.i.
- E. Before testing, repair or replace piping, valves, fittings, structures or other parts of system which have visible defects or leakage even if leakage or pressure loss may be below allowable limits.
- F. High Density Polyethylene (HDPE) installation.
  - 1. Follow AASHTO Section 30 and ASTM D2321.
  - 2. Structural bedding and cover:
    - a. Crushed stone.
      - 1) Size to fill voids in corrugations.
      - 2) Compaction: Follow AASHTO 30.5.3. and 30.5.4. Maximum 6-inch lifts with 95 percent following ASTM D698 "standard" density.
      - 3) Material must be adequately knifed into haunch and in between corrugations.
      - 4) Ponding and jetting prohibited.
  - 3. Minimum cover over top of pipe to subgrade 24 inches.
  - 4. Trench width.
    - a. Wider than compaction equipment in pipe zone.
    - b. Not less than pipe outside diameter plus 16 inches.
  - 5. Provide floatation resistance: Restraints or weights.
  - 6. Perform odd leg mandrel (go-no-go) deflection tests:
    - a. Follow SWS 3.2.6.1.4.
    - b. Perform 5 percent test twice:
      - 1) After backfill compaction and before paving.
      - 2) After paving and surface restoration.
    - c. Perform 7-1/2 percent test twice:
      - 1) 30 days after acceptance.
      - 2) 11 months after acceptance.

### 3.02 UNDERDRAIN INSTALLATION

- A. Follow State Specifications 612.

### 3.03 INCIDENTAL CONSTRUCTION

- A. Follow 33 05 00 for:
  - 1. Connecting dissimilar pipe materials.
  - 2. Excavation in pavement.
  - 3. Bedding.
  - 4. Cover.
  - 5. Backfill.
  - 6. Location aids.
  - 7. Insulation.
  - 8. Polyethylene film.
  - 9. Excess excavated material.
  - 10. Surface restoration.

END OF SECTION

SECTION 34 71 00  
ROADWAY CONSTRUCTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Earthwork.
- B. Base course.
- C. Pavement and surface course.
- D. Incidental construction:
  - 1. Curb and gutter.
  - 2. Sidewalks.
  - 3. Curb ramps.
  - 4. Drive approaches, and driveways.
  - 5. Pavement sawing.
  - 6. Pavement markings.
  - 7. Drainage facilities.
  - 8. Signs.
  - 9. Traffic control.
  - 10. Guardrail.
  - 11. Retaining walls.
  - 12. Restoration.
  - 13. Asphalt curb.
  - 14. Parking lot bumpers.

1.02 RELATED SECTIONS

- A. 33 05 00 – Common Work Results for Utilities.
- B. 32 90 00 – Planting.

1.03 SUBMITTALS

- A. Action:
  - 1. Submit the following to the Public Works, Utilities Department, and Village Engineer:
    - a. Product data.
    - b. Sieve analyses from State-certified laboratory.
    - c. Concrete Mix design. Submit at least 7 days before paving:
      - 1) Portland cement concrete curb and gutter, pavement, driveway, and sidewalk.
      - 2) High-early-strength concrete. Follow State Specification 415.2.1.
    - d. Wisconsin DOT-verified hot mix asphalt (HMA) pavement mix design for each pavement classification specified. Submit at least 7 days before paving.
- B. Informational:
  - 1. Base compaction test reports.
  - 2. Subbase compaction test reports.

3. Paving mix delivery tickets.
  - a. Asphaltic materials:
    - 1) Furnish ticket before placing material.
    - 2) Display on ticket:
      - a) Project.
      - b) Date.
      - c) Time.
      - d) Ticket number.
      - e) Type of mix.
      - f) Gross weight.
      - g) Tare weight.
      - h) Net weight.
      - i) Job total.
  - b. Concrete:
    - 1) Furnish tickets after delivery.
    - 2) Display on ticket:
      - a) Project.
      - b) Date.
      - c) Time.
      - d) Ticket number.
      - e) Class of concrete.
      - f) Grade of concrete.
      - g) Cement Weight.
      - h) Fly Ash type and weight.
      - i) Fine aggregate weight.
      - j) Coarse aggregate weight.
      - k) Gallons of water.
      - l) Time water was added.
      - m) Additives.
4. Base course delivery tickets that display:
  - a. Project.
  - b. Date.
  - c. Ticket number.
  - d. Type of material.
  - e. Gross weight.
  - f. Tare weight.
  - g. Net weight.
  - h. Job total.
5. Written concrete cylinder compression test results. Submit to Owner.
6. Provide Quality Management Program following State Specifications 460.2.8.1 General and 460.2.8.2 Contractor Testing control plan including:
  - a. Do not use 460.2.8.3 Department Testing.
7. Documentation showing permits have been obtained from Owner and from Regulatory Agencies for excess material disposal sites.

#### 1.04 REFERENCES

- A. ASTM D698 - Standard Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
- B. American Association of State Highway and Transportation Officials (AASHTO):
  1. AASHTO T22 - Standard Method for Compressive Strength of Cylindrical Concrete Specimens.

- 2. AASHTO T23 - Standard Method of Test for Making and Curing Concrete Test Specimens in the Field.
- 3. AASHTO T52 - Standard method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method.
- C. Wisconsin Standard Specifications.
- D. Wisconsin Manual for Uniform Traffic Control Devices.
- E. Wisconsin Department of Transportation Products Approved List (PAL).

#### 1.05 REGULATORY REQUIREMENTS

- A. Pay for local, county or state permits for Work on right-of-ways. Damage to pavements and to all property, public and private, due to this Work shall be repaired to same or better condition before construction by Contractor.

#### 1.06

- A. As a condition of acceptance, arrange, conduct, and pay for tests necessary to demonstrate satisfactory compliance with Contract Documents. Make adjustments at the plant necessary to meet requirements of Specifications including the instructions.
- B. Lab testing:
  - 1. Test material from the plant at least once a day.
  - 2. Meet the following parameters:
    - a. Air voids (Va): Follow State Specifications 460.2.8.3.1.6
    - b. Voids in the mineral aggregate (VMA): Follow State Specifications Table 460-1.
    - c. Gradations: Job mix formula (JMF): Follow Paragraph 1 of State Specification - Additional Special Provision 460.2.8.2.1.5 issued under ASP-6.
- C. Density testing:
  - 1. Take a minimum one test per location and one test per 250 tons.
    - a. Use nuclear method.
    - b. Targets specified hereinafter.
  - 2. Locations will be at Engineer's request.
- D. Results and reports:
  - 1. Make field adjustments to keep material within specified tolerances. If test results fall out of tolerance, increase testing frequency until material is within specification.
  - 2. Submit test reports within 48 hours to Engineering Department.

### PART 2 - PRODUCTS

#### 2.01 EMBANKMENTS

- A. Follow State Specifications 207. Do not use logs, stumps, brush, perishable material, frozen material or humus-bearing materials. No large stones larger than 3-inches or lumps allowed within entire subgrade of roadway, approaches, curb and gutter, or sidewalk..

#### 2.02 EXCAVATION BELOW SUBGRADE (EBS) BACKFILL

- A. Borrow: Follow State Specifications 208.
- B. Granular backfill: Follow State Specifications 209, Grade 1
- C. Breaker run: State Specification 311, maximum particle size 3 inches.
- D. Geotextile subgrade stabilization material: Follow State Specification 645, Type SAS

#### 2.03 BASE COURSE AND CRUSHED AGGREGATE SHOULDERS

- A. Follow State Specifications 305. Use 1-1/4" crushed limestone TB for bottom layer and 3/4" crushed limestone TB for upper layer.

#### 2.04 ASPHALTIC CONCRETE (HMA) PAVEMENT

- A. Binder course (Lower and Intermediate Layers): Follow State Specification 460.2 and:
  1. Type: See Village of Mukwonago Detail Drawings.
  2. Surface Gradation: See Village of Mukwonago Detail Drawings.
  3. Binder Grade: PG 58-28S
  4. Maximum recycled content: Follow State Specifications 460.2.5.
- B. Surface course (Upper Layer): Follow State Specification 460.2 and:
  1. Type: See Village of Mukwonago Detail Drawings.
  2. Surface Gradation: See Village of Mukwonago Detail Drawings.
  3. Binder Grade: PG 58-28S
  4. Maximum recycled material content: Follow State Specifications 460.2.5.
- C. Tack coat: Follow State Specification 455.2.5 asphaltic material dependent on weather conditions.
- D. Joint adhesive: Crafc0 Pavement Joint Adhesive.

#### 2.05 CONCRETE PAVEMENT

- A. Follow State Specification 415.
- B. Concrete: Follow State Specifications 501 with:
  1. Slump:
    - a. Slip-formed: 2.5 inches or less.
    - b. Non-slip-formed: 4 inches or less.
  2. Compressive strength: 3,500 pounds per square inch minimum.
  3. Do not add calcium chloride.
  4. Admixtures:
    - a. Set retarder: Follow State Specifications 501.2.3.2.
    - b. Water reducer: Follow State Specifications 501.2.3.3.
    - c. Air entrainment: Follow State Specifications 501.2.2.
    - d. Evaporation retardant: Eucoar by Euclid.
  5. High early strength concrete: Follow State Specifications 415.2.1, submit mix design.
- C. Steel reinforcement: Follow State Specifications 505 and:
  1. Deformed tie bars:
    - a. Grade: 60.
    - b. Length: 2 feet.
    - c. Size: No. 6.

- d. Epoxy coated.
- 2. Metal chairs: Epoxy Coated.3.Dowel bars. Follow State Specifications 505.2.6.2. Smooth and:
  - a. Grade: 60.
  - b. Length: 2 feet.
  - c. Size: No. 10.
  - d. Epoxy coated.
- 4. Joint sealant: Hot poured elastic.

## 2.06 INCIDENTAL CONSTRUCTION

- A. Concrete curb and gutter:
  - 1. Follow State Specifications 601.
  - 2. Do not add calcium chloride.
- B. Concrete sidewalks:
  - 1. Follow State Specifications 602.2.
  - 2. Do not add calcium chloride.
- C. Curb ramps.
  - 1. Neenah cast iron detectable warning fields. Detectable warning fields shall be unpainted.
  - 2. Follow State Specifications 602.2. Furnish detectable warning field from the DOT approved products list for the detectable warning field defined above.
- D. Drive approaches, and driveways.
  - 1. Concrete:
    - a. Follow State Specifications 501. Use high-early-strength cement.
    - b. Do not add calcium chloride.
  - 2. Asphaltic concrete (HMA): Follow specifications for surface course under ASPHALTIC CONCRETE PAVEMENT in this Section. Follow State Specifications 465.
- E. Pavement marking: Follow State Specifications 646 and:
  - 1. Paint.
  - 2. Temporary pavement marking: Follow State Specifications 649.
    - a. Removable tape.
- F. Drainage facilities:
  - 1. Culvert pipe.
    - a. Corrugated steel: Follow State Specifications 521.
    - b. Reinforced Concrete Pipe in Village Right-of-Way. Follow State Specifications 522.
  - 2. Bedding: 3/8-inch clear stone chips.
  - 3. Backfill: Granular.
  - 4. Apron endwalls: Same as pipe material.
- G. Signs: Follow State Specifications 637 Type H reflective sheeting
  - 1. Posts: Follow State Specifications 634.
    - a. 1 – 3/4" square galvanized.
- H. Traffic Control: Follow State Specifications 643.
  - 1. Contractor shall prepare and submit traffic control plan for approval.
  - 2. Traffic control plan shall conform to latest version of Wisconsin MUTCD.
- I. Guardrail: Follow State Specifications 614.

- J. Retaining Wall: Follow State Specifications 504.
- K. Restoration: Follow 32 90 00.
- L. Parking lot bumpers: Precast concrete. Nominal dimensions 72 by 9 by 6 inches high with 5/8-inch diameter holes at both ends. Include 18-inch long 1/2-inch diameter bars for securement.

## 2.07 SOURCE QUALITY CONTROL

- A. Asphaltic paving materials scale: Follow State Specification 450.3.1.1.1.
- B. Concrete paving materials scale: Follow State Specification 501.3.4.5.2.
- C. Base course materials scale: Follow State Specifications 109.1.4.

## PART 3 - EXECUTION

### 3.01 EARTHWORK

- A. Clearing and grubbing: Follow State Specifications 201.3.
  - 1. Cut wood to maximum 6 foot lengths, stack outside of right-of-way for land owner use. Remove wood not claimed by landowner.
- B. Removing old culverts and bridges: Follow State Specifications 203.3.
- C. Removing miscellaneous structures. Follow State Specifications 204.3 for:
  - 1. Curb and gutter.
  - 2. Asphaltic concrete pavement.
  - 3. Sidewalk.
  - 4. Guardrail.
- D. Roadway and drainage excavation. Follow State Specifications 205.3 for:
  - 1. Common excavation. No organic material or stones larger than 3-inches allowed within upper 12-inches of subgrade in a cut section. No organic material or stones larger than 3-inches allowed within entire subgrade layer in a fill section.
- E. Embankment: Follow State Specifications 207.3.
  - 1. Maximum layer thickness: 8 inches.
  - 2. Compaction: Standard
    - a. 95 percent of maximum density determined by ASTM D698 (Standard Proctor).
    - b. Subgrade must be proof rolled before acceptance.
- F. Preparation of roadway foundation: Follow State Specifications 211.3.
- G. Subgrade proof roll: Allow Engineer to inspect prepared subgrade and to witness proof roll test by a fully loaded quad-axle dump truck. Reconstruct where deflection is greater than 1/2 inch. Additional proof roll tests will be performed until entire subgrade passes.

