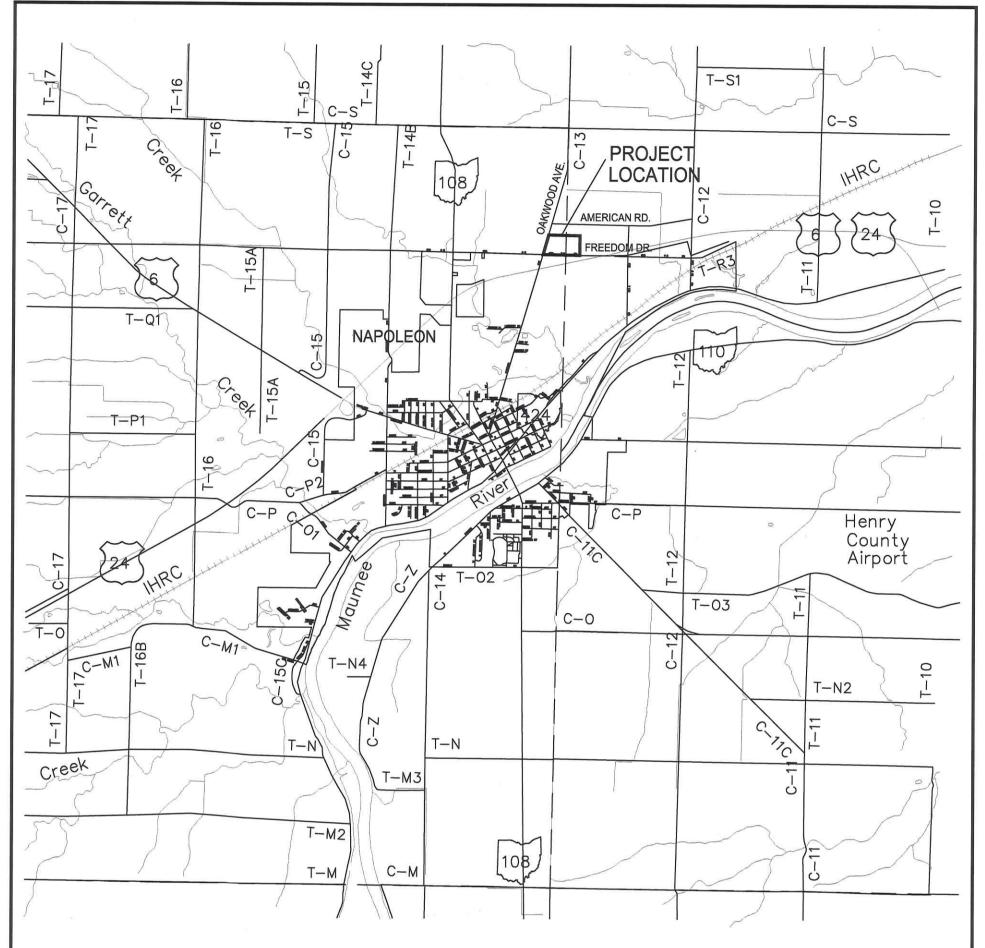
TEAM SHANK SITE DEVELOPMENT NAPOLEON, OHIO

	•	INDEX OF SHEETS
1	SHEET #	DRAWING DESCRIPTION
2	C101	COVER SHEET
3	C102	OVERALL SITE PLAN
4	C103	EXISTING SITE TOPOGRAPHY AND DEMOLITION PLAN
5	C104	SITE DIMENSION AND PAVING PLAN
6	C105	SITE GRADING PLAN
7	C106	EROSION AND SEDIMENT CONTROL PLAN
8	C107	EROSION AND SEDIMENT CONTROL DETAILS
9	C108	MISCELLANEOUS DETAILS
10	C109	GENERAL NOTES
11	C110	GENERAL NOTES
12		
13		

LEGENDS

EXISTING	LEGEND	PROPOSED L	<u>EGEND</u>
— — —625— — -	EXISTING MAJOR CONTOUR	sīsī	PROPOSED STORM SEWER
— — 624 — —	- EXISTING MINOR CONTOUR		PROPOSED WATERLINE
× _{673.85}	EXISTING SPOT ELEVATION		PROPOSED HALF-HIEGHT HEADWALL
R/W	- RIGHT-OF-WAY		PROPOSED CATCH BASIN
	EDGE OF PAVEMENT	>	PROPOSED FIRE HYDRANT
ST ST	- EXISTING STORM SEWER		PROPOSED ASPHALT PAVEMENT
SAN	- EXISTING SANITARY SEWER	A	PROPOSED CONCRETE PAVEMENT
WAT	EXISTING WATERLINE		
OE OE	- EXISTING OVERHEAD ELECTRIC	grading le	EGEND
UT	EXISTING TELECOMMUNICATIONS	625	PROPOSED MAJOR CONTOUR
(6)	EXISTING CATCH BASIN	624	PROPOSED MINOR CONTOUR
(\$A)	EXISTING SANITARY MANHOLE		PROPOSED SLOPE
皋	EXISTING FIRE HYDRANT	$\times^{674.00}$	PROPOSED SPOT ELEVATION
(<u>\(\frac{\frac{1}{1}}{1} \)</u>)	EXISTING WATER VALVE	× ^[674.00*]	PROPOSED SPOT ELEVATION AT FACE OF CADD 0.50' FOR TOP OF CURB ELEVATION
	EXISTING POWER POLE	~~ >	DRAINAGE FLOW ARROW
101	SOIL BORING	EROSION & S	EDIMENT



LOCATION MAP

SCALE: NONE

ZONING

CURRENT ZONING: I-1 (ENCLOSED INDUSTRIAL)
PROPOSED ZONING: I-1 (ENCLOSED INDUSTRIAL)

) See 1000

CONTROL LEGEND

sf —— sf — PROPOSED SILT FENCE

SOIL TYPE BOUNDARY

PROPOSED STABILIZED

CONSTRUCTION ENTRANCE

PROPOSED INLET PROTECTION

PROPOSED PERMANENT STABILIZATION

STANDARD DRAWINGS

OHIO DEPARTMENT OF TRANSPORTATION

BP-4.1 DRIVEWAY

BP-5.1 CONCRETE CURBS AND COMBINED CURB AND GUTTER

2.1 HALF-HEIGHT HEADWALL DETAIL

1-3.1 TRAFFIC DIVIDERS1-5.1 REMOVABLE STEEL BOLLARDS

SPECIFICATIONS

ALL MATERIAL AND CONSTRUCTION MUST MEET THE REQUIREMENTS OF THE CITY OF NAPOLEON:

STORM SEWER

THE STANDARDS AND SPECIFICATIONS OF THE CITY OF NAPOLEON AND THE OHIO ENVIRONMENTAL PROTECTION AGENCY

WATERLINES

THE STANDARDS AND SPECIFICATIONS OF THE CITY OF NAPOLEON AND THE OHIO ENVIRONMENTAL PROTECTION AGENCY

SANITARY SEWER

THE STANDARDS AND SPECIFICATIONS OF THE CITY OF NAPOLEON AND THE OHIO ENVIRONMENTAL PROTECTION AGENCY

<u>PAVEMENT</u>

THE STANDARDS AND SPECIFICATIONS OF THE OHIO DEPARTMENT OF TRANSPORTATION

STORM WATER POLLUTION PREVENTION PLAN (SWP3)

A STORM WATER POLLUTION PREVENTION PLAN HAS BEEN PREPARED FOR THIS PROJECT AND SHALL BE CONSIDERED TO BE A PART OF THE CONSTRUCTION DOCUMENTS.

BENCHMARK

THE VERTICAL DATUM IS BASED ON NAVD88 AS OBSERVED FROM CONTINUALLY OPERATED BASE STATION MANAGED BY OHIO DEPARTMENT OF TRANSPORTATION.

THE COORDINATES ARE REFERENCED TO OHIO STATE PLAN GRID COORDINATES OH-N NAD83 (2011).

SITE BENCHMARK #H1

IRON PIN SET SOUTH SIDE OF FREEDOM DR. SOUTH OF PROPOSED BUILDING N=640550.53 E=1525001.82 ELEV: 679.83

N=640550.53 E=1525001.82 ELEV: 679.83

SITE BENCHMARK #H2

MAG NAIL SET NORTH SIDE OF FREEDOM DRIVE @ SOUTHEAST CORNER OF PROPERTY

N=640570.97 E=1525604.93 ELEV: 679.23'

LOCATION

LAT. 41° 24' 51.21" N LONG. 84° 07' 00.84"W





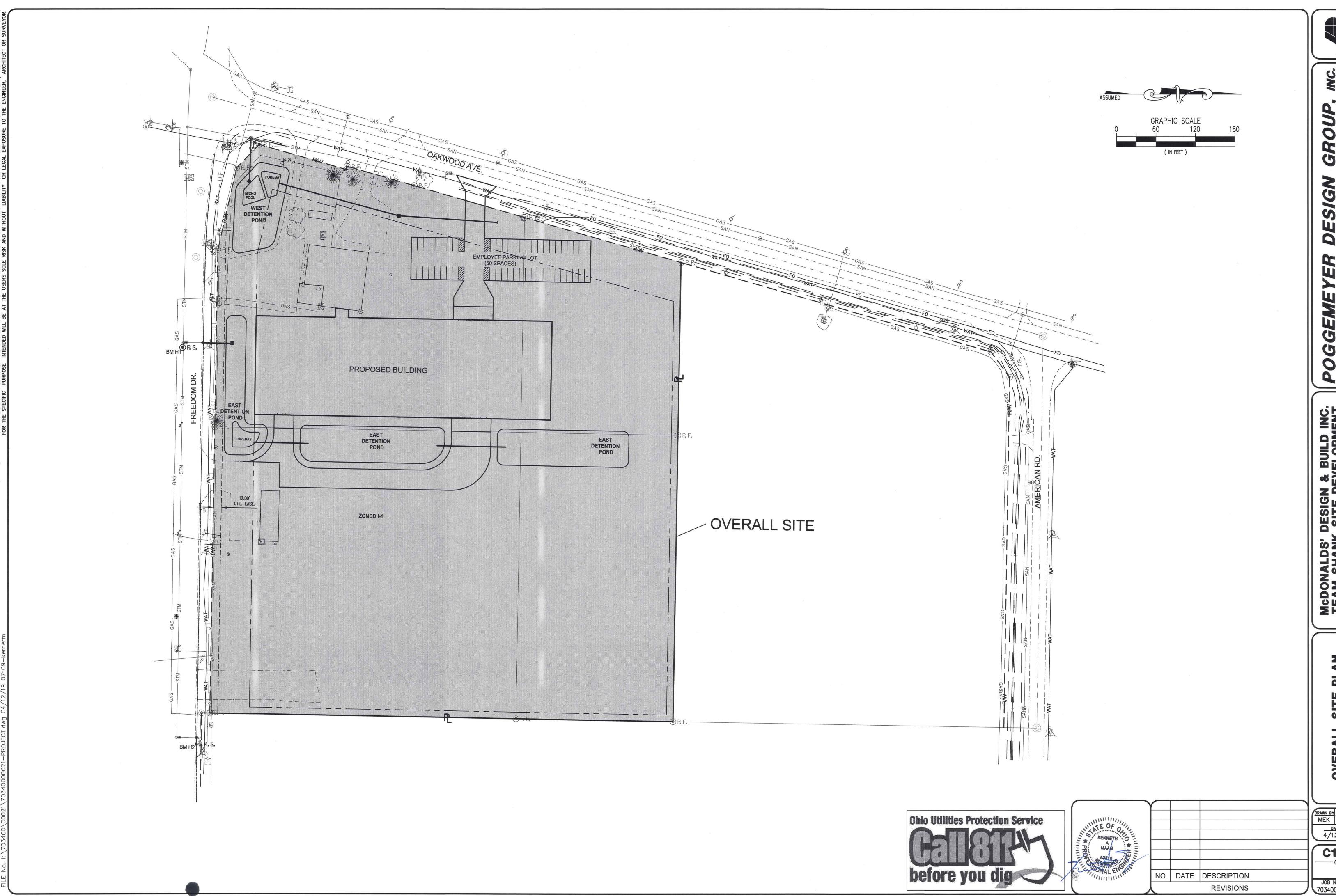
NO.	DATE	DESCRIPTION	91
		REVISIONS	

McDONALDS' DESIG TEAM SHANK SITE NAPOLEON

DRAWN BY CHECKED BY MEK KAM

DATE
4/12/19

OF NUMBER



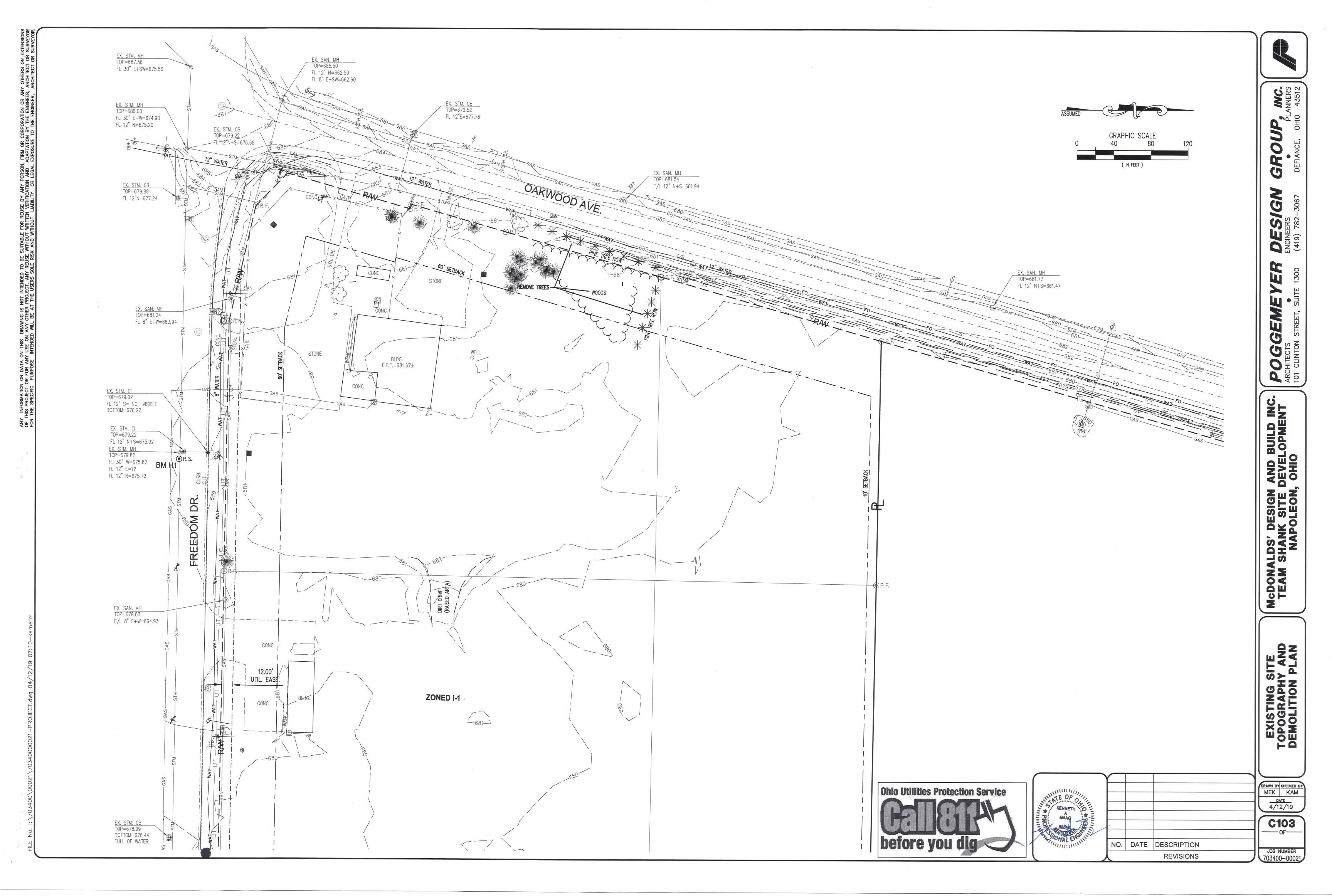
McDonalds' Design & Build Inc. Team Shank Site Development Napoleon, Ohio

