STORM SEWER INTERIM REMEDIAL MEASURES WORK PLAN FOR COURT STREET BUILDING 5/5A

TOWN OF DEWITT, NEW YORK

Prepared for

Lockheed Martin Corporation
Syracuse, New York

June 1997

Prepared by

EMCON
Crossroads Corporate Center
One International Blvd., Suite 700
Mahwah, New Jersey 07495

Project 86143-002.000

CONTENTS

1 INTRODUCTION

This document presents a Work Plan for conducting Interim Remedial Measure (IRM) activities at the former General Electric (GE) Court Street Plant (CSP-5/5A) site located in the Town of Dewitt, Onondaga County, New York. This IRM Work Plan is being prepared in accordance with Section V, Paragraph G, of the Order on Consent (Index No. D7-0001-96-05) for the site between the New York State Department of Environmental Conservation (NYSDEC) and Lockheed Martin Corporation (LMC). The site is classified as a Class 3 site on the New York State Registry of Inactive Hazardous Waste Disposal Sites (No. 734070).

This IRM Work Plan describes activities designed to mitigate groundwater infiltration into the site's storm sewer system which may be the source of volatile organic compounds (VOCs) detected in the storm system outfalls.

1.1 Site Location

CSP-5/5A is located at the intersection of Deere and Tarbell Roads in the Town of Dewitt, Onondaga County, New York. The site is located south of the New York State Thruway, west of the Carrier Circle, as shown on Figure 1.

West of the site is the South Branch of Ley Creek, and to the north is Sanders Creek, as shown on Drawing 1.

1.2 Background

Previous use of the site by GE, included a number of underground storage tanks (USTs), and a solvent storage pad for storage of virgin solvents and thinners. Subsurface investigations performed in 1992 indicated that VOC-impacted soil and groundwater were present at the site, primarily along the western site boundary, adjacent to CSP-5. Three source areas were identified including the former USTs, the solvent storage pad, and an area adjacent to a former metal garage at the southwest corner of CSP-5. In 1992, IRMs were completed to remove contaminated soils from these areas. Groundwater which accumulated in the excavations was also removed from the site.

Confirmatory sampling indicated that the majority of VOC-impacted soils in the former UST area and the former solvent storage pad area were removed, and that complete removal was performed adjacent to the former metal garage. A Remedial Action Plan (RAP) was prepared in 1993, which recommended collection and treatment of groundwater on-site to mitigate off-site migration of residual VOCs in groundwater. This RAP in combination with the previous source (soils) removals was proposed to reduce the volume of VOCs in the site soils and groundwater, and to control the areal migration of impacted groundwater.

The original storm sewer system at the site consisted of bell and spigot, clay tile piping with brick catch basins. This type of construction typically allows infiltration of groundwater into the piping and catch basins. In 1992 and 1993, additional IRM activities related to the storm sewer system, were completed to prevent groundwater infiltration from VOC-impacted areas. These activities included abandonment and relocation of catch basins, grouting of existing sections of clay tile piping, and installation of new storm sewer piping. Post-IRM sampling of the outfalls confirmed that the IRMs were successful in mitigating the infiltration of VOCs to the storm system at that time.

Recent storm sewer outfall sample results, collected as part of a Remedial Investigation/Feasibility Study (RI/FS), were received in April of 1997. These results indicated that low-level VOCs were present in the Sanders Creek and Ley Creek storm sewer outfalls (OF-01 and OF-02, respectively, as shown on Drawing 1), as described below.

Sanders Creek Outfall (OF-01)

Preliminary laboratory data from the March 1997 sampling indicate that a total of 269 parts per billion (ppb) of VOCs were detected at this outfall. The compounds detected in the outfall (vinyl chloride, 1,1-dichloroethane, 1,2 dichloroethene) were also detected in MW-16S. MW-16S is located adjacent to the storm sewer line between catch basins CB-3 and CB-4. This segment of storm sewer was not replaced during IRMs conducted at the site in 1992 and 1993. The construction of this segment of storm sewer is bell and spigot clay tile pipe which may allow infiltration of groundwater into the storm sewer system.

In order to minimize or eliminate the impacts of any groundwater infiltration to OF-01 from the storm sewer between CB-3 and CB-4, LMC installed a gasketed pressure plug into the inlet and outlet of CB-3, and an inflatable packer into the inlet of CB-4. In addition, a gasketed pressure plug was installed in the outlet of CB-2 to prevent stormwater buildup in the pipe between CB-2 and CB-3. In the event of significant ponding adjacent to CB-3, stormwater will be pumped from CB-3 into CB-4 for discharge to Sanders Creek.

In addition, LMC utilized remote video equipment to observe the condition of the storm sewer piping between CB-4 and outfall OF-01 to identify areas of groundwater infiltration. Although significant gaps were observed at the joints of the bell and spigot clay tile piping along the entire segment, areas of visible groundwater infiltration were limited to the first 25 to 50 feet of pipe north of CB-4. This is most likely due to the fact that the groundwater elevation closer to Sanders Creek is below the invert elevation of the storm sewer piping.

Ley Creek Outfall (OF-02)

Preliminary laboratory data from the March 1997 sampling indicate that a total of 44 ppb of VOCs were detected at this outfall. A significant portion of the storm sewer system was replaced as part of an IRM conducted in 1992 and 1993, to eliminate the infiltration of contaminated groundwater into the system. Observations of the catch basins indicates that groundwater is entering the system near catch basin CB-5 and the storm sewer lines east and south of CB-7. Although CB-5 was replaced as part of the previous IRM, settling has separated a joint in the manhole which is below the groundwater table. The portion of storm sewer system east and south of CB-7 was not replaced during the 1992 and 1993 IRMs, but groundwater in this area is not believed to be impacted.

LMC repaired CB-5 to minimize or eliminate the infiltration of groundwater. This repair was completed using a hydraulic cement to seal the joint.

In addition, LMC utilized remote video equipment to observe the condition of the storm sewer piping between CB-1, CB-5, CB-7, CB-10, and outfall OF-02 to identify areas of groundwater infiltration. The sections of piping which were replaced during the 1992 and 1993 IRMs did not appear to be subject to groundwater infiltration. The bell and spigot clay tile piping east and south of CB-7 did show signs of groundwater infiltration around the joints. However, groundwater in this area of the site is not believed to be impacted.

2 INTERIM REMEDIAL MEASURES

2.1 Description of IRM Work

Based on the results of the activities described above, LMC recommends the following additional activities in order to minimize or eliminate the potential for groundwater infiltration into the storm sewer system.

To address discharges to Sanders Creek, LMC will complete the following activities:

1. Abandon (pressurized grout) approximately 310 feet of the bell and spigot clay tile pipe from CB-3 to OF-1 as described in Section 2 of the Technical Specifications (Appendix A).

2. CB-4 (old brick catch basin) will be replaced with a new catch basin CB-4A at the present location of CB-4.

3. A new catch basin and outfall (CB-20 and OF-1A (Drawing 1) will be installed.

4. LMC will install new SDR 35 piping connecting the catch basins as shown on Drawing 1. The existing invert of OF-01 will be matched at OF-01A. Existing CB-4 inverts will be matched in CB-20. The outlet invert elevation of the new CB-4A will be set to provide drainage to CB-20.

5. Restore asphalt pavement affected by the replacement activities.

6. Restore grading and vegetative cover along areas north of the fenceline affected by replacement activities.

To address discharges to Ley Creek, LMC will conduct the following activities:

1. Replace CB-5 with a one-piece manhole which will not be subject to future separation due to settling.

2. Restore asphalt pavement affected by the replacement activities.

During construction, the contractor will be responsible for maintaining control of stormwater runoff at the site, and for preventing stormwater run-on to the work area.

Stormwater runoff control can be provided using temporary pumping equipment at the CB-4/CB-4A location or other approved method.

Because some of the proposed construction is below the groundwater table, the contractor will be responsible for control of groundwater to keep excavations relatively free of standing water during construction. Knowing that groundwater in certain areas of the proposed work is VOC-contaminated, the contractor will direct groundwater removed during dewatering to storage containers provided by LMC. Dewatering is described further in Section 2 of the Technical Specifications (Appendix A).

Excavated soils and groundwater from dewatering activities will be contained and staged on-site by the contractor for waste classification and off-site disposal by LMC. LMC will provide containers for these materials. As provided for in Section 2 of the Technical Specifications, unsaturated soils excavated from areas north of the fence line near Sanders Creek may be reused as backfill north of the fence line.

The Technical Specifications governing each item of work are included in Appendix A of this Work Plan. Please refer to the Technical Specifications for specific aspects of the components of IRM construction.

2.2 Project Access

Access agreements have been obtained by LMC to allow access for the IRM work described herein. Separate easements allow for access to the former GE facility property (i.e., within the fenceline), and the property north of the fenceline (i.e., between Sanders Creek and the northern portion of the fence line).

The United States Army Corps of Engineers (USACE) was contacted to confirm applicability of this IRM project under Nationwide Permit No. 3 (Maintenance). USACE personnel confirmed that the replacement of OF-01 would qualify as a Nationwide Permit No. 3 activity. Therefore, no individual Section 404 permit is required. Nationwide Permit No. 3 does not require pre-discharge notification.

3 CONFIRMATORY SAMPLING

Following installation of the CB-5 replacement manhole, LMC will collect one sample of water from OF-02 (Ley Creek) during dry weather flow conditions. The sample will be analyzed for Target Compound List (TCL) VOCs by NYSASP Method 95-4. The effectiveness of the IRM at OF-1 (Sanders Creek) will be evaluated based on the presence or absence of flow during dry weather conditions. Based on this data, LMC and NYSDEC will determine if additional IRMs with regard to the storm sewer are necessary.

Sampling of OF-2 and observation of OF-1 flow, will be repeated in April 1998.

The samples will be collected in accordance with the RI/FS Work Plan. In addition to the environmental samples, one each of the following will be collected/analyzed in accordance with the Quality Assurance Project Plan of the RI/FS Work Plan:

- Trip Blank
- Field Blank
- Field Duplicate
- Matrix Spike
- Matrix Spike Duplicate
- Matrix Spike Blank

4 HEALTH AND SAFETY

All work specified in this Work Plan will be performed in accordance with the Health and Safety Plan, Court Street 5/5A Site (BB&L, August 1996), the Site-Specific Health and Safety Plan Addendum #1 - Construction Addendum, Court Street 5/5A Site (EMCON, May 1997), and all applicable Federal and State occupational safety regulations. In addition, all contractor employees working at the site will have successfully completed the LMC Contractor Safety Training within 12 months prior to site work.

5 ENGINEERING CERTIFICATION

LMC will prepare a final engineering report following IRM construction and initial confirmatory sampling. This report will include a certification that all activities were completed in accordance with the NYSDEC-approved Work Plan. The final engineering report will include "as-built" drawings (including any changes made to the Remedial Design during construction). The "as-built" drawings, final engineering report, and certification will be prepared, signed and sealed by a professional engineer.

6 SCHEDULE

The schedule for completion of the IRM work described herein includes final NYSDEC review and approval of this Work Plan, contractor procurement, construction activities, confirmatory sampling and preparation of a final engineering report. The IRM construction activities described herein will be completed within two to four weeks from receipt of NYSDEC approval of this Work Plan. Individual scheduled items are listed below.