### 3.02 BASE COURSE AND CRUSHED AGGREGATE SHOULDERS

- A. Crushed aggregate base course: Follow State Specifications 301 and 305.
  - 1. Compaction: Standard compaction.
    - a. 95 percent of maximum density determined by Modified Proctor.

- b. Allow Engineer to inspect prepared base course and to witness proof roll test by a fully loaded, quad-axle dump truck. Reconstruct where deflection is greater than 1/2 inch as determined by the engineer. Additional proof roll tests will be performed until entire base course passes.
- 2. Allowable deviation from design grade: 1/2 inch
- 3. Utility structures: Set to 1/2-inch to 3/4-inch below finish surface course elevation.

### 3.03 PAVEMENT MILLING/PULVERIZING SHAPING AND GRADING

- A. Follow State Specification 325 and:
  - 1. Remove and stockpile excess milled/pulverized materials to Owner approved location.
  - 2. At completion of each working day, ramp ends of milled/pulverized material flush to adjacent pavement for all traffic lanes.
  - 3. Excavate and remove topsoil and unstable subgrade materials and replace with on-site sound material.
  - 4. Grade, shape, and compact milled/pulverized materials.
  - 5. Redistribute materials as needed within project to fill areas with insufficient materials, low areas, and settled utility trenches.
  - 6. Move excess material to other areas within the project.
  - 7. Use new crushed stone base material only when existing materials are depleted and Engineer approves.
  - 8. Allow Engineer to inspect new base course before paving.
  - 9. Allowable deviation from design grade: 1/2 inch.
  - 10. Utility structures: Set to finish course elevation.
  - 11. Compaction: Standard compaction.
    - a. Allow Engineer to inspect prepared base course and to witness proof roll test by a fully loaded quad-axle dump truck. Reconstruct where deflection is greater than 1/2 inch as determined by the engineer. Additional proof roll tests will be performed until entire base course passes.
- B. Abutting existing pavement:
  - 1. Provide full depth saw cut at match lines.
  - 2. Provide butt joint at locations specified in field. Anticipate 25-foot length.
  - 3. Pulverize existing pavement within construction limits.
  - 4. Stockpile milled/pulverized materials at location secured by Contractor.
  - 5. Over-excavate, remove and dispose of earth material over butt joint length.
  - 6. Taper thickness of removed materials from 4 inches at match line to 0 inches at opposite end of butt joint.
  - 7. Re-spread milled/pulverized materials over excavated area.
  - 8. Remove sufficient material to maintain minimum pavement and base thickness as specified herein at saw cut.

### 3.04 EXCAVATED MATERIAL

- A. Surplus excavated material shall be hauled and disposed of at Contractor's expense unless otherwise indicated by Public Works and Utilities Departmentsf.

### 3.05 PAVEMENT AND SURFACE COURSES

- A. Tack coat: Follow State Specification 455.3.2.
  - 1. Apply between each layer of asphaltic concrete.
  - 2. Allow to cure before paving.

- B. Mill butt joints: Mill and dispose of 1-1/2 inches of existing pavement at locations shown.
- C. Asphaltic concrete pavement: Follow State Specifications 450 and 460
  - 1. Do not use 460.2.8.3 Department Testing.
  - 2. Maximum variations:
    - a. 1/8 inch across a 5-foot straight edge.
    - b. Thickness: Within 1/4 inch of design.
    - c. Finish elevation: Within 1/4 inch of design.
  - 3. Temperatures:
    - a. Asphaltic concrete at placement: Between 265 and 330 degrees Fahrenheit.
    - b. Subgrade: Above 32 degrees Fahrenheit.
    - c. Air temperature: Follow State Specifications 450.3.2.1.2.3.
      - 1) Contractor may submit cold weather paving plan for review if air temperature falls below specified limits. Engineer reserves the right to reject plan without cause. If implemented, plan shall be at no additional cost to Owner.
  - 4. Layer thickness: Shown on Drawings.
  - 5. Compaction: Follow State Specifications 460.3.3 Maximum Density Method
  - 6. Saw cut, excavate and remove unstable binder course, base course and subgrade materials. Replace removed materials. Clean binder pavement by sweeping or flushing before applying surface pavement.
  - 7. Allow Engineer to inspect binder course before applying surface course.
  - 8. Joints: Crafcu joint adhesive shall be used for all longitudinal joints and curb flanges.
  - 9. Ramp curb flanges if surface course is not planned to be paved within one week of binder course installation.

### 3.06. CONCRETE PAVEMENT

- A. Follow State Specification 415 and 501.
- B. Placement delays.
  - 1. If less than 30 minutes: Cover unfinished end with wet burlap.
  - 2. If greater than 30 minutes: Install construction joint.
  - 3. If concrete attains initial set: Install construction joint.
  - 4. If finishing equipment breaks down: Discontinue placement.
  - 5. If finishing and curing operations cannot be kept within their time sequence: Discontinue placement.
  - 6. Engineer reserves the right to order discontinuation of placement for any reasons deemed detrimental to the quality of the finished material.
- C. Maximum delivery time:
  - 1. Below 60 degrees Fahrenheit: 1-1/2 hours.
  - 2. Above 60 degrees Fahrenheit: 1 hour.
  - 3. Begins with addition of water to cement or cement to aggregates. Time ends when completely discharged.
  - 4. Extend time above 60 degrees Fahrenheit to 1-1/2 hours with approved retarder.
  - 5. Concrete must be totally discharged within maximum delivery time and/or 300 drum revolutions, whichever occurs first.
- D. Joints:
  - 1. Saw cut joints to prevent surface shrinkage cracks.
    - a. Longitudinal: Saw cut joints within 36 hours after placing concrete.
    - b. Transverse: Saw cut joints by approximately midnight of the same day of the concrete pour.
  - 2. Spacing: 10 feet minimum and as shown on Drawings.

3. Width: 1/4 inch.
  4. Depth: Pavement thickness/3.
  5. Tie bars: 3 feet on center placed at mid depth of slab. Follow details on Drawings.
  6. Dowel bars: 1 foot on center placed at mid depth of slab. Follow details on Drawings.
- E. Curing: Apply impervious coating. Follow State Specification 415.3.12
- F. Cold weather concreting:
1. Do not place below 35 degrees Fahrenheit.
  2. Do not place on frozen grade.
  3. Cover completed Work: Follow State Specifications 415.3.13.2.
- G. Testing:
1. Follow State Specifications 501.3.10.
  2. Perform slump test. Follow State Specifications 501.3.7.1
  3. Measure air entrainment: Follow State Specifications 501.3.2.4.2, AASHTO T152.
  4. Cast 6-inch diameter by 12 inch high compression strength cylinders.
  4. Cast 3 test cylinders for every 100 cubic yards placed.
  5. Allow Engineer to observe field testing.
  6. Test cylinders in lab:
    - a. 1 at 7 days.
    - b. 2 at 28 days.
    - c. Follow State Specifications 501, AASHTO T22 and T23.
- H. Opening to traffic: Permitted when design compressive strength achieved by lab test samples and with Engineer's approval.

### 3.07 INCIDENTAL CONSTRUCTION

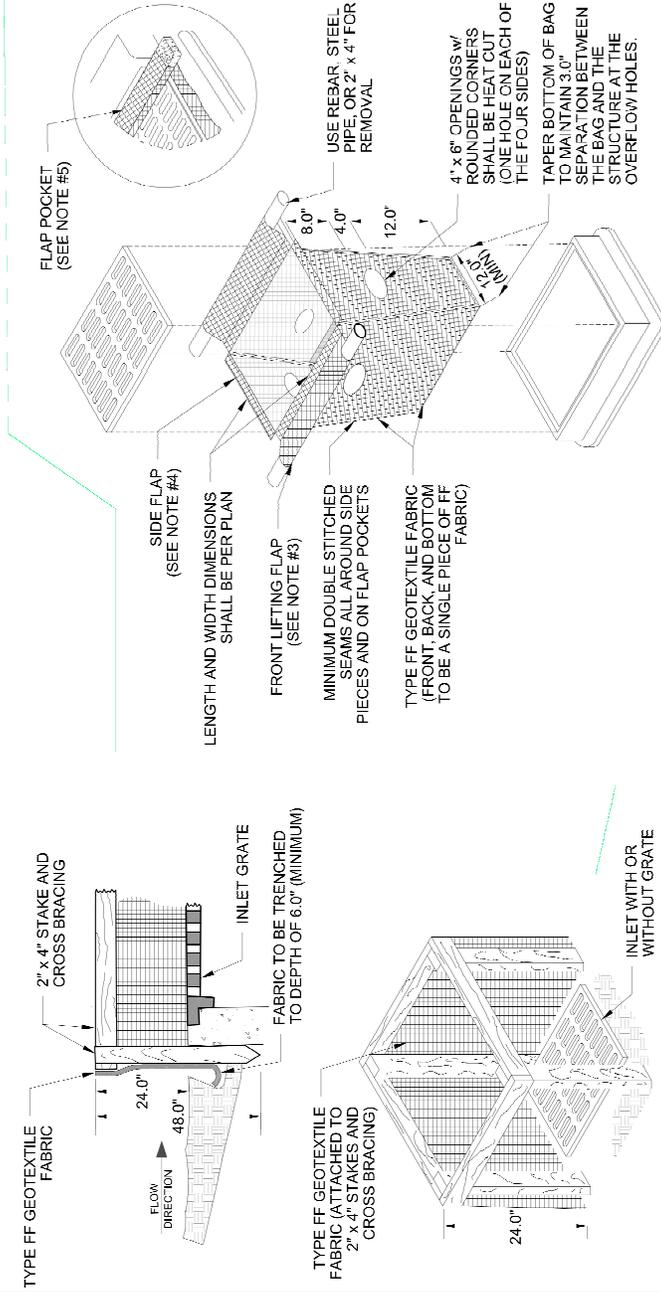
- A. Concrete curb and gutter: Follow State Specification 601.3.
1. Joints.
    - a. Construct expansion joints at:
      - 1) 5 feet from inlets or catch basins.
      - 2) End of curves.
      - 3) 50 feet maximum intervals.
      - 4) At one end of all curb and gutter removed and replaced
      - 5) Single layer 1/2-inch thick expansive material.
    - b. Construct contraction joints at 10 feet spacing.
      - 1) Minimum spacing: 6 feet.
      - 2) Maximum spacing: 12 feet.
      - 3) Match abutting concrete joints.
      - 4) Depth: Minimum 2 inches.
  2. Curing:
    - a. Apply impervious coating within one hour of placement.
    - b. Coat all sides of curb including exposed surface after forms removed.
    - c. Apply two coats in perpendicular directions.
- B. Sidewalks: Follow State Specifications 602.3.
1. Required on both sides of all streets.
  2. Joints.
    - a. Provide expansion joints abutting existing construction and structures with 1/2 inch expansion joint filler.
      - 1) 50 feet maximum interval.
      - 2) At one end of all sidewalk removed and replaced.
    - b. Provide contraction joints at spacing equal to width of walk and:

- 1) Minimum 3 feet.
  - 2) Maximum 12 feet.
  - 3) Depth: Minimum 1 inch.
  - 4) Width: Approximately 1/8 inch.
3. Curb ramps: Follow State Specifications 602.3.
    - a. Construct curb ramps to ADA specifications and the latest version of the Wisconsin Department of Transportation curb ramp detail drawings.
  4. Curing:
    - a. Follow State Specifications 415.3.12.
    - b. Apply impervious coating within one hour of placement.
    - c. Coat all sides of sidewalk including exposed surface after forms removed.
    - d. Apply two coats in perpendicular directions.
  5. Steps: Follow State Specifications 602.3.4.
- C. Concrete drive approaches: Follow Village Standard Detail for Concrete Driveway Approach.
1. Joints.
    - a. Expansion Joints abutting curb or walk: Use 1/2-inch expansion joint filler.
    - b. Contraction Joints: Locate at midpoint of drive, perpendicular to curb.
      - 1) Minimum spacing 6 feet.
      - 2) Maximum spacing 12 feet.
  2. Curing.
    - a. Follow State Specifications 415.3.12.
    - b. Apply impervious coating within one hour of placement.
    - c. Coat all sides of concrete drive approach including exposed surface after forms removed.
    - d. Apply two coats in perpendicular directions.
- D. Asphaltic concrete drive approaches. Only allowed with approval from Public Works and Village Engineer. Follow PAVEMENT AND SURFACE COURSES in this Section, except place single 3-inch layer thickness.
- E. Pavement sawing. Follow State Specifications 690.3. Cut depth: Full pavement thickness
- F. Pavement marking: Follow State Specifications 646.3.
1. Apply same day on pavements open to traffic: State Specifications 646.3.1.
  2. Pavement surface temperature:
    - a. Painted: Above 35 degrees Fahrenheit.
  3. Provide clean pavement to ensure proper bonding.
  4. Provide temporary centerline marking at 50-foot interval between paving operations and application of final pavement marking.
  5. Temporary pavement marking: Follow State Specification 649.3 and Drawings.
- G. Drainage facilities:
1. Pipe culverts:
    - a. Follow State Specification 520.3, except do not use Paragraph 1 in Section 520.3.1.
    - b. Bedding: Provide 6 inches of 3/4-inch crushed stone chips below pipe.
  2. Private entrance and temporary culverts. Provide 6 inches of 3/8-inch crushed stone chips below pipe.
  3. Backfill with:
    - a. Excavated material when granular gradation is met and with Engineering Department approval.
    - b. Granular backfill.