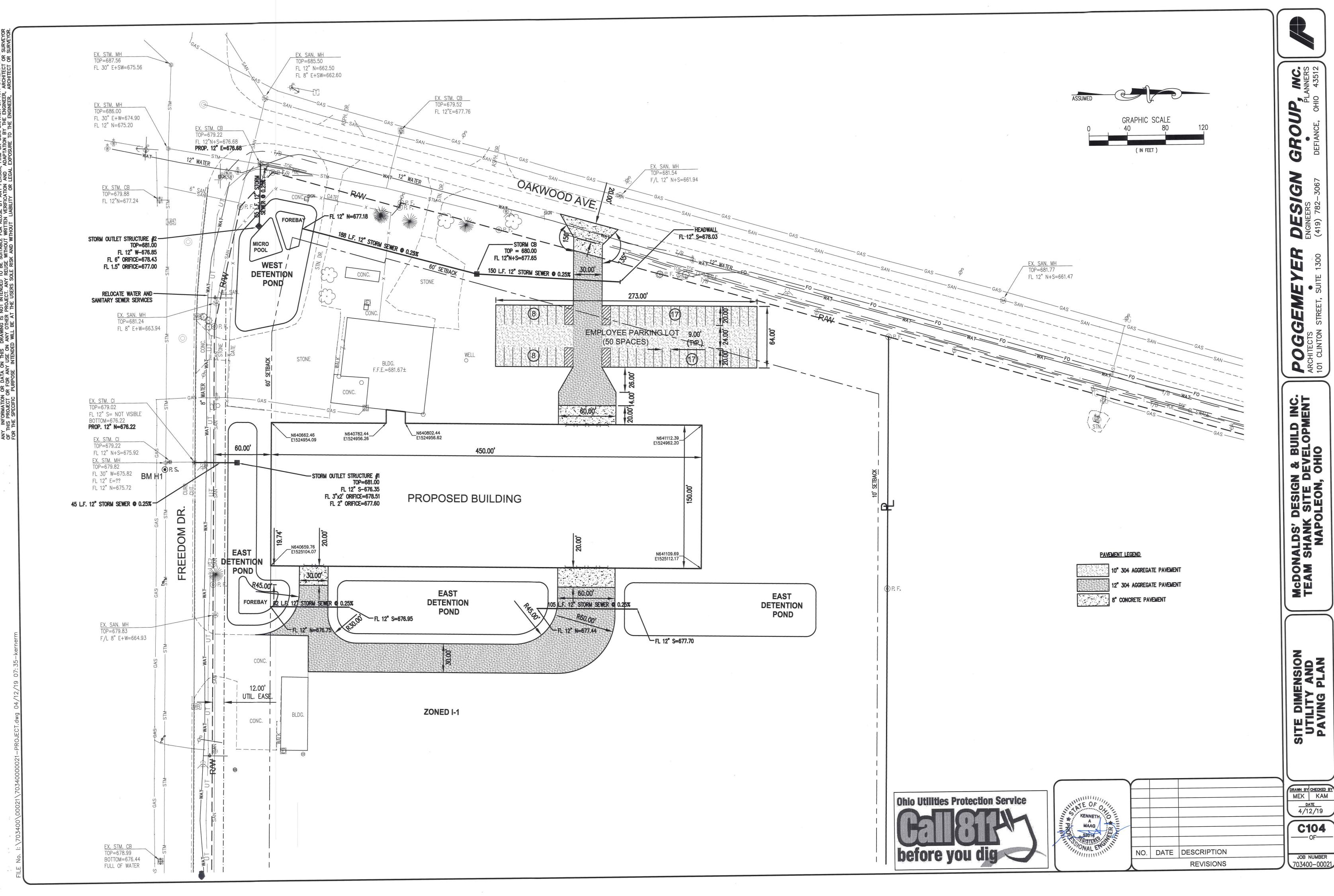
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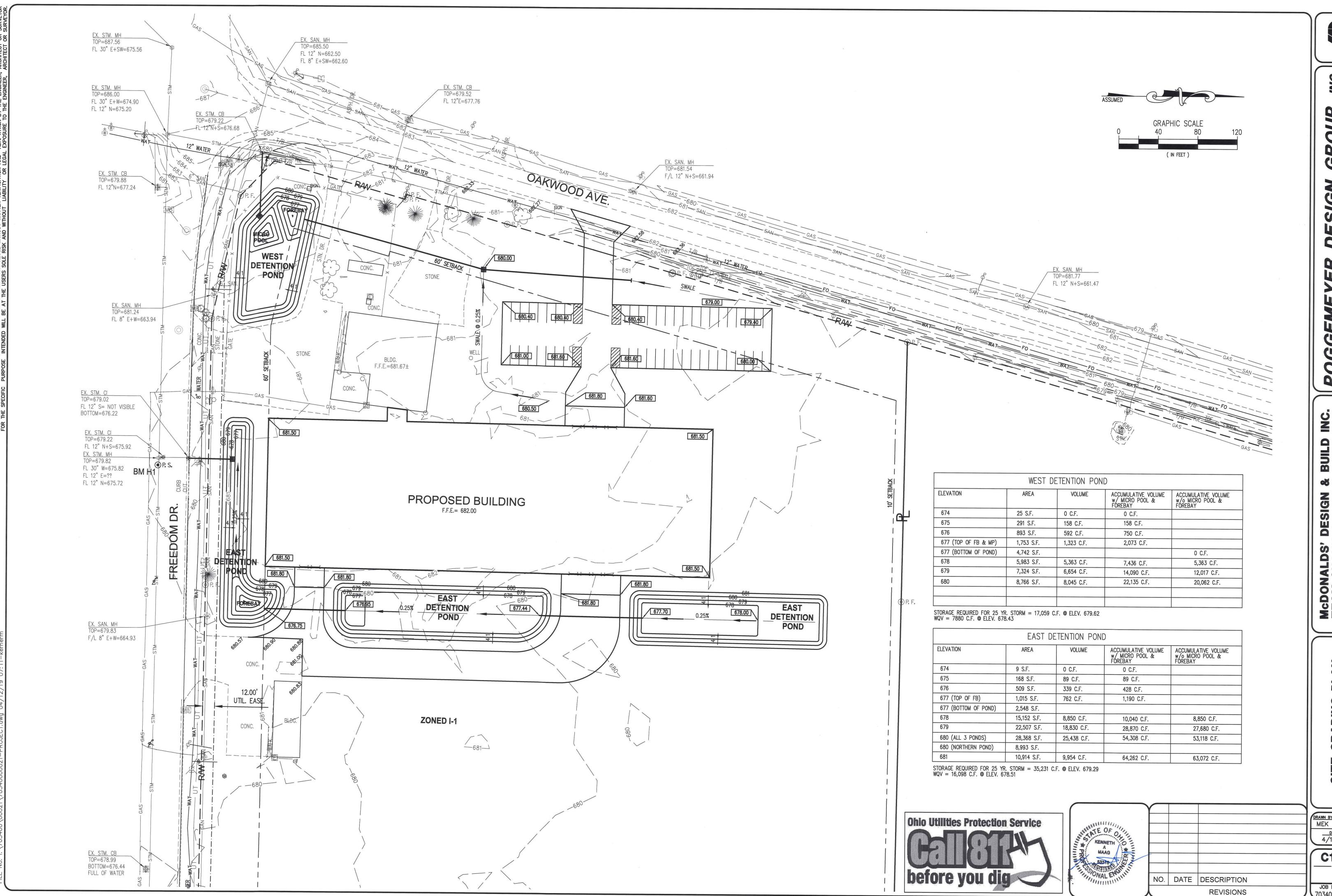
4/12/19

C102





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GRO DEFIANCE

DESIGNENGINEERS
(419) 782–3067

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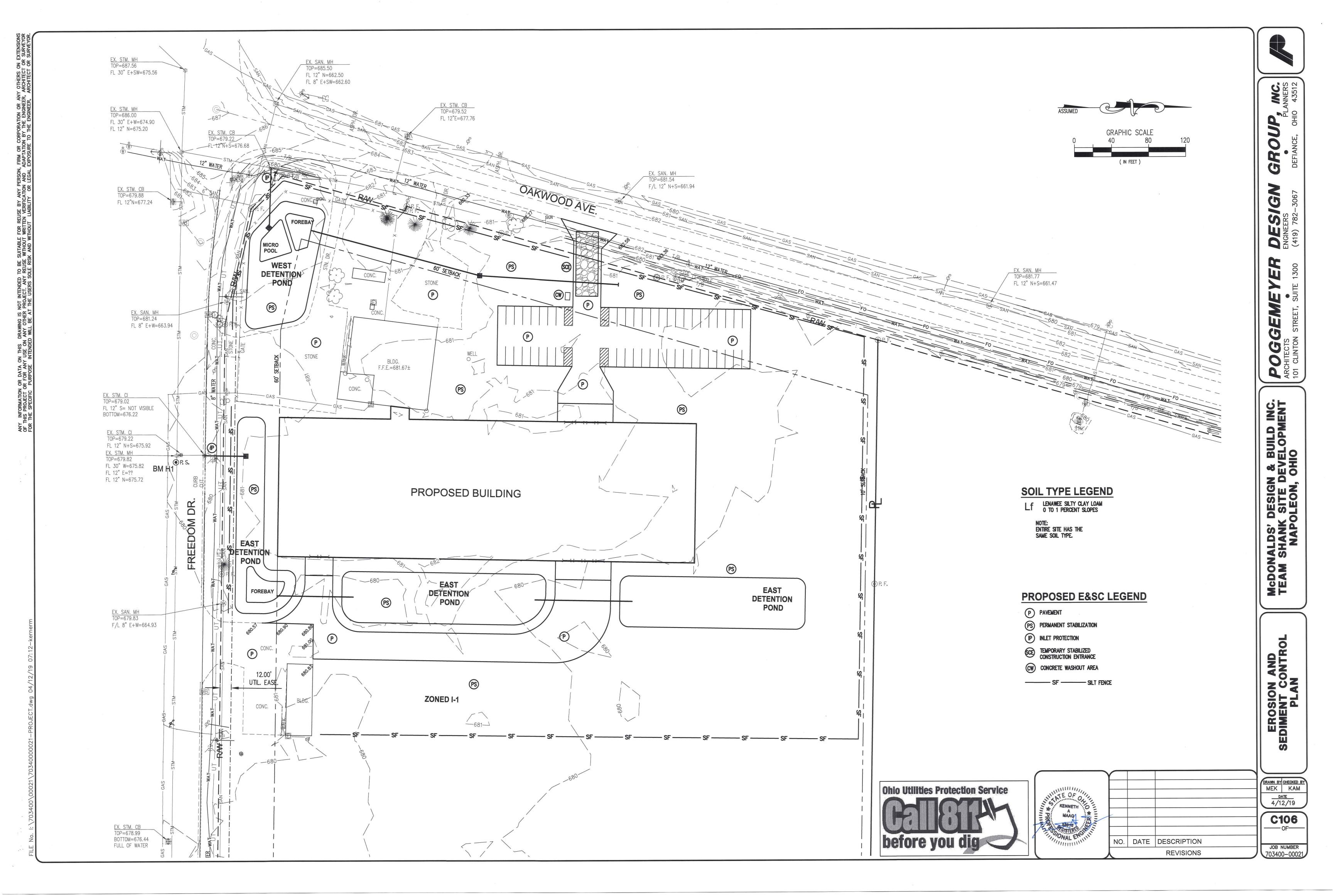
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McDonalds' Design & Build Inc. Team Shank Site Development Napoleon, Ohio

GRADING

DRAWN BY CHECKED BY MEK KAM DATE 4/12/19 C105

---- OF-----JOB NUMBER 703400-00021

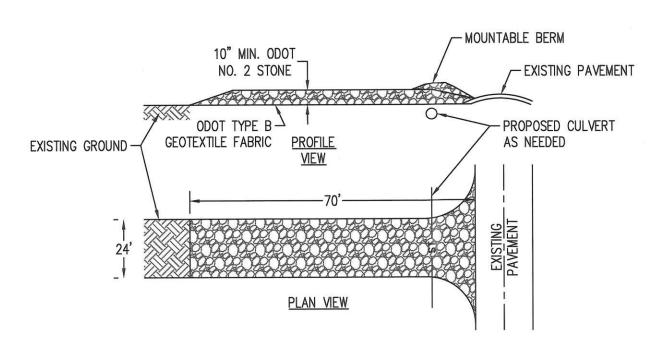


TEMPORARY DIVERSION BERM DETAIL

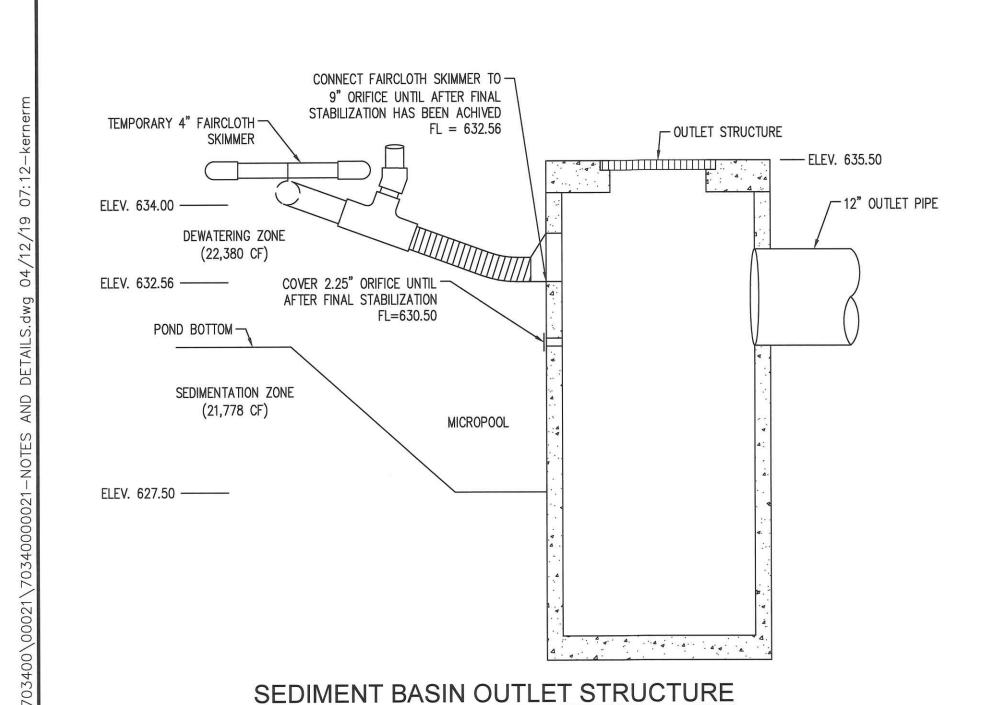
NOT TO SCALE

 NOT ANTICIPATED TO BE USED FOR THIS PROJECT. USE AS NECESSARY TO DIRECT RUNOFF TO THE SEDIMENT BASIN BEFORE THE STORM SEWER IS IN

- 2. DIVERSION DITCH SHALL BE INSTALLED AFTER SEDIMENT BASIN INSTALLATION AND PRIOR TO EARTH
- DISTURBANCE ACTIVITIES. ROUTINELY INSPECT DIVERSIONS AFTER EACH SIGNIFICANT RAIN EVENT, MAINTAINING DIVERSIONS IN A FUNCTIONAL CONDITION AT ALL TIMES.
- 4. REMOVE SEDIMENTS COLLECTED AT THE BASE OF THE DIVERSION WHEN THEY REACH HALF OF THE EXPOSED HEIGHT OF CONTROL.
- WHERE THE DIVERSION DETERIORATES OR FAILS, IT SHALL BE REPAIRED OR REPLACED WITH A MORE EFFECTIVE ALTERNATIVE.



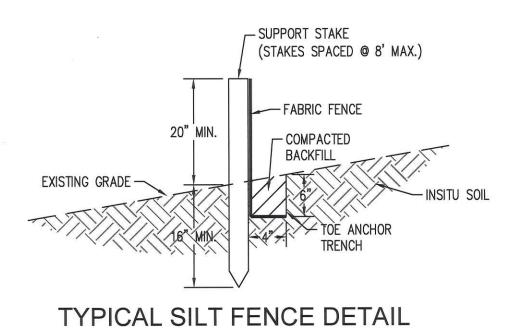
STABILIZED CONSTRUCTION ENTRANCE



NOT TO SCALE

2"X4" FRAME (TYP.) CONSTRUCTION GRADE 2"X4" STAKES FILTER FABRIC MEETING CMS 712.09, TYPE C, ON ALL FOUR SIDES 18" DEEP TRENCH EXCAVATED FOR FILTER FABRIC ON ALL FOUR SIDES CATCH BASIN INLET PROTECTION

CONSTRUCTION GRADE -



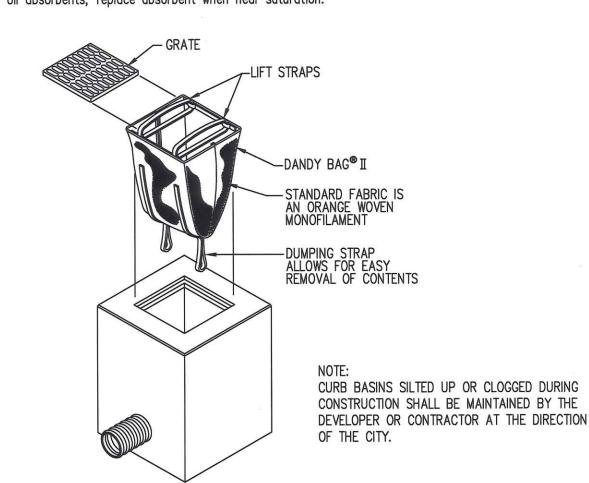
NOT TO SCALE

DANDY BAG®I

Installation and Maintenance Guidelines

Installation: Remove the grate from catch basin. If using optional oil absorbents; place absorbent pillow in unit. Stand the grate on end. Move the top lifting straps out of the way and place the grate into the Dandy Bag®I so that the grate is below the top straps and above the lower straps. Holding the lifting devices, insert the grate into the inlet.

Maintenance: Remove all accumulated sediment and debris from vicinity of unit after each storm event. After each storm event and at regular intervals, look into the Dandy Bag®IL. If the containment area is more than 1/3 full of sediment, the unit must be emptied. To empty unit, lift the unit out of the inlet using the lifting straps and remove the grate. If using optional oil absorbents; replace absorbent when near saturation.



SITE MANAGEMENT

CONCRETE WASHOUT

- COMPLETE CONSTRUCTION/INSTALLATION OF THE SYSTEM AND HAVE WASHOUT LOCATIONS OPERATIONAL PRIOR TO CONCRETE DELIVERY.
- DO NOT WASH OUT CONCRETE TRUCKS OR EQUIPMENT INTO STORM DRAINS, WETLANDS, STREAMS, RIVERS, CREEKS, DITCHES, OR STREETS.
- NEVER WASH OUT INTO A STORM SEWER DRAINAGE SYSTEM. THESE SYSTEMS ARE TYPICALLY CONNECTED
- TO A NATURAL CONVEYANCE SYSTEM. WHERE NECESSARY, PROVIDE STABLE INGRESS AND EGRESS.
- IT IS RECOMMENDED THAT WASHOUT SYSTEMS BE RESTRICTED TO WASHING CONCRETE FROM MIXER AND PUMP TRUCKS AND NOT USED TO DISPOSE OF EXCESS CONCRETE OR RESIDUAL LOADS DUE TO POTENTIAL TO EXCEED THE DESIGN CAPACITY OF THE WASHOUT SYSTEM. SMALL AMOUNTS OF EXCESS OR RESIDUAL
- CONCRETE (NOT WASHOUT WATER) MAY BE DISPOSED OF IN AREAS THAT WILL NOT RESULT IN FLOW TO AN AREA THAT IS TO BE PROTECTED. INSTALL SIGNAGE IDENTIFYING THE LOCATION OF CONCRETE WASHOUT SYSTEMS.
- RUNOFF FROM A RAINSTORM OR SNOW MELT SHOULD NOT CARY WASTES AWAY FROM THE WASHOUT

MAINTENANCE

- INSPECT DAILY AND AFTER EACH STORM EVENT.
- INSPECT THE INTEGRITY OF THE OVERALL STRUCTURE INCLUDING, WHERE APPLICABLE, THE CONTAINMENT
- INSPECT THE SYSTEM FOR LEAKS, SPILLS, AND TRACKING OF SOIL BY EQUIPMENT.
- INSPECT THE POLYETHYLENE LINING FOR FAILURE, INCLUDING TEARS AND PUNCTURES.
- ONCE CONCRETE WASTES HARDEN, REMOVE AND DISPOSE OF THE MATERIAL. • EXCESS CONCRETE SHOULD BE REMOVED WHEN THE WASHOUT SYSTEM REACHES 50 PERCENT OF CAPACITY.
- USE OF THE SYSTEM SHOULD BE DISCONTINUED UNTIL APPROPRIATE MEASURES CAN BE INITIATED TO CLEAN THE STRUCTURE. PREFABRICATED SYSTEMS SHOULD ALSO UTILIZE THIS CRITERION, UNLESS THE MANUFACTURER HAS ALTERNATE SPECIFICATIONS.
- UPON REMOVAL OF THE SOLIDS, INSPECT THE STRUCTURE. REPAIR THE STRUCTURE AS NEEDED OR CONSTRUCT A NEW SYSTEM.
- DISPOSE OF ALL CONCRETE IN A LEGAL MANNER.
- THE PLASTIC LINER SHOULD BE REPLACED AFTER EVERY CLEANING.
- THE CONCRETE WASHOUT SYSTEM SHOULD BE REPAIRED OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE.
- CONCRETE WASHOUT SYSTEMS ARE DESIGNED TO PROMOTE EVAPORATION. HOWEVER, IF THE LIQUIDS DO NOT EVAPORATE AND THE SYSTEM IS NEAR CAPACITY, IT MAY BE NECESSARY TO VACUUM OR REMOVE THE LIQUIDS AND DISPOSE OF THEM IN AN ACCEPTABLE METHOD. DISPOSAL MAY BE ALLOWED AT THE LOCAL SANITARY SEWER AUTHORITY PROVIDED THEIR NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMITS ALLOW FOR ACCEPTANCE OF THIS MATERIAL. ANOTHER OPTION WOULD BE TO UTILIZE A SECONDARY CONTAINMENT SYSTEM OR BASIN FOR FURTHER DEWATERING.