Schedule Item	Estimated Time Frame	Completion Date
1. Submit Work Plan to NYSDEC		June 25, 1997
2. NYSDEC Review and Approval	Within 2 weeks of Work Plan Submittal	July 9, 1997
3. Contractor Procurement	Within 2 weeks of NYSDEC approval of Work Plan	July 23, 1997
4. Begin Construction	Within 1 week following Contractor procurement	July 30, 1997
5. Complete Construction	Within 2 weeks following Contractor procurement	August 13, 1997
6. Initial Confirmatory Sampling	Within 2 weeks following completion of construction	August 27, 1997
7. Receive Laboratory Analysis	Within 4 weeks following sampling	September 24, 1997
8. Engineering Report	Within 4 weeks following receipt of analytical data	October 22, 1997
7. Follow-up Confirmatory Sampling		April 1998

FIGURES

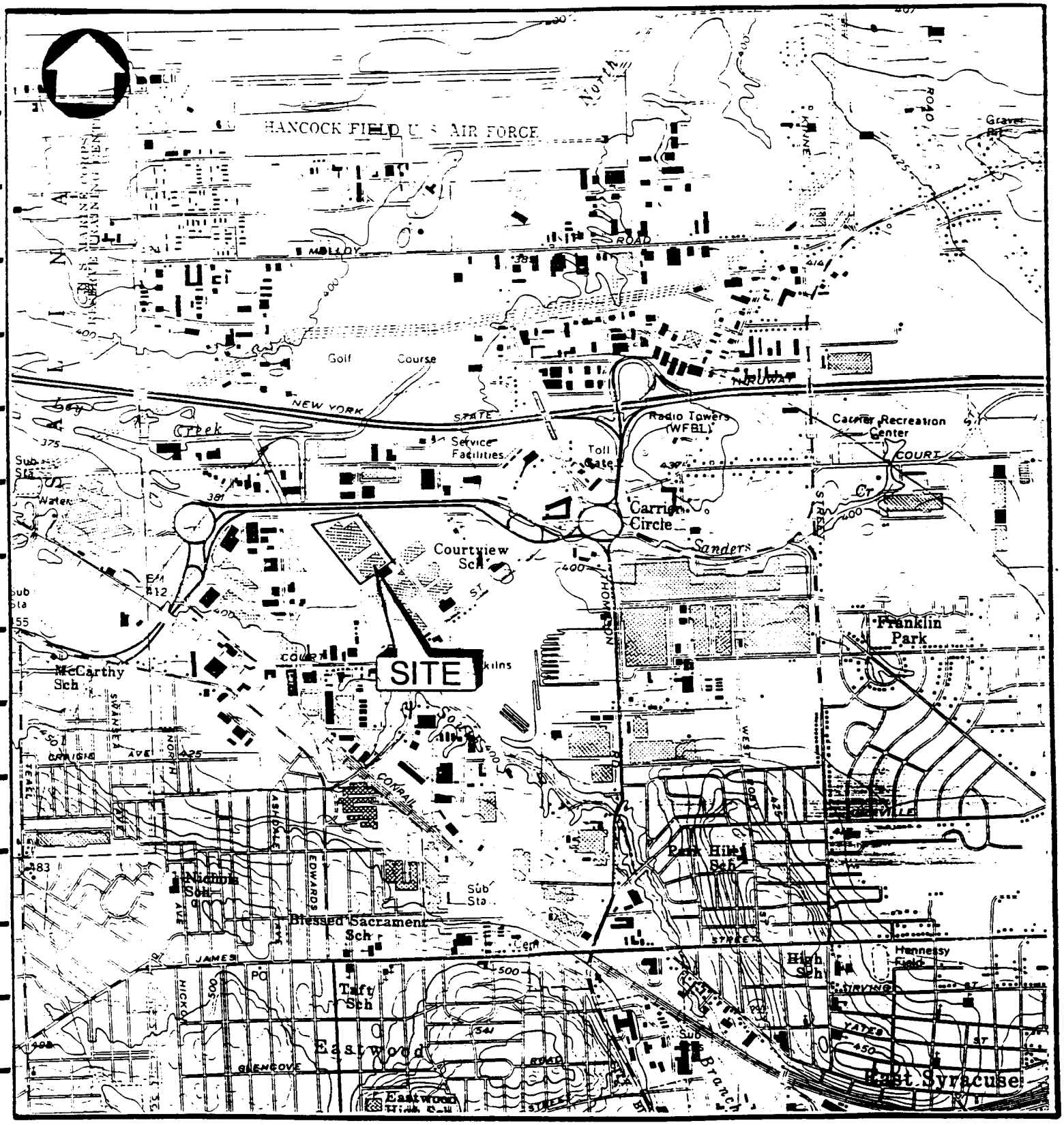


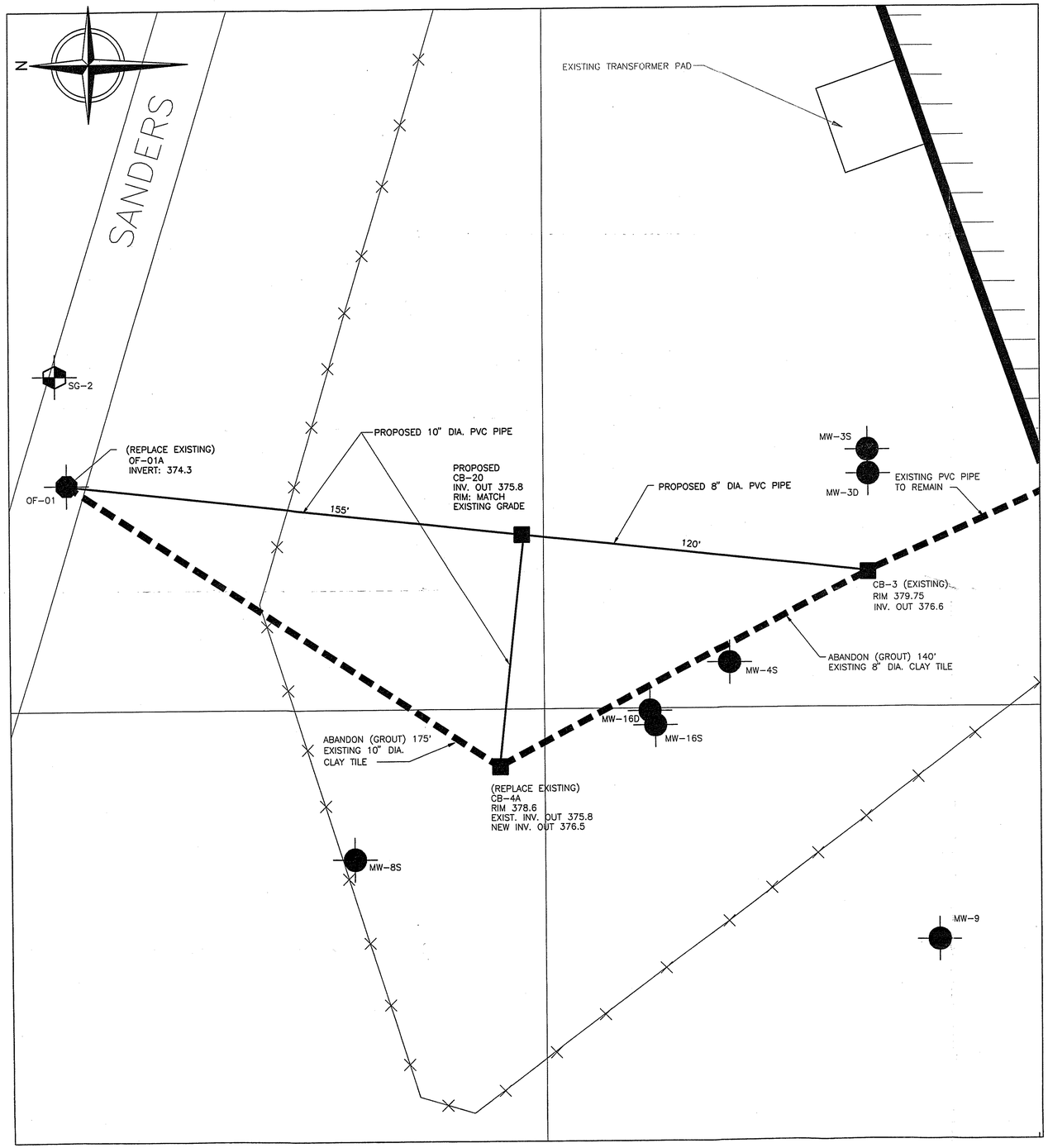
FIGURE 1

SITE LOCATION MAP

FORMER GE COURT STREET 5/5A SITE
DEWITT, NEW YORK

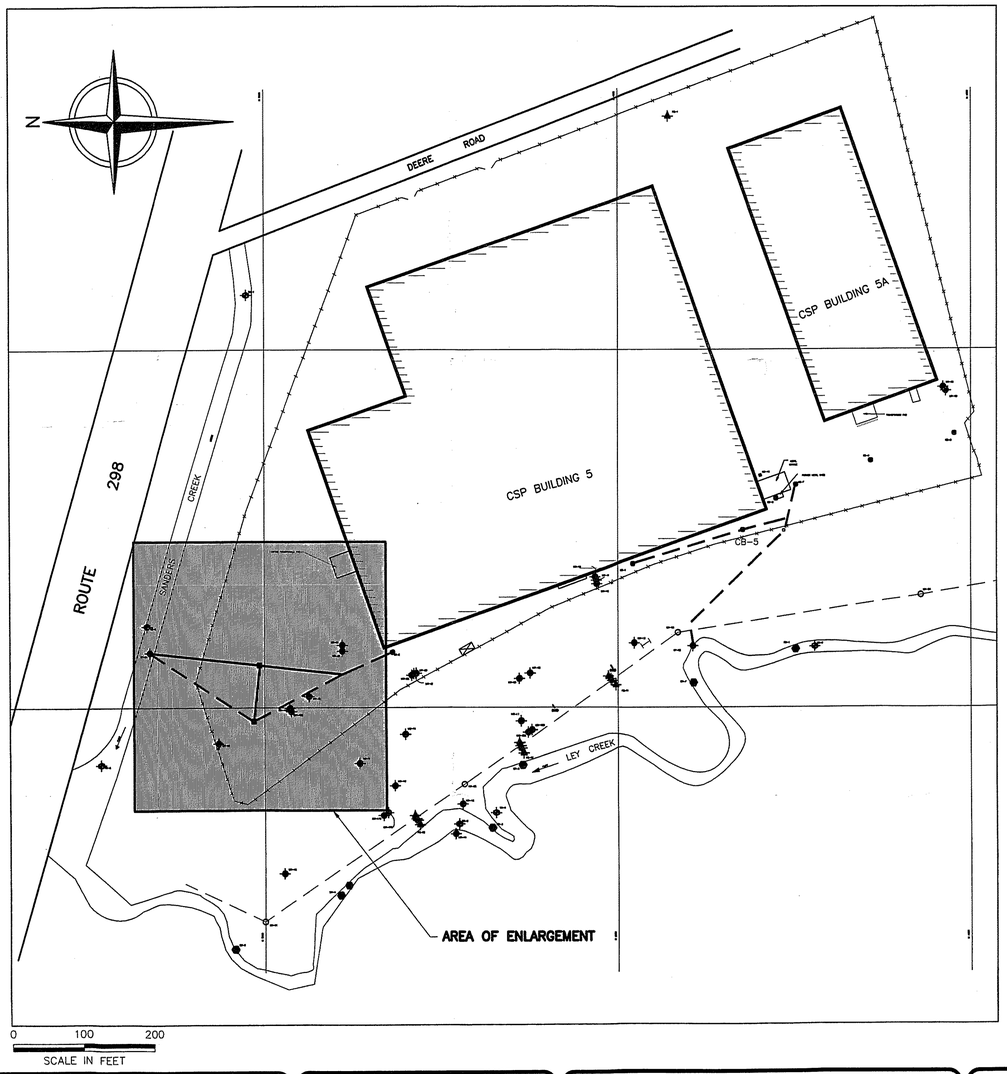
SOURCE: 1957 U.S.G.S EAST SYRACUSE QUADRANGLE
7.5 MIN. SERIES PHOTOREVISED 1978

DRAWINGS



LEGEND:

- MW — EXISTING MONITORING WELL
- SG — EXISTING STAFF GAUGE
- CB — STORM DRAIN CATCH BASIN
- OF — EXISTING STORMWATER OUTFALL
- EXISTING STORM SEWER LINE



MARK A. SWYKA, P.E.
N.Y.P.E. Lic. No. 64543
Date 6/23/97

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
DATE OF ISSUE 6/97		DWN BY A.K. / DES BY C.T.	CHK BY / APP BY			

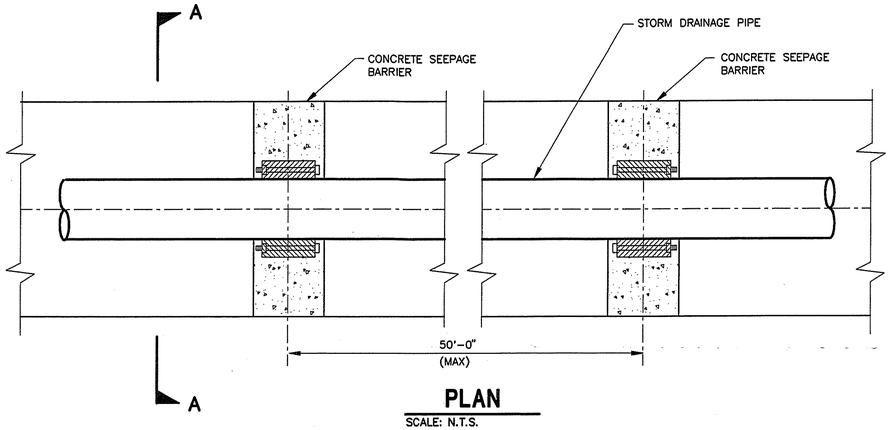
emcon

LOCKHEED MARTIN CORPORATION
FORMER GE COURT STREET BUILDING 5/5A
TOWN OF DEWITT, ONONDAGA COUNTY, NEW YORK

PROPOSED STORM SEWER IRM

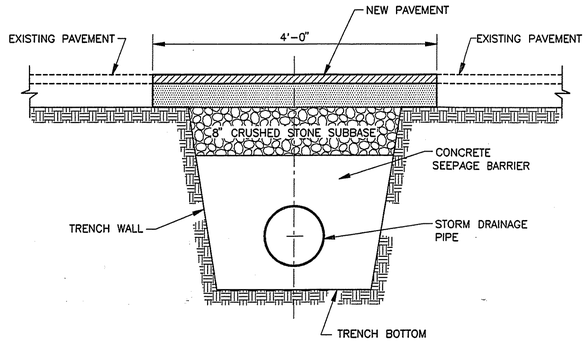
DRAWING NO. 1
PROJECT NO. 86143-001.000

1" 1/2" 0" 1"



PLAN

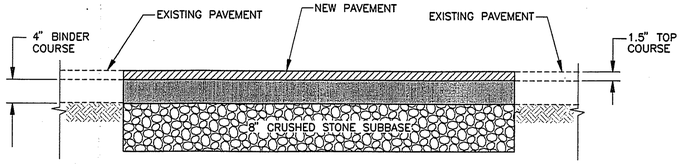
SCALE: N.T.S.