4. Consolidate backfill by: Mechanical compaction.
  5. Salvaged pipe: Follow State Specifications 524.
  6. Apron endwalls:
    - a. Material: Same as pipe.
- H. Signs: Follow State Specifications 637.3.
1. Relocating signs: Follow State Specifications 638.3.2.
- I. Traffic control: Follow State Specification 643.3.
1. Warning lights: Type A.
- J. Guardrail: Follow State Specification 614.3.
- K. Retaining walls: Follow State Specifications 504.3.
- L. Restoration: Follow 32 90 00.
- M. Asphaltic curb: Follow State Specifications 465.3.2.

END OF SECTION

**FIGURE 1. INLET PROTECTION TYPES A AND D**



**INLET PROTECTION TYPE D**

CAN BE INSTALLED IN INLETS WITH OR WITHOUT CURB BOXES

**INLET PROTECTION TYPE A**

**NOTES:**

1. TAPER BOTTOM OF BAG TO MAINTAIN THREE INCHES OF CLEARANCE BETWEEN THE BAG AND THE STRUCTURE, MEASURED FROM THE BOTTOM OF THE OVERFLOW OPENINGS TO THE STRUCTURE WALL.
2. GEOTEXTILE FABRIC TYPE FF FOR FLAPS, TOP AND BOTTOM OF OUTSIDE OF FILTER BAG, FRONT, BACK, AND BOTTOM OF FILTER BAG BEING ONE PIECE.
3. FRONT LIFTING FLAP IS TO BE USED WHEN REMOVING AND MAINTAINING FILTER BAG.
4. SIDE FLAPS SHALL BE A MAXIMUM OF TWO INCHES LONG. FOLD THE FABRIC OVER AND REINFORCE WITH MULTIPLE STITCHES.
5. FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2" x 4". THE REBAR, STEEL PIPE, OR WOOD SHALL BE INSTALLED IN THE REAR FLAP AND SHALL NOT BLOCK THE TOP HALF OF THE CURB FACE OPENING.

**MAINTENANCE NOTES:**

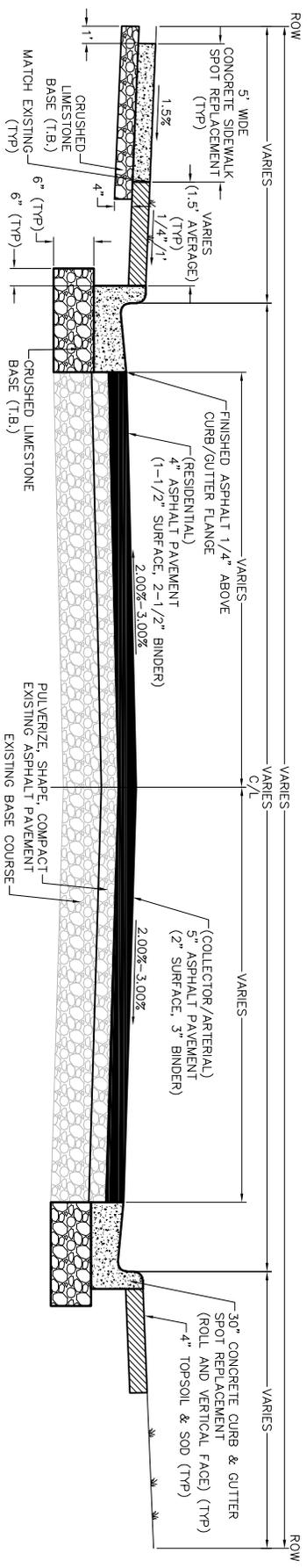
1. WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED IN THE FABRIC DOES NOT FALL INTO THE STRUCTURE. MATERIAL THAT HAS FALLEN INTO THE INLET SHALL BE IMMEDIATELY REMOVED.

WISCONSIN  
 DEPT. OF NATURAL RESOURCES

1060  
 TECHNICAL STANDARD No.  
 08/2014  
 REVISION DATE  
 NOT TO SCALE

VILLAGE OF MUKWONAGO NOTE: TYPE D INLET PROTECTION SHALL BE USED IN ALL AREAS. WOOD/REBAR TO BE REMOVED DURING WINTER.

# EXHIBIT PV-01 - EXISTING REHABILITATION

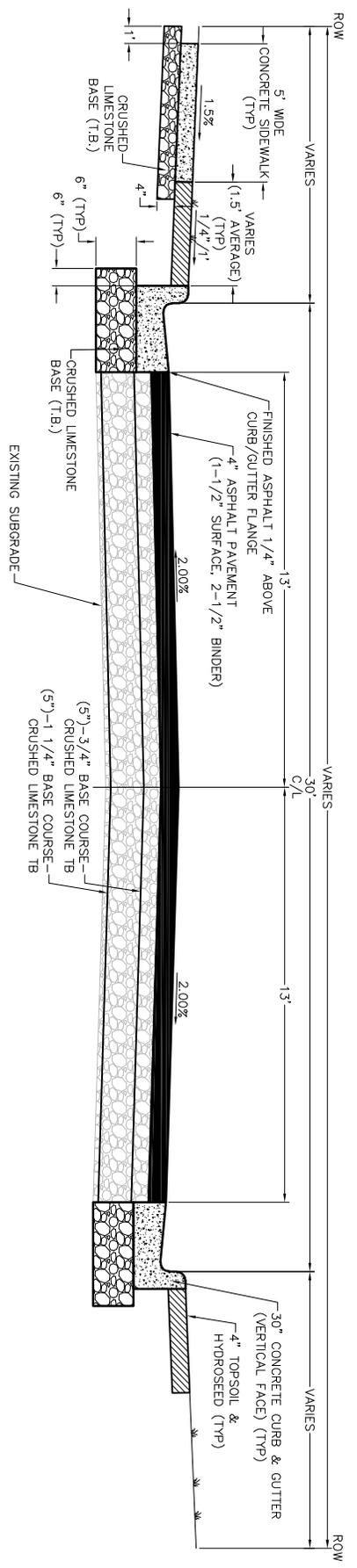


ASPHALT MIX SPECIFICATION			
COURSE	RESIDENTIAL	COLLECTORS	ARTERIAL/INDUSTRIAL
BINDER	3LT 58-28S	3LT 58-28S	3MT 58-28S
SURFACE	5LT 58-28S	5LT 58-28S	5MT 58-28H

- NOTES:
1. ADJUST MH FRAMES, AND VALVE BOXES TO 1/4-INCH TO 1/2-INCH LOWER THAN FINISH GRADE.
  2. 4" THICK CONCRETE SIDEWALK, EXCEPT 6" THICK THROUGH DRIVEWAY APPROACH.
  3. COMPACT BASE TO 95%.

**TYPICAL EXISTING URBAN SECTION-REHABILITATION** NO SCALE  
 PV-01 2

# EXHIBIT PV-01A - NEW RESIDENTIAL

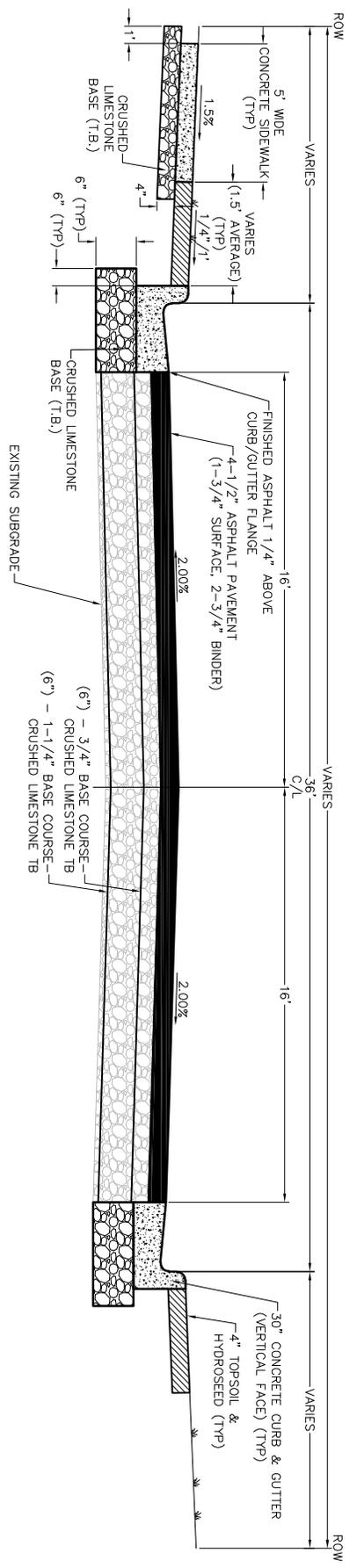


ASPHALT MIX SPECIFICATION			
COURSE	RESIDENTIAL	COLLECTORS	ARTERIAL/INDUSTRIAL
BINDER	3LT 58-28S	3LT 58-28S	3MT 58-28S
SURFACE	5LT 58-28S	5LT 58-28S	5MT 58-28H

- NOTES:
1. ADJUST MH FRAMES, AND VALVE BOXES TO 1/4-INCH TO 1/2-INCH LOWER THAN FINISH GRADE.
  2. 4" THICK CONCRETE SIDEWALK, EXCEPT 6" THICK THROUGH DRIVEWAY APPROACH.
  3. COMPACT BASE TO 95%.

**TYPICAL NEW URBAN SECTION-RESIDENTIAL** NO SCALE  
 PV-01A 2

# EXHIBIT PV-01B - NEW COLLECTOR

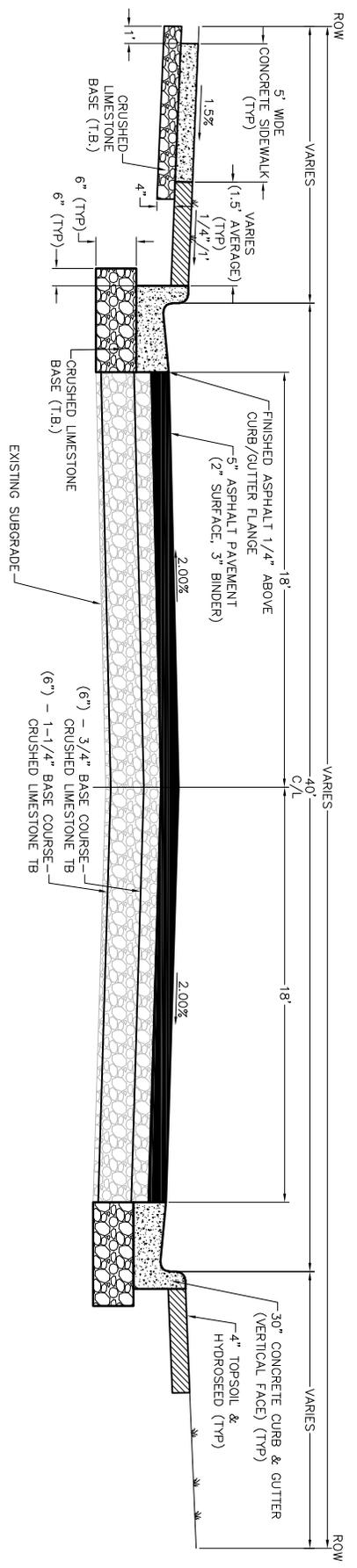


ASPHALT MIX SPECIFICATION			
COURSE	RESIDENTIAL	COLLECTORS	ARTERIAL/INDUSTRIAL
BINDER	3LT 58-28S	3LT 58-28S	3MT 58-28S
SURFACE	5LT 58-28S	5LT 58-28S	5MT 58-28H

- NOTES:
1. ADJUST MH FRAMES, AND VALVE BOXES TO 1/4-INCH TO 1/2-INCH LOWER THAN FINISH GRADE.
  2. 4" THICK CONCRETE SIDEWALK, EXCEPT 6" THICK THROUGH DRIVEWAY APPROACH.
  3. COMPACT BASE TO 95%.

**TYPICAL NEW URBAN SECTION-COLLECTOR** NO SCALE  
 PV-01B 2

# EXHIBIT PV-01C - NEW ARTERIAL

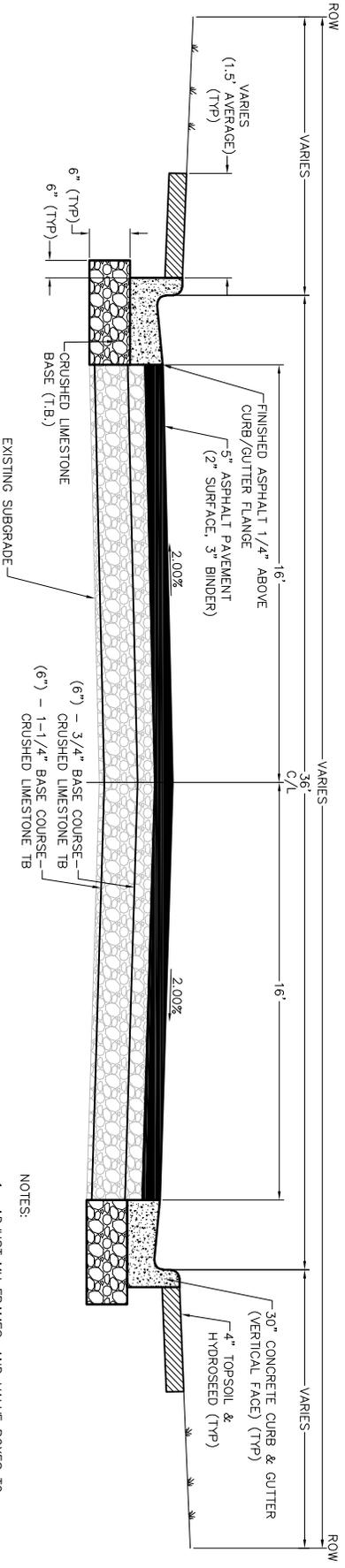


ASPHALT MIX SPECIFICATION			
COURSE	RESIDENTIAL	COLLECTORS	ARTERIAL/INDUSTRIAL
BINDER	3LT 58-28S	3LT 58-28S	3MT 58-28S
SURFACE	5LT 58-28S	5LT 58-28S	5MT 58-28H

- NOTES:
1. ADJUST MH FRAMES, AND VALVE BOXES TO 1/4-INCH TO 1/2-INCH LOWER THAN FINISH GRADE.
  2. 4" THICK CONCRETE SIDEWALK, EXCEPT 6" THICK THROUGH DRIVEWAY APPROACH.
  3. COMPACT BASE TO 95%.