CONCRETE WASHOUT DETAIL SCALE: NONE (PRACTICE 3.76)

0 0

0

0

BERM AROUND PERIMETER

0

15x15' MIN. OR AS REQUIRED TO CONTAIN

WASTE CONCRETE

- 10 MIL PLASTIC LINING

-3:1 OR FLATTER

10 MIL PLASTIC LINING

SIDE SLOPES

-GROUND SURFACE

LATH & FLAGGING

(ON ALL SIDES)

TEMPORARY CONCRETE WASHOUT FACILITY NOTES:

SIGN TO INDICATE THE

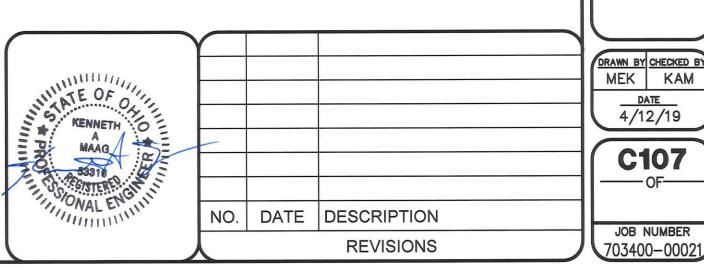
CONCRETE WASHOUT AREA

LOCATION OF THE

COMPACTED EMBANKMENT-MATERIAL TYP.

- 1. TEMPORARY CONCRETE WASHOUT FACILITIES (TYPE BELOW GRADE) SHOULD BE CONSTRUCTED AS SHOWN ON THE DETAIL, WITH A RECOMMENDED MINIMUM LENGTH AND MINIMUM WIDTH OF 15 FEET. THE QUANTITY AND VOLUME SHOULD BE SUFFICIENT TO CONTAIN ALL LIQUID AND CONCRETE WASTE GENERATED BY WASHOUT OPERATIONS.
- 2. PLASTIC LINING MATERIALS SHALL BE A MINIMUM OF 10 MIL POLYETHYLENE SHEETING AND SHALL BE FREE OF HOLES, TEARS OR OTHER DEFECTS THAT COMPROMISE THE IMPERMEABILITY OF THE MATERIAL.

Ohio Utilities Protection Service



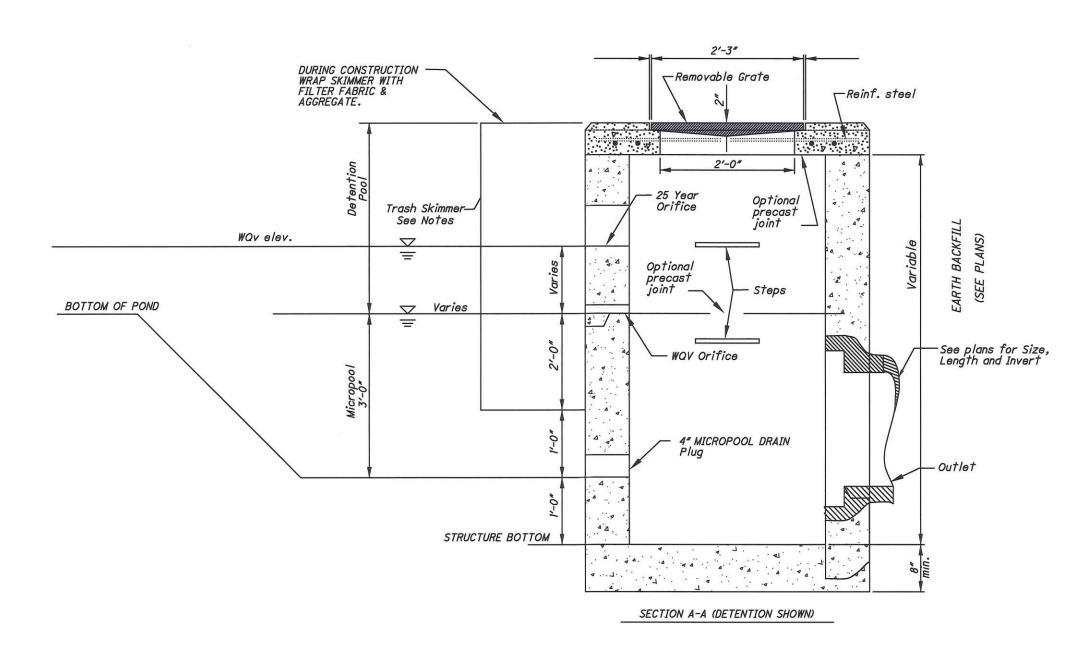
BUILD INC.
/ELOPMENT

SEDIMENT CONTROL
DETAILS

4/12/19 C107 --- OF----

MEK KAM

PLAN VIEW (DETENTION SHOWN)



OUTLET STRUCTURE DETAIL

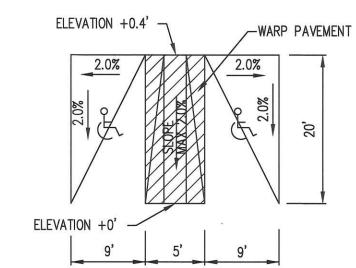
NOT TO SCALE

	EAST OUTLET STRUCTURE #1	WEST OUTLET STRUCTURE #2
SIZE OF STRUCTURE	2' x 2'	2' x 2'
TOP OF STRUCTURE	681.00	681.00
25 YEAR ELEVATION	679.62	679.29
WQV ELEVATION	678.51	678.43
WQV ORIFICE ELEVATION	677.60	677.00
25 YEAR DETENTION ORIFICE ELEVATION	678.51	678.43
WQV ORIFICE SIZE	2"	1.5"
NUMBER OF ORIFICES	1	1
25 YEAR DETENTION ORIFICE SIZE	3" x 2'	6" DIA.
OUTLET SIZE	12"	12"
OUTLET INVERT	676.35	676.85
BOTTOM OF STRUCTURE	675.85	676.35

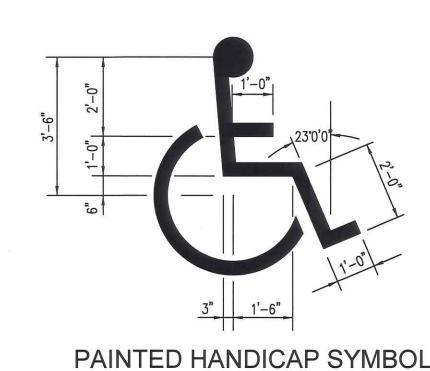
LOCATION AND ELEVATION: When given on the plans, the location and the elevation are at the top center of the grate. The orifice holes should be placed at the elevations as shown on the plans.

TRASH SKIMMER: Use trash skimmer screens to protect the WQv perforation's. It must extend from the top of the structure to 2' below the permanent pool level and be open at the top and bottom. The radius of the trash skimmer shall be 3'\(\phi\) or as shown on the plans. Trash skimmer shall be stainless steel or galvanized steel per CMS 711.02. Maximum perforation size shall be 2 inches. Securely fasten trash skimmer to the basin using hardware galvanized per CMS 711.02.

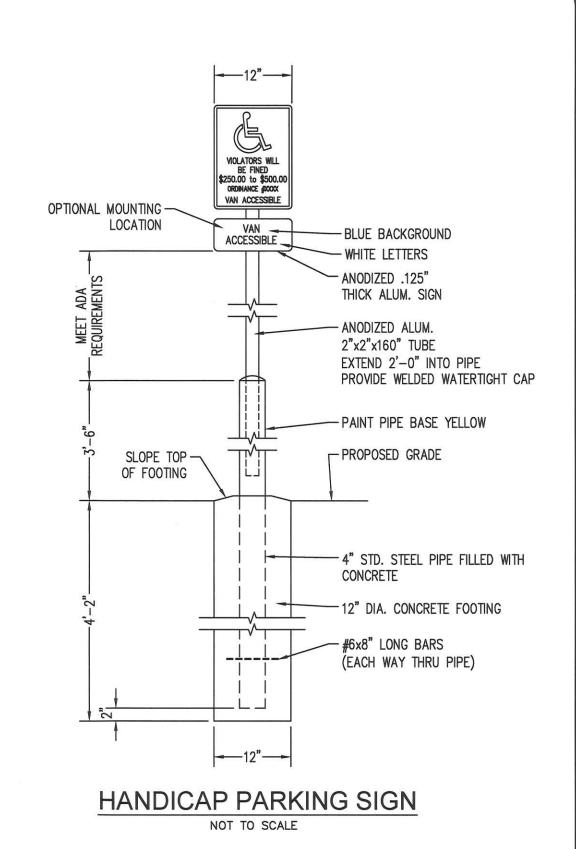
After 70% covering of grassed areas, remove fabric and aggregate from trash skimmer.



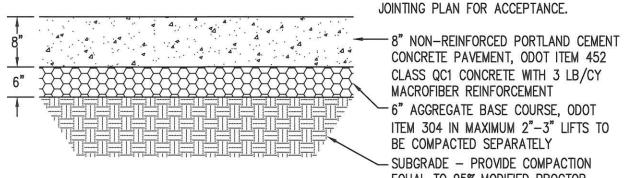
TYPICAL HANDICAP PARKING



SCALE: NONE

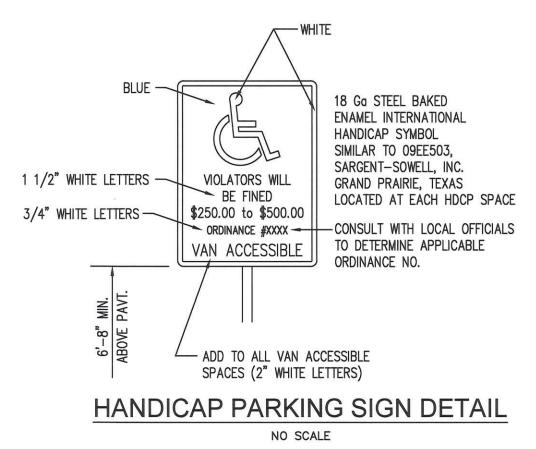


NOTE: PAVEMENT JOINTS SHALL CONFORM TO ODOT ITEM 452 AND ODOT STANDARD DRAWINGS BP-2.1 AND BP-2.2. CONTRACTOR SHALL PROVIDE CONCRETE PAVEMENT



CLASS QC1 CONCRETE WITH 3 LB/CY MACROFIBER REINFORCEMENT ← 6" AGGREGATE BASE COURSE, ODOT ITEM 304 IN MAXIMUM 2"-3" LIFTS TO BE COMPACTED SEPARATELY - SUBGRADE - PROVIDE COMPACTION EQUAL TO 95% MODIFIED PROCTOR (ASTM 1557) ODOT ITEM 203

TYPICAL CONCRETE PAVEMENT SECTION NOT TO SCALE



MISCELLANEOUS DETAILS

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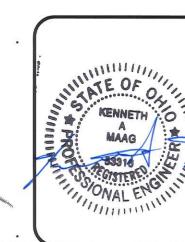
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BUILD INC. ELOPMENT

McDONALDS' DESIGN & TEAM SHANK SITE DEV NAPOLEON, OH

Ohio Utilities Protection Service



1				
	NO.	DATE	DESCRIPTION	
			REVISIONS	

DRAWN BY CHECKED BY MEK KAM DATE 4/12/19 C108 ----- OF-----

SITE WORK SPECIFICATIONS

- A. WORK INCLUDES CLEARING, GRUBBING, GRADING, EROSION CONTROL, UNDERGROUND UTILITIES, PAVING, SITE RESTORATION, AND INCIDENTAL ITEMS AS SHOWN AND AS SPECIFIED.
- B. CONSTRUCTION LIMITS SHALL BE WITHIN OWNERS PROPERTY BOUNDARIES AND CONSTRUCTION EASEMENTS AS SHOWN ON DRAWINGS.

REGULATIONS

THE CONTRACTOR IS RESPONSIBLE FOR INITIATING, MAINTAINING, SUPERVISING, AND COMPLYING WITH ALL FEDERAL OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA), STATE, AND LOCAL SAFETY REQUIREMENTS. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING AND MAINTAINING SAFEGUARDS, SAFETY DEVICES, AND PROTECTIVE EQUIPMENT NECESSARY FOR THE PROTECTION OF PERSONS AND PROPERTY AFFECTED BY THE PROJECT AT ALL TIMES. SHEETING, BRACING, CRIBBING, ETC. MUST BE INSTALLED AS REQUIRED TO PROVIDE MAXIMUM SAFETY TO THE CONTRACTOR'S WORKERS IN FULL COMPLIANCE WITH OSHA REGULATIONS. IN ADDITION, THE CONTRACTOR IS RESPONSIBLE FOR SECURING THE PROJECT TO PREVENT UNAUTHORIZED PERSONNEL FROM HAZARDOUS OR DANGEROUS CONDITIONS.

SPECIFICATIONS: GENERAL NOTES

- ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CONSTRUCTION STANDARDS AND SPECIFICATIONS OF THE STATE LOCAL/MUNICIPAL/ TOWNSHIP AND/OR COUNTY DEPARTMENT OF TRANSPORTATION LATEST EDITION AND CONSTRUCTION STANDARDS, UNLESS OTHERWISE NOTED, AND TENANT REQUIREMENTS AS DEPICTED IN THESE PLANS. IN ADDITION, ALL WORK WILL BE IN COMPLIANCE WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AND REGULATIONS, UNLESS NOTED OTHERWISE.
- B. THE CONTRACTOR SHALL FURNISH SUPERVISION, LABOR, MATERIALS, AND EQUIPMENT, AND SHALL PERFORM ALL WORK AND SERVICES NECESSARY TO COMPLETE IN A SATISFACTORY MANNER THE SITE PREPARATION, EXCAVATION, FILLING, COMPACTION, AND GRADING, AS SHOWN ON THE APPROVED AND ISSUED FOR CONSTRUCTION PLANS; AS DESCRIBED THEREIN.

CONSTRUCTION SURVEYING

- A. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR LAYING OUT THE LOCATION, ALIGNMENT, ELEVATION, AND GRADE OF ALL WORK SHOWN ON THE DRAWINGS AND SPECIFICATIONS.
- B. THE CONTRACTOR SHALL USE COMPETENT PERSONNEL AND SUITABLE EQUIPMENT. IF NECESSARY, THE CONTRACTOR SHALL EMPLOY A REGISTERED ENGINEER OR SURVEYOR TO SUPERVISE THE WORK.
- VERIFICATION AND PROTECTION
- VERIFY LOCATIONS OF SURVEY CONTROL POINTS PRIOR TO STARTING WORK. PROMPTLY NOTIFY OWNER OF ANY DISCREPANCIES DISCOVERED.
- PROTECT OR RELOCATE SURVEY CONTROL POINTS PRIOR TO STARTING SITE WORK; PRESERVE PERMANENT REFERENCE POINTS DURING CONSTRUCTION.
- D. ELEVATION DATUM: ALL ELEVATIONS ARE BASED ON U.S.G.S. DATUM. (ONLY IF NEEDED).

PROJECT RECORD DRAWINGS

KEEP A CURRENT SET OF DRAWINGS AT JOB SITE THAT ARE MARKED TO SHOW LOCATION OF ITEMS CONCEALED UPON COMPLETION OF WORK AND ALL CHANGES MADE DURING CONSTRUCTION. DIMENSION UNDERGROUND AND CONCEALED WORK AND UTILITIES FROM PERMANENT REFERENCE POINTS; RECORD VERTICAL DISTANCES. SUBMIT PROJECT RECORD DRAWINGS TO OWNER UPON COMPLETION OF WORK IN THE FORM OF EITHER AUTOCAD OR MICROSTATION ELECTRONIC FILES.

COORDINATION

- THE CONTRACTOR SHALL COORDINATE THE STAGING AREA LOCATION FOR MATERIALS, EQUIPMENT, AND EMPLOYEE PARKING WITH THE OWNER.
- B. THE OWNER'S BUILDING OPERATIONS SHALL BE MAINTAINED AT ALL TIMES; CONSTRUCTION SCHEDULE AND TRAFFIC MAINTENANCE SHALL BE APPROVED BY THE OWNER.