SECTION A

SCALE: N.T.S.

MALMD-02

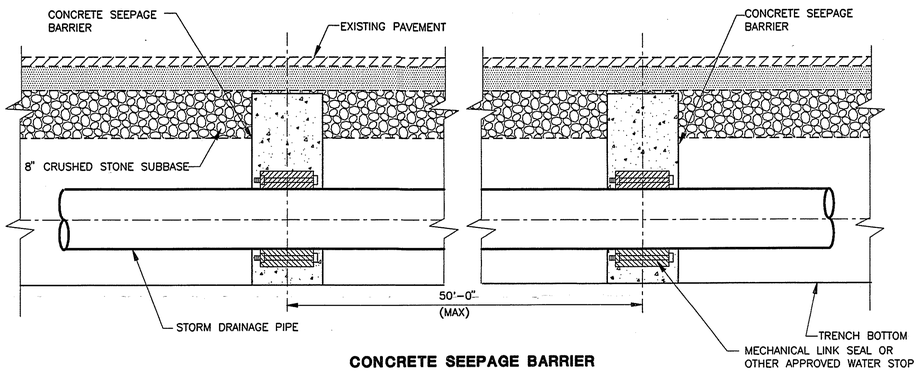


PAVEMENT RESTORATION

DETAIL

SCALE: N.T.S.

MALMD-03

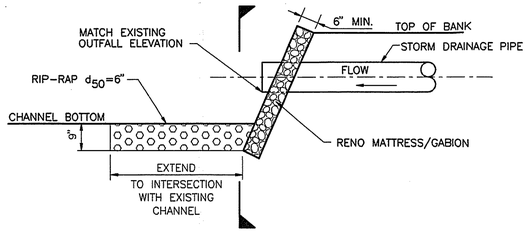


CONCRETE SEEPAGE BARRIER

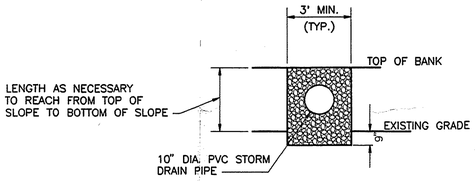
PROFILE

SCALE: N.T.S.

MALMD-01



ELEVATION



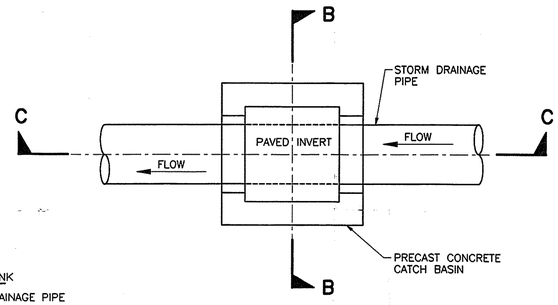
SECTION

STORM DRAINAGE PIPE OUTLET

DETAIL 3 (2 | 2)

SCALE: N.T.S

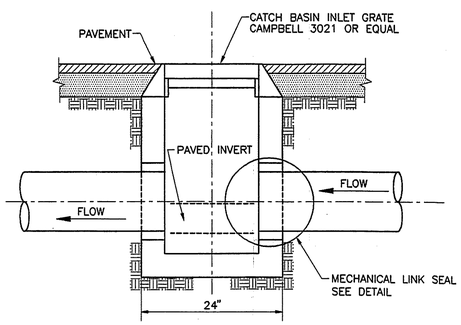
MALMD-09



CATCH BASIN

PLAN

SCALE: N.T.S.

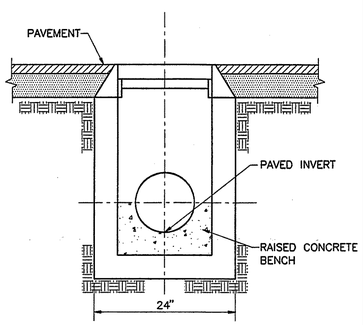


CATCH BASIN

SECTION C (2 | 2)

SCALE: N.T.S.

MAMLD-04

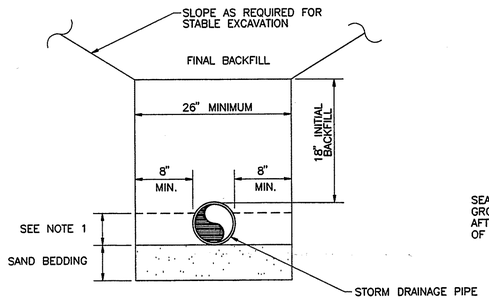


CATCH BASIN

SECTION B (2 | 2)

SCALE: N.T.S.

MAMLD-04



NOTES:

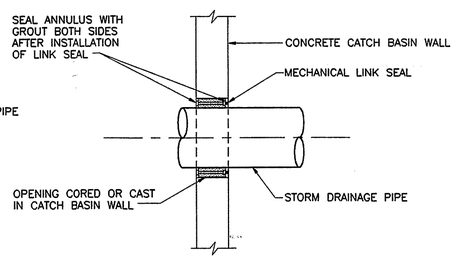
1. CARE SHALL BE TAKEN TO INSURE THAT FILL IS MADE COMPACT AND FROM THE BOTTOM OF THE PIPE TO A MINIMUM HEIGHT OF 70 PERCENT OF THE PIPES OUTSIDE DIAMETER.
2. INITIAL BACKFILL SHALL BE MADE IN 8"-10" LIFTS AND COMPACTED USING HAND OPERATED EQUIPMENT.

PIPE BEDDING

DETAIL 1 (2 | 2)

SCALE: N.T.S.

MALMD-06



TYPICAL MANHOLE PENETRATION

DETAIL 2 (2 | 2)

SCALE: N.T.S.

MALMD-05

MARK A. SWYKA, P.E.

N.Y.P.E. Lic. No. 64543 — 6/20/97 Date

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DATE OF ISSUE 6/97 — DWN BY A.K. — DES BY C.T. — CHK BY — APP BY

emcon

LOCKHEED MARTIN CORPORATION
FORMER GE COURT STREET BUILDING 5/5A
TOWN OF DEWITT, ONONDAGA COUNTY, NEW YORK

DETAILS

DRAWING NO. 2

PROJECT NO. 86143-001.000

1" 1/2" 0" 1"

APPENDIX A

TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

SECTION 00010
CONTRACTOR SPECIAL CONDITIONS

1. PART 1 - GENERAL

1.1 OSHA COMPLIANCE

A. The performance of this work is covered by OSHA 29 CFR 1910.120(e). As such, all contractor employees shall have completed 40 hour safety training and shall have attended annual 8-hour refresher training. All trenching shall be performed in accordance with 29 CFR 1926.650-652.

1.2 ENVIRONMENT SAFETY AND HEALTH TRAINING

A. All Contractor employees working at the site shall have successfully completed the LMC Contractor Safety Training within 12 months prior to working at the site.

1.3 WORK PLAN

A. The Contractor shall prepare a proposed sequence of work for the performance of the activities covered by this work plan. The Contractor's proposed sequence of work shall be submitted to the Engineer for approval. No work shall be performed prior to approval of the proposed sequence of work.

B. If the Contractor proposes changes to the Work Plan, the Contractor is responsible for the preparation of a Site Operations Plan describing the proposed changes in construction or method of implementation.

C. All Contractor proposed changes to the Work Plan must be approved by the Engineer in writing prior to implementation.

1.4 SAFETY MONITORING

A. The Contractor is responsible for safety monitoring in accordance with the site Health and Safety Plan and Construction Addendum.

B. The site-specific Health and Safety Plan is available to the Contractor upon request.

C. A copy of the site-specific Health and Safety Plan and Construction Addendum will be provided to the successful bidder.

1.5 DEFINITIONS

Owner - Lockheed Martin Corporation, Syracuse, New York
Engineer - EMCON/Wehran-New York, Inc., Crossroads Corporate Center
One International Boulevard, Suite 200, Mahwah, New Jersey 07495
Contractor - Construction Contractor selected by Owner for implementation of activities covered under this Work Plan.

END OF SECTION

SECTION 01502
ENVIRONMENTAL PROTECTION

1. PART 1 - GENERAL

1.1 WORK INCLUDED

A. The Contractor shall furnish all labor, equipment, and materials required for environmental protection during and as the result of construction operations under this Contract except for those measures set forth in other provisions of these Specifications. Environmental protection requires consideration of air, water and land, and involves noise and solid waste management as well as other pollutants.

1.2 RELATED SECTIONS

A. Section 02140 - Dewatering

B. Section 02228 - Waste Material Disposal

1.3 APPLICABLE REGULATIONS

A. In order to prevent environmental pollution and to provide for environmental protection arising from construction activities related to the performance of this Contract, the Contractor and his subcontractors shall comply with all applicable Federal, State, and local laws and regulations concerning environmental protection, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

1.4 SUBMITTALS

A. Implementation Plan

Prior to commencement of the work, the Contractor shall:

1. Submit in writing his plans for implementing this Section for environmental protection.

2. Meet with the Engineer to develop mutual understandings relative to compliance with the provisions of this Section and administration of the environmental protection program.

B. Erosion Sedimentation Plan

1. The Contractor shall submit to the Engineer for approval, a detailed erosion and sedimentation plan sufficiently in advance of construction so as not to delay initiation of work. The plan shall include location and construction details of the Contractor's proposed dikes, basins, etc. In addition, the Contractor shall provide and submit his control measures for stockpile material. No site work may commence without an approved plan. Plan should conform to New York State Guidelines for Urban Erosion and Settlement Control.

2. Contractor is to size the erosion and sediment control system consistent with the NOAA Climatological Summary data for Syracuse, New York provided in the Supplementary General Conditions.

2. PART 2 – PRODUCTS

2.1 GENERAL

A. All materials shall be in accordance with the Contractor's plan for environmental protection.

2.2 MATERIALS

A. Silt Fence

B. Hay

C. Snow Fences

D. Burlap

3. PART 3 - EXECUTION

3.1 PROTECTION OF LAND RESOURCES

A. General - It is intended that the land resources within the project boundaries and outside the limits of permanent work performed under this Contract be preserved in their present condition, or be restored to a condition after completion of construction, that will appear to be natural and not detract from the appearance of the project. The Contractor shall confine his construction activities to areas defined except with written approval of the property owners and the Engineer.

B. Prevention of Landscape Defacement - Limits of working areas include areas for storage of construction material, and shall be cleared in a manner which will enable satisfactory restoration and which will not affect the environment during or after the construction period. The Contractor shall not enter beyond the working limits of the working area except with written approval of the Engineer and Owner.

C. Location of Storage - The location of areas for storage of the Contractor's materials required temporarily in the performance of the work, shall be within the limits of the working area and shall require written approval of the Engineer prior to use. The preservation of the landscape shall be an imperative consideration in the selection of all such sites. Where temporary structures are constructed on sidehills, the Engineer may require cribbing to be used to obtain level foundation. Benching or leveling of earth may not be allowed, depending on the location of the proposed facility.

D. Post-Construction Cleanup or Obliteration - The Contractor shall obliterate all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction. It is anticipated that excavation, filling and paving will be required to restore the area to near pre-construction conditions.

3.2 PROTECTION OF WATER RESOURCES

A. General - The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acids, or harmful materials. It is the responsibility of the Contractor to investigate and comply with all applicable Federal, State, County, and Municipal laws concerning pollution of rivers, streams and impounded water. All work under this Contract shall be performed in such a manner that objectionable conditions will not be created in streams through, or bodies of water adjacent to, the project area.