**TYPICAL NEW URBAN SECTION-ARTERIAL**  
 NO SCALE  
 PV-01C 2

**EXHIBIT PV-01D - NEW INDUSTRIAL**



ASPHALT MIX SPECIFICATION			
COURSE	RESIDENTIAL	COLLECTORS	ARTERIAL/INDUSTRIAL
BINDER	3LT 58-28S	3LT 58-28S	3MT 58-28S
SURFACE	5LT 58-28S	5LT 58-28S	5MT 58-28H

**TYPICAL NEW URBAN SECTION-INDUSTRIAL**  
 NO SCALE

PV-01D 2

- NOTES:
1. ADJUST MH FRAMES, AND VALVE BOXES TO 1/4-INCH TO 1/2-INCH LOWER THAN FINISH GRADE.
  2. COMPACT BASE TO 95%.

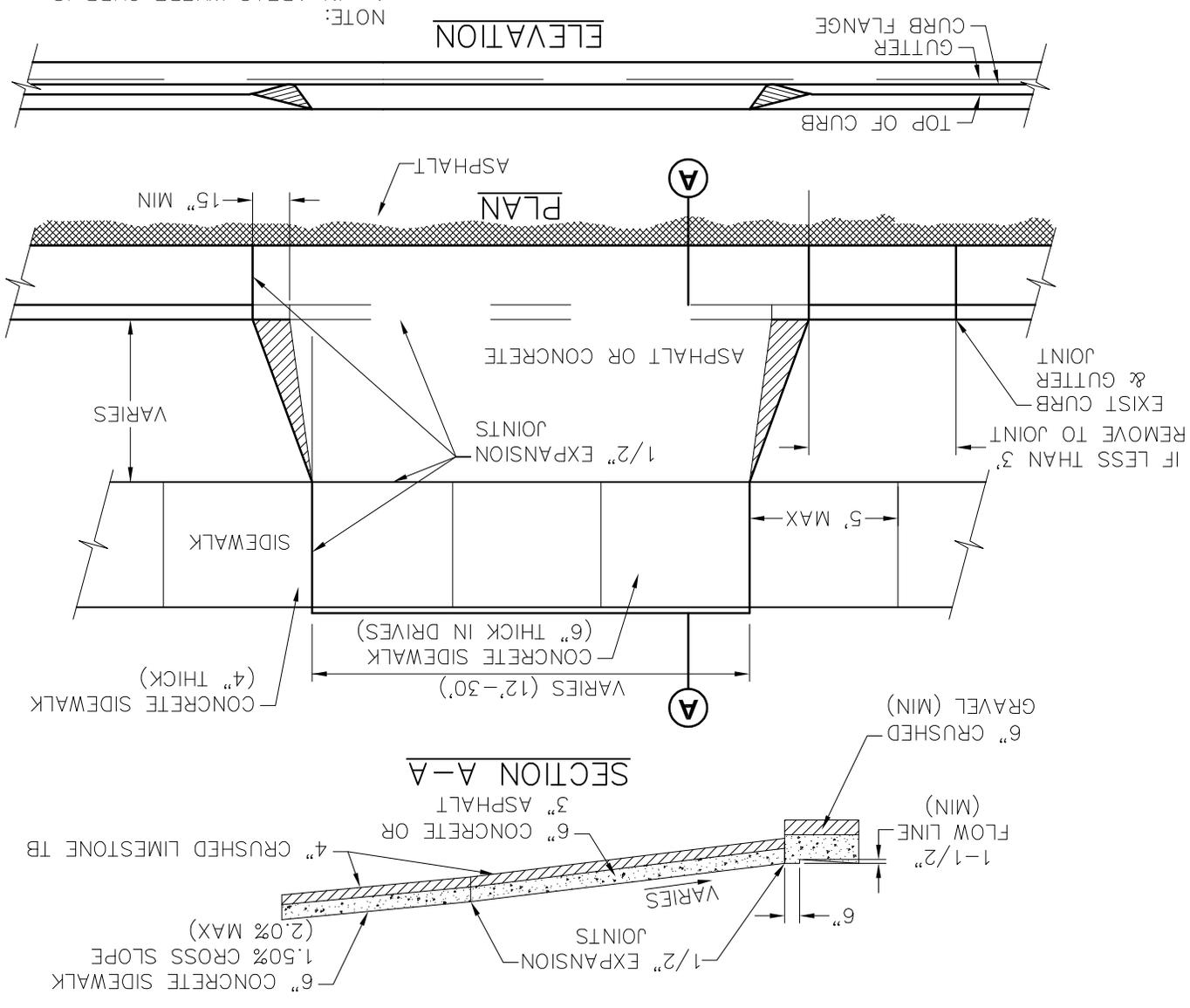
# EXHIBIT PV-02

driveapr 48

## ASPHALT OR CONCRETE DRIVEWAY

NO SCALE

- NOTE:
1. IN AREAS WHERE CURB IS MOUNTABLE, DRIVEWAYS TO MATCH TOP OF CURB.
  2. DRIVEWAY OPENING AT CURB MINIMUM 15' AND MAXIMUM 33'.



**EXHIBIT PV-03**

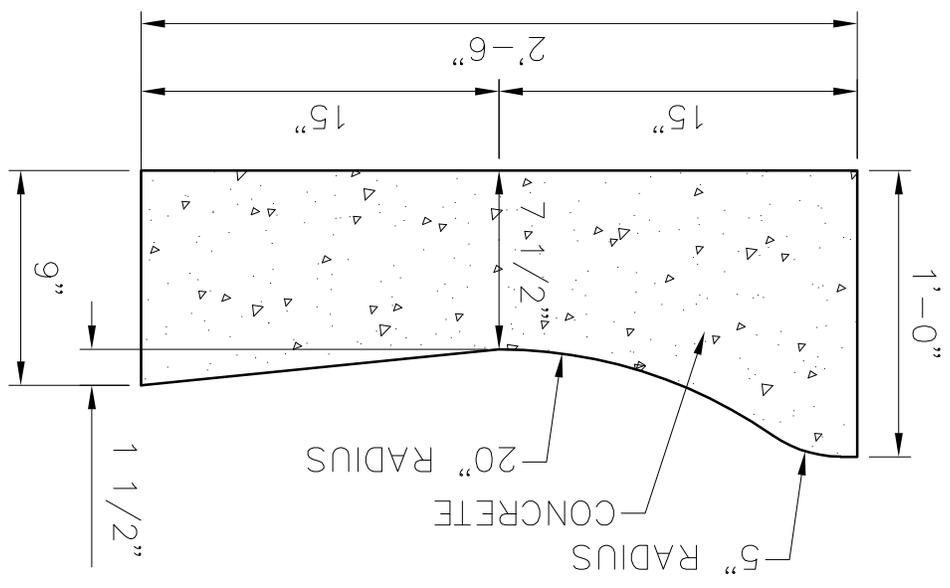
- NOTE:  
 1. ONLY TO BE USED IN REPLACEMENT OF EXISTING ROLL FACE CURB & GUTTER.

02770C&G1 1

NO SCALE

**30" ROLL FACE CURB & GUTTER-REHABILITATION**

NOTE:  
 ROLL FACE CURB & GUTTER NOT ALLOWED IN NEW DEVELOPMENT.