UNDERGROUND UTILITIES

- A. THE LOCATION OF THE UNDERGROUND UTILITIES SHOWN ON THE PLANS HAVE BEEN OBTAINED BY DILIGENT FIELD CHECKS, FROM THE RESPECTIVE UTILITY OWNERS, AND SEARCHES OF AVAILABLE RECORDS. IT IS BELIEVED THEY ARE ESSENTIALLY CORRECT BUT THE OWNER DOES NOT GUARANTEE THEIR ACCURACY OR COMPLETENESS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE INVESTIGATION, LOCATION, TYPE & MATERIAL, SUPPORT, PROTECTION AND RESTORATION OF ALL EXISTING UTILITIES AND APPURTENANCES WHETHER SHOWN ON THESE PLANS OR NOT. THE CONTRACTOR SHALL EXPOSE ALL UTILITIES OR STRUCTURES PRIOR TO CONSTRUCTION TO VERIFY THE VERTICAL AND HORIZONTAL EFFECT ON THE PROPOSED IMPROVEMENTS.
- UTILITY NOTIFICATION: AT LEAST TWO WORKING DAYS PRIOR TO COMMENCING CONSTRUCTION OPERATIONS IN AN AREA WHICH MAY INVOLVE UNDERGROUND UTILITY FACILITIES, THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER, THE UTILITY PROTECTION SERVICE AND THE OWNERS OF ANY UNDERGROUND UTILITY FACILITY SHOWN IN THE PLANS.
- D. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THE CONTINUITY OF SERVICE TO THE OVERALL UTILITY SYSTEMS AS ISOLATED REMOVALS OF SYSTEM COMPONENTS OCCURS AND AS NEW COMPONENTS ARE ADDED AND CONNECTED TO THE VARIOUS SYSTEMS.
- IF ACTIVE UTILITIES ARE ENCOUNTERED BUT NOT SHOWN ON THE DRAWINGS, THE OWNER SHALL BE ADVISED BEFORE WORK IS CONTINUED.
- INACTIVE AND ABANDONED UTILITIES ENCOUNTERED IN EXCAVATING AND GRADING OPERATIONS SHALL BE REPORTED TO THE OWNER. THEY SHALL BE REMOVED, PLUGGED OR CAPPED AS DIRECTED BY THE UTILITY COMPANY OR THE ENGINEER.
- G. CONNECTIONS TO EXISTING PIPE: WHERE THE PLANS PROVIDE FOR PROPOSED CONDUIT TO BE CONNECTED TO, OR TO CROSS OVER OR UNDER AN EXISTING SEWER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE THE EXISTING PIPE BOTH AS TO LINE AND GRADE BEFORE HE STARTS TO LAY THE PROPOSED CONDUIT.
- MAINTENANCE OF SEWER FLOWS: THE CONTRACTOR SHALL SO CONDUCT HIS OPERATIONS SO AS TO MAINTAIN AT ALL TIMES SEWER FLOWS THROUGH EXISTING FACILITIES.
- ALL NEW CONDUITS, INLETS, CATCH BASINS, AND MANHOLES CONSTRUCTED AS A PART OF THE PROJECT SHALL BE FREE OF ALL FOREIGN MATTER AND IN A CLEAN CONDITION BEFORE THE PROJECT IS ACCEPTED.

8. REMOVALS

REMOVAL OF EXISTING PAVEMENT SHALL BE ACCOMPLISHED BY SAW CUTTING IN A NEAT, STRAIGHT LINE TO PROVIDE A SMOOTH VERTICAL SURFACE. FOR ASPHALT PAVEMENT ENSURE THAT THE JUNCTURE BETWEEN NEW AND EXISTING PAVEMENT IS FLUSH AND MADE IN A MANNER TO ENSURE A CONTINUOUS BOND. CLEAN FACE AND APPLY A TACK COAT JUST PRIOR TO PLACING NEW ASPHALT PAVEMENT PER THE APPROPRIATE SECTION SHOWN ON THE PLANS. FOR CONCRETE PAVEMENT APPLY A BONDING AGENT JUST PRIOR TO PLACING NEW CONCRETE PAVEMENT PER THE SECTION ON THIS PLANS.

PROTECTION

- A. PROTECT IMPROVEMENTS ON SITE AND ON ADJOINING PROPERTIES. PROVIDE BARRICADES, COVERINGS, OR OTHER TYPES OF PROTECTION AS NECESSARY TO PREVENT DAMAGE AND TO SAFEGUARD AGAINST INJURY. RESTORE TO ORIGINAL CONDITION IMPROVEMENTS DAMAGED BY THE WORK OR IMPROVEMENTS WHICH REQUIRED TEMPORARY REMOVAL DURING CONSTRUCTION.
- THE CONTRACTOR SHALL PROVIDE SHORING, BRACING, LATERAL SUPPORTS, ETC. AND TAKE WHATEVER PRECAUTIONS NECESSARY TO PREVENT THE UNDERMINING OF ADJACENT EXISTING FOUNDATIONS AND MAINTAIN THE STRUCTURAL INTEGRITY OF EXISTING STRUCTURES.
- THE CONTRACTOR SHALL PROVIDE ADEQUATE PROTECTION AGAINST DAMAGE TO ALL EXISTING UTILITIES, STRUCTURES, AND COMPLETED PORTIONS OF THE WORK, AND TO PREVENT INJURIES TO PERSONS. IT SHALL BE THE CONTRACTORS SOLE RESPONSIBILITY TO MAINTAIN THE INTEGRITY OF ALL UTILITIES, STRUCTURES, AND ABUTTING PROPERTIES. THE COST OF ANY REPAIR OR REPLACEMENT OF DAMAGED ITEMS SHALL BE BORNE SOLELY BY THE CONTRACTOR. THE CONTRACTOR SHALL MAINTAIN FULL RESPONSIBILITY FOR ALL METHODS, MEANS AND PROCEDURES RELATED TO CONSTRUCTION.

10. TRAFFIC CONTROL

- FURNISH AND MAINTAIN CONSTRUCTION BARRICADES AND TRAFFIC CONTROL DEVICES WHEN WORKING IN AREAS OPEN TO TRAFFIC. BARRICADES AND TRAFFIC CONTROL DEVICES SHALL COMPLY WITH STATE DOT STANDARDS.
- B. THE CONTRACTOR SHALL KEEP EXISTING STREETS, ROADS, DRIVES, AND BUILDING ENTRIES CLEAR OF DIRT, DEBRIS AND EQUIPMENT.

A. TESTING LABORATORY SERVICES

- ANSI/ASTM D3740 PRACTICE FOR EVALUATION OF AGENCIES ENGAGED IN TESTING AND/OR INSPECTION OF SOIL AND ROCK AS USED IN ENGINEERING DESIGN AND CONSTRUCTION.
- ANSI/ASTM E329 RECOMMENDED PRACTICE FOR INSPECTION AND TESTING AGENCIES FOR CONCRETE, STEEL AND BITUMINOUS MATERIALS AS USED IN CONSTRUCTION.
- B. SELECTION AND PAYMENT
- CONTRACTOR SHALL EMPLOY AND PAY FOR SERVICES OF AN INDEPENDENT TESTING LABORATORY TO PERFORM SPECIFIED INSPECTION AND TESTING.
- EMPLOYMENT OF TESTING LABORATORY SHALL BE IN NO WAY RELIEVE CONTRACTOR OF OBLIGATION TO PERFORM WORK IN ACCORDANCE WITH REQUIREMENTS OF CONTRACT DOCUMENTS.
- C. QUALITY ASSURANCE
- COMPLY WITH REQUIREMENTS OF ANSI/ASTM E329 AND ANSI/ASTM D3740.
- 2. LABORATORY: AUTHORIZED TO OPERATE IN STATE IN WHICH PROJECT IS
 - D. LABORATORY RESPONSIBILITIES
- TEST SAMPLES OF MIXES SUBMITTED BY CONTRACTOR.
- PROVIDE QUALIFIED PERSONNEL AT SITE DURING TESTING. COOPERATE WITH OWNER AND CONTRACTOR IN PERFORMANCE OF SERVICES.
- 3. PERFORM SPECIFIED INSPECTION, SAMPLING, AND TESTING OF PRODUCTS IN ACCORDANCE WITH SPECIFIED STANDARDS.
- 4. ASCERTAIN COMPLIANCE OF MATERIALS AND MIXES WITH REQUIREMENTS OF
- 5. PROMPTLY NOTIFY OWNER AND CONTRACTOR OF OBSERVED IRREGULARITIES OR NON-CONFORMANCE OF WORK OR PRODUCTS.
 - E. LABORATORY REPORTS
- AFTER EACH INSPECTION AND TEST, PROMPTLY SUBMIT TWO COPIES OF LABORATORY REPORT TO OWNER, AND TO CONTRACTOR.

- PROJECT TITLE AND NUMBER
- NAME OF INSPECTOR.
- DATE AND TIME OF SAMPLING OR INSPECTION.
- IDENTIFICATION OF PRODUCT. LOCATION IN THE PROJECT.
- G) TYPE OF INSPECTION OR TEST
- H) DATE OF TEST.
- RESULTS OF TESTS. J) CONFORMANCE WITH CONTRACT DOCUMENTS.
- WHEN REQUESTED BY OWNER, PROVIDE INTERPRETATION OF TEST RESULTS.
- F. LIMITS ON TESTING LABORATORY AUTHORITY
- 1. LABORATORY MAY NOT RELEASE, REVOKE, ALTER, OR ENLARGE ON REQUIREMENTS OF CONTRACT DOCUMENTS.
- 2. LABORATORY MAY NOT APPROVE OR ACCEPT ANY PORTION OF THE WORK.
- 3. LABORATORY MAY NOT ASSUME ANY DUTIES OF CONTRACTOR.
- LABORATORY HAS NO AUTHORITY TO STOP THE WORK.

G. CONTRACTOR RESPONSIBILITIES

- DELIVER TO LABORATORY AT DESIGNATED LOCATION, ADEQUATE SAMPLES OF MATERIALS PROPOSED TO BE USED WHICH REQUIRE TESTING, ALONG WITH PROPOSED MIX DESIGNS.
- 2. COOPERATE WITH LABORATORY PERSONNEL, AND PROVIDE ACCESS TO THE WORK.
- CONTRACTOR SHALL ARRANGE AND PAY FOR SOIL AND BASE COURSE TESTING AS REQUIRED BY THE CONTRACT DOCUMENTS AND AS FOLLOWS:
- 1. SITE FILL: PERFORM AT LEAST ONE FIELD DENSITY TEST FOR EVERY 10,000 SQ. FT. OF FILL PLACED WITHIN BUILDING, SLAB, AND PAVEMENT AREAS, WITH AT LEAST ONE TEST FOR EVERY 2FT. OF FILL
- UTILITY TRENCH BACKFILL: PERFORM AT LEAST TWO TESTS IN RANDOM COMPACTED BACKFILL LAYERS FOR EVERY 400 L.F. OF TRENCH UNDER PAVEMENTS AND SLABS.
- 3. DETENTION POND DIKES: PERFORM AT LEAST ONE TEST FOR EVERY 100 L.F. OF DIKE IN RANDOM FILL
- 4. BASE COURSE: PERFORM AT LEAST ONE FIELD DENSITY TEST FOR EVERY 10,000 SQ. FT. OF BASE COURSE PLACED.
- FAILED TESTS: IF ANY OF THE ABOVE TESTS INDICATED THAT MATERIALS HAVE BEEN PLACED AT A LOWER DENSITY THAN REQUIRED, PERFORM ADDITIONAL TESTS AS REQUIRED TO DETERMINE THE EXTENT OF THE DEFICIENCY.
- CONTRACTOR SHALL ARRANGE AND PAY FOR ASPHALT AND CONCRETE TESTING AS REQUIRED BY THE CONTRACT DOCUMENTS.
- CONTRACTOR SHALL ARRANGE AND PAY FOR TESTING OF PIPE LINES AS SPECIFIED

12. EROSION CONTROL

EROSION CONTROL MEASURES SHALL COMPLY WITH THE DRAWINGS; THE EROSION CONTROL AND STORM WATER MANAGEMENT PLAN PROVIDED.

13. CLEARING AND GRUBBING

- A. THIS WORK SHALL CONSIST OF ALL CLEARING AND GRUBBING, REMOVAL OF EXISTING STRUCTURES UNLESS OTHERWISE STATED. PROPER AND APPROVED DISPOSAL OF MATERIALS NOT REUSED FOR THE PROJECT. PREPARATION OF THE LAND TO BE FILLED, FILLING OF THE LAND, SPREADING AND COMPACTION OF THE FILL, AND ALL SUBSIDIARY WORK NECESSARY TO COMPLETE THE GRADING OF THE CUT AND FILL AREAS TO CONFORM WITH THE LINES, GRADES, SLOPES AND SPECIFICATIONS.
- SUBSURFACE CONDITIONS: PRIOR TO BIDDING THE WORK, THE CONTRACTOR SHALL EXAMINE. INVESTIGATE, AND INSPECT THE CONSTRUCTION SITE AS TO THE NATURE AND LOCATION OF THE WORK AND THE GENERAL AND LOCAL CONDITIONS AT THE CONSTRUCTION SITE, INCLUDING, WITHOUT LIMITATION, THE CHARACTER OF SURFACE OR SUBSURFACE CONDITIONS AND OBSTACLES TO BE ENCOUNTERED ON AND AROUND THE CONSTRUCTION SITE; AND SHALL MAKE SUCH ADDITIONAL INVESTIGATION NECESSARY FOR THE PLANNING AND PROPER EXECUTION OF THE WORK.
- BORINGS AND/OR SOILS INVESTIGATIONS HAVE BEEN MADE FOR THE PURPOSE OF THE DESIGN OF THIS PROJECT. RESULTS OF THESE BORINGS AND STUDIES WILL BE MADE AVAILABLE BY THE OWNER TO THE CONTRACTOR UPON REQUEST, BUT THE OWNER AND GEOTECHNICAL FIRM ARE NOT RESPONSIBLE FOR ANY INTERPRETATIONS OR CONCLUSIONS WITH RESPECT THERETO MADE BY THE CONTRACTOR ON THE BASIS OF SUCH INFORMATION AND THE OWNER FURTHER HAS NO RESPONSIBILITY FOR THE ACCURACY OF THE BORINGS AND THE SOIL INVESTIGATIONS.
- OTHER VEGETATION, IMPROVEMENTS, RUBBISH AND DEBRIS, AND OBSTRUCTIONS THAT INTERFERE WITH PROPOSED CONSTRUCTION; REMOVE ITEMS ONLY AS NECESSARY FOR COMPLETION OF WORK. CUT BRUSH AND VEGETATION FLUSH WITH GROUND. GRUB OUT STUMPS, AND ROOTS HAVING

A DIAMETER OF 2" OR LARGER, AND ROOT CLUSTERS TO A DEPTH OF AT LEAST 24 INCHES

BELOW SUBGRADE ELEVATION FOR PAVEMENTS, STRUCTURES, AND EMBANKMENTS AND 6"

D. REMOVE TREES, STUMPS, SNAGS, SHRUBS, BRUSH, HEAVY GROWTHS OF GRASS, WEEDS AND

14. TOP SOIL STRIPPING

- STRIP TOPSOIL FROM PROJECT AREA TO WHATEVER DEPTHS ENCOUNTERED; PREVENT INTERMINGLING WITH UNDERLAYING SUBSOIL OR OTHER OBJECTIONABLE MATERIAL. REMOVE HEAVY GROWTHS OF GRASS FROM AREAS BEFORE STRIPPING TOPSOIL.
- B. STOCKPILE TOPSOIL IN STORAGE PILES IN AREAS AS DESIGNATED BY OWNER. CONSTRUCT STORAGE PILES TO FREELY DRAIN SURFACE WATER. COVER OR SPRINKLE WATER ON STORAGE PILES TO PREVENT WINDBLOWN DUST.

15. EARTH WORK AND GRADING CONSTRUCTION

BELOW GROUND SURFACE IN OTHER AREAS.

- ALL EARTH AND GRADING SHALL BE IN ACCORDANCE WITH THE CONSTRUCTION STANDARDS AND SPECIFICATIONS OF THE STATE DEPARTMENT OF TRANSPORTATION LATEST EDITION.
- B. THE GRADING OPERATIONS SHALL BE CLOSELY SUPERVISED AND INSPECTED, PARTICULARLY DURING THE REMOVAL OF UNSUITABLE MATERIAL AND THE CONSTRUCTION OF EMBANKMENTS OR BUILDING PADS, BY THE GEOTECHNICAL ENGINEER OR HIS REPRESENTATIVE. ALL TESTING, INSPECTION AND SUPERVISION OF THE SOILS RELATED OPERATIONS SHALL BE ENTIRELY THE RESPONSIBILITY OF THE GEOTECHNICAL ENGINEER.
- C. THE GRADING AND CONSTRUCTION OF THE SITE IMPROVEMENTS SHALL NOT CAUSE PONDING OF STORMWATER. ALL AREAS ADJACENT TO THESE IMPROVEMENTS SHALL BE GRADED TO ALLOW POSITIVE DRAINAGE.
- D. THE PROPOSED GRADING ELEVATIONS SHOWN ON THE PLANS ARE FINISHED GRADE, EXCEPT FOR AREAS AS DESIGNATED FOR FUTURE DEVELOPMENT.
- E. THE DETENTION BASIN AND BERMS MAY BE OVER EXCAVATED TO MEET FILL REQUIREMENTS. THE OVER EXCAVATED AREAS WILL BE REFILLED WITH SUITABLE MATERIAL.
- F. THE SELECTED FILL MATERIAL SHALL BE PLACED IN UNIFORM LAYERS SO THAT THE COMPACTED THICKNESS IS APPROXIMATELY SIX INCHES (6"). EACH LAYER SHALL BE THOROUGHLY MIXED DURING SPREADING TO INSURE UNIFORMITY.
- PLACE FILL IN PAVEMENT AREAS, DETENTION POND DIKES, UNDER BUILDING FOUNDATIONS AND SLABS, UNDER OUT LOT BUILDING PADS, AND WITHIN 10 FEET OF BUILDING LINES IN LOOSE LIFTS NOT MORE THAN 8 INCHES THICK AT A MOISTURE CONTENT AT OR NEAR OPTIMUM, AND COMPACT TO AT LEAST 95% OF MAXIMUM DENSITY IN ACCORDANCE WITH ASTM SPECIFICATION D-1557 (MODIFIED PROCTOR METHOD), OR TO OTHER DENSITY AS DETERMINED BY THE GEOTECHNICAL ENGINEER. PLACE FILL IN LANDSCAPE AREAS IN LOOSE LIFTS 12 INCHES THICK AND COMPACT TO 90% OF MAXIMUM STANDARD PROCTOR DENSITY.
- FILL: FILL MATERIALS SHALL BE CLEAN GRANULAR MATERIAL. SUITABLE ON-SITE CUT MATERIAL MAY BE USED FOR REQUIRED FILLS. PROVIDE ADDITIONAL OFF-SITE FILL AS NECESSARY TO BRING SITE TO REQUIRED GRADES. FILL MATERIALS SHALL BE APPROVED BY GEOTECHNICAL
- THE SURFACE VEGETATION, TOPSOIL AND ANY OBVIOUSLY SOFT UNDERLYING SOIL SHOULD BE STRIPPED FROM ALL AREAS TO RECEIVE FILL. IF THE UNDERLYING SUBGRADE SOILS RUT DEEPER THAN ONE INCH (1") UNDER THE CONSTRUCTION EQUIPMENT OR IF THE MOISTURE CONTENT EXCEEDS THAT NEEDED FOR PROPER COMPACTION, THE SOIL SHALL BE SCARIFIED, DRIED AND RE-COMPACTED TO NINETY-FIVE PERCENT (95%) OF MODIFIED PROCTOR WITHIN BUILDING PAD AND PAVEMENT AREAS.

IF UNSUITABLE BEARING SOILS ARE REMOVED FROM BENEATH PROPOSED FOOTINGS, EXCAVATION SHALL EXTEND LATERALLY BEYOND PERIMETER OF FOUNDATION FOR A DISTANCE AT LEAST EQUAL TO THICKNESS OF BACKFILL BELOW FOOTING BASE. THIS PROVISION SHALL ALSO APPLY WHERE A RAISED STRUCTURAL PAD IS CONSTRUCTED TO ACHIEVE A BEARING ELEVATION GREATER THAN THE EXISTING GRADES.