B. Erosion - Surface drainage from cuts and fills within the construction limits, whether or not completed, and from borrow and waste disposal areas, shall, if turbidity producing materials are present, be held in suitable sedimentation basins or shall be graded to control erosion within acceptable limits. Temporary erosion and sediment control measures such as berms, dikes, drains, or sedimentation basins, if required to meet the above standards, shall be provided and maintained until permanent drainage and erosion control facilities are completed and operative. The area of bare soil exposed at any one time by construction operations should be held to a minimum.

C. Apply temporary mulch on denuded ground immediately after rough grading is completed. This shall apply to all areas not subject to appreciable traffic during construction, even those that are to receive some form of construction later if ground is to be exposed 30 days or more.

D. Upon approval by the Engineer, stream and drainage ditch crossings by fording with equipment shall be limited to control turbidity, and in areas of frequent crossings, temporary culverts or bridge structures shall be installed. Any temporary culverts or bridge structures shall be removed upon completion of the project. Fills and waste areas shall be constructed by selective placement to eliminate silts or clays on the surface that will erode and contaminate adjacent streams.

E. Spillages - At all times of the year, special measures shall be taken to prevent chemicals, fuels, oils, greases, bituminous materials, waste washings, herbicides and insecticides, and cement and surface drainage from entering public waters. Should a spillage into the public waters occur, the Contractor shall immediately notify the proper authorities. The Contractor will be responsible for any and all costs associated with the cleanup of spillages.

F. Washing and Curing Water - Water used in embankment material processing, aggregate processing, concrete curing, foundation and concrete cleanup, and other wastewaters shall not be allowed to reenter the waterway if an increase in the turbidity of the waterway will result therefrom. At the point where this water enters the waterway, precautions must be taken to assure that no permanent damage or serious temporary damage is caused by change of the pH factor of the stream or by introduction of nutrients or oxygen-consuming materials. Chemicals shall be added to adjust pH factor, if required.

G. Disposal - Disposal of any materials, wastes, effluents, trash, garbage, oil, grease, chemicals, etc., in areas adjacent to streams or other waterways shall be strictly prohibited. If any waste material is dumped in unauthorized area, the Contractor shall remove the material and restore the area to the condition of the adjacent undistrubed area. If necessary, contaminated ground shall be excavated, disposed of as specified hereinbefore, and replaced with suitable fill material, compacted and finished with topsoil, all at the expense of the Contractor.

H. Decontamination – All equipment and vehicles that are within an area exposed to contaminants shall be thoroughly washed before leaving the construction site. All runoff from this activity shall be collected and disposed of in a manner consistent with all applicable Federal, State, County, and municipal laws concerning pollution of surface waters.

3.3 PROTECTION OF FISH AND WILDLIFE

A. The Contractor shall at all times perform all work and take such steps required to prevent any interference or disturbance to fish and wildlife. The Contractor will not be permitted to alter water flows or otherwise disturb native habitat adjacent to the project area which, in the opinion of the Engineer, are critical to fish or wildlife. Fouling or polluting of water will not be permitted. Wash waters and wastes shall be processed, filtered, ponded, or otherwise treated prior to their release into streams or other waterways. Should polluting or fouling the water occur, the Contractor shall immediately notify the proper authorities. The Contractor will be responsible for any and all costs associated with the cleanup of polluted or fouled waters.

3.4 MAINTENANCE

A. The Contractor shall dispose of all discarded debris, aggregate samples and concrete test samples from any source whatsoever, in a manner approved by the Engineer. Toilet facilities shall be kept clean and sanitary at all times. Services shall be performed at such a time and in such a manner to least interfere with the operations. Services shall be accomplished to the satisfaction of the Engineer.

B. The Contractor shall frequently remove materials no longer required on the site, such as excess excavated material, forms, temporary structures and similar materials and equipment so that, at all times, the site, access routes to the site and any other areas disturbed by his operations shall present a neat, orderly, workmanlike appearance.

C. Before substantial completion inspection, the Contractor shall remove all surplus material, falsework, temporary structures, including foundations thereof, plant of any description, and debris of every nature resulting from his operations, and put the site in a neat, orderly condition; and restore all areas which have been used for storage of materials and equipment, and all areas which have been disturbed by his operations, to their original condition or to a condition satisfactory to and approved by the Engineer.

3.5 DUST CONTROL

A. The Contractor shall maintain all excavations, embankments, stockpiles, haul roads, permanent access roads, waste areas, borrow areas and all other work areas within or without the project boundaries free from dust which would cause a hazard or nuisance to others or contaminate surface water.

B. The Contractor shall, at his own expense, keep dust under control at all times on all roadways and other areas adjacent to the work or on the site of the work by the use of at least once a day and at other times when directed, including after working hours, Saturdays, Sundays and holidays, of self-loading motor sweepers, vacuums, spraying water, and a combination of these methods.

C. Approved temporary methods of stabilization consisting of motor sweepers, vacuums, spraying water, and a combination of these methods, will be permitted to control dust. Spraying water shall be repeated at such intervals a to keep all parts of the disturbed area at least damp at all times, and the Contractor shall have sufficient suitable equipment on the job to accomplish this, if sprinkling is used. Dust control shall be performed daily as the work proceeds and whenever a dust nuisance or hazard occurs.

D. All areas undergoing excavation, grading, filling, cutting or subject to other dust-producing activities by vehicles should be subjected to dust-inhibiting practices. The use of liquid palliatives and penetrating asphaltic materials will not be permitted. Anchored mulch (asphaltic binders will not be permitted) shall be applied to non-traffic areas subject to blowing as a temporary treatment. Permanent vegetation shall be established as soon as possible.

3.6 NOISE CONTROL

A. The Contractor shall use every effort and means possible to minimize or eliminate noise caused by his operation which the Engineer may consider objectionable. The Contractor shall provide working machinery, designed to operate with the least possible noise. The Contractor is responsible for maintaining compliance with all applicable noise regulations and all State and local noise ordinances.

3.7 PESTICIDES AND HERBICIDES

A. The use of pesticides or herbicides in construction operations are prohibited.

3.8 PROHIBITED CONSTRUCTION PROCEDURES

A. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors, and floodplains is strictly prohibited. Any violation of this restriction by the Contractor or any person employed by him, will be brought

to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the Contractor will be required to remove the fill at his own expense and restore the area impacted.

B. The Contractor shall at a minimum be strictly prohibited from performing the following construction procedures:

1. Dumping of spoil material into any stream corridor, any wetlands, any surface waters, or at unspecified locations.

2. Indiscriminate, arbitrary or capricious operation of equipment in any stream corridors, any wetlands or surface waters.

3. Pumping of silt-laden water from trenches or other excavations into any surface waters, any stream corridors or any wetlands.

4. Damaging vegetation adjacent to, or outside of, the access road or the right-of-way.

5. Disposal of trees, brush and other debris in any stream corridors, any wetlands, any surface waters, or at unspecified locations.

6. Permanent or unspecified alteration of the flow line of any stream.

7. Open burning of project debris.

8. Location of storage stockpile areas in environmentally sensitive area.

9. Disposal of excess or unsuitable excavation material in wetlands or floodplains even with permission of the property owner.

10. Discharging silty or muddy water from dewatering operations into natural water courses.

END OF SECTION

SECTION 02131
STORM DRAIN ABANDONMENT

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The Contractor shall furnish all labor, equipment, and materials required to plug the designated existing storm drains with cement/bentonite grout as specified herein.

1.2 RELATED SECTIONS

A. Section 01502 - Environmental Protection

B. Section 02140 - Dewatering

C. Section 02228 - Waste Disposal

D. Section 02601 - Catch Basins and Appurtenances

E. Section 02650 - PVC Pipe

1.3 SUBMITTALS

A. Prior to commencing the Work, the Contractor shall submit a plan detailing the specific materials, methods, and controls to be utilized in the Work. The plan shall be submitted to the Engineer for approval. The plan shall establish the minimum volume of material to be used.

2. PART 2 - PRODUCTS

2.1 GROUT

A. Materials used for plugging the storm drains shall include concrete, cement grout, neat cement and/or a cement/bentonite mix. The specific materials proposed, including mix ratios, shall be included in the submitted referral in Part 1.3 above.

B. Only commercially manufactured and sealed new materials will be accepted in the Work. Contractor shall record the type and manufacture of all raw materials used and provide the Engineer a jar sample of the mixed materials.

C. Water used for the grout will be obtained from a reliable potable water supply. Recirculated water will not be permitted in the Work.

3. PART 3 – EXECUTION

3.1 REQUIREMENTS

A. The grout shall be mixed thoroughly by the Contractor to ensure that the mixture is free of lumps. To assure the grout will provide a satisfactory seal, it is necessary to place it in one continuous operation before sealing begins.

B. Grout material shall be placed by Tremie pouring. The Tremie pipe shall be kept full continuously from start to finish, and withdrawn slowly as the material is introduced.

C. Prior to starting the Work, Contractor shall submit, in accordance with Part 1.3 above, specific procedures to be used insure a continuous flow of grout in the Tremie line. Pumping shall be proposed to minimize chance of leaving voids. The submittal shall include specifying the pumping rate, rate of withdrawal, and confirmed volume to be filled. The submittal shall also address monitoring of volume placed.

END OF SECTION

SECTION 02140
DEWATERING

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The Contractor shall furnish all labor, materials, equipment, tools and appurtenances required to complete and maintain the work of lowering and control of groundwater levels, hydrostatic pressures, and surface water to permit all excavations, and construction to be performed as shown, specified or required. The control of all surface water, temporary drainage, ice, and snow, shall be considered as part of this work. The Contractor shall correct all damage resulting from inadequacy of the dewatering system or from flooding of the construction site from other causes.

1.2 RELATED SECTIONS

A. Section 01502 - Environmental Protection

B. Section 02150 - Shoring and Bracing

C. Section 02220 - Excavation

D. Section 02223 - Backfill and Fill

E. Section 02601 - Catch Basins

F. Section 02650 - PVC Pipe

1.3 SUBMITTALS

A. Prior to starting the work, the Contractor shall submit a plan of the proposed dewatering systems. The dewatering shall be coordinated with the shoring and bracing, and other excavation work. Any review or comments by the Engineer shall not relieve the Contractor of his responsibility for dewatering.

2. PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials shall conform to those included in the Contractor's plan for dewatering.

3. PART 3 - EXECUTION

3.1 REQUIREMENTS

A. The Contractor shall comply with the following minimum requirements for dewatering:

1. The static water level within the excavation shall be drawn down at a minimum to the bottom of the excavation so as to maintain the undisturbed state of the foundation soils and allow the installation of the structure and placement of backfill to the required density.

2. The system used shall not cause settlement damage to adjacent structures. The Contractor shall carry out the work by the use of other methods which will not endanger adjacent structures; all such work shall be done at the Contractor's expense. The Contractor shall be responsible for correcting, as necessary, any adverse effects his dewatering may have on existing buildings, wells, utilities, and water courses at no additional cost to the Owner.

3. Pumping shall be carefully controlled. The Contractor shall observe the elevation of the groundwater in the trench and shall control the pumping as necessary.

4. The Contractor shall provide sufficient standby equipment for maintaining dewatering on a continuous basis in the event that all of, or part of, the system should become inadequate or fail, including failure by a power outage.

B. Tanks for temporary on-site storage of water collected during dewatering operations shall be provided by the Owner.

C. All groundwater removed during the construction shall be disposed of in accordance with all Federal, State, County, and municipal rules governing contaminated water by the Owner.

D. All surface water generated by construction activity within the area of work shall be considered as contaminated. This water shall be disposed of in accordance with all governing Federal, State, County, and municipal regulations by the Owner.

E. The Contractor is responsible for all permits and approvals associated with construction dewatering and temporary surface water control.

END OF SECTION

SECTION 02150
SHORING AND BRACING

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The Contractor shall furnish all labor, materials, equipment, tools and appurtenances required to complete the work of shoring, bracing, and sheeting or sheet piling, necessary to complete the construction, protect structures, and prevent the loss of ground or caving of embankments, as shown, specified or required, and shall meet all applicable building and safety codes.

B. Pressures on sheeting and the stability of the sheeting and bottom of the excavation are dependent not only on soil conditions but upon many procedures and options available to the Contractor, such as dewatering, staging of excavation and installation of bracing, flexibility of sheeting, construction equipment used, and time of completing the work. All such factors shall be considered investigated in the design of the sheeting and bracing.

1.2 RELATED DOCUMENTS

A. Recommended Technical Provisions for Shoring and Sloping of Trenches and Excavations, U.S. Department of Commerce.

B. Construction Safety and Health Regulations, U.S. Department of Labor, Occupational Safety and Health Administration.

1.3 SUBMITTALS

A. The Contractor shall submit drawings, computations and substantiating data prepared, and signed and sealed by a Professional Engineer licensed in the State, showing his proposed sheeting, sheet piling, and bracing design and method of construction for the information of the Engineer prior to the start of such construction. Any review or comments by the Engineer shall not relieve the Contractor of his responsibility for sheeting and bracing.