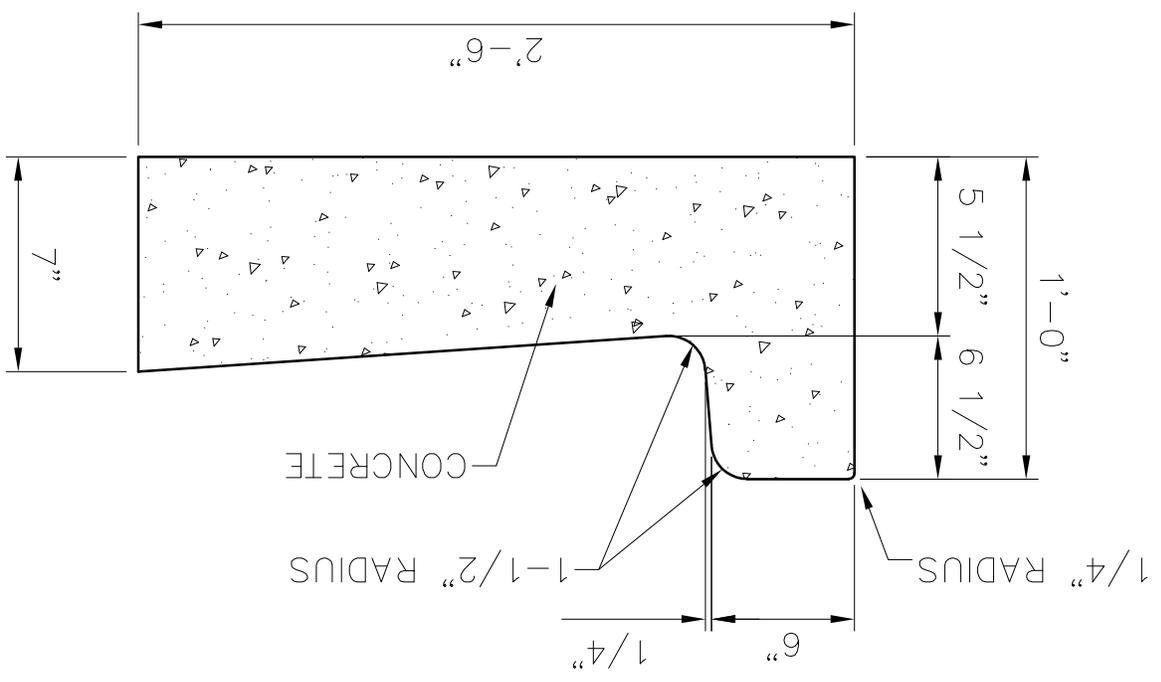


# EXHIBIT PV-04

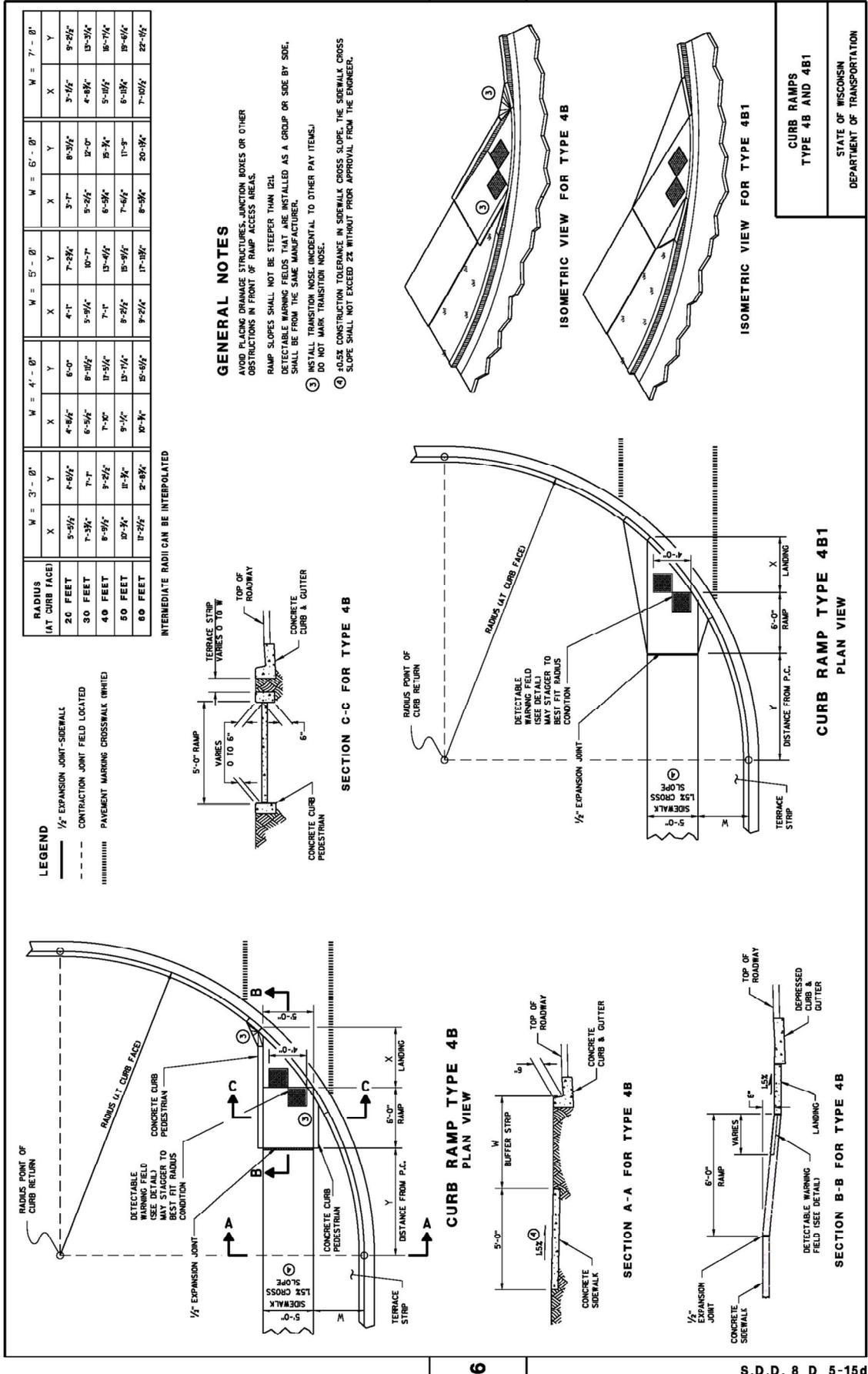
## 30" VERTICAL FACE CURB & GUTTER

NO SCALE

02770C&G2 1



# EXHIBIT PV-05



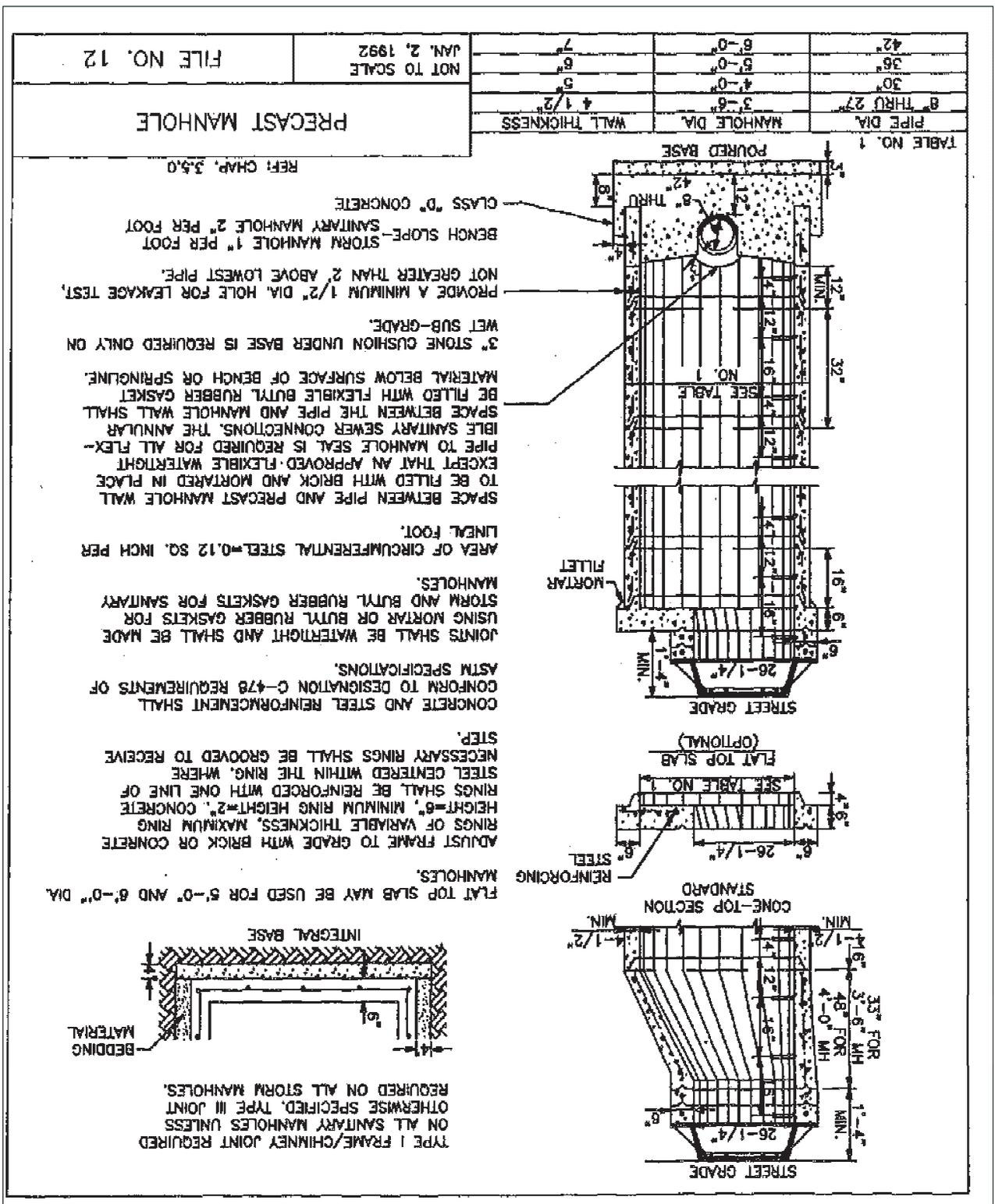
NOTE: TRUNCATED DOME PANELS SHALL BE YELLOW METAL

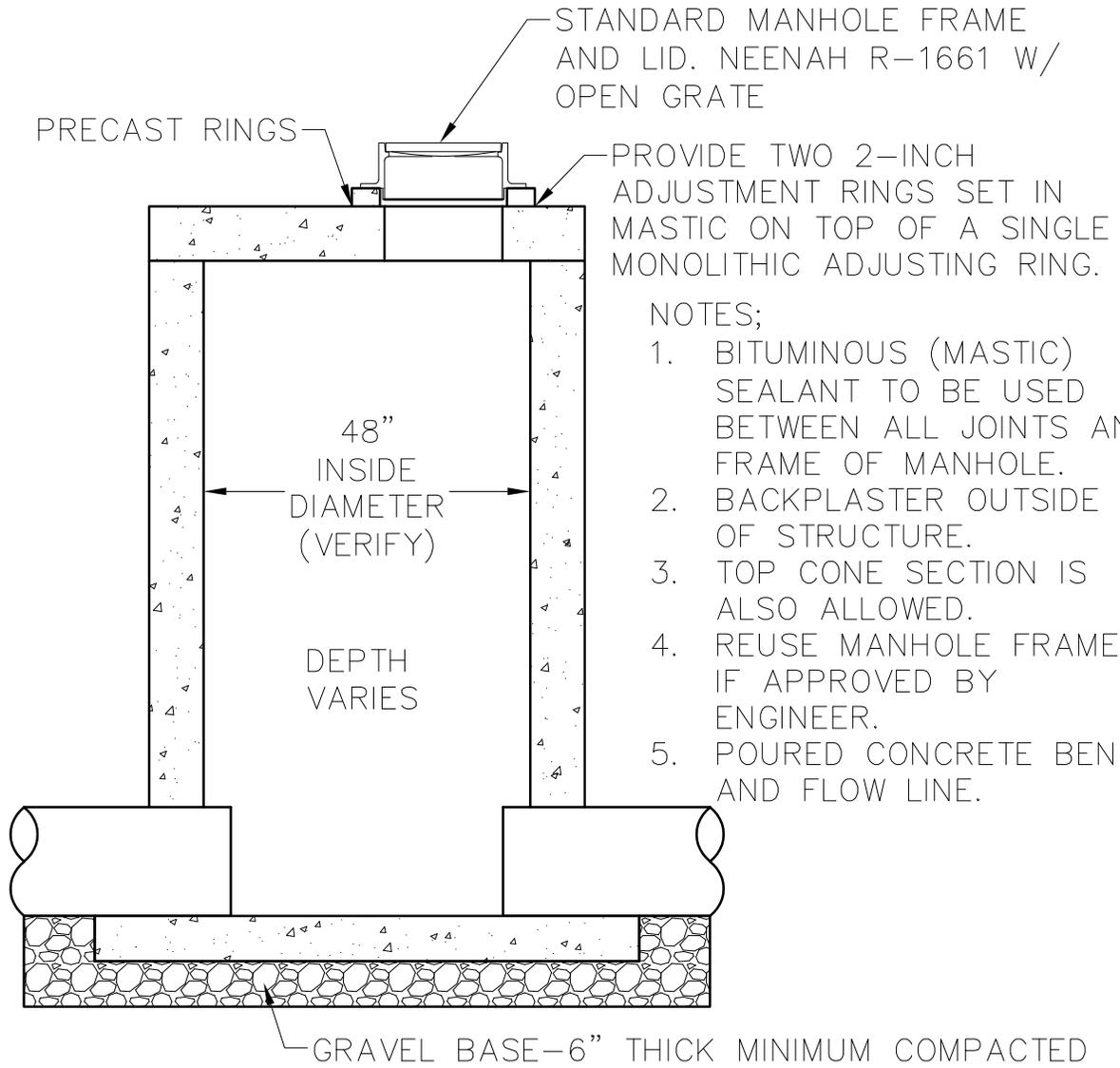
S.D.D. 8 D 5-15d  
 CURB RAMP TYPE 4B AND 4B1  
 STATE OF WISCONSIN  
 DEPARTMENT OF TRANSPORTATION

S.D.D. 8 D 5-15d

# EXHIBIT SAN-01

- NOTE:
1. USE SINGLE LAYER MONOLITHIC RING AND TWO 2-INCH ADJUSTING RINGS IN CHIMNEY.
  2. NO STEPS ALLOWED IN TOP FIVE FEET OF MANHOLE, MEASURED FROM RIM ELEVATION DOWN.
  3. SET ADJUSTING RINGS AND FRAME IN MASTIC.
  4. BACKPLASTER OUTSIDE OF STRUCTURE, NO BACKPLASTER ALLOWED INSIDE MANHOLE.





NOTES;

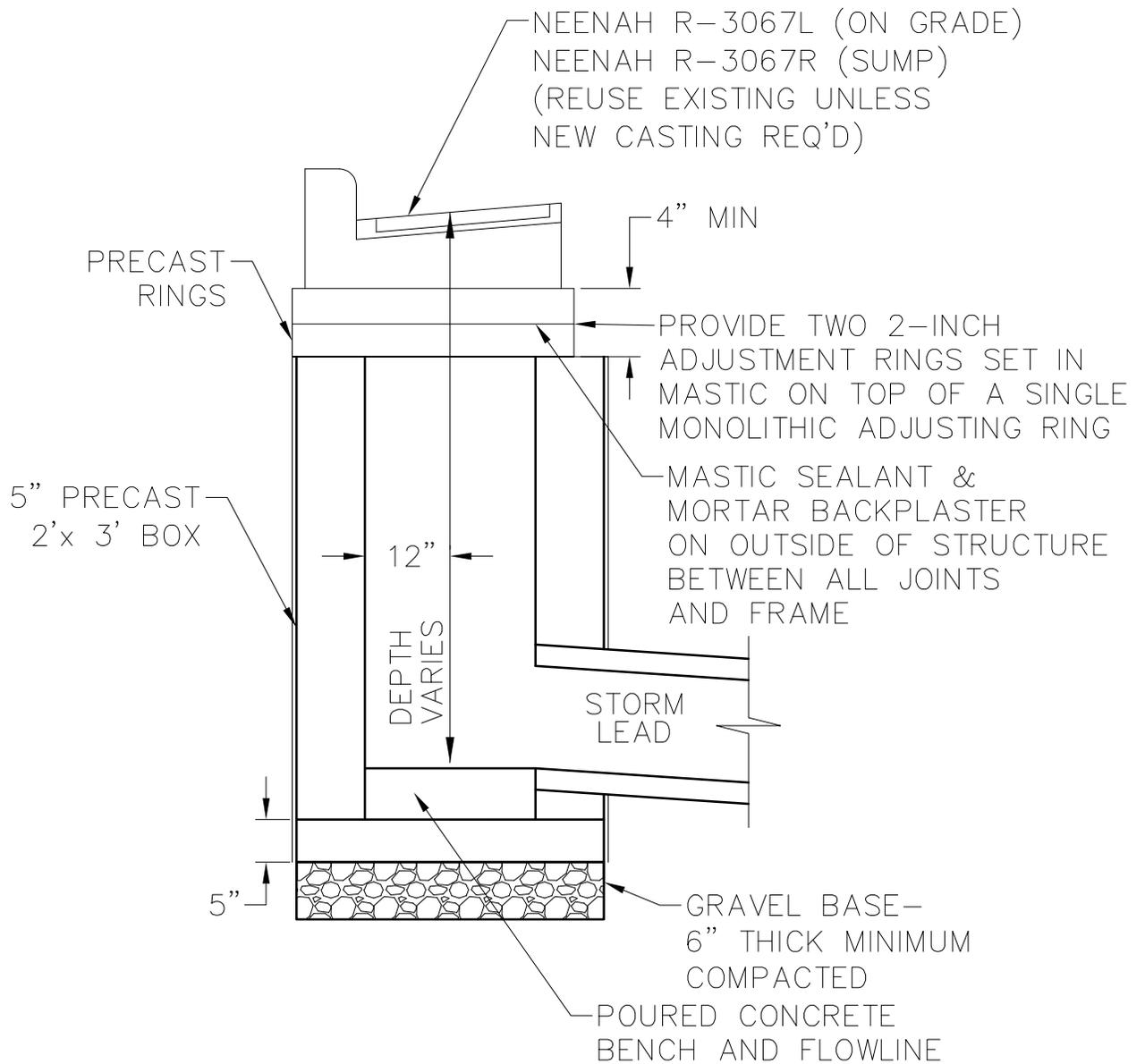
1. BITUMINOUS (MASTIC) SEALANT TO BE USED BETWEEN ALL JOINTS AND FRAME OF MANHOLE.
2. BACKPLASTER OUTSIDE OF STRUCTURE.
3. TOP CONE SECTION IS ALSO ALLOWED.
4. REUSE MANHOLE FRAMES IF APPROVED BY ENGINEER.
5. POURED CONCRETE BENCH AND FLOW LINE.