UNSUITABLE MATERIALS: EXCAVATE ORGANIC, FROZEN, WET, SOFT, AND LOOSE SOILS (INCLUDING PREVIOUSLY PLACED UNCOMPACTED FILL SOILS); BOULDERS; REMNANTS OF PREVIOUS CONSTRUCTION; AND OTHER UNSUITABLE MATERIALS FROM BENEATH PROPOSED FOUNDATIONS, SLABS, PAVEMENTS, AND DETENTION POND DIKES. THE COST OF THIS WORK SHALL BE INCLUDED IN THE BASE BID FOR THE PROJECT.

ALL UNSTABLE MATERIAL AND ALL SURPLUS EXCAVATED MATERIAL NOT REQUIRED SHALL BE REMOVED FROM THIS SECTION. THE LOCATION OF DUMP AND LENGTH OF HAUL SHALL BE THE CONTRACTOR'S RESPONSIBILITY WITH THE OWNER'S APPROVAL, PRIOR TO EXPORTING FILL FROM SITE. AN ADDITIONAL EROSION AND SEDIMENT CONTROL PLAN MUST BE SUBMITTED AS AN AMENDMENT/ADDITION TO THIS PROJECT.

- TOLERANCE FOR AREAS TO RECEIVE SLABS OR PAVEMENTS SHALL BE 0.10 FT. ABOVE OR BELOW ESTABLISHED SUBGRADE. TOLERANCE FOR AREAS TO RECEIVE TOPSOIL SHALL BE 0.30 FT. ABOVE OR BELOW ESTABLISHED SUBGRADE.
- THE SUBGRADE FOR PAVEMENT AREAS SHALL BE PROOF-ROLLED BY THE CONTRACTOR AND ANY UNSUITABLE AREAS ENCOUNTERED SHALL BE REMOVED AND REPLACED AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
- MUST BE UNDERCUT OR IMPROVED BY APPROPRIATE PREPARATION AND COMPACTION TECHNIQUES. SUBGRADE FOR FOUNDATIONS, SLABS, PAVEMENTS, AND FILL SHALL BE APPROVED BY GEOTECHNICAL ENGINEER.

SUBGRADE: PRIOR TO FILLING, PROOF-ROLL EXPOSED SUBGRADE TO DETECT AREAS WHICH

UPON COMPLETION OF THE SURFACE IMPROVEMENTS, THE CONTRACTOR SHALL RE-SPREAD A MINIMUM OF THREE INCHES (4") OF TOPSOIL ON ALL DISTURBED AREAS. BACKFILL: PLACE FILL OR BACKFILL ADJACENT TO STRUCTURES IN A MANNER TO PREVENT DAMAGE AND ALLOW STRUCTURES TO ASSUME LOADS GRADUALLY AND UNIFORMLY, AT

APPROXIMATELY SAME RATE ON ALL SIDES. BACKFILL FOR FOUNDATION WALLS AND BEHIND

RETAINING WALLS FOR A LATERAL DISTANCE OF AT LEAST 3 TO 4 FT., OR FOR A DISTANCE AT

LEAST EQUAL TO WIDTH OF BASE OF FOOTING, WHICHEVER IS GREATER, SHALL BE

MAINTAIN EXISTING DRAIN TILE OR REROUTE INTO NEW STORM SEWER.

WELL-GRADED, FREE DRAINING GRANULAR MATERIAL. DEWATERING: PERFORM SITE GRADING IN A MANNER TO PREVENT SURFACE WATER AND GROUND WATER FROM FLOWING INTO WORK AREA. PROMPTLY REMOVE WATER FROM EXCAVATIONS USING PUMPS, SUMPS, AND DEWATERING SYSTEM COMPONENTS NECESSARY TO CONVEY WATER AWAY FROM EXCAVATIONS. CONVEY WATER REMOVED FROM EXCAVATIONS AND RAIN WATER TO COLLECTION OR RUN-OFF AREAS. PROVIDE AND MAINTAIN TEMPORARY DRAINAGE DITCHES. IF UNDERGROUND SPRINGS OR DRAIN TILE ARE ENCOUNTERED, NOTIFY GEOTECHNICAL ENGINEER BEFORE PROCEEDING. WHEN POSSIBLE

16. TRENCHING FOR UTILITIES

- A. EXCAVATE TRENCHES SO THAT PIPE CAN BE LAID SAFELY AND ACCURATELY TO REQUIRED LINE AND GRADE. HAND EXCAVATE FOR BELLS, FITTINGS AND PROJECTIONS TO ALLOW FOR PROPER JOINTING AND TO INSURE THAT PIPE RESTS EVENLY ALONG BARREL AND IS NOT RESTING ON
- B. IF ROCK IS ENCOUNTERED DURING TRENCHING, CONTACT OWNER BEFORE PROCEEDING FURTHER WITH AFFECTED PIPELINE.
- DEWATER TRENCHES AS REQUIRED TO PROVIDE STABLE BEDDING FOR PIPE. DEWATERING WILL BE INCIDENTAL TO WORK; NO ADDITIONAL COMPENSATION WILL BE ALLOWED.
- D. WHEN TRENCH BOTTOM IS UNSTABLE BECAUSE OF GROUND WATER, GEOTECHNICAL ENGINEER MAY REQUIRE EXTRA EXCAVATION TO REMOVE UNSTABLE MATERIAL AND REPLACE
- IN SAND AND GRAVEL SOILS, BOTTOM OF TRENCH MAY BE SHAPED TO FIT BOTTOM 1/3 OF PIPE. IN SILT AND CLAY SOILS, BOTTOM OF TRENCH SHALL BE 4 INCHES BELOW PIPE BARREL AND 3 INCHES BELOW BELL. IN ROCK, BOTTOM OF TRENCH SHALL BE 6 INCHES BELOW PIPE BARREL. UNDER FOUNDATIONS AND FOOTINGS, BOTTOM OF TRENCH SHALL BE 8 INCHES BELOW PIPE BARREL.
- BEDDING, HAUNCHING, AND INITIAL BACKFILL FOR RIGID PIPES SHALL BE IN ACCORDANCE WITH ASTM C12, CLASS C OR BETTER. TRENCHES DUG-IN SANDY OR GRAVEL MATERIALS MAY USE UNDISTURBED EARTH FOR BEDDING PROVIDED SURFACE IS SHAPED TO CONFORM TO PIPE. PROVIDE GRANULAR BEDDING IN ALL OTHER TRENCHES FROM SUBGRADE TO A POINT SUPPORTING BOTTOM 1/3 OF PIPE FOR RIGID PIPE AND TO SPRINGLINE (MID-HEIGHT) FOR FLEXIBLE PIPE. PLACE AND COMPACT BEDDING SO THAT IT FILLS AND SUPPORTS PIPE HAUNCH
- PROVIDE TAMPED GRANULAR INITIAL BACKFILL UP TO A MINIMUM DEPTH OF 1 FOOT ABOVE PIPE. TAKE SPECIAL CARE IN PLACING AND TAMPING INITIAL BACKFILL MATERIAL SO ALIGNMENT AND GRADE OF PIPE IS NOT DISTURBED NOR PIPE DAMAGED.
- BACKFILL MORE THAN 1 FOOT OVER PIPE SHALL BE GRANULAR BACKFILL. COMPACT BACKFILL IN ACCORDANCE WITH REQUIREMENTS OF "SITE GRADING" ARTICLE.
- GRANULAR BEDDING SHALL BE PLACED WITH A MINIMUM THICKNESS OF 6 INCHES (6") BENEATH THE BARREL AND BELL OF THE PIPE. THE 6 INCH (6") GRANULAR BEDDING BENEATH THE PIPE SHALL BE TAMPERED PRIOR TO THE PIPE PLACEMENT. GRANULAR BEDDING SHALL EXTEND UP AND AROUND THE PIPE TO 12 INCHES (12") ABOVE THE PIPE AND SHALL BE COMPACTED IN GRAVEL AGGREGATE FOR PVC PIPE. BEDDING SHALL BE COMPACTED IN ACCORDANCE WITH STATE DOT STANDARD SPECIFICATIONS.
- PIPE BACKFILL SHALL INCLUDE THE MATERIAL PLACED OVER THE PIPE EMBEDMENT MATERIAL. TRENCHES COMING WITHIN FIVE FEET (5') OF PAVED OR STONED STREETS, ALLEYS, DRIVEWAYS, SIDEWALKS, AND PARKING AREAS SHALL BE BACK FILLED FOR THEIR FULL DEPTH WITH GRANULAR MATERIAL MEETING THE REQUIREMENT OF BACKFILL FOR TYPE "B" CONDUITS. THE TOP OF THE BACKFILL SHALL EXTEND FROM FIVE FEET (5') OUTSIDE CURB TO FIVE FEET (5') IF APPLICABLE. THE COST OF PROVIDING THE COMPACTED GRANULAR BACKFILL SHALL BE INCLUDED IN THE CONTRACTORS BID. GRANULAR BACKFILL SHALL BE MECHANICALLY COMPACTED 304 STONE AND SHALL BE COMPACTED TO 98% OF MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR TEST.

17. WATERLINE

ORGANIZATIONS.

THE SPECIFICATIONS OF THE AMERICAN NATIONAL STANDARDS INSTITUTE, AMERICAN WATER WORKS ASSOCIATION AND THE AMERICAN SOCIETY OF TESTING AND MATERIALS HEREIN REFERRED TO FOR WATER SERVICE MAIN PIPE, GATE VALVES, FIRE HYDRANTS, AND OTHER APPURTENANCES, UNLESS OTHERWISE NOTED, SHALL BE THE LATEST SPECIFICATIONS AND STANDARDS OF THE RESPECTIVE

THE WORK SHALL CONFORM TO APPLICABLE PROVISIONS OF THE FOLLOWING REFERENCE STANDARDS, LATEST EDITION, EXCEPT AS MODIFIED HEREIN.

STANDARD SPECIFICATIONS FOR DUCTILE IRON CASTINGS

AWWA C111 RUBBER-GASKET JOINTS FOR DUCTILE-IRON PRESSURE PIPE AND FITTINGS DUCTHE IRON CENTRIFLIGALLY CAST AWWA C153 DUCTILE IRON COMPACT FITTINGS FOR WATER SERVICE

AWWA C104 CEMENT-MORTAR LINING FOR DUCTILE-IRON PIPE AND FITTINGS DRY-BARREL FIRE HYDRANTS AWWA C502 RESILIENT-SEATED GATE VALVES FOR WATER SUPPLY SERVICE AWWA C509 INSTALLATION OF DUCTILE-IRON WATER MAINS AND THEIR APPURTENANCES AWWA C600 AWWA C605 UNDERGROUND INSTALLATION OF POLYVINYL CHLORIDE (PVC) PRESSURE PIPE

AND FITTINGS FOR WATER AWWA C651 DISINFECTING WATER MAINS AWWA C800 UNDERGROUND SERVICE LINE VALVE AND FITTINGS POLYETHYLENE (PE) PRESSURE PIPE AND TUBING, ½ IN. THROUGH 3 IN. FOR AWWA C901

AWWA C900 POLYVINYL CHLORIDE (PVC) PRESSURE PIE AND FABRICATED FITTINGS, 4 IN. THROUGH 12 IN. FOR WATER TRANSMISSION AND DISTRIBUTION. AWWA C905 PLOYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FABRICATED FITTINGS, 14 IN. THROUGH 48 IN.

AWWA C909 MOLECULARLY ORIENTED POLYVINYL CHLORIDE (PVCO) PRESSURE PIPE 4 IN. THROUGH 24 IN. FOR WATER, WASTEWATER AND RECLAIMED WATER SERVICE. OHIO DEPARTMENT OF TRANSPORTATION CONSTRUCTION MATERIALS SPECIFICATIONS.

TEN STATE STANDARDS - RECOMMENDED STANDARDS FOR WATER WORKS. CONFORMANCE TO THE TEN STATES STANDARDS SHALL BE EQUALED OR EXCEEDED FOR WATER LINES.

PARTICULAR EMPHASIS SHALL BE PUT UPON THE FOLLOWING SECTIONS OF PART 8: 8.0.1 MATERIALS CONFORM TO AWWA STANDARDS

WATER SERVICE.

- 8.1.2 MINIMUM 6" DIAMETER FOR FIRE PROTECTION 8.5.3 MINIMUM 4' GROUND COVER
- 8.5.5 PRESSURE TESTING AWWA C-6003
- 8.5.6 DISINFECTION AWWA C-651*
- 8.6.2 VERTICAL SEPARATION MAIN/SEWER (18") 8.6.3 HORIZONTAL SEPARATION MAIN/SEWER (10') 8.6.6 NO ENTRY AND NO CONTACT WITH SEWER MANHOLES
- ANY DEVIATION FROM THE ABOVE WILL NOT BE PERMITTED. IN CASES WHERE ONE AND/OR MORE OF THE ABOVE MENTIONED STANDARDS FALL SHORT OF THE WATER DEPARTMENT STANDARDS, THE LATTER SHALL GOVERN.

18. WATER MAIN INSTALLATION

WATER MAINS SHALL BE INSTALLED IN ACCORDANCE WITH THE RECOMMENDATION'S OF MANUFACTURER AND AWWA C600 AND AWWA C605.

ALL WATERLINES SHALL BE INSTALLED WITH A MINIMUM OF 5 FEET OF GROUND COVER, AS MEASURED FROM THE TOP OF THE PIPE TO FINISHED GRADE OR AS MODIFIED ON THE PLANS. WATERLINE SERVICE CONNECTIONS SHALL BE INSTALLED WITH A MINIMUM OF 4 FEET OF COVER.

PIPE SECTIONS LESS THAN 10-FEET IN LENGTH SHALL NOT BE USED WHERE A FULL PIPE SECTION CAN

ALL PIPES SHALL BE THOROUGHLY CLEANED INSIDE AND OUTSIDE BEFORE BEING LOWERED INTO THE TRENCH AND SHALL BE KEPT CLEAN DURING THE INSTALLATION. THE END OF THE PIPE SHALL BE

GENERAL NOTES

WATER MAINS SHALL BE TESTED AND STERILIZED UNDER THE DIRECT SUPERVISION OF WATER DEPARTMENT PERSONNEL. MATERIAL TO BE FURNISHED BY THE CONTRACTOR ACCORDING TO SPECIFICATIONS. ALL EXCAVATION AND BACKFILL TO BE PERFORMED BY THE CONTRACTOR, UNLESS OTHERWISE SPECIFIED.

THE WATER DEPARTMENT SHALL BE NOTIFIED IN WRITING BY THE CONTRACTOR AT LEAST SEVEN (7) DAYS BEFORE BEGINNING ANY WATER MAIN CONSTRUCTION.

ONLY WATER DEPARTMENT PERSONNEL ARE TO OPERATE WATER DEPARTMENT VALVES.

PLUGGED TO EXCLUDE WATER, ANIMALS OR OTHER DEBRIS FROM ENTERING PIPE.

LEAKAGE TESTING

THE CONTRACTOR SHALL MAKE PRESSURE AND LEAKAGE TESTS OF ALL PIPELINES IN ACCORDANCE

PRESSURE TEST SHALL BE MADE IN ALL PIPELINES OR VALVED SECTIONS. THE CONTRACTOR SHALL FURNISH THE PUMP, PIPE CONNECTIONS, TAPS, GAUGES, AND ALL OTHER APPURTENANCES FOR MAKING THE TEST. THE LINE, OR SECTION THEREOF TO BE TESTED, SHALL BE SLOWLY FILLED WITH WATER AND ALL AIR EXPELLED BEFORE MAKING THE TEST.

HYDROSTATIC PRESSURE SHALL BE APPLIED BY MEANS OF A PUMP, TAKING WATER FROM AN AUXILIARY SUPPLY. THE TEST PRESSURE SHALL BE 150 PSI, OR TWO (2) TIMES THE NORMAL OPERATING PRESSURE OF THE SECTION UNDER TEST, WHICHEVER IS THE GREATER. THE PRESSURE SHALL BE MAINTAINED FOR A MINIMUM OF TWO (2) HOURS, OR FOR SUFFICIENT TIME FOR THOROUGH INSPECTION OF PIPING, FITTINGS, VALVES, HYDRANTS, ETC. BY MEANS OF A CONTINUOUS RUNNING PUMP. LEAKING JOINTS SHALL BE TIGHTENED, AND CRACKED OR OTHERWISE DEFECTIVE MATERIAL SHALL BE REMOVED AND REPLACED AND THE TEST SHALL BE REPEATED UNTIL SATISFACTORY RESULTS ARE OBTAINED.

LEAKAGE TESTS SHALL BE MADE SIMULTANEOUSLY WITH OR FOLLOWING COMPLETION OF PRESSURE TESTS OF ALL PIPE LINES OR VALVED SECTIONS THEREOF. THE CONTRACTOR SHALL FURNISH THE PUMPS, GAUGES, AND OTHER APPARATUS AS DEFINED ABOVE, INCLUDING A MEASURABLE AUXILIARY WATER CONTAINER.

LEAKAGE IS DEFINED AS THE QUANTITY OF WATER TO BE SUPPLIED NECESSARY TO MAINTAIN IN THE PIPING BEING TESTED THE LEAKAGE TEST PRESSURE IN SUCH PIPING FILLED WITH WATER AND FREE FROM AIR. THE LEAKAGE TEST PRESSURE SHALL BE NOT LESS THAN 150 PSI OR TWO (2) TIMES THE NORMAL OPERATING PRESSURE OF THE SECTION UNDER THE TEST. THE DURATION OF THE LEAKAGE TEST SHALL BE NOT LESS THAN TWO (2) HOURS. ALLOWABLE LEAKAGE FOR DUCTILE IRON PIPE SHALL NOT EXCEED THE RATE IN TABLE 6A OF AWWA C600-93. ALLOWABLE LEAKAGE FOR PVC PIPE SHALL NOT EXCEED THE RATE IN TABLE 3 OF AWWA C605-94.

19. PIPE MATERIALS GENERAL

THE PIPE SHALL BE APPROPRIATELY MARKED TO ALLOW THE ENGINEER TO VERIFY THE PROVIDED PIPE MATERIAL MEETS THE REQUIREMENTS OF THESE SPECIFICATIONS.