B. Pressures on sheeting and the stability of the sheeting and bottom of the excavation are dependent not only on soil conditions but upon many procedures and options available to the Contractor, such as dewatering, staging of excavation

and installation of bracing, flexibility of sheeting, construction equipment used, and time of completing the work. All such factors shall be considered investigated in the design of the sheeting and bracing.

C. In trenches, the sheeting shall be designed so that the lowest brace is no closer than 12 inches above the base of the structure to be installed.

1.4 RELATED SECTIONS

A. Section 02140 – Dewatering

B. Section 02220 – Excavation

C. Section 02223 – Backfill and Fill

1.5 QUALITY CONTROL

A. During the installation of the sheeting and bracing and as long as the excavation is open, the Contractor's Professional Engineer shall monitor the work to insure that it is carried out in accordance with his design and procedures. For this purpose, leveling observations for heave and settlement shall be made in addition to piezometric readings where excavations extend below the water table or through soft cohesive soils.

2. PART 2 – PRODUCTS

2.1 MATERIALS

A. Steel Sheet Piling

1. Steel sheet piling shall conform to the requirements of ASTM A328.

B. Timber Sheeting

1. The timber, unless otherwise noted, may consist of any species which will satisfactorily stand driving. It shall be sawn or hewn with square corners and shall be free from worm holes, loose knots, wind shakes, decayed or unsound portions, or other defects which might impair its strength or tightness.

3. PART 3 - EXECUTION

3.1 VERIFYING EXISTING CONDITIONS

A. Before commencing work, the Contractor shall check and verify all governing dimensions and elevations, including field measurements of existing and adjoining work on which his work is dependent, to assure proper fit and clearance of each part of the work to the new and existing structures.

B. The Contractor's attention is drawn to General Conditions for general information for evaluating existing conditions which may affect his work.

3.2 COORDINATION WITH OTHER OPERATIONS

A. The schedule and progress of the shoring, bracing, and sheeting work shall be coordinated with the dewatering, excavation, and backfilling work. If, during the progress of the excavation, lateral movement of the embankment is discovered, corrective measures shall be taken immediately to prevent further movement.

3.3 INSTALLATION

A. <u>All Sheeting</u>

1. All sheeting, whether steel or timber, permanent or temporary, shall be safely designed and shall be carried to adequate depths and braced as necessary for proper performance of the work. Construction shall be such as to permit excavation as required. Interior dimension shall be such as to give sufficient clearance for construction forms and their inspection. Movements of sheeting or bracing which prevent the proper completion of the sub-structure or cause damage to any adjacent structure by undermining or any other change shall be corrected at the sole expense of the Contractor. No part of the sheeting or bracing shall be allowed to extend into the structure without written permission of the Engineer.

2. If the Engineer is of the opinion that, at any point, any proper supports have not been provided, he may order additional supports put in at the expense of the Contractor, and compliance with such order shall not relieve or release the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.

B. Permanent Steel Sheet Piling

1. In locations where sheeting is installed to protect existing structures, it shall remain in place unless otherwise specified. All permanent sheeting shall be steel.

2. Permanent steel sheet piling shall be cut off at 2 feet below the original ground, or as directed by the Engineer. All material cut off shall remain the property of the Contractor and shall be disposed of by him.

C. Temporary Steel or Timber Sheeting

1. Temporary sheeting shall be either steel or timber.

2. Unless otherwise ordered by the Engineer, all parts of the temporary sheeting shall be removed upon completion of the work for which it was provided. The excavation shall be backfilled and properly compacted prior to removal of sheeting unless otherwise permitted by the Engineer. Sheeting may be left in place at the option of the Contractor if so permitted by the Engineer and the cutoffs removed from the site.

3. The Contractor shall leave in place to be embedded in the backfill, any sheeting and bracing which the Engineer may direct him in writing to leave in place at any time, during the progress of the work, for the purpose of preventing injury to structures, utilities, or property, whether public or private. The Engineer may direct that steel or timber used for sheeting and bracing be cut off at any specified elevation.

4. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

5. No sheeting is to be completely withdrawn if driven below mid-diameter of any pipe or structure footing, and under no circumstances shall any sheeting be cut off at a level lower than one foot above the top of any pipe.

3.4 REMOVAL OF SHORING AND BRACING MATERIALS

A. Where the Contractor elects not to remove shoring and bracing material, all such material shall be removed to the extent that the top of the material shall be a minimum of 5 feet below the proposed finished grade.

B. Removal of shoring and bracing shall be carried out in a manner such that no structure shall be disturbed or damaged during or after removal. Protection of structures during the removal of shoring and bracing shall be the sole responsibility of the Contractor, and any disturbance or damage shall be rectified at no expense to the Owner.

3.5 SAFETY

A. Installation and removal methods of shoring and bracing shall meet, or exceed, the minimum requirements of the applicable codes and safety precautions as outlined in such codes, and shall be enforced by the Contractor.

END OF SECTION

SECTION 02220
EXCAVATION

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The Contractor shall furnish all labor, materials, equipment, tools and appurtenances required to complete the work of excavation, storage of excess and unsuitable materials, and other related and incidental work within the designated area and as required for the construction of other work, as shown, specified or required.

B. The Contractor shall locate all existing utilities in work areas prior to commencing any excavation activities.

1.2 RELATED SECTIONS

A. Section 01502 - Environmental Protection

B. Section 02140 - Dewatering

C. Section 02150 - Shoring and Bracing

D. Section 02223 - Backfill and Fill

E. Section 02228 - Waste Material Disposal

1.3 DEFINITIONS

A. Excavation shall mean the removal from place of all materials and shall include soil, structures above and below ground, rock, pavements, topsoil, demolition waste material, boggy waste, rubbish, tree stumps, boulders, logs, ashes, cinders or organic material such as peat, humus or organic silt.

1.4 PROTECTION OF PEOPLE AND PROPERTY

A. The Contractor shall plan and conduct his operations so as to prevent damage to existing structures, safeguard people and property, minimize traffic inconvenience, protect the structures to be installed, and provide safe working conditions.

B. Excavations, except as specified hereinafter, shall be adequately sheeted and braced. Where the installation of sheeting is impractical or might cause damage, as a result of, but not limited to, vibration, settlement or lateral movement, the Contractor shall utilize other methods.

C. Excavation may be made without sheeting and bracing within the limitations and requirements of the governmental agencies having jurisdiction, provided that:

1. Hazards, such as described hereinbefore, do not exist in the proximity of the excavation.

2. Work is not in streets or other paved, landscaped or improved areas.

3. Work can be restricted to the land provided for the Contractor's use.

4. The Contractor shall submit a certification by a Professional Engineer licensed in the State, indicating the maximum slope of the sides of the excavation proposed, and that said slopes will be stable under all normal anticipated weather conditions for the period that the excavation will be open. Such certification shall be based on the Contractor's own subsurface exploration and consideration of the options available to the Contractor such as dewatering, construction equipment, and proximity of spoil area. Any review or comments by the Engineer shall not relieve the Contractor of his responsibility arising from the excavation.

D. In cases where excavation without sheeting and bracing is not permissible solely because of protection of workmen, trench boxes may be used. Such use shall be certified by the Professional Engineer retained by the Contractor.

E. The Contractor shall not stockpile any material without the Engineer's approval.

F. Stockpiles that are approved by the Engineer shall be carefully placed and the surrounding area shall be protected by placement of hay or straw bales, or an equivalent erosion control structure in accordance with the New York Guidelines for Urban Erosion and Sediment Control.

2. PART 2 – PRODUCTS

Not Used

3. PART 3 – EXECUTION

3.1 LIMITS OF EXCAVATION

A. Excavation shall be carried to the dimensions indicated, specified or required or as directed by the Engineer to provide sufficient clearance for the construction and inspection of the structure to be installed.

B. Excavation carried below the depths shown, specified or required, without written directions from the Engineer, shall be refilled to the proper grade with thoroughly compacted subgrade fill material; all work of this nature shall be at the Contractor's expense.

3.2 STORAGE AND DISPOSAL

A. Excavated material, which is suitable and approved for backfill and fill shall be placed in stockpiles unless or until it can be placed in the work. It shall not be placed close to the side of excavations, where the weight of the material could create a surcharge on such sides, whether sheeted or not. Places for stockpiles shall be only where shown or approved, and shall avoid environmentally sensitive areas. The Contractor shall provide erosion control methods such as mulching, perimeter hay bales, etc., in accordance with the Contractor's approved erosion and sediment control plan.

B. Unsuitable material shall be placed in storage containers provided by the Owner as directed by the Engineer.

3.3 EXCAVATION INSTRUCTIONS

A. No excavation shall commence until the Contractor has staked out and surveyed the proposed work.

B. Following excavation for swales, concrete structures, outlets, outfalls, pipes, etc., the Contractor shall regrade and add compacted fill as needed in order to achieve required surface for placement of materials. All visible sharp protruding objects shall be removed or covered with a minimum of 12 inches of compacted fill.

3.4 FIELD QUALITY CONTROL

A. The depth and limit of excavation will be in accordance with these Specifications and the Engineer's direction and will be verified during the course of excavation by the Engineer.

END OF SECTION

SECTION 02223
BACKFILL AND FILL

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The Contractor shall furnish all labor, materials, equipment, tools and appurtenances required to complete the work of backfill and fill, including backfill, subgrade fill placement, embankments, grading, and other related and incidental work within the designated area and as required for the construction of other work, as shown, specified or required.

1.2 RELATED SECTIONS

A. Section 02140 - Dewatering

B. Section 02150 - Shoring and Bracing

C. Section 02220 - Excavation

D. Section 02228 - Waste Material Disposal

E. Section 03002 - Field Concrete

1.3 DEFINITION

A. Backfill shall consist of furnishing material, if necessary, and placing and compacting material within excavated areas below grade.

B. Embankments and fill shall consist of furnishing material, if necessary, and placing and compacting material above existing grade and within existing structures where designated.

1.4 PROTECTION OF PEOPLE AND PROPERTY

A. Protection of people and property shall conform to the requirements of Section 02220 - Excavation.

2. PART 2 - PRODUCTS

2.1 MATERIALS - GENERAL

A. All backfill and fill materials, unless otherwise specified, shall consist of suitable selected and approved clean well graded granular soil from off-site sources. Fill material shall meet the approval of the Engineer and the requirements of USCS Classification GW, GP, GM, GC, SW, SP, SM.

B. The maximum particle size shall be no larger than one-half the layer thickness.

C. Where backfill or subgrade fill density requirements are not specified a minimum density of 85 percent of maximum dry density shall be used as determined by Modified Proctor Test (ASTM D1557), unless otherwise specified.

D. No frozen earth shall be used for backfill. All backfill and subgrade fill materials shall be free from all perishable and objectionable materials.

E. Backfill materials for piped utilities shall be natural soil, not containing deleterious material, refuse, rubble, muck, metal, wood, etc., and no particle greater than 2 inches in size can be used. The backfill shall be compacted in 12-inch lifts with the exception of seepage barriers which shall consist of Class B concrete.

F. All required fill materials shall be substantially free from organic materials, wood, trash, and other objectionable materials which may be compressible or which cannot be properly compacted. It shall not contain granite blocks, broken concrete, masonry rubble, or other similar materials. It shall have physical properties such that it can be readily spread and compacted to the specified permeability and/or density. Snow, ice, and frozen soil shall not be permitted.

2.2 SUBGRADE FILL

A. The Contractor is to designate the intended source facility(ies) for the subgrade fill material required to be provided by these Specifications.

B. Materials used as subgrade fill shall be provided by the Contractor from an off-site borrow source. The soil to be used shall be field-monitored by the Engineer for contamination. Soil from a new source location shall not be included in the work prior to the written acceptance of testing by the Engineer. Depending on the results, the Engineer shall accept or reject the soil or require further testing. The Contractor shall not proceed with construction using this material, prior to acceptance by the Engineer. Should unstable soils be encountered, torvane and pocket pentrometer testing may be performed by the Engineer, and no further

material shall be placed in the area in question without the approval of the Engineer.

2.3 BEDDING SAND

A. This material shall be free of any sharp objects which could puncture or otherwise cause damage to piping. It shall be a clean sand with subangular or rounded grains, and a maximum particle size of 1/2-inch. The soil shall be acceptable to the Engineer.

B. In addition to the bedding sand, the pipe shall be fully encased within a covering of Class B concrete to extend from the trench bottom to above the water table to act as a seepage barrier. These seepage barriers will be constructed at a minimum frequency of 1 for every 50 linear feet of pipe.

2.4 CLEAN STONE

A. Clean stone shall be clean crushed stone with a maximum particle size of 3 inches in any dimension. The stone shall be acceptable to the Engineer.