# STORM MANHOLE DETAIL

NO SCALE

STO-01 20

## EXHIBIT STO-01



1. INLET TO BE PROTECTED WITH GEOTEXTILE FABRIC BETWEEN THE GRATE AND FRAME. PROTECTION TO REMAIN IN PLACE UNTIL SITE VEGETATION IS ESTABLISHED.
2. IN AREAS WITH ROLL FACE CURB, REPLACEMENT CURB SHALL TRANSITION TO VERTICAL FACE CURB & GUTTER AT INLET FRAME.

## **STORM INLET DETAIL**

NO SCALE

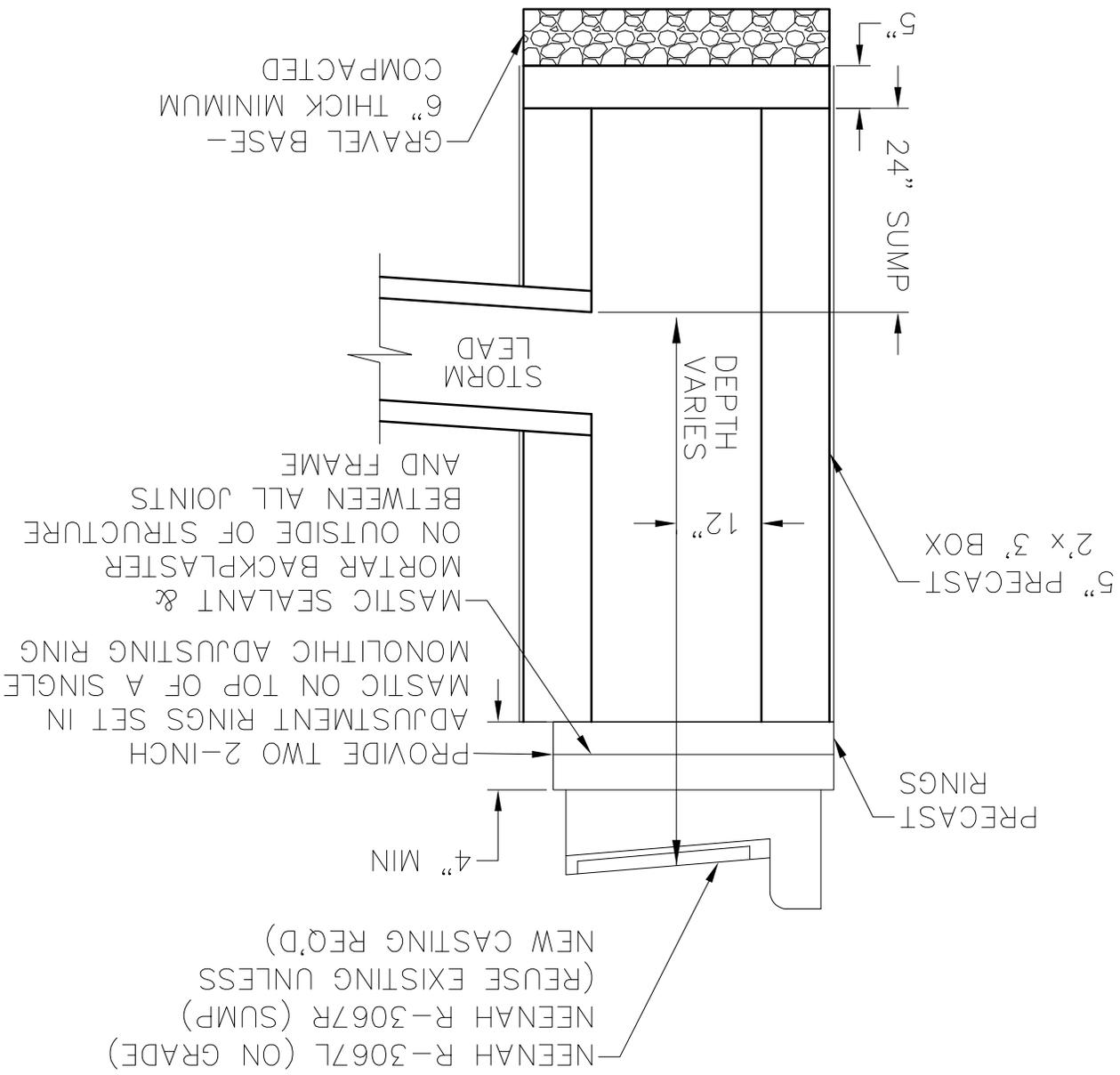
STO-02 20

### **EXHIBIT STO-02**

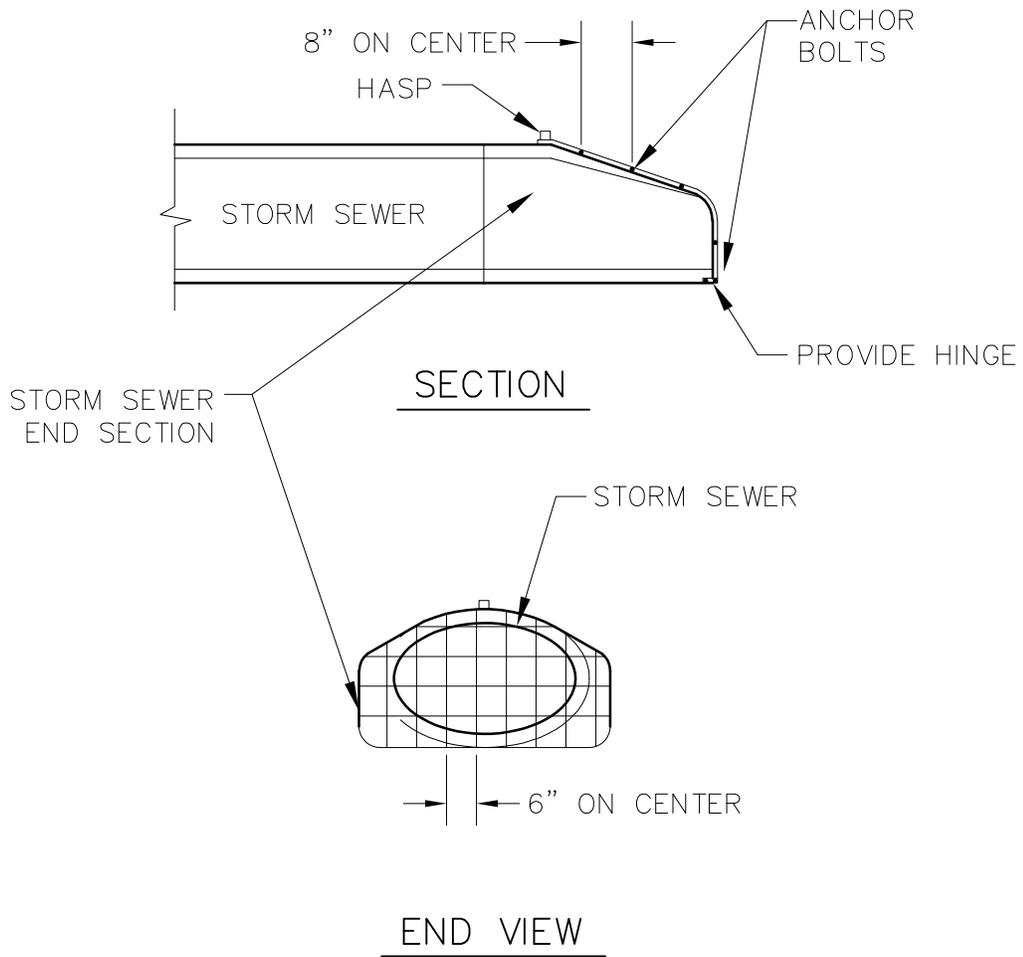
**EXHIBIT STO-03**

**CATCH BASIN DETAIL**  
 NO SCALE

1. INLET TO BE PROTECTED WITH GEOTEXTILE FABRIC BETWEEN THE GRATE AND FRAME. PROTECTION TO REMAIN IN PLACE UNTIL SITE VEGETATION IS ESTABLISHED.
2. IN AREAS WITH ROLL FACE CURB, REPLACEMENT CURB SHALL TRANSITION TO VERTICAL FACE CURB & GUTTER AT INLET FRAME.



STO-03 20



NOTES:

- 1) TRASH RACK BARS TO BE GALVANIZED.
- 2) CONNECTOR PLATE WITH BOLT ATTACHED AT THREE POINTS TO ENDWALL.
- 3) PLANT FIT TRASH RACK CONFIGURATION TO FIT RELATIVE END SECTION.