MATERIALS NOT SPECIFICALLY MEETING THE REQUIREMENTS OF THESE SPECIFICATIONS MAY BE SUBMITTED FOR REVIEW AND APPROVAL BY THE ENGINEER. THE CONTRACTOR SHALL SUBMIT A BID UNIT PRICE FOR MATERIALS TO BE PROVIDED UNDER THIS SPECIFICATION UPON MATERIALS THAT MEET THE REQUIREMENTS OF THESE SPECIFICATIONS. IF ALTERNATE MATERIALS ARE APPROVED, THE ENGINEER MAY REQUEST A UNIT PRICE DEDUCT FROM THE CONTRACTOR.

THE ENGINEER RESERVES THE RIGHT TO SPECIFY MATERIALS WITH MORE STRINGENT OR CONSERVATIVE PERFORMANCE CHARACTERISTICS FOR PARTICULAR APPLICATIONS.

THE ENGINEER RESERVES THE RIGHT TO REQUIRE MANUFACTURER OR SUPPLIER CERTIFICATIONS OR TEST REPORTS THAT THE SUPPLIED MATERIAL MEETS THE REQUIREMENTS OF THESE SPECIFICATIONS.

DUCTILE IRON PIPE

DUCTILE IRON PIPE TO BE USED FOR WATER MAIN SHALL BE PROVIDED IN ACCORDANCE WITH AWWA

DUCTILE IRON PIPE SHALL BE THICKNESS CLASS 50. DUCTILE IRON PIPE SHALL BE PROVIDED WITH A RUBBER-GASKET JOINT IN ACCORDANCE WITH AWWA C111. BRONZE WEDGES SHALL BE USED AT ALL PUSH-ON JOINTS (2 PER JOINT). THE WEDGE SHALL BE DRIVEN INTO THE PUSH-ON JOINT TO PROVIDE ELECTRICAL CONDUCTIVITY BETWEEN PIPES.

DUCTILE IRON PIPE SHALL BE COATED WITH A BITUMINOUS MATERIAL ON THE EXTERIOR OF THE PIPE IN ACCORDANCE WITH AWWA C151 AND THE INTERIOR OF THE PIPE SHALL BE CEMENT MORTAR LINED IN ACCORDANCE WITH AWWA C104.

DUCTILE IRON PIPE AND FITTINGS SHALL BE WRAPPED IN A MINIMUM 8 MIL. THICK POLYETHYLENE TUBE PER AWWA C-105, UNLESS THE REQUIREMENT IS WAIVED BY THE OWNER. FITTINGS SHALL BE WRAPPED FOR A DISTANCE OF 5 FEET ON EACH SIDE OF THE FITTING. RIPS, TEARS, PUNCTURES OR OTHER DAMAGE TO THE POLYETHYLENE TUBE SHALL BE REPAIRED PRIOR TO PLACEMENT OF BACKFILL.

21. POLYVINYL CHLORIDE (PVC) PIPE PVC PIPE TO BE USED FOR WATER MAINS SHALL BE PROVIDED IN ACCORDANCE WITH AWWA C900, DR18. PC 235 FOR PIPE SIZES 4-INCH THROUGH 12-INCH DIAMETER AND AWWA C905, DR 18, PC 235

FOR PIPE SIZES 14-INCH THROUGH 24-INCH DIAMETER. PVC PIPE SHALL BE DUCTILE IRON EQUIVALENT OUTSIDE DIAMETER. PIPE SHALL BE OF THE INTEGRAL WALL-THICKENED BELL END TYPE INCORPORATING ELASTOMERIC GASKETS TO AFFECT THE PRESSURE SEAL. PIPE SHALL HAVE A NOMINAL LAYING LENGTH OF 20-FEET. PIPE SHALL BE DESIGNED FOR

DIRECT CONNECTION INTO DUCTILE IRON FITTINGS USING MECHANICAL JOINTS.

PIPE SHALL BE BLUE IN COLOR.

22. MOLECULARLY ORIENTED POLYVINYL CHLORIDE (PVCO) PIPE

PVCO PIPE TO BE USED FOR WATER MAINS SHALL BE PROVIDED IN ACCORDANCE WITH AWWA C909, PC235 FOR PIPE SIZES 4-INCH THROUGH 12-INCH. PVCO PIPE SHALL BE DUCTILE IRON EQUIVALENT OUSIDE DIAMETER. PIPE SHALL BE OF THE INTEGRAL WALL-THICKENED BELL END TYPE INCORPORATING ELASTOMERIC GASKETS TO AFFECT THE PRESSURE

DIRECT CONNECTION INTO DUCTILE IRON FITTINGS USING MECHANICAL JOINTS.

PIPE SHALL BE BLUE IN COLOR. 23. DUCTILE IRON FITTINGS

LINED AND COATED AS SPECIFIED ABOVE.

ALL FITTINGS SHALL BE DUCTILE IRON CONFORMING TO AWWA C153 AND AWWA C11 AND SHALL BE

SEAL. PIPE SHALL HAVE A NOMINAL LAYING LENGTH OF 20-FEET. PIPE SHALL BE DESIGNED FOR

FITTINGS SHALL BE OF THE MECHANICAL JOINT OR PUSH-ON TYPE INCORPORATING RUBBER GASKETS. CAPS AND PLUG FITTINGS REQUIRED FOR TESTING OF THE WATER MAINS SHALL BE PROVIDED WITH STANDARD TAPPED CONNECTIONS. PIPE COUPLINGS SHALL REQUIRE THE PIPE TO BE FURNISHED WITH GROOVED OR SHOULDERED ENDS PROPERLY MACHINED TO RECEIVE THE COUPLING.

ALL FITTINGS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR WATERMAIN INSTALLED.

24. MECHANICAL JOINT RESTRAINTS

RESTRAINED JOINTS SHALL BE PROVIDED AT ALL FITTINGS AND TO THE LENGTHS, IN FEET, AS SHOWN ON THE DRAWINGS AND IN ACCORDANCE WITH LOCAL STANDARDS AND MANUFACTURERS

MECHANICAL JOINT RESTRAINTS SHALL BE PROVIDED IN ACCORDANCE WITH ASTM A536, AWWA C111

MECHANICAL JOINT RESTRAINTS SHALL INCLUDE A RESTRAINING MECHANISM THAT WHEN ACTUATED, IMPACTS MULTIPLE WEDGING ACTIONS AGAINST THE PIPE, INCREASING ITS RESISTANCE TO MOVEMENT AS INTERNAL PIPE PRESSURE INCREASES. THE JOINT SHALL MAINTAIN SOME FLEXIBILITY FOLLOWING PLACEMENT OF FINAL BEDDING AND BACKFILL. THE RESTRAINING DEVICE SHALL BE CONSTRUCTED OF DUCTILE IRON HEAT TREATED TO A HARDNESS OF 370 BHN WITH A MINIMUM WORKING PRESSURE OF 250 PSI AND AN SAFETY FACTOR OF 2:1.

RESTRAINED JOINTS FOR FITTINGS SHALL BE MEGA-LUG SERIES 2000, AS MANUFACTURED BY EBAA IRON, INC., OR EQUAL. CONCRETE THRUST BLOCKING IS ALSO REQUIRED.

BELL CLAMP RESTRAINT FOR DIP WITH PUSH-ON JOINTS, WHERE REQUIRED, SHALL BE SERIES 800 "COVERALL," AS MANUFACTURED BY EBAA IRON, INC., OR EQUAL.

ALL BOLTS AND NUTS SHALL BE COR-TEN. ALL OTHER HARDWARE SHALL BE DUCTILE IRON.

DIMENSIONS OF THE JOINT RESTRAIN SHALL BE SUCH THAT IT CAN BE USED WITH STANDARD MECHANICAL JOINT BELL AND TEE-HEAD BOLTS CONFORMING TO AWWA C111. TWIST-OFF NUTS SHALL BE USED TO INSURE PROPER ACTUATION OF THE RESTRAINING DEVICES.

THE CONTRACTOR SHALL PROVIDE THRUST BLOCKING AS SHOWN ON THE PLAN DETAIL SHEET.

WATERMAIN PIPE SHALL BE ANCHORED USING MECHANICAL JOINT RESTRAINTS AT ALL DEAD ENDS, BENDS, TEES, VALVES AND CHANGES IN DIRECTION OF THE PIPE IN ACCORDANCE WITH THE APPLICABLE TABLE AS SHOWN ON THE PLAN DETAIL SHEET.

ALL DETECTABLE TRACING WIRE SHALL BE INSTALLED WITH ALL WATER MAINS. THE WIRE SHALL BE INSULATED NO. 12 COPPER ELECTRICAL WIRE (THW). SPLICES IN TRACING WIRE SHALL BE MADE WITH SHRINK TYPE BUTT-END ELECTRICAL CONNECTORS.

THE TRACING WIRE SHALL BE CONNECTED TO EACH FIRE HYDRANT AND SHALL BE PLACED UNDER THE

IF THE WATERLINE ENDS AT A VALVE BOX, THE TRACING WIRE SHALL BE PLACED OUTSIDE OF THE VALVE BOX AND THEN ENTER THE VALVE BOX THROUGH A HOLE DRILLED BY THE CONTRACTOR

APPROXIMATELY 8 INCHES BELOW THE TOP OF THE VALVE BOX. GATE VALVES

VALVES: VALVES 4 INCHES THROUGH 16 INCHES SHALL BE OF RESILIENT-SEATED GATE VALVE DESIGN. THE VALVES SHALL BE CONSTRUCTED WITH IRON BODY, FUSION BONDED EPOXY COATING ON ALL INTERIOR AND EXTERIOR SURFACES, NON-RISING VALVE STEM, THE VALVE WEDGE SHALL BE DUCTILE IRON COMPLETELY ENCLOSED IN RUBBER. THE VALVE SHALL OPEN WHEN THE STEM WITH 2 INCH SQUARE NUT IS TURNED COUNTER CLOCKWISE. VALVES SHALL BE DESIGNED FOR A WORKING PRESSURE OF 200 PSI WHEN USED IN NON-SHOCK COLD WATER. SERVICE STEM SEAL TO BE RUBBER-O-RING. VALVES SHALL CONFORM TO

ANSI/AWWA STANDARD C509.

ALL BOLTS IN THE VALVE SHALL BE COR-TEN OR STAINLESS STEEL.

FIRE HYDRANTS FIRE HYDRANTS: FIRE HYDRANTS MUST BE OF THE DRY BARREL DESIGN. THEY MUST BE NON-DRAINING, WITH A 5 1/4 INCH MAIN VALVE. HYDRANTS MUST MEET OR EXCEED THE AMERICAN WATER WORKS ASSOCIATIONS C502 SPECIFICATION.

SHOES WILL BE 6" MECHANICAL JOINT WITH ACCESSORIES. THE HYDRANT MUST EMPLOY A TRAFFIC DESIGN AND ALLOW FOR A 360-DEGREE FACING OF NOZZLES. THE NOZZLES SHOULD BE AT LEAST 18" FROM THE GROUND (TRAFFIC BREAK-AWAY) LIN

HYDRANTS MUST CONSIST OF A <u>ONE</u> PIECE LOWER BARREL AND <u>ONE</u> PIECE UPPER BARREL. HYDRANT

HYDRANTS ARE TO HAVE $1\frac{1}{2}$ " PENTAGON NUTS AND BE OPEN LEFT IN DESIGN. THERE WILL BE TWO (2) 2 1/2" NST HOSE NOZZLES AND ONE (1) 4" PUMPER NOZZLE 4 11/16 O.D. (THREADS TO BE VERIFIED WITH LOCAL CODES). FIRE HYDRANTS WILL BE PAINTED SAFETY YELLOW OR PER LOCAL

CLASS III AND ASTM C-443.

27. SANITARY SEWER MATERIAL PVC PVC PIPE 12" DIAMETER AND SMALLER SHALL MEET THE LATEST REQUIREMENTS OF ASTM F-794. WITH A MINIMUM PIPE STIFFNESS OF 60 PSI; MEET THE LATEST REQUIREMENTS OF ASTM F-949, WITH A MINIMUM PIPE STIFFNESS OF 50 PSI; MEET THE LATEST REQUIREMENTS OF ASTM D-3034, SDR 35 (TYPE PSM). PIPE SHALL HAVE A MINIMUM CELL CLASSIFICATION OF 12454-B, 12454-C OR 1236-A

PER ASTM D-1784. PVC PIPE 15" DIAMETER AND LARGER AND NOT OTHERWISE SPECIFIED: SHALL MEET THE LATEST REQUIREMENTS OF ASTM F-794. WITH A MINIMUM PIPE STIFFNESS OF 46 PSI: OR MEET THE LATEST REQUIREMENTS OF ASTM F-949, WITH A MINIMUM PIPE STIFFNESS OF 50 PSI. PIPE SHALL HAVE A

MINIMUM CELL CLASSIFICATION OF 12454-B, 12454-C OR 12364-A PER ASTM D-1784. ALL PVC PIPE SHALL BE APPROPRIATELY MARKED FOR THE PURPOSE OF IDENTIFICATION AND SHALL BE

SUBJECT TO INSPECTION AND REJECTION AT THE FACTORY, TRENCH OR OTHER POINT OF DELIVERY.

THE PIPE SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D-2321 AND WITH THE REQUIREMENTS

THE ENDS OF ALL RIBBED PVC PIPE THAT WILL BE INSTALLED IN MANHOLES SHALL BE PROVIDED WITH

ALL PIPE SHALL BE OF THE INTEGRAL BELL ELASTOMERIC GASKETED JOINT TYPE. THE JOINTS SHALL BE PUSH-ON TYPE MEETING THE REQUIREMENTS OF ASTM D-3212 AND THE JOINT SHALL BE DESIGNED TO PREVENT DISPLACEMENT OF THE GASKET WHEN ASSEMBLING THE JOINT.

OF THESE SPECIFICATIONS. ANY REQUIREMENTS OF ASTM D-2321 WHICH MAY BE IN CONFLICT OR INCONSISTENT WITH THE REQUIREMENTS OF THESE SPECIFICATIONS SHALL BE VOID TO THE EXTENT OF SUCH CONFLICT OR INCONSISTENCY.

REINFORCED CONCRETE PIPE ALL SIZES OF REINFORCED CONCRETE PIPE SHALL MEET THE LATEST REQUIREMENTS OF ASTM C-76,

A FACTORY INSTALLED OVERSLEEVE. FIELD INSTALLED OVERSLEEVES WILL NOT BE PERMITTED.

IDENTIFICATION AND NO PIPE SHALL BE DELIVERED UNTIL IT HAS REACHED THE APPROPRIATE STRENGTH REQUIREMENTS. ALL RCP SHALL BE SUBJECT TO INSPECTION AND REJECTION AT THE FACTORY, TRENCH OR OTHER POINT OF DELIVERY.

REINFORCED CONCRETE SEWER PIPE (RCP) SHALL BE APPROPRIATELY MARKED FOR THE PURPOSE OF

JOINTS FOR RCP SHALL BE OF THE RUBBER GASKET TYPE CONFORMING TO ASTM C-443. THE GASKET

SHALL BE THE SOLE ELEMENT DEPENDED UPON TO MAKE THE JOINT WATERTIGHT. REINFORCED CONCRETE ELLIPTICAL PIPE SHALL BE PROVIDED IN ACCORDANCE WITH ASTM C507.

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HIGH DENSITY POLYETHYLENE (HDPE) PIPE SHALL ONLY BE USED FOR GRAVITY STORM SEWER OR DRAINAGE TILE APPLICATION. IT SHALL BE MARKED FOR THE PURPOSE OF IDENTIFICATION AND SHALL BE SUBJECT TO INSPECTION AND REJECTION AT THE FACTORY, TRENCH OR OTHER POINT OF DELIVERY. ACCEPTABLE PIPE SIZE SHALL BE 36" OR LESS.

HDPE PIPE SHALL HAVE A SMOOTH INTERIOR AND ANNULAR EXTERIOR CORRUGATIONS. PIPE 10" AND SMALLER SHALL MEET AASHTO M252, TYPE S AND THE VIRGIN MATERIAL SHALL CONFORM WITH THE MINIMUM REQUIREMENTS OF CELL CLASSIFICATION 424420C. PIPE 12" AND LARGER SHALL MEET AASHTO M294, TYPE S OR ASTM F2306 AND THE VIRGIN MATERIAL SHALL CONFORM WITH THE MINIMUM REQUIREMENTS OF CELL CLASSIFICATION 435400C. CELL CLASSIFICATIONS SHALL BE PER ASTM D3350 EXCEPT CARBON BLACK CONTENT SHOULD NOT EXCEED 5%.

PIPE JOINTS SHALL MEET THE REQUIREMENTS OF AASHTO M252, M294 OR ASTM F2306. JOINTS SHALL BE WATERTIGHT MEETING THE REQUIREMENTS OF ASTM D3212. GASKETS SHALL BE POLYISOPRENE MEETING THE REQUIREMENTS OF ASTM F477 AND SHALL BE INSTALLED BY THE MANUFACTURER AND COVERED WITH A REMOVABLE WRAP. JOINT LUBRICANT PROVIDED BY THE PIPE MANUFACTURER SHALL BE USED ON THE GASKET AND BELL. TWELVE INCH (12") AND LARGER PIPE SHALL HAVE A REINFORCED BELL WITH A BELL TOLERANCE DEVICE INSTALLED BY THE MANUFACTURER.

PIPE SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321 AND THE MANUFACTURERS GUIDELINES. MINIMUM COVER IN TRAFFIC AREAS FOR 4" THROUGH 36" PIPE SHALL BE 12", HOWEVER PIPE FLOTATION SHALL ALSO BE CONSIDERED.

28. SERVICE CONNECTIONS

SERVICE CONNECTIONS IN ALL PIPE 15" DIAMETER AND SMALLER SHALL BE INSTALLED INTO FACTORY MADE TEES OF THE SAME MATERIAL AS THE MAIN SEWER.

SERVICE CONNECTIONS IN ALL PIPE 18" DIAMETER AND LARGER SHALL BE INSTALLED INTO THE MAIN SEWER BY ONE OF THE FOLLOWING METHODS. IN PVC OR HDPE SEWER MAINS, THE CONNECTIONS SHALL BE MADE WITH INSERTA-TEES AS MANUFACTURED BY FOWLER MANUFACTURING COMPANY OR APPROVED EQUAL. NO ALTERNATIVE INSERTA-TEES SHALL BE CONSIDERED EQUAL UNTIL APPROVED THE ENGINEER. IN RCP SEWER MAINS THE CONNECTIONS SHALL BE MADE BY CORING THE CONCRETE MAIN AND INSTALLING A FLEXIBLE WATERTIGHT KOR-N-SEAL BOOT AS MANUFACTURED BY NATIONAL POLLUTION CONTROL SYSTEMS, INC. OR APPROVED EQUAL. NO OTHER BOOT ASSEMBLY SHALL BE CONSIDERED EQUAL UNTIL APPROVED BY THE ENGINEER.

MATERIALS USED TO CONSTRUCT SEWER SERVICE CONNECTIONS SHALL BE ASTM 3034.