3. PART 3 – EXECUTION

3.1 PRECAUTIONS

A. Subgrade fill placement shall not:

1. Be performed with frozen materials.

2. Be placed on snow that has a thickness greater than a tenth of an inch.

3. Be placed on ice. Ice shall be defined as frozen water on the surface of in situ soils or previously placed material.

B. Subgrade fill placement will be permitted on frozen underlying layers.

3.2 BACKFILLING

A. Backfill shall not be placed until the structure, pipeline, or other construction component has been inspected in place and approved. The extent of pipe trench left open shall be kept to a minimum.

B. Unless otherwise directed, excavations shall be backfilled as soon as possible after structures are constructed, pipes are laid and the work is inspected, tested as required and accepted, and permission to backfill has been given by the Engineer. Immediately prior to backfilling, all rubbish, debris, forms and similar materials shall be removed from the excavations.

C. Backfill shall be brought up evenly on each side of structures, and for their full length. The thickness of each compacted layer shall not exceed that specified under Subpart 2.1 unless specified otherwise or as directed by the Engineer. Care shall be taken to ensure that no damage is done to structures or protective coatings thereon.

D. Where sheeting is withdrawn, all cavities left thereby shall be filled with select soil, hosed or tamped in place so as to fill all voids thoroughly.

3.3 TRENCH BACKFILL PROCEDURES

A. Pipes shall be bedded and backfilled as directed by the Engineer. Care shall be taken to place and compact material under pipe haunches.

B. Trenches shall be backfilled by hand to a depth of not less than 12 inches above the top of the pipe, for the full width of the trench. Such backfill shall be uniformly placed in 6-inch maximum layers. Care shall be taken not to damage the pipe. Each layer shall be hand tamped and compacted before the next layer is placed. After the trench has been backfilled to 12 inches above the top of the pipe, backfill may then be placed and compacted in 8-inch to 12-inch lifts.

C. Final backfill north of the existing fenceline maybemade with excavated material from the unsaturated zone of the trench excavation north of the existing fenceline.

3.4 COMPACTION OF BACKFILL AND SUBGRADE FILL

A. All backfill and subgrade fill are to be compacted. The density of all backfill and subgrade fill shall be at least equal to that shown or specified. The moisture content of the backfill and subgrade fill material shall be such that proper compaction shall be obtained. Puddling for compacting will not be permitted.

B. Hand-operated plate type vibratory tampers or other suitable equipment may be used in areas not accessible to larger rollers or compactors and to avoid damaging pipes.

3.5 FILLING

A. Areas on which embankments or other fill will be constructed shall be cleared and prepared as for backfilling. Immediately prior to filling, the subgrade shall be proofrolled unless otherwise specified. All unsuitable material as determined by the Engineer shall be removed prior to filling.

B. Fill shall be brought to grade uniformly throughout the area. The thickness of each compacted layer shall not exceed one foot unless otherwise specified by the Engineer.

3.6 FIELD QUALITY CONTROL

A. Tests for the fill materials proposed for construction will be made by a certified testing laboratory employed by the Contractor as required by the Engineer. The test information will be submitted to the Engineer for approval before any fill material is used in construction.

B. Any areas not meeting the specified compaction will be reworked or replaced and recompacted.

END OF SECTION

SECTION 02228
WASTE MATERIAL DISPOSAL

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The Contractor shall furnish all labor, materials, equipment, tools and appurtenances required to complete the work of properly disposing of all waste materials during and as the result of the construction operations under this Contract, as specified or required.

B. The Owner will be responsible for providing storage containers for temporary on-site storage of both liquid and solid waste materials.

C. Off-site disposal shall be the responsibility of the Owner.

1.2 RELATED SECTIONS

A. Section 01502 - Environmental Protection

B. Section 02140 - Dewatering

C. Section 02220 - Excavation

D. Section 02223 - Backfill and Fill

1.3 APPLICABLE REGULATIONS

A. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor and his subcontractors shall comply with all applicable Federal, State, and local laws and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

B. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors, and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him, will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate

action be taken against the offending parties. Therefore, the Contractor will be required to remove the fill at his own expense and restore the area impacted.

2. PART 2 - PRODUCTS

Not Used

3. PART 3 - EXECUTION

3.1 GENERAL

A. Waste materials shall include, but not be limited to, contaminated groundwater, vehicle wash runoff, refuse, demolition waste material, wood, rock, boulders, floating debris, trash, garbage, etc.

B. If any waste or surplus material is dumped in unauthorized areas, the Contractor shall remove the material and restore the area to the condition of the adjacent undisturbed area. If necessary, contaminated ground shall be excavated, properly disposed of, and replaced with suitable fill material, compacted and finished with topsoil, all at the expense of the Contractor.

C. The Contractor is responsible for any fines associated with improper disposal of waste material.

D. No materials shall be burned at the site.

E. Containers for the temporary on-site storage of solid and liquid wastes will be provided by the Owner.

F. The Contractor is responsible for on-site handling of all solid and liquid wastes. Placement of wastes in the container will be designated by the Owner's Representative and covering all containers.

G. All spilled waste material shall be contained, collected, and placed in the appropriate container as designated by the Owner's Representative.

H. Disposal of waste material shall be the responsibility of the Owner.

END OF SECTION

SECTION 02235
TOPSOIL AND SEEDING

1. PART 1 - GENERAL

1.1 SCOPE

A. The Contractor shall furnish all labor, materials, equipment, tools, and appurtenances required to complete the work of furnishing and placing topsoil and the temporary and permanent seeding of all areas of the Work requiring topsoil and seeding.

1.2 RELATED SECTIONS

A. Section 02223 - Backfill and Fill

2. PART 2 - PRODUCTS

2.1 TOPSOIL

A. All areas designated on the Plan or as ordered by the Engineer shall be prepared for planting operations by scarifying and raking the subgrade, spreading and amending the topsoil if necessary to complete the work, and fine grading by raking, compacting and otherwise manipulating the soil to form draining grades.

B. Topsoil shall be the surface layer of soil with no admixture of refuse or material toxic to plant growth and shall be free from subsoil, stumps, roots, brush, stones, clay, lumps or similar objects larger than 2 inches in diameter. The organic content shall not be less than 5 percent, nor more than 20 percent as determined by loss on ignition of moisture-free samples dried at 100°C.

All topsoil shall meet the following Mechanical Analysis:

	Percent Passing	Percent Retained
1" Screen	100	0
1/4" Screen	97-100	0-3
No. 100 Mesh Screen	60-40	40-60

No more than 60 percent of the material passing the No. 100 mesh sieve shall consist of clay, as determined by the Bouyocous Hydrometer or by the decantation method. All percentages shall be based on dry weight of samples.

Natural topsoil may be amended by the Contractor with approved methods and materials to meet the foregoing Specifications.

2.2 SEED

A. Seed for disturbed areas shall be in proportions by weight as follows:

Mixture	Rate per Acre (lbs)
Creeping Red Fescue or Tall Fescue	100
Redtop	20
	120

or

Mixture	Rate per Acre (lbs)
Creeping Red Fescue or Tall Fescue	80
Perennial Ryegrass	20
Birdsfoot Treefoil	40
	140

B. Seeding in drainage channels shall be in the following proportions:

Mixture	Rate per Acre (lbs)
Birdsfoot Treefoil or Ladino clover	40
Tall Fescue or smooth bromegrass	80
Redtop or ryegrass	20
	140

C. A certificate attesting that the seed mixture is of the specified varieties and proportions shall be submitted to the Engineer. Five (5) copies of the certificate are required. Approval of this and other certificates called for by these Specifications does not constitute acceptance of this Work.

3. PART 3 – EXECUTION

3.1 TOPSOIL INSTALLATION

A. No topsoil shall be spread until the subgrade elevations and the topsoil have been approved by the Engineer.

B. Topsoil shall be spread over the prepared and approved subgrade in sufficient quantity to obtain a minimum compacted layer of 6 inches. All sticks, roots, brush, wire, masonry, and all stones larger than 2-inch and other extraneous matter shall be removed from topsoil by rakings, including hand raking, as may be required, or other approved method. Topsoil shall be raked, compacted, and otherwise manipulated to form, after compaction, smooth draining grades as shown on the Plans.

C. All topsoil areas shall be protected against trespassing and damage at all times.

D. Contractor shall take all necessary steps to protect slopes from damage due to erosion, settlement of backfill, or other causes. Topsoil areas damaged shall be promptly repaired to the satisfaction of the Engineer.

E. Care shall be taken to prevent any erosion of this material, particularly if stockpiles are to remain during the winter season. Any loss of this material due to erosion shall be replaced by Contractor. Likewise, any clean-up due to silting or damage resulting from the above-mentioned erosion shall be the entire responsibility of the Contractor with no costs to be incurred by the Owner.

3.2 SEEDING

A. Seed shall be sown by means of water pressure and mulched as approved by the Engineer. Rate of mulch shall be submitted to the Engineer for approval.

B. Irregularities which form low areas which will cause ponding shall be eliminated. The ground shall be scarified, cultivated, iron raked and wood raked until the surface is smooth and friable. The seed shall be placed to a depth of not exceeding 1/8-inch. The seeding shall be accomplished in two operations. One-half of the specified rate shall be used in seeding the area in one direction and one-half in parallel lines at right angles.

C. Contractor shall be responsible for producing a good stand of grass acceptable to the Engineer. During dry weather, the grass areas shall be kept watered with sprinklers or other methods approved by the Engineer. The Contractor shall mow the grass, as required, to keep the areas in proper condition. Mowing shall not be closer than 2 inches.

D. The maintenance work shall be continuous until the entire project is accepted by the Engineer. Damage due to neglect of watering shall be the responsibility of the Contractor. Any areas not doing well or damaged shall be top-dressed, and reseeded. No grass areas will be accepted until they are covered with a satisfactory, healthy stand of grass of the varieties specified.

E. In the event that excessive weed growth occurs, the Contractor shall undertake, at no additional cost to the Owner, a protocol for manual removal of weeds from the affected areas as directed in order to achieve a relatively weed-free grass area.

F. Provide a substantial barrier, not less than 30 inches high, to serve as protection for all seeded areas against trespassing and damage at all times. Damage due to erosion, settlement of backfill, trespassing or other causes shall promptly be repaired by the Contractor at his own expense.

G. Contractor will be held responsible for the maintenance of all work and parts thereof prior to issuance of the Certificate of Final Acceptance.

H. Any soil or other material which has been brought onto the paved areas by hauling operation shall be removed promptly, keeping these areas clean at all times. Upon completion of the seeding, all excess soil, stones and debris which has not previously been cleaned up shall be removed from the site or disposed of as directed by the Engineer.

I. Temporary Seeding – A temporary winter cover of 2 bushels of oats per acre may be planted from August 15 to September 15, in intermediate cover areas. Temporary seeding of areas covered with topsoil as specified in Section 02235 – Topsoil and Seeding shall be as follows:

1. Ryegrass (annual or perennial) at 30 lbs. per acre (0.7 lbs. per 1,000 sq.ft.).

2. Certified "Aroostook" Winter rye (cereal rye) at 100 lbs. per acre (2.5 lbs. per 1,000 sq.ft.).

Use winter rye if seeding in October/November.

SECTION 02271
STONE RIP-RAP

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The Contractor shall furnish all labor, materials, equipment, tools and appurtenances required to complete the work of furnishing and placing stone rip-rap, as shown, specified or required.

1.2 RELATED SECTIONS

A. Section 02220 - Excavation

B. Section 02223 - Backfill and Fill

2. PART 2 - PRODUCTS

2.1 MATERIALS

A. Stone rip-rap shall consist of hard, durable, sharp, clean material. It shall be free from any considerable amount of flat, laminated or elongated particles; and shall be free from cracks, overburden shells, clay, organic matter, coal, limestone, dolomitic material, shale or other deleterious matter.

B. The stone rip-rap shall sustain a loss of not more than 40 percent after 500 revolutions in the ASTM abrasion test (Los Angeles machine - ASTM C535), and shall sustain a loss of not more than 10 percent after 12 cycles of freezing and thawing (AASHTO Test 103 for Ledge Rock Procedure A). Stone rip-rap shall have a minimum specific gravity of 2.50, as defined by ASTM C127). The Contractor shall submit test reports for abrasion tests, freeze/thawing tests, and specific gravity to the Engineer at least 3 weeks prior to delivery of material to the site. A minimum of three stone rip-rap samples shall be tested and results submitted to the Engineer for type from each source of supply. The tests will be performed by a testing laboratory employed by the Owner.

C. Stone rip-rap shall be supplied graded as follows:

1. 50 percent by weight greater than or equal to the D_{50} designation as shown in the Plans or as designated for gabion filling.

D. The breadth or thickness of a single stone shall not be less than 1/3 its length.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Stone rip-rap shall be placed to minimum thicknesses as indicated in Plans.