**TRASH RACK**

NO SCALE

STO-GRATE-04 96

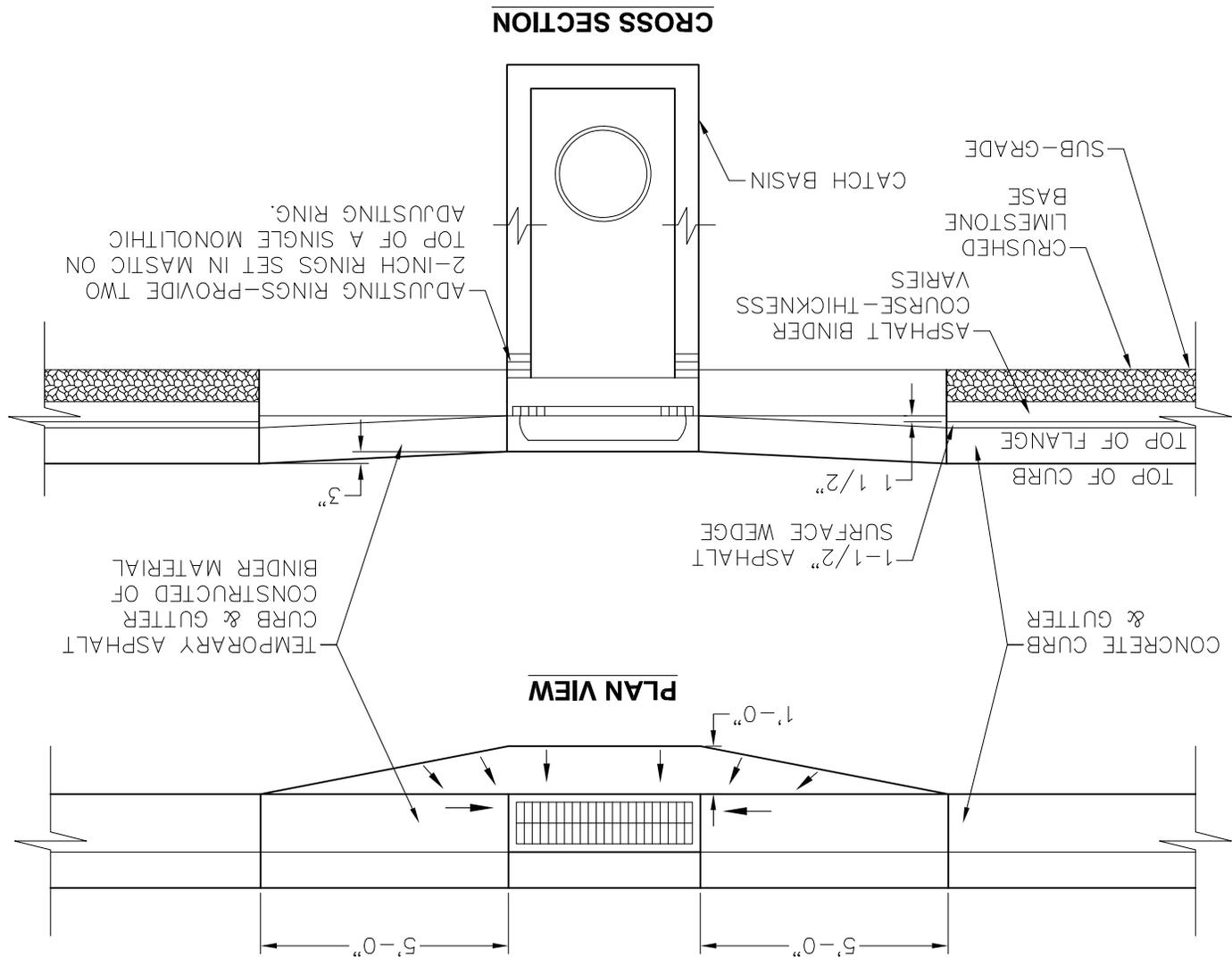
**EXHIBIT STO-04**

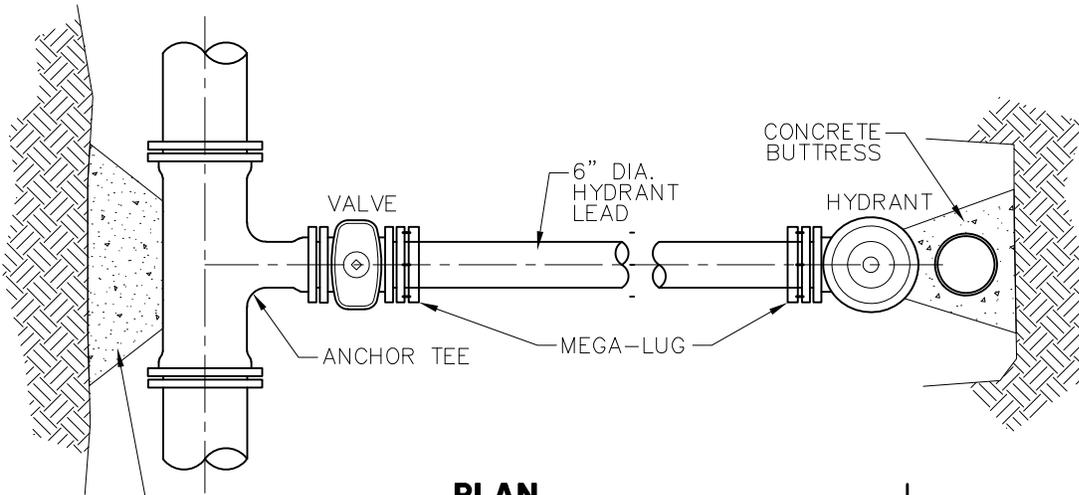
# EXHIBIT STO-05

## INTERIM CATCH BASIN

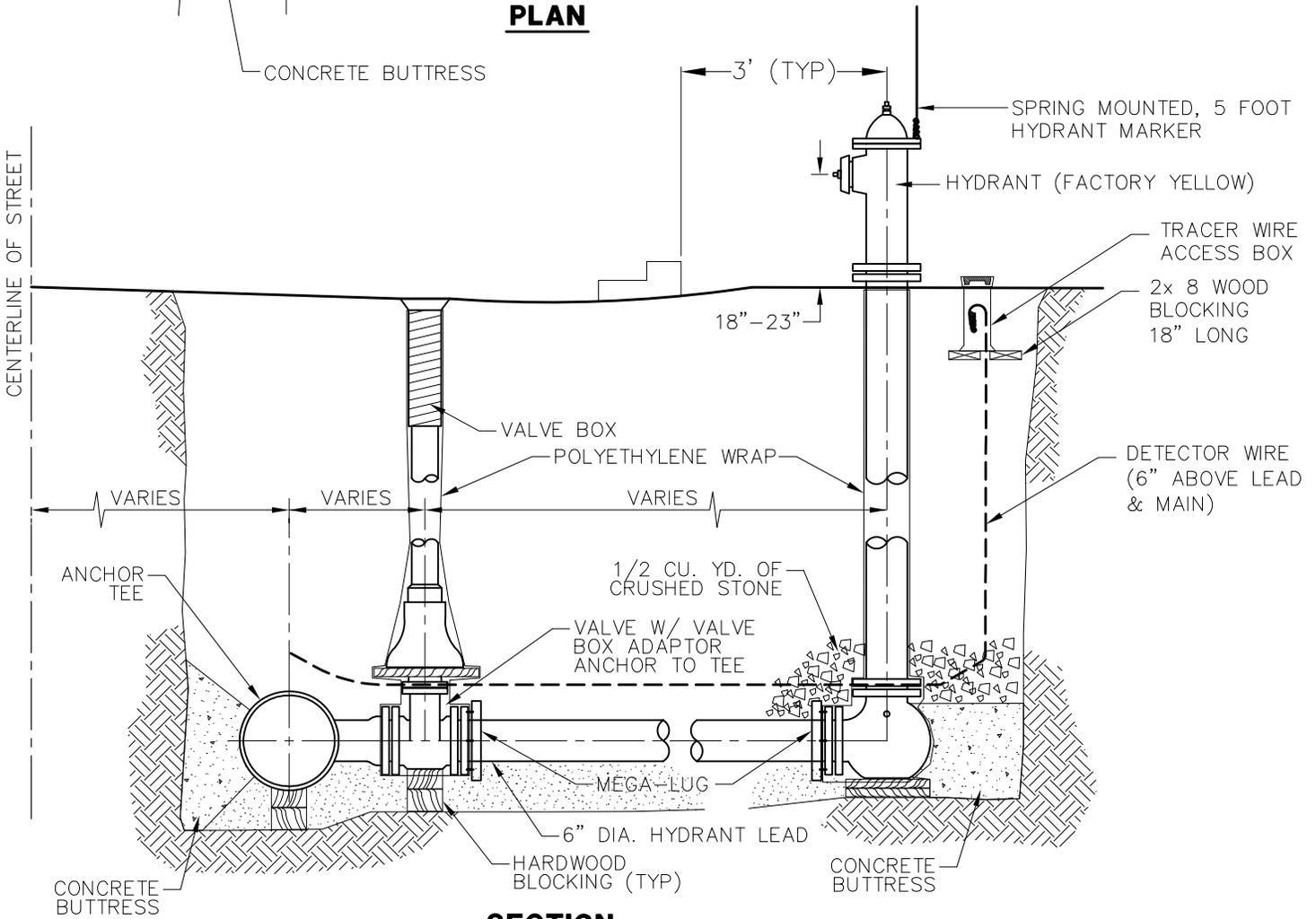
STO-CB-07 32  
 NO SCALE

NOTE:  
 TEMPORARY BITUMINOUS CONCRETE CURB AND GUTTER TO REMAIN IN PLACE UNTIL FINISHED ASPHALT SURFACE COURSE IS SCHEDULED. PRIOR TO REPLACEMENT OF ASPHALT SURFACE COURSE, CONTRACTOR TO REMOVE TEMPORARY ASPHALT BINDER, CURB AND GUTTER, ADJUST FRAME TO PROPER GRADE AND POUR CONCRETE CURB AND GUTTER





**PLAN**



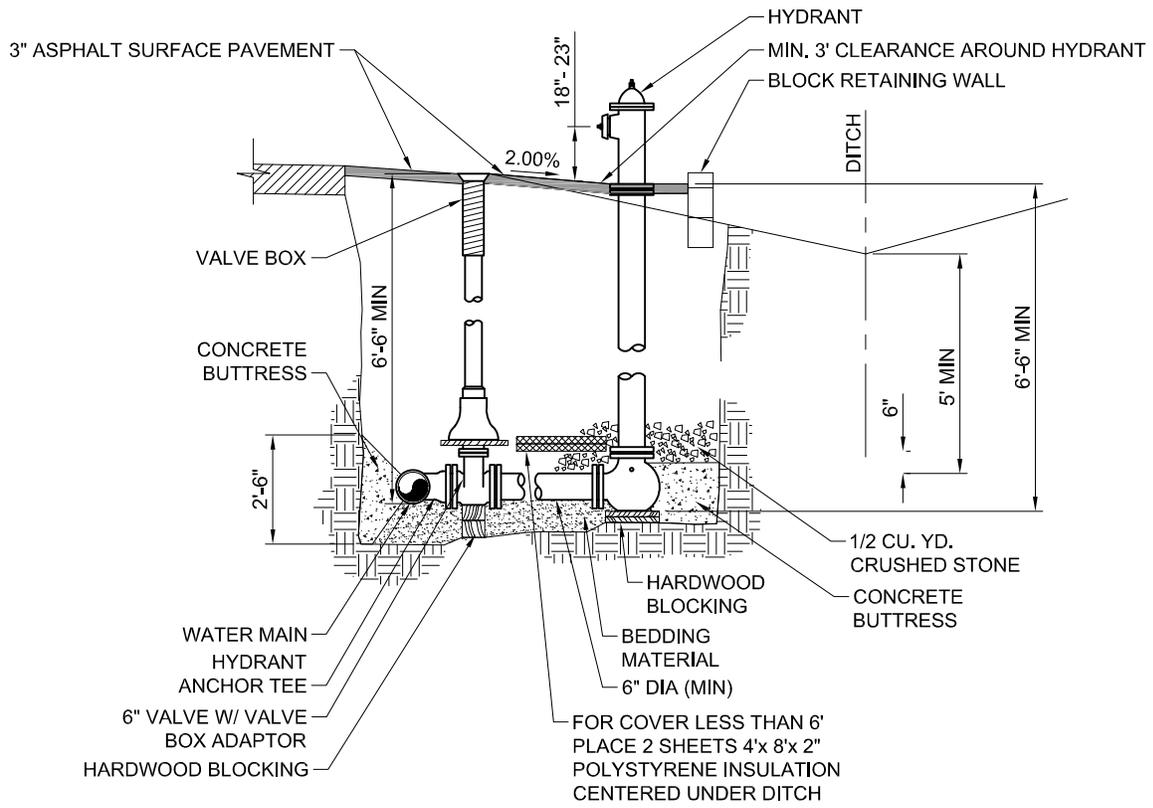
**SECTION**

NOTE :  
REFER TO FILE NO. 38 OF THE "STANDARD SPECIFICATIONS  
FOR SEWER AND WATER CONSTRUCTION IN WISCONSIN" FOR  
FURTHER INFORMATION