CONNECTION OF EXISTING SEWER SERVICES TO THE NEW SEWER SERVICES SHALL BE WITH A FERNCO OR APPROVED FLEXIBLE WATERTIGHT CONNECTIONS.

PLUGS SHALL BE PROVIDED AT THE FOLLOWING LOCATIONS:

PERMANENT PLUGS SHALL BE PROVIDED AT ALL LOCATIONS WHERE EXISTING SEWERS ARE CUT AND NOT RECONNECTED.

TEMPORARY PLUGS SHALL BE PROVIDED AT ALL LOCATIONS WHERE NEW PIPE STUBS ARE INSTALLED FOR FUTURE SEWER EXTENSIONS.

THE PLUGS SHALL BE DESIGNED SPECIFICALLY FOR USE WITH THE TYPE OF PIPE IN WHICH THEY ARE INSTALLED, SHALL BE WATERTIGHT, AND SHALL BE CAPABLE OF REMOVAL WITHOUT CAUSING DAMAGE TO THE PIPE IN WHICH THEY ARE INSTALLED.

THE COST OF ALL LABOR, EQUIPMENT, AND MATERIALS REQUIRED TO INSTALL PLUGS SHALL BE INCLUDED IN THE APPROPRIATE UNIT PRICE BID FOR THE PERTINENT SEWER ITEM.

SANITARY SEWER LEAKAGE TESTING

IN ALL REFERENCES TO TEST PRESSURES, A PRESSURE ADJUSTMENT SHALL BE MADE WHERE GROUND WATER IS ABOVE THE SEWER LINE BEING TESTED, BY ADDING 0.433 PSI PRESSURE FOR EACH FOOT THE GROUND WATER LEVEL IS ABOVE THE INVERT OF THE PIPE, BASED UPON MAXIMUM FOR THE TESTING SECTION. THE CONTRACTOR SHALL MAKE PROVISIONS FOR DETERMINING THE GROUND WATER LEVEL, AND THE LEVEL SHALL BE CONFIRMED BY THE ENGINEER.

AIR SHALL BE APPLIED SLOWLY TO THE TEST SECTION UNTIL THE PRESSURE REACHES 3 PSIG (POUNDS PER SQUARE INCH, GAUGE) PLUS ADJUSTMENT FOR GROUNDWATER. THE PRESSURE INSIDE THE PIPE SHALL NOT EXCEED 5 PSIG, PLUS ADJUSTMENT FOR GROUND WATER. WHEN THE PRESSURE INSIDE THE TEST SECTION REACHES 4.0 PSIG, THE AIR PRESSURE SHALL BE THROTTLED SO THAT THE INTERNAL PRESSURE IS MAINTAINED BETWEEN 4.0 AND 3.5 PSIG FOR AT LEAST TWO MINUTES, TO PERMIT TEMPERATURE STABILIZATION.

UPON EXPIRATION OF THE TWO-MINUTE PERIOD, THE AIR SUPPLY SHALL BE SHUT OFF OR DISCONNECTED AND THE PRESSURE ALLOWED TO DROP TO EXACTLY 3.5 PSIG. AT THE EXACT TIME 3.5 PSIG IS REACHED, A STOP WATCH SHALL BE STARTED AND THE TIME REQUIRED FOR THE PRESSURE TO DROP TO EXACTLY 2.5 PSIG SHALL BE DETERMINED.

NOTE: MAKE PROPER PRESSURE ADJUSTMENTS FOR GROUND WATER, WHERE APPLICABLE. IN DETERMINING THE BEGINNING AND END OF THE PERIOD FOR THE 1.0 PSIG PRESSURE DROP. TO AVOID OVER PRESSURIZING THE SEWER THE TES PRESSURE SHALL NOT **EXCEED 9 PSIG.**

THE PERMISSIBLE TIME ALLOCATION FOR THE 10. PSIG PRESSURE DROP SHALL BE CALCULATED ON THE BASIS OF THE DIAMETER AND LENGTH OF MAIN SEWER TESTED AND NO ADJUSTMENT SHALL BE MADE FOR SERVICE CONNECTION INCLUDED IN THE TEST.

THE AIR TEST FOR THE TEST SECTION SHALL BE CONSIDERED ACCEPTABLE IF THE TIME ELAPSED FOR THE 1.0 PSIG PRESSURE DROP, AS PREVIOUSLY SPECIFIED, IS EQUAL OR GREATER THAN THE TIME SHOWN IN THE TABLE:

	MINIMUM	HOLDING 7			ONDS FOR		SORE DROI	٠,
PIPE	LENGTH OF MAINLINE TESTED							
DIAMETER	100'	150'	200'	250'	300'	350'	400'	450
4"	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:4
6"	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:2
8"	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:2
10"	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:4
12"	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:3
15"	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:0
18"	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:4

31. DEFLECTION TESTING

THE CONTRACTOR SHALL PERFORM DEFLECTION TESTS ON ALL FLEXIBLE PIPE. NO TESTS MAY BE CONDUCTED UNTIL AFTER THE FINAL BACKFILL HAS BEEN IN PLACE FOR AT LEAST 30 DAYS.

PRIOR TO PERFORMING THE DEFLECTION TEST, THE CONTRACTOR SHALL CLEAN ALL SEWERS WITH A JET TRUCK. ALL SEDIMENT, DIRT, DEBRIS, STONE, TRASH AND ANY OTHER FOREIGN ITEMS SHALL BE FLUSHED AND REMOVED FROM THE SEWER.

NO PIPE SHALL EXCEED A DEFLECTION OF 5%. WHERE POSSIBLE, ELECTRONIC EQUIPMENT SHALL BE USED TO MEASURE AND RECORD THE DEFLECTION IN FLEXIBLE PIPE. IF SUCH EQUIPMENT IS NOT AVAILABLE, DEFLECTION TESTS CAN BE RUN USING RIGID MANDRELS WITH DIAMETERS EQUAL TO 95% OF THE INSIDE DIAMETER OF THE PIPE. ALL DEFLECTION TESTS SHALL BE PERFORMED WITHOUT MECHANICAL PULLING DEVICES. THE SYSTEM WILL NOT BE CONDITIONALLY ACCEPTED UNTIL A SATISFACTORY DEFLECTION TEST, WITNESSED BY THE ENGINEER, IS OBTAINED.

THE CONTRACTOR SHALL INCLUDE IN THE BID ALL COSTS FOR LABOR AND MATERIALS NECESSARY TO COMPLETE THE DEFLECTION TESTING HEREIN SPECIFIED. ALL TESTS SHALL BE CONDUCTED IN THE PRESENCE OF THE ENGINEER OR HIS AGENT WHOSE JUDGEMENT SHALL BE FINAL AS TO ACCEPTANCE OF ANY TEST.

32. PRECAST MANHOLE STRUCTURES

ALL PRECAST MANHOLE STRUCTURES SHALL BE PROVIDED IN ACCORDANCE WITH ASTM C478, ASTM C443 AND MEETING THE REQUIREMENTS OF RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES (TEN STATE STANDARDS).

PRECAST MANHOLE STRUCTURES SHALL BE PROVIDED UTILIZING CONCRETE WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 5000 PSI WITH AN AIR CONTENT BETWEEN 5% AND 7%.

ALL REINFORCING STEEL SHALL BE GRADE 60.

BASES FOR MANHOLES SHALL BE OF THE PRECAST REINFORCED CONCRETE TYPE WITH THE BOTTOM INTEGRALLY CAST WITH THE WALLS. BOTTOM REINFORCEMENT SHALL BE ADEQUATELY TIED TO WALL REINFORCEMENT.

IF NOT INTEGRALLY CAST WITH THE BASE, THE CONTRACTOR SHALL PROVIDE A CLASS II CONCRETE INVERT THROUGH THE MANHOLE. THE CAST-IN-PLACE INVERT SHALL BE PLACED FOLLOWING THE INSTALLATION OF ALL PIPE CONNECTIONS. THE INVERT SHALL HAVE A DEPTH THROUGH THE MANHOLE EQUAL TO THE RADIUS OF THE SEWER PIPE AND SHALL SLOPE UPWARD TOWARD THE MANHOLE WALLS FROM THE CENTERLINE OF THE SEWER PIPE APPROXIMATELY 3 INCHES, TROWELED

ALL PIPE PENETRATIONS INTO THE MANHOLE SECTION SHALL BE SHOCK ABSORBENT AND SHEAR RESISTANT, DESIGNED TO PREVENT ANY DIRECT CONTACT BETWEEN THE PIPE AND MANHOLE AND SHALL PROVIDE A WATERTIGHT SEAL CONNECTION BETWEEN THE PIPE BARREL AND MANHOLE STRUCTURE WITH THE PIPE DEFLECTED P TO 12-DEGREES IN ANY DIRECTION. THE FLEXIBLE JOINTS SHALL BE A-LOCK, KORN-SEAL, PRESS WEDGE II OR APPROVED EQUAL.

RISER SECTIONS SHALL HAVE A MINIMUM INSIDE DIAMETER OF 48-INCHES.

TOP SECTIONS MAY BE EITHER FLAT TOP SLABS OR ECCENTRIC TRANSITIONS. TOP SECTIONS SHALL HAVE A 24-INCH DIAMETER OPENINGS SO AS TO ACCOMMODATE THE CAST IRON FRAME AND COVER. FLAT TOP SLABS SHALL BE A MINIMUM OF 8-INCHES THICK.

THE CAST IRON MANHOLE FRAME SHALL BE SET AT THE PROPER ELEVATION BY SUE OF PRECAST CONCRETE ADJUSTING RINGS PLACED ON THE TOP SECTION OF THE MANHOLE STRUCTURE. THE ADJUSTING RINGS SHALL BE A MINIMUM OF 4-INCHES IN HEIGHT AND SHALL NOT EXCEED 16-INCHES IN TOTAL HEIGHT. CONCRETE ADJUSTING RINGS SHALL BE HELD IN PLACE WITH MORTAR COMPOSED OF 1 PART, BY VOLUME, PORTLAND CEMENT AND 2 PARTS CLEAN, HARD SAND.

33. MANHOLE FRAMES AND COVERS

ALL MANHOLE FRAMES AND COVERS SHALL BE A GRAY IRON CASTING CONFORMING TO ASTM A48.

ALL MANHOLE FRAMES AND COVERS SHALL BE NEENAH FOUNDRY COMPANY R-1772 WITH TYPE B COVER, EAST JORDAN 1022-2 WITH TYPE A COVER OR APPROVED EQUAL.

BOTH THE UNDERSIDE OF THE LID AND THE UPPER SURFACE OF THE LEDGE UPON WHICH THE LID RESTS SHALL BE MACHINED SO AS TO PREVENT ROCKING OF THE LID ON ITS SUPPORTING SURFACE. CASTINGS SHALL BE CLEANED AND DIPPED IN COAL TAR PITCH VARNISH AT THE FACTORY.

MANHOLE COVERS SHALL BE MARKED TO INDICATE THE PROPOSED SEWER SERVICE. THE WORDS "SANITARY SEWER" CAST INTO THE TOP OF THE CASTING USED FOR SANITARY MANHOLES; "STORM SEWER" CAST INTO THE TOP OF CASTINGS USED FOR STORM MANHOLES; AND "SEWER" CAST INTO THE TOP OF CASTINGS USED FOR COMBINED SEWER MANHOLES. THE CONTRACTOR SHALL VERIFY WHICH COVER IS REQUIRED FOR EACH MANHOLE PRIOR TO ORDERING.

34. MANHOLE STEPS

APPROVED EQUAL.

MANHOLES SHALL BE PROVIDED WITHOUT STEPS UNLESS SPECIFIED OTHERWISE ON THE PLAN.

STEPS SHALL BE MODEL PS2-PF MANHOLE STEP AS MANUFACTURED BY M.A. INDUSTRIES, INC. OR

IF STEPS ARE SPECIFIED TO BE PROVIDED, THEY SHALL CONFORM TO THE FOLLOWING:

THE VERTICAL SPACING OF STEPS SHALL BE NOT MORE THAN 16-INCHES.

THE CONTRACTOR SHALL CAREFULLY SET EACH RISER SECTION TO ENSURE THAT THE STEPS ARE PROPERLY ALIGNED BETWEEN PRECAST SECTIONS. THE CONTRACTOR MAY BE REQUIRED TO RELOCATE THE STEPS AS DIRECTED BY THE ENGINEER TO ALIGN THE STEPS WITH THE TOP SECTION OF THE MANHOLE.

NEW CONNECTIONS TO EXISTING MANHOLES MAY REQUIRE THE CONTRACTOR TO RELOCATE THE EXISTING STEPS TO AVOID CONFLICT WITH AN INSIDE DROP PIPE CONNECTION.

35. SANITARY MANHOLE LEAKAGE TESTING

ALL SANITARY OR COMBINATION SEWER MANHOLES SHALL BE VACUUM TESTED IN ACCORDANCE WITH THE PROCEDURES DESCRIBED IN ASTM C1244 IN THE PRESENCE OF THE ENGINEER. THE PROCEDURE FOR MANHOLE TESTING IS SUMMARIZED AS FOLLOWS:

- A. ALL PIPES ENTERING THE MANHOLE SHALL BE PLUGGED AND BRACED.
- B. ONCE A VACUUM OF 10-INCHES OF MERCURY IS DRAWN INTO THE MANHOLE THE VACUUM
- EQUIPMENT SHALL BE SHUT OFF. C. THE TIME FROM THE VACUUM TO DROP FROM 10-INCHES OF MERCURY TO 9-INCHES OF MERCURY SHALL BE MEASURED AND COMPARED TO THE FOLLOWING TABLE.

	MINIM	UM TEST TIME IN SEC	CONDS	
MANHOLE	MAN	HOLE DIAMETER		
DEPTH	48"	60"	72"	84"
10' & UNDER	20	26	41	50
12'	25	33	49	59
14'	30	39	57	68
16'	35	46	65	77
18'	40	52	73	87
20'	45	59	81	97
221	F0	C.E.	90	106

D. IF THE TIME OF THE VACUUM DROP IS LESS THAN THE SPECIFIED TIME, THE CONTRACTOR SHALL LOCATE AND CORRECT THE DEFECT AT NO ADDITIONAL COST TO THE OWNER. REPAIRS SHALL BE PERFORMED IN ACCORDANCE WITH ASTM C478.

THE CONTRACTOR SHALL INCLUDE ALL COSTS NECESSARY TO PERFORM THE AIR TESTS IN THE BID UNIT PRICE FOR MANHOLE INSTALLED.

PROHIBITED CONNECTIONS:

NO BUILDING SEWER WITH ANY OF THE FOLLOWING SOURCES OF CLEAR WATER SHALL BE CONNECTED TO THE CITY'S SEWER SYSTEM.

- FOUNDATION OR FOOTING DRAINS, BY GRAVITY OR SUMP PUMP
- YARD DRAINS
- HEAT PUMP DISCHARGES STORM DRAIN CONNECTIONS
- ROOF DRAINS/DOWN SPOUTS
- SUMP PUMP DISCHARGES COOLING WATER DISCHARGES

STORM SEWER

PVC PIPE 12" DIAMETER AND SMALLER SHALL MEET THE LATEST REQUIREMENTS OF ASTM F-794, WITH A MINIMUM PIPE STIFFNESS OF 60 PSI; MEET THE LATEST REQUIREMENTS OF ASTM F-949, WITH A MINIMUM PIPE STIFFNESS OF 50 PSI; MEET THE LATEST REQUIREMENTS OF ASTM D-3034, SDR 35 (TYPE PSM). PIPE SHALL HAVE A MINIMUM CELL CLASSIFICATION OF 12454-B, 12454-C OR 1236-A

PVC PIPE 15" DIAMETER AND LARGER AND NOT OTHERWISE SPECIFIED; SHALL MEET THE LATEST REQUIREMENTS OF ASTM F-794, WITH A MINIMUM PIPE STIFFNESS OF 46 PSI; OR MEET THE LATEST REQUIREMENTS OF ASTM F-949, WITH A MINIMUM PIPE STIFFNESS OF 50 PSI. PIPE SHALL HAVE A MINIMUM CELL CLASSIFICATION OF 12454-B, 12454-C OR 12364-A PER ASTM D-1784.

ALL PVC PIPE SHALL BE APPROPRIATELY MARKED FOR THE PURPOSE OF IDENTIFICATION AND SHALL BE SUBJECT TO INSPECTION AND REJECTION AT THE FACTORY, TRENCH OR OTHER POINT OF DELIVERY.

ALL PIPE SHALL BE OF THE INTEGRAL BELL ELASTOMERIC GASKETED JOINT TYPE. THE JOINTS SHALL BE PUSH-ON TYPE MEETING THE REQUIREMENTS OF ASTM D-3212 AND THE JOINT SHALL BE DESIGNED TO PREVENT DISPLACEMENT OF THE GASKET WHEN ASSEMBLING THE JOINT.

THE PIPE SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D-2321 AND WITH THE REQUIREMENTS OF THESE SPECIFICATIONS. ANY REQUIREMENTS OF ASTM D-2321 WHICH MAY BE IN CONFLICT OR INCONSISTENT WITH THE REQUIREMENTS OF THESE SPECIFICATIONS SHALL BE VOID TO THE EXTENT OF SUCH CONFLICT OR INCONSISTENCY.

THE ENDS OF ALL RIBBED PVC PIPE THAT WILL BE INSTALLED IN MANHOLES SHALL BE PROVIDED WITH A FACTORY INSTALLED OVERSLEEVE. FIELD INSTALLED OVERSLEEVES WILL NOT BE PERMITTED.

REINFORCED CONCRETE PIPE

ALL SIZES OF REINFORCED CONCRETE PIPE SHALL MEET THE LATEST REQUIREMENTS OF ASTM C-76, CLASS III AND ASTM C-443.

REINFORCED CONCRETE SEWER PIPE (RCP) SHALL BE APPROPRIATELY MARKED FOR THE PURPOSE OF IDENTIFICATION AND NO PIPE SHALL BE DELIVERED UNTIL IT HAS REACHED THE APPROPRIATE STRENGTH REQUIREMENTS. ALL RCP SHALL BE SUBJECT TO INSPECTION AND REJECTION AT THE FACTORY, TRENCH OR OTHER POINT OF DELIVERY.

JOINTS FOR RCP SHALL BE OF THE RUBBER GASKET TYPE CONFORMING TO ASTM C-443. THE GASKET SHALL BE THE SOLE ELEMENT DEPENDED UPON TO MAKE THE JOINT WATERTIGHT.

REINFORCED CONCRETE ELLIPTICAL PIPE SHALL BE PROVIDED IN ACCORDANCE WITH ASTM C507.