END OF SECTION

SECTION 02272
GABIONS

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Under this item, the Contractor shall furnish, assemble, and fill with stone, PVC-coated heavily galvanized steel wire mesh baskets of approved sizes, as supplied by Maccaferri Gabions, Inc. (or Owner-approved equivalent). Their sizes shall be as specified herein, manufactured in accordance with these Specifications and placed in accordance with the lines, grades, and dimensions shown in the Plans, or as required by the Engineer.

B. The assembly and erection of gabions or reno mattresses shall be in accordance with the manufacturer's instructions.

1.2 RELATED SECTIONS

A. Section 02220 - Excavation

B. Section 02223 - Backfill and Fill

C. Section 02271 - Stone Rip-Rap

1.3 DELIVERY, STORAGE AND HANDLING

A. Gabions shall be delivered to the site folded flat, tied in pairs, and packed in bundles.

B. Gabions shall be stored on-site in a location and manner approved by the Engineer and Owner, and in accordance with the manufacturer's instructions.

C. Gabions shall be stored on a level area free from standing water or mud.

D. Gabions shall be stored indoors or covered prior to using with canvas tarpaulin.

E. Gabions and gabion bundles shall be handled in accordance with the manufacturer's instructions.

1.4 SUBMITTALS

A. The manufacturer shall provide certification to the Engineer stating the wire size, galvanizing, and PVC coating are in accordance with the Specifications.

2. PART 2 - PRODUCTS

2.1 MANUFACTURING

A. Gabions shall be manufactured in such a manner that their sides, ends, lid and diaphragm(s) can be assembled to form rectangular units of the specified dimensions.

B. Gabions shall be of a single unit construction. The front, base, back and lid shall be woven into a single unit. The ends and diaphragm(s) shall be factory-connected to the base.

C. All perimeter edges of the mesh forming the gabion shall be securely selvedged so that the joints obtained have at least the same strength as the wire mesh itself.

D. The gabion length shall be 2, 3, or 4 times its horizontal width. The horizontal width shall not be less than 36 inches. Where the gabion length exceeds 1½ times its horizontal width, the gabion shall be divided into cells by diaphragm(s) of the same mesh and gauge as the gabion body.

2.2 GABION MATERIALS

A. Mesh - Mesh openings shall be hexagonal in shape, measuring approximately 3¼ inches by 4½ inches, uniform size.

B. Mesh Joints - All joints shall be flexible and double twisted to prevent unravelling.

C. Galvanizing - All steel wire used shall be zinc-coated (galvanized) having a minimum amount of zinc coating of 0.80 oz./sq.ft. of wire, and complying with Federal Specification (QQ-W-461 H, Class 3). Binding wire shall have a coating of not less than 0.70 oz./sq.ft.

All dimensions are subject to a tolerance limit of ±5 percent of manufacturer's specified sizes.

2.3 PVC COATING

A. PVC Coating - All zinc-coated steel wire shall be additionally coated with a minimum of 0.020 inches of grey PVC, which shall be suitable to resist destructive effects of immersion in acidic, salt, or polluted water, exposure to ultraviolet light and abrasion, and retain these characteristics under test in accordance with ASTM Specifications B117-73, D1499-64(77) and D1203-74 (ISO 176-1976). The PVC shall possess the following typical properties:

Property	Test Method	Value
Thickness, mils minimum	ASTM D1593 Para 8.1.3	15
Specific Gravity (minimum)	ASTM D792 Method A	1.3
Minimum Tensile Properties		
1. Breaking Factor (kg/cm^2)	ASTM D412	210
2. Elongation at Break (percent)	ASTM D412	200-280
3. Modulus (force) at 100 percent Elongation (kg/cm^2)	ASTM D412	190
Volatile Loss (percent loss maximum)	ASTM D1203 Method A	
	105° C - 24 Hr	2
	105° C - 240 Hr	6
Durometer Harness (Shore D)	ASTM D2240	50-60
Brittleness Temperature		
Cold Bend Temperature	BSS-2782-104A	-30° C
Cold Flex Temperature	BSS-2782-150B	15° C

B. Mesh Wire - The nominal diameter of the steel wire mesh shall be 0.1063 inches (U.S. Gauge No. 12) after zinc coating, and an overall nominal diameter (core wire plus PVC coating) of 0.1453 inches.

C. Selvedge Wire – The nominal diameter of the selvedge wire, running through all the edges (perimeter wire), shall be 0.1339 inches (U.S. Gauge No. 10) after zinc coating, and an overall nominal diameter (core wire plus PVC coating) of 0.1739 inches.

D. Lacing Wire – The nominal diameter of the wire, necessary for assembling and lacing the gabion units, shall be 0.0866 inches (U.S. Gauge No. 13) after zinc coating, and an overall nominal diameter (core wire plus PVC coating) of 0.1266 inches.

All wire gauges are subject to tolerances in accordance with ASTM 641A-71A, Table 3.

E. Tensile Strength of all wire used for manufacturing the gabions and lacing wire shall be in accordance with ASTM A641, measured before fabrication of netting.

F. Load Test shall be conducted in accordance with Federal Specifications (QQ-W-461 H, Class 3).

G. Elongation Test shall be conducted in accordance with Federal Specifications (QQ-W-461 H, Class 3).

The steel wire diameters are based on the french wire gauges and are approximately the U.S. gauge numbers stated.

3. PART 3 – EXECUTION

3.1 ASSEMBLY

A. Gabions are supplied folded flat, tied in pairs, and packed in bundles. Single gabions shall be removed from the bundle, unfolded flat on the ground, and all kinks and bends flattened.

B. The gabion unit shall then be assembled individually, by erecting the sides (front and back), ends and diaphragm(s), ensuring that all creases are in the correct position and the tops of all sides level.

C. The four corners of the gabion unit shall be laced first, followed by the edges of internal diaphragm(s) to the sides.

D. The recommended lacing procedure consists of cutting a length of lacing wire (approximately 1½ times the distance to be laced – not to exceed 5 feet). Secure the wire terminal at the corner by looping and twisting, then proceed to lace with

alternating single and double loops at approximately 5-inch intervals. Securely fasten the other lacing wire terminal.

3.2 INSTALLATION

A. The assembled gabion units are carried to the job site and placed in their proper location. For structural integrity, all adjoining empty gabions must be laced along the perimeter of their contact surfaces in order to obtain a monolithic structure.

3.3 FILLING

A. Gabion units shall be filled with hard, durable, clean stone meeting the requirements of Section 02271, Part 2, 2.1.A-B from 3 to 8 inches in size, as identified in the Table, or as approved by the Engineer.

Gabion Thickness (inches)	Stone Size (inches)
6	3-4
9	3-6
12	4-6
18	4-8

B. Gabions may be filled by almost any type of earth-handling equipment such as: backhoe, gradall, crane, etc.

C. Care shall be taken when placing fill material to assure that the sheathing on PVC-coated gabions will not be broken or damaged.

D. Gabion shall be filled in 3 layers, 1 foot at a time. Two connecting wires shall be placed between each layer in all cells along all exposed faces of the gabion structure. All connecting wires shall be looped around two mesh openings and the wire terminals shall be securely twisted to prevent their loosening.

E. The cells in any row shall be filled in stages so that local deformation may be avoided. That is, at no time shall any cell be filled to a depth exceeding 1 foot more than the adjoining cell.

F. Along all exposed gabion faces, the outer layer of stone shall be carefully placed and packed by hand in order to ensure proper alignment and a neat, compact, square appearance.

G. The last layer of stone shall be levelled with the top of the gabion to allow proper closing of the lid and provide an even surface for the next course.

H. It is good practice to place backfill to gabion walls simultaneously with the gabion filling operation.

I. Well packed filling without undue bulging, and secure lacing, is essential in all structures.

3.4 LID CLOSING

A. The lids shall be stretched tight over the filling, using crowbars or lid-closing tools, until the lid meets the perimeter edges of the front and end panels.

B. The lid shall then be tightly laced along all edges, ends, and diaphragm(s) in the same manner as described above for assembling.

C. Well packed filling without undue bulging, and secure lacing, is essential in all structures.

3.5 CUTTING AND FOLDING MESH

A. Where shown on the Drawings, or otherwise directed by the Engineer, the gabion mesh shall be cut, folded, and wired together to suit existing site conditions. The mesh must be cleanly cut and the surplus mesh cut out completely, or folded back and neatly wired to an adjacent gabion face. The cut edges of the mesh shall be securely laced together with lacing wire in the manner described above for assembling.

B. The assembling, installation, filling, and lid closing of the reshaped gabions shall be carried out as specified above.

END OF SECTION

SECTION 02519
PAVING

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work specified in this section consists of construction of pavement binder course, top course, crushed stone base course, and construction of plant-mixed hot bituminous pavement construction.

1.2 RELATED SECTIONS

A. Section 02220 - Excavation

B. Section 02223 - Backfill and Fill

1.3 REFERENCES

A. AASHTO M147-65 - Materials for Aggregate and Soil-Aggregate.

B. ASTM C136 - Sieve Analysis of Fine and Coarse Aggregates.

C. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb Rammer and 12-inch Drop.

D. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and 18-inch Drop.

E. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

F. New York State Department of Transportation (NYSDOT) - Standard Specifications for Road and Bridge Construction.

1.4 TIME OF CONSTRUCTION

A. The permanent paving for the roadways and paved areas shall not be placed until the use of heavy equipment is no longer required on the site and until all

operations on the site have advanced to a point where no damage to the pavement will result from the Contractor's operations. The use of finished pavement for or during heavy construction operations will not be permitted. Time of construction of permanent plant paving will be subject to the approval of the Engineer.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

2. PART 2 - PRODUCTS

2.1 BITUMINOUS CONCRETE

A. The bituminous concrete used shall be composed of a 4-inch binder course and 1.5-inch top course.

B. The materials for bituminous concrete shall conform to the requirements of Section 403 of the NYSDOT Standard Specifications.

2.2 CRUSHED STONE SUBBASE

A. The bituminous concrete shall be placed over an 8-inch layer of compacted crushed stone subbase conforming to Section 304 of NYSDOT Standard Specifications.

3. PART 3 - EXECUTION

3.1 SITE PREPARATION

A. The Contractor shall perform all grading necessary to bring the subgrade to lines and grades required for the facility to drain properly. The Contractor shall compact all fill areas supporting pavement to 90 percent of the maximum dry density as determined by ASTM D1557.

3.2 BITUMINOUS CONCRETE

A. After the subgrade has been compacted, the bituminous concrete material shall be laid at an accepted placing temperature.

B. Each course shall be evenly spread as to achieve the required compacted thickness of each respective layer.

C. The bituminous concrete paving shall be constructed according to the methods outlined in the applicable sections found in the NYSDOT Standard Specifications.

END OF SECTION

SECTION 02601
CATCH BASINS AND APPURTENANCES

1. PART 1 - GENERAL

1.1 SCOPE

A. The work to be performed under this Section shall consist of supplying and installing the precast concrete catch basins including any frames and covers and fittings for complete installation of the structures as specified herein or as indicated on the Construction Plans.

B. Air entrained concrete shall be used for all precast concrete sections. Precast sections shall be constructed as described in these Specifications.

C. All pre-cast catch basins shall be of one-piece design

1.2 RELATED SECTIONS

A. Section 02220 - Excavation

B. Section 02223 - Backfill and Fill

1.3 SUBMITTALS

A. The Contractor shall furnish shop drawings showing physical dimensions of all catch basins and appurtenances.

B. The Contractor shall furnish calculations signed and sealed by an Engineer licensed in the State of New York for all precast units to the Engineer for approval.

2. PART 2 - MATERIALS

2.1 CONCRETE CASTINGS

A. Concrete work shall conform to all the requirements of ACI 301-84, Specifications for Structural Concrete for Buildings. Concrete shall have a minimum compressive strength of 4,000 psi at 28 days.

B. Each concrete structure shall be designed to the requirements of ASTM C857-87, load designation A-16.

C. All exterior concrete surfaces, with the exception of joint surfaces, shall be coated with Bitumastic Super Service Black No. 300M coal tar epoxy as manufactured by Koppers Chemical Company or an approved equal corrosion resistant, waterproof material, pursuant to manufacturer's recommendations.

2.2 WALL PENETRATION CLOSURES

A. Wall openings shall be cored for all entrance and exit pipe locations. The opening shall be based upon the size of the connecting pipe as shown in the Construction Plans.

B. The pipe to concrete wall closures shall be made by the use of a mechanical link-seal as manufactured by Thunderline Corp. of Belleville, Michigan, with Type 304 stainless bolts, nuts, and washers.

2.3 INLET GRATES

A. New York Department of Transportation-approved inlet stream flow grates shall be supplied for all inlet boxes. The inlet grates shall be Campbell Foundry Company, pattern number 3021, or approved equal.