HYDRANT LEADS SHALL BE RESTRAINED

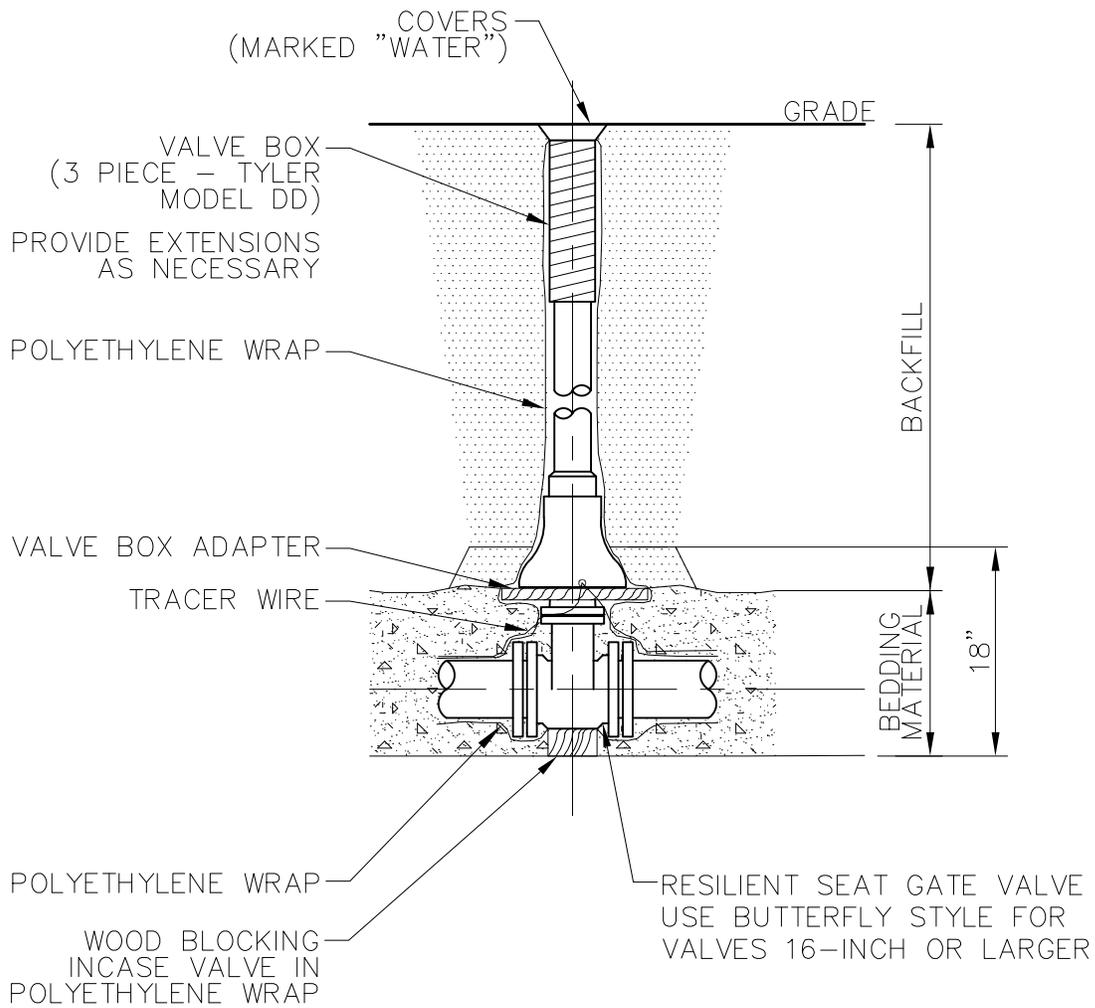
**HYDRANT SETTING DETAIL**

NO SCALE



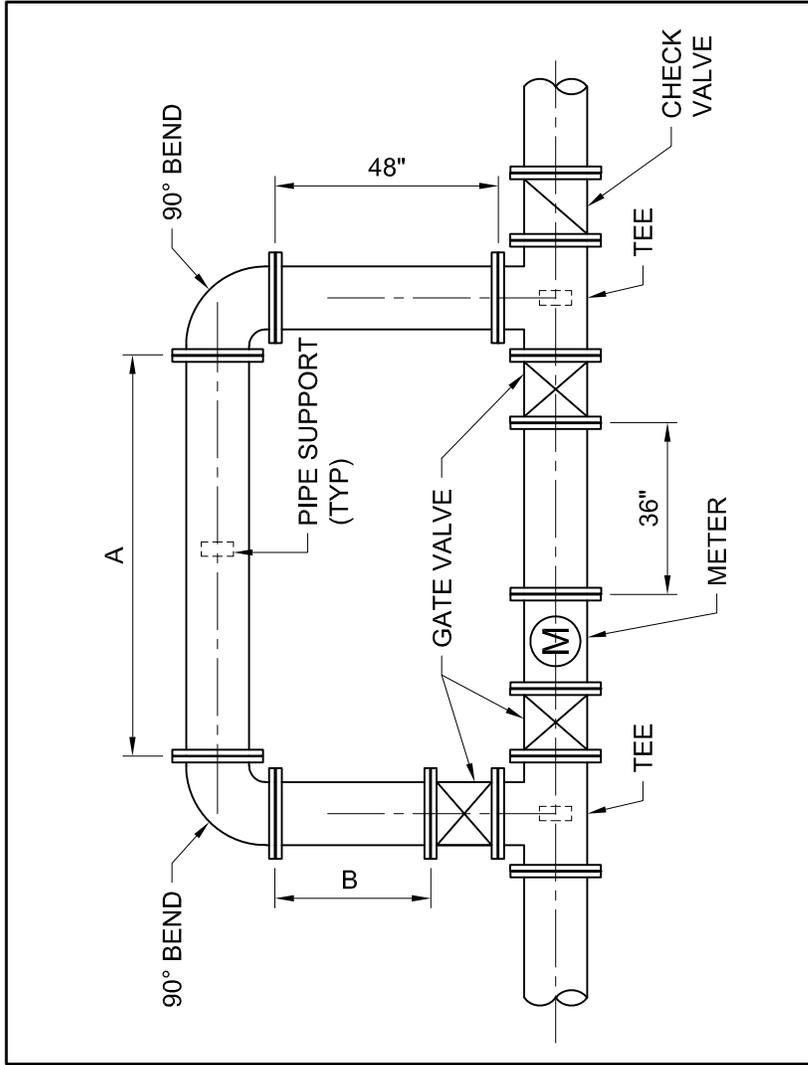
**DITCHLINE HYDRANT RETAINING WALL**

NO SCALE



## STANDARD GATE VALVE BOX SETTING

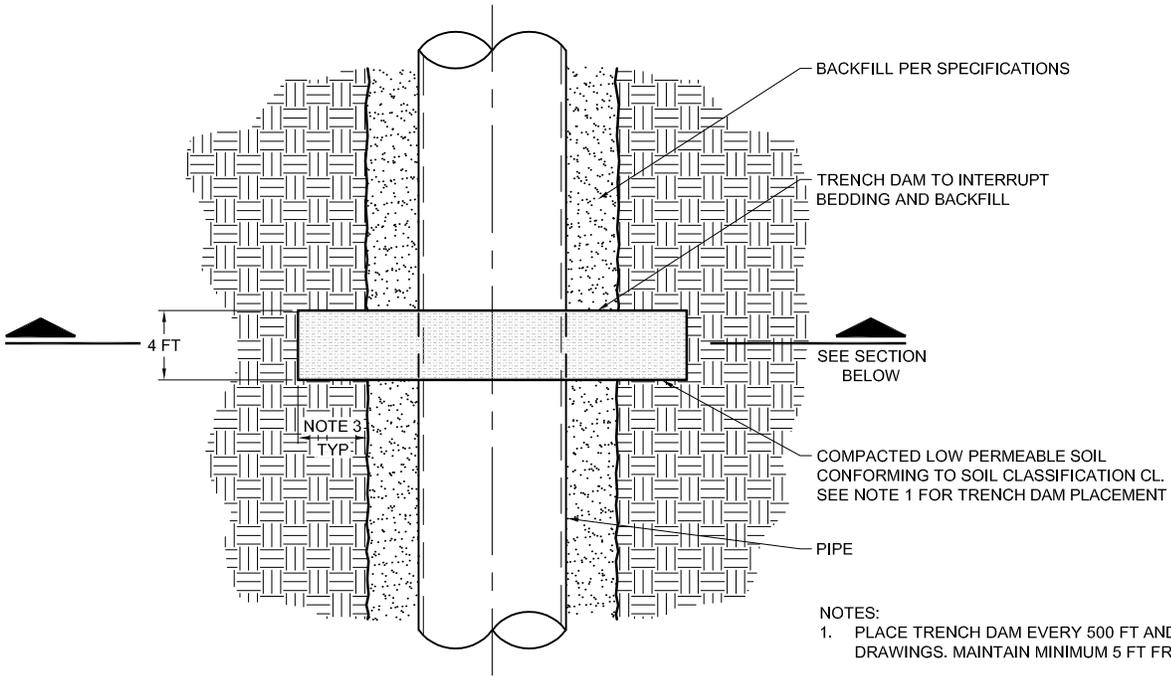
NO SCALE



- NOTES:
- CHECK VALVE ONLY REQUIRED IF LOOPED INTO SYSTEM, SINGLE FEED NOT REQUIRED.
  - PROVIDE SMOOTH BORE SAMPLE TAP.
  - PROVIDE POURED CONCRETE FLOOR SLOPED TO DRAIN.
  - ALL METERS SHALL HAVE LIFTING EYE CENTERED ON METER.
  - ROOM SHALL HAVE DOUBLE SWINGING ENTRY DOORS.
  - PROVIDE PAVED ACCESS DRIVE TO ENTRYWAY.
  - INSTALL TEST PORT THROUGH WALL TO EXTERIOR OF BUILDING.
  - PROVIDE 48-INCHES OF CLEARANCE BETWEEN PIPING AND WALLS.
  - CENTERLINE OF MAINLINE PIPE SHALL BE 18"-24" OFF SURFACE ELEVATION.
  - NO UNDERGROUND VAULT STRUCTURES ALLOWED.

PIPE / METER SIZE	A	B	DISTANCE FROM METER TO DOWNSTREAM CHECK VALVE
4"	87 <sup>3</sup> / <sub>8</sub> "	38 <sup>7</sup> / <sub>8</sub> "	20"
6"	102 <sup>3</sup> / <sub>8</sub> "	37 <sup>3</sup> / <sub>8</sub> "	30"
8"	112 <sup>3</sup> / <sub>8</sub> "	36 <sup>3</sup> / <sub>8</sub> "	40"

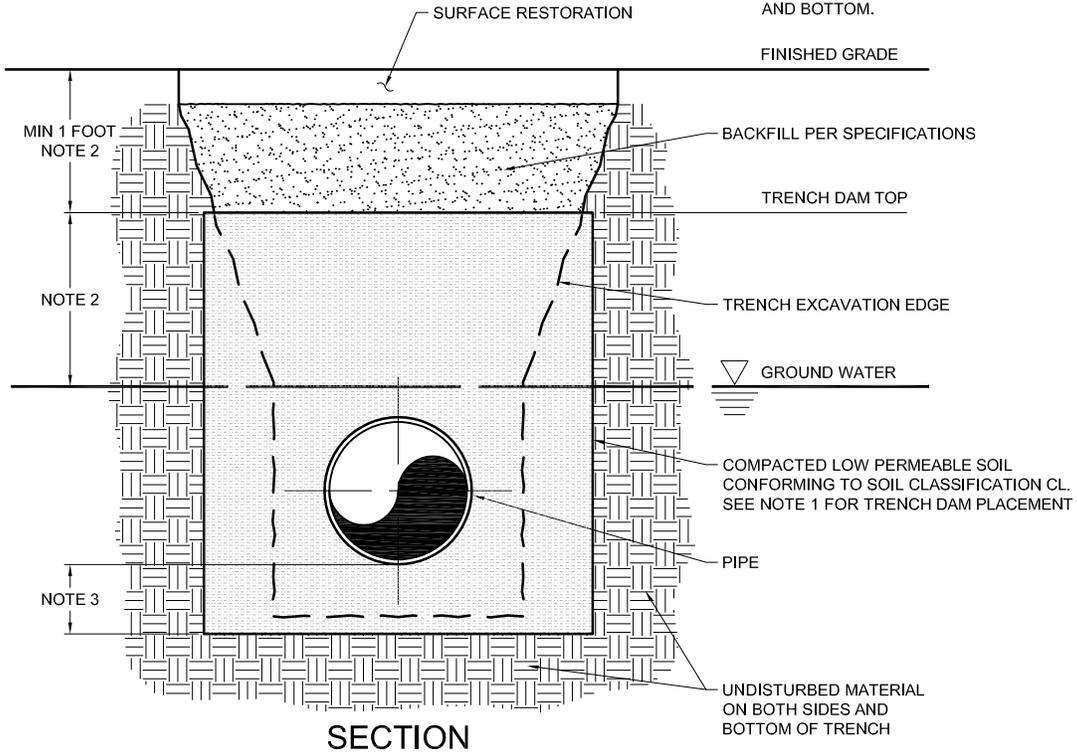
**WATER METER LAYOUT PLAN**  
 NO SCALE  
 Z-018-WM-02-WATER METER VAULT DETAIL



PLAN

NOTES:

1. PLACE TRENCH DAM EVERY 500 FT AND WHERE SHOWN ON DRAWINGS. MAINTAIN MINIMUM 5 FT FROM MANHOLES.
2. EXTEND TRENCH DAM TOP A MINIMUM OF 5 FT ABOVE GROUND WATER LEVEL, OR MAINTAIN A MINIMUM DEPTH OF ONE FOOT BELOW FINISHED GRADE (WHICHEVER ELEVATION IS LOWER). GROUND WATER DETERMINED BY NEAREST BORING OR BY ENGINEER.
3. NOTCH TRENCH DAM A MINIMUM OF 2 FT BEYOND UNDISTURBED MATERIAL ON TRENCH EXCAVATION SIDES AND BOTTOM.



SECTION

TRENCH DAM

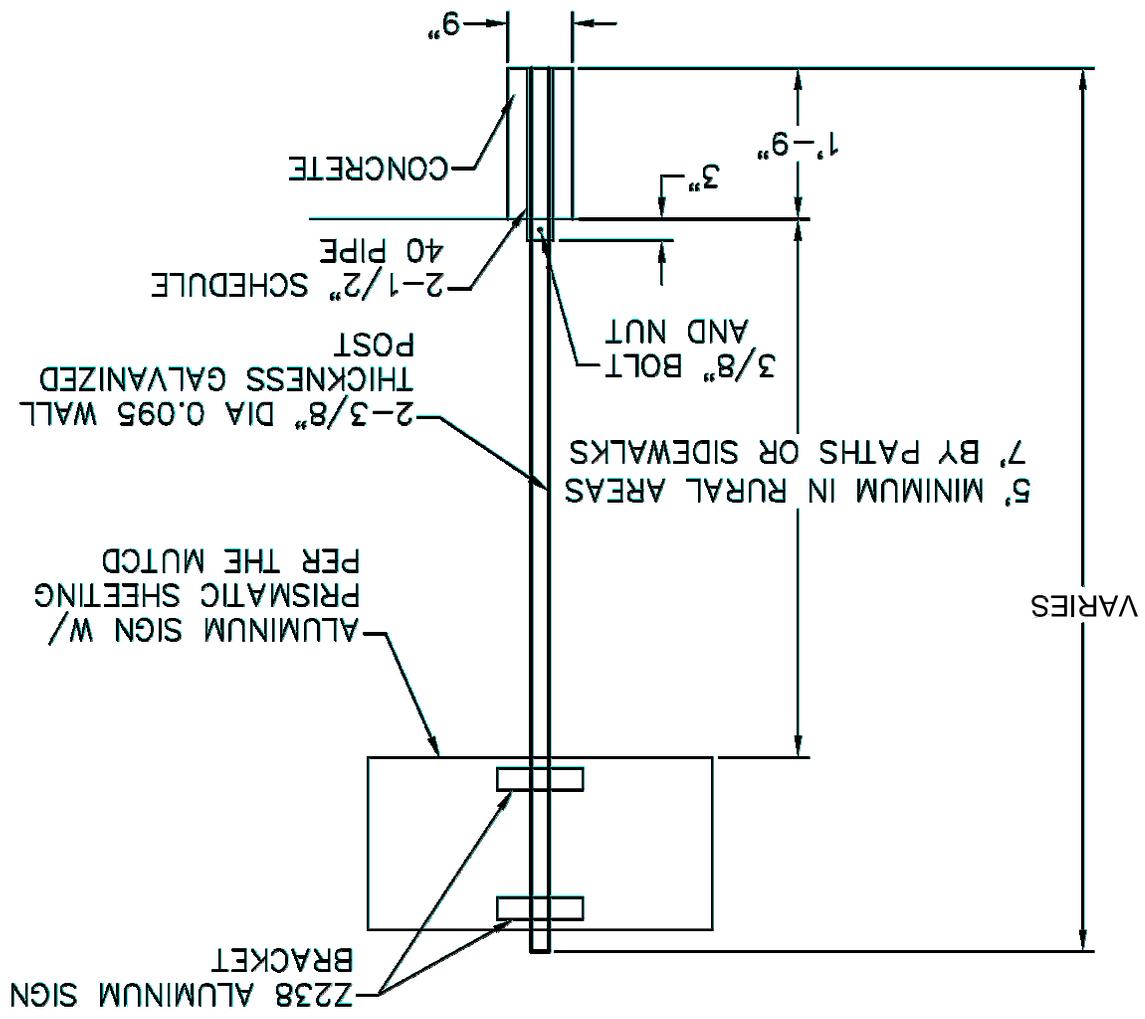
NO SCALE (32) CDT-TRENCH DAM

EXHIBIT GN-01

**SIGN POST DETAIL IN PAVEMENT**  
 NO SCALE

Sign post detail in pavement 2

ALL SIGN INSTALLATIONS TO MEET MUTCD STANDARDS.  
 SIGNS TO BE HELD TO THE BRACKETS WITH STAINLESS STEEL NYLON LOCK NUTS.  
 ALL PEDESTRIAN AND SCHOOL CROSSING SIGNS HAVE TO BE FYGHIP.  
 STREET NAME PLATES SHALL BE 9" BLADE WITH 6" UPPER/LOWER CASE LETTERING, WHITE  
 ON GREEN LETTERING. (FOR PRIVATE ROADS LETTERING IS WHITE ON BLUE)



**EXHIBIT GN-02**

Sign post detail in rural 2

NO SCALE

**SIGN POST DETAIL IN UNPAVED AREAS**

ALL SIGN INSTALLATIONS TO MEET MUTCD STANDARDS.  
 SIGNS TO BE HELD TO THE BRACKETS WITH STAINLESS STEEL NYLON LOCK NUTS.  
 ALL PEDESTRIAN AND SCHOOL CROSSING SIGNS HAVE TO BE F.Y.G.I.P.  
 STREET NAME PLATES SHALL BE 9" BLADE WITH 6" UPPER/LOWER CASE LETTERING, WHITE  
 ON GREEN LETTERING. (FOR PRIVATE ROADS LETTERING IS WHITE ON BLUE)