3. PART 3 - EXECUTION

3.1 INSTALLATION OF PRECAST CONCRETE SECTIONS

A. All sections shall be installed as specified herein. In all cases, sections shall be set level and approved by the Engineer prior to placement of additional sections. Any sections found not to be level shall be removed and placed level.

B. All gasket joints shall be well lubricated, properly seated, and meet the approval of the Engineer.

C. Grouted joints shall be uniform and shall be formed of material as described in this Section. They shall be subject to the approval of the Engineer.

D. Prior to backfilling, all sections shall be checked for cracks, chips, or misalignments, and shall be replaced or repaired at the discretion of the Engineer.

E. Prior to backfilling, the exterior surfaces shall be recoated with Bitumastic Super Service Black No. 300M coal tar epoxy as manufactured by Koppers Chemical Company or an approved equal corrosion resistant, waterproof material, pursuant to manufacturer's recommendations.

F. A non-shrink grout, such as Meadows-Sealtight V-3 Non-Metallic or approved equal, shall be applied to all concrete joints and to all inlets to the structure.

END OF SECTION

SECTION 02650
PVC PIPE

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work covered by this Section includes the requirements, materials, and methods for installing underground piping.

B. The Contractor shall furnish and install the various pipelines and appurtenant work as specified herein, or as reasonably required to produce a complete, proper, and functional installation in accordance with the intent of these Construction Documents.

1.2 RELATED SECTIONS

A. Section 02220 - Excavation

B. Section 02223 - Backfill and Fill

C. Section 02601 - Catch Basins and Appurtenances

D. Section 03002 - Field Concrete

1.3 QUALITY ASSURANCE

A. Pipe installation shall be performed by skilled workers. Each pipe laying crew shall have a pipe laying foreman.

B. Pipe shall be accurately installed to the lines and grades shown, or as approved by the Engineer, so that inverts are smooth.

C. Deflections in horizontal alignment at joints are not permitted without the written consent of the Engineer. If so approved, the deflections shall not exceed one-half the manufacturer's recommendation.

D. When requested by the Engineer, a qualified field representative of the manufacturer shall be present at the jobsite for the first day of pipe laying to assure that proper procedures are followed, and during leakage testing.

E. The Engineer shall be notified in advance whenever an existing pipeline location conflicts with the proposed locations of the Work.

F. Pipe and fittings of the same type shall be the products of a single manufacturer.

G. Pipe Adaptors - Join pipes of different materials with adaptors specifically manufactured for that purpose and as approved by the Engineer.

H. All piping shall be of the type and size described in this Section of the Specifications.

1.4 DELIVERY, STORAGE, AND HANDLING

A. All pipes and fittings shall be carefully handled when loading and unloading. Lift by hoists or lower on skidways in a manner to avoid shock or impact.

B. Where required, due to weight of material and for the safety and protection of workmen, materials, equipment, property, and the work, use derricks, ropes, or other suitable equipment for lowering pipe into trenches. Take particular care to avoid damaging the pipe.

C. PVC pipe and fittings shall be protected against the damaging ultraviolet rays of the sun when stored for any period. Such protection shall consist of canvas covering, or other material as recommended by the manufacturer. Plastic sheets shall not be used which may allow excessive temperatures to develop where pipe is stored. All pipe which has been distorted or otherwise negatively affected by high temperatures shall be rejected, regardless of the pipe's appearance after return to ambient temperatures. Rejected pipe shall be marked and removed from the site of the work immediately.

D. The manufacturer's recommended procedures for pipe stacking shall be followed. When pipe is stacked for storage, the heaviest series of pipe shall be placed at the bottom.

E. PVC pipe and fittings shall be protected from damage by sharp objects through all phases of work.

F. If any defective pipe is discovered after being laid or placed, removal and replacement with a sound pipe will be required without cost to the Owner.

2. PART 2 - MATERIALS

2.1 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. All pipe shall be SDR 35 PVC pipe D3034, gaskets F477, joints D3212, gasketed bell end pipe conforming to ASTM Standards D1784, D1785, D3034, D3212 and F477 as manufactured by Certainteed Corporation or approved equal.

B. Pipe shall be solid. Pipe shall have a nominal diameter as shown on the Plans.

C. All pipe fittings shall be Schedule 40 socket type and conform to ASTM Standards D1784 and D2467.

2.2 BEDDING MATERIAL

A. Bedding and backfill material for solid pipes shall conform to Section 02223 - Backfill and Fill, and shall be placed in accordance with applicable requirements set forth in that Section.

3. PART 3 - EXECUTION

3.1 INSPECTION GENERAL

A. Each length of pipe and each fitting shall be carefully inspected prior to lowering into trench. All materials not meeting the requirements of these Specifications, or otherwise found defective or unsatisfactory by the Engineer, shall be rejected and immediately marked and removed from the jobsite by the Contractor on the same working day as so discovered.

B. Bedding, subbedding, and other trench conditions shall be carefully inspected prior to laying pipe in each stretch of open trench. All conditions shall be made available to the Engineer for inspection purposes, and the Engineer shall be further advised where, in the Contractor's opinion, unstable or otherwise deleterious conditions exist.

C. Each stretch of completed pipeline shall be inspected prior to backfilling. Backfilling operations shall not be initiated prior to inspection by the Engineer.

3.2 PREPARATION

A. Pipe and fitting interiors and joint surfaces, shall be thoroughly cleaned prior to installation. Pipes and fittings shall be maintained clean.

3.3 PIPE INSTALLATION

A. Pipes and fittings shall be carefully lowered into the trench.

B. Pipe and fittings shall be installed so that there will be no deviation at the joints and so that inverts present a smooth surface. Pipe and fittings which do not fit together to form a tight fitting joint are not permitted.

C. Pipe shall be installed with the spigot ends (where applicable) pointing in the direction of flow.

D. Pipes shall be installed in the locations and to the required lines and grades as provided in these Specifications and as shown on the Plans, using an approved method of control. The Engineer has the authority to order the removal or relaying of all pipe laid contrary to the specifications, his instructions, or during his absence.

E. Excavations shall be maintained free of water during the progress of the Work. No pipes shall be laid in water nor shall there be any joints made up in water. All slides or cave-ins of the trenches or cuts shall be remedied to the satisfaction of the Engineer.

F. Cleanliness of installed pipe and fitting interiors shall be maintained throughout the Work.

G. All adjustments to the line and grade of pipe shall be done by scraping away or compacted filling of the bedding stone under the barrel of the pipe, and not by blocking or wedging.

H. Fittings shall be installed as required and in accordance with the Specifications. The installation of fittings after the pipeline has been laid will not be permitted without the written approval of the Engineer. In such cases, complete details pertaining to the proposed type of fittings and the installation procedure shall be submitted by the Contractor to the Engineer for review before approval will be considered.

I. Approval by the Engineer is required prior to changing the location of any of the Work due to field conditions. Changes in pipe sizes are prohibited without a written consent from the Engineer.

J. All installed piping shall form completely connected systems including connections to and appurtenances specified in other sections to result in a satisfactorily operating installation.

K. Pipe lengths of 20 feet shall be utilized, except that shorter lengths may be utilized where connecting to catch basins, only inasmuch as is necessary to properly effect the joint(s) in the desired location. In all cases, the number of pipe joints shall be minimized. In the case of random lengths of pipe, the Contractor shall provide proper smooth and square ends prior to assembling.

L. Perform field cutting of pipe with use of a finetoothed hacksaw, a handsaw, or a circular saw providing square ends for proper joints. Cut ends shall be beveled in accordance with manufacturer's instructions.

M. Gasketed joints shall be used to join lengths of PVC pipe.

N. The Contractor's specific attention is directed toward the critical nature of effecting and maintaining the specified compaction of the embedment materials in the pipe zone.

O. Every 50 feet along the alignment of newly installed pipe, a seepage barrier will be constructed by filling the trench with Class B concrete to a level above the seasonal high groundwater level.

3.4 CONNECTIONS TO STRUCTURES

A. Where required, the Contractor shall make connections to structures. The use of excessive force or blunt instruments is prohibited in installing the pipe through the wall. The structure shall be maintained in good repair. The Contractor shall provide approved watertight connections at the wall.

END OF SECTION

SECTION 03002
FIELD CONCRETE

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work covered by this Section includes supplying and installing field concrete to be used in concrete anchor for leachate collection system clean-out riser protective covers. All concrete shall be installed in accordance with the details specified in this Section.

1.2 RELATED SECTIONS

A. Section 02220 - Excavation

B. Section 02223 - Backfill and Fill

C. Section 02601 - Catch Basins and Appurtenances

D. Section 02650 - PVC Collection Pipe

1.3 REFERENCES

A. The following standards form a part of this specification:

American Concrete Institute (ACI)

ACI 305	Recommended Practice for Hot Weather Concreting
ACI 306	Recommended Practice for Cold Weather Concreting
ACI 315	Details and Detailing of Concrete Reinforcement
ACI 318	Building Code Requirements for Reinforced Concrete

American Society for Testing and Materials (ASTM)

ASTM C33	Concrete Aggregates
ASTM C40	Test for Organic Impurities in Fine Aggregates for Concrete
ASTM C94	Ready-Mixed Concrete
ASTM C143	Test for Slump of Portland Cement Concrete
ASTM C150	Portland Cement
ASTM C260	Air Entraining Admixtures for Concrete
ASTM A615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

2. PART 2 - MATERIALS

2.1 CONCRETE

A. All concrete, reinforced or non-reinforced shall have a 28-day compressive strength of 3,500 psi unless otherwise noted.

B. No additional admixtures shall be used unless approved by the Engineer.

C. No additional water, except for the amount indicated by the design mix, shall be added to the concrete without the prior permission of the Engineer.

D. Owner reserves right to test concrete for conformance with this Specification.

2.2 REINFORCING

A. Reinforcing, as shown on the plans or as directed by the Engineer, shall conform to ACI 315, 318, and ASTM A615. All steel reinforcing bars shall be Grade 60.

2.3 CEMENT

A. The cement shall be an approved brand of American manufactured Portland Cement Type II, conforming to the applicable requirements of ASTM C150.

2.4 AGGREGATES

A. Except as otherwise noted, aggregate shall conform to the requirements of ASTM C33.

B. Maximum size aggregate shall be 3/4-inch.

C. Fine aggregate shall conform to ASTM C40.

2.5 ADMIXTURES

A. All concrete (unless otherwise directed) shall contain an air entraining agent. Air entrained concrete shall have air content by volume of 4 to 8 percent for 3/4-inch aggregate.

B. Air entraining agent shall be in accordance with ASTM C260 and shall be Darex AEA, as manufactured by Dewey and Almy Chemical Division; W.R. Grace and Company, Pacewel (air entraining type) as manufactured by Johns Manville; Sika Aer as manufactured by Sika Chemical Company, or an approved equal product.

C. Water reducing agent shall be WRDA, as manufactured by Dewey and Almy, Placewel (non-air entraining type, as manufactured by Johns Manville; Sika Plastiment, as manufactured by Sika Chemical Company, or an approved equal product.

D. Water reducing agent-retarder shall be "Daratard", as manufactured by Dewey and Almy, Sika Plastiment as manufactured by Sika Chemical Company, WR-77 by Chem-Masters Corp., or an approved equal product.

3. PART 3 - EXECUTION

3.1 PREPARATION

A. Before placing concrete, forms and the space to be occupied by the concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint or other material which would tend to reduce the bond.

B. Earth, concrete, masonry, or other water permeable material against which concrete is to be placed shall be thoroughly saturated with water immediately before concrete is placed. Concrete anchor collars shall be placed against undisturbed earth. Felt roofing paper shall be placed to protect joints. No

concrete will be placed so as to cover bolts or nuts, or to interfere with the removal of the joints.

C. No concrete shall be placed until the consolidation of the ground and the arrangement and details of forms and reinforcing have been inspected and approved by the Engineer.

3.2 CONCRETE PLACING DURING COLD WEATHER

A. Concrete shall not be placed on frozen ground, and no frozen material or material containing ice shall be used. Materials for concrete shall be heated when temperature is below 40°F, or is expected to fall to below 40°F within 72 hours, and the concrete after placing shall be protected by covering, heat, or both.

B. All details of Contractor's handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the Engineer. All procedures shall be in accordance with provisions of ACI 306.

3.3 CONCRETE PLACING DURING HOT WEATHER

A. Concrete just placed shall be protected from the direct rays of the sun, and the forms and reinforcement just prior to placing shall be sprinkled with cold water. The Contractor shall make every effort to minimize delays which will result in excessive mixing of the concrete after arrival on the job.

B. During periods of excessively hot weather (90°F or above), ingredients in the concrete shall be cooled insofar as possible, and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 90°F, when ready for placement, will not be acceptable and will be rejected.

END OF SECTION