HIGH DENSITY POLYETHYLENE (HDPE) PIPE SHALL ONLY BE USED FOR GRAVITY STORM SEWER OR DRAINAGE TILE APPLICATION. IT SHALL BE MARKED FOR THE PURPOSE OF IDENTIFICATION AND SHALL BE SUBJECT TO INSPECTION AND REJECTION AT THE FACTORY, TRENCH OR OTHER POINT OF DELIVERY. ACCEPTABLE PIPE SIZE SHALL BE 36" OR LESS.

HDPE PIPE SHALL HAVE A SMOOTH INTERIOR AND ANNULAR EXTERIOR CORRUGATIONS. PIPE 10" AND SMALLER SHALL MEET AASHTO M252, TYPE S AND THE VIRGIN MATERIAL SHALL CONFORM WITH THE MINIMUM REQUIREMENTS OF CELL CLASSIFICATION 424420C. PIPE 12" AND LARGER SHALL MEET AASHTO M294, TYPE S OR ASTM F2306 AND THE VIRGIN MATERIAL SHALL CONFORM WITH THE MINIMUM REQUIREMENTS OF CELL CLASSIFICATION 435400C. CELL CLASSIFICATIONS SHALL BE PER ASTM D3350 EXCEPT CARBON BLACK CONTENT SHOULD NOT EXCEED 5%.

PIPE JOINTS SHALL MEET THE REQUIREMENTS OF AASHTO M252, M294 OR ASTM F2306. JOINTS SHALL BE WATERTIGHT MEETING THE REQUIREMENTS OF ASTM D3212. GASKETS SHALL BE POLYISOPRENE MEETING THE REQUIREMENTS OF ASTM F477 AND SHALL BE INSTALLED BY THE MANUFACTURER AND COVERED WITH A REMOVABLE WRAP. JOINT LUBRICANT PROVIDED BY THE PIPE MANUFACTURER SHALL BE USED ON THE GASKET AND BELL. TWELVE INCH (12") AND LARGER PIPE SHALL HAVE A REINFORCED BELL WITH A BELL TOLERANCE DEVICE INSTALLED BY THE

PIPE SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321 AND THE MANUFACTURERS GUIDELINES. MINIMUM COVER IN TRAFFIC AREAS FOR 4" THROUGH 36" PIPE SHALL BE 12", HOWEVER PIPE FLOTATION SHALL ALSO BE CONSIDERED.

FINGER DRAINS SHALL BE INSTALLED IN ALL CATCH BASINS. 10' LONG IN ALL FOUR DIRECTIONS.

THE STORM DRAINAGE SYSTEM SHALL BE CLEANED BY THE CONTRACTOR PRIOR TO ACCEPTANCE BY

INSPECTION AND TESTING: CONTRACTOR SHALL PERFORM THE FOLLOWING INSPECTIONS AND TESTS IN PRESENCE OF ENGINEER:

- LEAKAGE INSPECTION: STORM SEWERS SHALL BE INSPECTED FOR EXCESSIVE INFILTRATION AND SAND LEAKAGE. CONTRACTOR SHALL REPAIR ALL SAND LEAKS AND INFILTRATION LEAKS WHICH MAY CAUSE A CONTINUED MAINTENANCE PROBLEM.
- ALIGNMENT AND GRADE: CHECK ALIGNMENT AND GRADE BY LAMPING METHOD. IF PIPE SHOWS POOR ALIGNMENT, OFFSET OR OPEN JOINTS, SAGS, OR KINKS, DEFECTS SHALL BE CORRECTED BY CONTRACTOR BEFORE FINAL ACCEPTANCE. PIPELINE SHALL BE RELAID IF LAMP CANNOT BE VIEWED BETWEEN ADJACENT MANHOLES.
- DEFLECTION LIMITATION: DEFLECTIONS IN PVC AND PE PIPE SHALL BE LIMITED TO 5% PERCENT OF NOMINAL PIPE DIAMETER. IF VISUAL INSPECTION INDICATES A GREATER DEFLECTION, CONTRACTOR SHALL SUPPLY AND PULL A BALL WITH A DIAMETER 5% PERCENT LESS THAN INTERNAL PIPE SIZE THROUGH SEWER; FAILURE TO FREELY PASS THROUGH SHALL BE CAUSE FOR REJECTION OF SEWER.

37. DOWN SPOUT LATERALS

- A. PIPE: PVC DRAINS FROM DOWN SPOUTS TO STORM SEWER SHALL BE PVC PIPE, ASTM D2665, WITH SOLVENT WELD JOINTS.
- STONE BACKFILL: WASHED, EVENLY GRADED GRAVEL OR CRUSHED STONE WITH 100% PASSING 1 INCH SIEVE AND NOT MORE THAN 5% PASSING NO. 8 SIEVE.

38. PAVEMENT AND RETAINING WALL DRAIN TILE

- A. UNDER DRAIN PIPE: PERFORATED CORRUGATED POLYETHYLENE DRAINAGE PIPE COMPLYING
- PIPE WRAP: SYNTHETIC FABRIC WITH AN APPROXIMATE WEIGHT OF 3 OZ./SQ. YD; ADS SOCK, OR APPROVED EQUAL.
- UNDER DRAIN AGGREGATE: CLEAN, WASHED, 1/2 INCH STONE CHIPS OR PEA GRAVEL. 1/2 INCH STONE CHIPS SHALL BE GRADED IN ACCORDANCE WITH ASTM C33, SIZE NO 7. PEA GRAVEL SHALL CONSIST OF ROUNDED, FREE FLOWING AGGREGATE WITH PARTICLE SIZE NOT MORE THAN 3/4 INCH AND NOT LESS THAN 1/8 INCH IN DIAMETER.
- GEOTEXTILE FABRIC: DRAINAGE FILTRATION FABRIC COMPLYING WITH STATE DOT STD. SPEC.

39. MANHOLES AND INLETS

- A. MANHOLES: MANHOLES SHALL BE PRECAST REINFORCED CONCRETE RINGS, ASTM C478 OF SIZES SHOWN ON DRAWINGS. JOINT SHAPE SHALL BE COMPATIBLE WITH DESIGNATED JOINT MATERIALS. STEPS AND PIPE SEAL COMPONENTS SHALL BE CAST INTO RISER SECTIONS. JOINT MATERIALS SHALL BE RUBBER RING GASKETS OR PLASTIC GASKET MATERIAL. PIPE SEALS SHALL BE FLEXIBLE, WATER TIGHT, GASKETED SEALS FOR PIPE ENTRANCE HOLES, EXCEPT THAT MORTAR SEALS MAY BE USED FOR STORM SEWER PIPE. ALL INVERTS SHALL BE POURED OR
- B. CASTINGS: FRAMES AND LIDS SHALL BE CAST IRON, ASTM A48, CLASS 30, OR UNIFORM QUALITY, FREE FROM BLOW HOLES, POROSITY, HARD SPOTS, SHRINKAGE DEFECTS, CRACKS OR OTHER SERIOUS DEFECTS. MANHOLE CASTINGS SHALL BE TRUE TO PATTERN WITH MACHINED BEARING FACES BETWEEN FRAME AND COVER. TYPE OF CASTINGS SHALL BE AS DESIGNATED

ON DRAWINGS. LIDS FOR SANITARY MANHOLES SHALL HAVE SELF-SEALING NEOPRENE O-RING

STEPS: ASTM C478; CAST IRON OR STEEL REINFORCED COPOLYMER POLYPROPYLENE.

GASKETS AND CONCEALED PICK HOLES.

- D. CONCRETE: CONCRETE FOR INVERTS SHALL HAVE 3 TO 5 PERCENT AIR-ENTRAINMENT AND A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS.
- E. INSTALLATION: MANHOLES WITH MORE THAN ONE ENTRANCE PIPE AND MANHOLES AT CHANGES IN ALIGNMENT OR GRADE SHALL HAVE FORMED FLOW CHANNELS WITH SMOOTH RADIUS TRANSITIONS. PIPE SEALS SHALL BE COMPLETED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. PIPES WITH FLEXIBLE SEALS SHALL BE SUPPORTED OUTSIDE MANHOLES BY BEDDING AS SPECIFIED FOR TYPE OF PIPE INSTALLED.

A. END WALLS: APRON END WALLS SHALL BE PRE-FABRICATED FLARED END SECTIONS OF SAME MATERIAL AS SEWER PIPE OR OF REINFORCED CONCRETE. PROVIDE TRASH GUARDS AND PIPE TIES AS DETAILED ON DRAWINGS.

B. RIPRAP: RIPRAP SHALL BE IN ACCORDANCE WITH STATE DOT.

C. GEOTEXTILE FILTER FABRIC: FILTER FABRIC SHALL BE IN ACCORDANCE WITH STATE DOT.

D. INSTALLATION: INSTALL FILTER FABRIC AS SHOWN AND IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS. SURFACE TO RECEIVE FABRIC SHALL BE SMOOTH AND FREE OF OBSTRUCTIONS, DEPRESSIONS, AND DEBRIS. LAY FABRIC PARALLEL TO DIRECTION OF WATER FLOW. IF LAPPING OF FABRIC IS REQUIRED, MINIMUM OVERLAP SHALL BE 2 FT. OVERLAPS MAY BE ELIMINATED IF FABRIC SECTIONS ARE EITHER FACTORY OR FIELD SEWN. SEAM STRENGTH SHALL BE AT LEAST 80% OF FABRIC TENSILE STRENGTH. SECURE FABRIC IN PLACE TO PREVENT SHIFTING BEFORE OR DURING PLACEMENT OF STONE OR RIPRAP. PLACE RIPRAP FROM BASE OF SLOPE UPWARD; HEIGHT OF RIPRAP FREE FALL SHALL BE NO MORE THAN 1FT. REPAIR OR REPLACE TORN OR PUNCTURED FABRIC IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS; NO EXTRA COMPENSATION WILL BE ALLOWED.

41. PAVEMENT CONSTRUCTION

- A. ALL PAVEMENT CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CONSTRUCTION STANDARDS AND SPECIFICATIONS OF THE STATE DEPARTMENT OF TRANSPORTATION LATEST
- B. UNSUITABLE MATERIAL ENCOUNTERED IN EXCAVATING FOR PAVEMENT SUBGRADE SHALL BE REMOVED AND REPLACED WITH SUITABLE MATERIAL TO THE LIMITS APPROVED BY THE ENGINEER. UNSUITABLE MATERIAL THAT IS EXCAVATED SHALL BE DISPOSED OF ELSEWHERE AT THE CONTRACTORS EXPENSE.
- THE PAVEMENT SUBGRADE AND BASE COURSE MATERIAL SHALL BE INSPECTED AND APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO PLACEMENT OF THE AGGREGATE BASE COURSE, AT WHICH TIME, THE SUBGRADE AND BASE COURSE SHALL BE "PROOF ROLLED" BY THE CONTRACTOR WITH LEGALLY LOADED SIX-WHEELED TRUCK IN THE PRESENCE OF THE ENGINEER
- D. SUBGRADE COMPACTION: COMPACTED SUB-BASE SOIL UNDER ROADWAY WILL BE "PROOF ROLLED" FOR COMPACTION BY CONTRACTOR BY A TANDEM DUMP TRUCK LOADED WITH A LEGAL LOAD OF STONE, BEFORE STONE BASE IS PLACED. ALL SOFT SPOTS FOUND DURING PROOF ROLL OF SUB-BASE SHALL BE DUG OUT AND REPLACED WITH SUITABLE SOIL OR #2 STONE. IN LIEU OF USING #2 STONE, FABRIC OR GEOGRIDS MAY BE USED. STONE BASE WILL BE "PROOF ROLLED" AGAIN BY DUMP TRUCK OUT TO THE EDGES OF THE PAVEMENT, BEFORE PAVING BEGINS. SUB-BASE SOIL COMPACTION TESTS SHALL MEET CURRENT SPECIFICATIONS FOR SUBGRADE COMPACTION.

42. CURB AND GUTTER, WALKS, AND SLABS

- A. CURBS SHALL BE DEPRESSED AT LOCATIONS WHERE PUBLIC WALKS/PEDESTRIAN PATHS INTERSECT CURB LINE AT PAVEMENT INTERSECTION, CONCRETE SPILLWAYS, AND OTHER LOCATIONS AS DIRECTED BY THE ENGINEER.
- CONCRETE CURB AND GUTTER SHALL BE IN ACCORDANCE WITH DOT STANDARD SPEC., LOCATE CONTRACTION JOINTS AT 20 FT. ON CENTER, UNLESS OTHERWISE SHOWN. LOCATE EXPANSION JOINTS AS REQUIRED BY STATE DOT STD. SPEC.
- CONCRETE WALKS, SHALL BE IN ACCORDANCE WITH DOT STANDARD SPECS. UNLESS OTHERWISE SHOWN, LOCATE SIDEWALK CONTRACTION JOINTS AT 5FT. ON CENTER AND EXPANSION JOINTS AT 50 FT. ON CENTER. UNLESS OTHERWISE SHOWN, LOCATE CONTRACTION JOINTS IN LARGER SLABS AT 15 FT. INTERVALS IN EACH DIRECTION, REINFORCED WITH LUBRICATED SMOOTH DOWEL BARS (3/4 INCH DIAMETER, 18 INCH LENGTH, AT 12 INCH CENTERS).
- ALL CONCRETE CURB AND GUTTER AND PAVEMENT SHALL BE BROOMED FINISHED. CONCRETE TEST CYLINDERS SHALL BE TAKEN EACH DAY THAT CONCRETE IS POURED. A COMPRESSIVE STRENGTH OF AT LEAST 3,500 PSI FOR CURB AND GUTTER AND 4,000-4,500 PSI FOR PAVEMENT SHALL BE VERIFIED BY AN INDEPENDENT LABORATORY TO BE ACCEPTABLE. RESULT OF THE TESTING SHALL BE SUBMITTED TO THE ENGINEER AND OWNER.
- FOR ALL CONCRETE CURB AND GUTTER AREAS, THREE-QUARTER INCH (3/4") THICK PRE-MOLDED FIBER EXPANSION JOINTS WITH 3/" X 20" PLAIN ROUND STEEL DOWEL BARS SHALL BE INSTALLED AT ALL P.C'S., P.T.'S.. CURB RETURNS, AND AT THE END OF EACH POUR. ALTERNATE ENDS OF THE DOWEL BARS SHALL BE GREASED AND FITTED WITH METAL EXPANSION TUBES. THREE-QUARTER INCH (3/4") THICK FIBER EXPANSION JOINTS SHALL BE USED IN EVERY CASE AT TWELVE FOOT (12') MAXIMUM INTERVALS IN THE CURB AND CUT 2 1/4" DEEP, CURB JOINTING SHALL BE LOCATED AT CONCRETE PAVEMENT JOINTS. THE GRANULAR CURB BASE SHALL BE A MINIMUM OF SIX (6) INCHES OF AGGREGATE BASE MATERIAL TO ALLOW FOR PROPER SUBGRADE DRAINAGE. COMPACTED CURB SUBGRADE SHALL BE SHAPED PARALLEL TO THE CURB FLOW LINE AND POSITIVELY DRAINED TO INLETS AND CATCH BASINS. ALL ROADWAYS SHALL BE CONSTRUCTED TO A SELECT COMPACTED SUBGRADE, GRADED PARALLEL TO THE FINISH SURFACE.

43. BASE COURSE

PLACE CRUSHED AGGREGATE BASE COURSE TO THE LINES AND GRADES SHOWN IN ACCORDANCE WITH STATE DOT STD. SPEC. BASE COURSE SHALL BE GRADUATION NO. 2. COMPACT BASE COURSE IN 6 INCH MAXIMUM LIFTS TO 95% OF STANDARD PROCTOR DENSITY, ASTM D698.

44. P.C.C. PAVEMENT

- A. THIRTY DAYS PRIOR TO THE START OF PAVING THE CONTRACTOR SHALL SUBMIT A MIX DESIGN ANALYSIS OF THE PROPOSED CONCRETE. THE MIX DESIGN SHALL INCLUDE THE SOURCE AND QUANTITY OF ALL CONSTITUENTS, COMPRESSIVE STRENGTH, FLEXURAL STRENGTH, AIR CONTENT, SLUMP AND YIELD. PAVING MAY NOT BEGIN PRIOR TO OWNER'S APPROVAL OF THE
- B. CONCRETE SHALL CONFORM TO THE DEPARTMENT OF TRANSPORTATION AND ALL OTHER APPLICABLE SECTIONS WITH A WATER/CEMENT RATIO OF .45 OR LESS AND AIR CONTENT OF 6%
- C. FOR EACH 150 CUBIC YARDS OR PORTION THEREOF PLACED PER DAY, THE FOLLOWING TESTS SHALL BE PERFORMED: SLUMP, AIR CONTENT, TEMPERATURE, ON SET OF 3 COMPRESSIVE STRENGTH CYLINDERS. FOR EVERY FIFTH SET OF CYLINDERS ONE SET OF THREE FLEXURAL STRENGTH BEAMS SHALL BE CAST. ALL TESTING SHALL COMPLY WITH ASTM STANDARDS: C-31,
- D. AFTER CONCRETE HAS SET, ALL EXPANSION JOINTS ADJACENT TO BUILDINGS SHALL BE CLEANED AND SEALED WITH HOT APPLIED RUBBERIZED SEALANT MEETING FEDERAL SPECIFICATION SS-S-1401C AND ASTM D3405.
- E. CONTRACTOR SHALL PROVIDE A JOINTING AND EXPANSION LAYOUT PLAN TO OWNER FOR APPROVAL PRIOR TO THE START OF CONSTRUCTION.

45. ASPHALTIC CONCRETE PAVEMENT

PLACE ASPHALTIC CONCRETE BINDER AND WEARING COURSES TO THE LINES AND GRADES SHOWN IN ACCORDANCE WITH DOT STD. SPEC. ASPHALT CEMENT SHALL BE PENETRATION GRADE 85-100 OR PERFORMANCE GRADE PG 58-28. COMPACT PAVEMENT UNTIL ROLLER MARKS ARE ELIMINATED AND NOT LESS THAN 92% OF THE TARGET MAXIMUM DENSITY IS OBTAINED.

- A. THE BITUMINOUS PAVEMENT COURSE MATERIAL SHALL BE INSPECTED BY AN INDEPENDENT TESTING LABORATORY AT THE ASPHALT MIXING PLANT TO VERIFY THAT THE PORTIONS OF MATERIAL ARE WITHIN THE ALLOWABLE LIMITS OF THE SPECIFICATIONS AS DEFINED BY THE DEPARTMENT OF TRANSPORTATION APPLICABLE SECTIONS. WRITTEN CONFIRMATION OF CONFORMANCE SHALL BE SUBMITTED TO THE OWNER.
- B. AFTER THE BITUMINOUS AGGREGATE BASE COURSE HAVE BEEN PROOF ROLLED AND REPAIRED WHEN REQUIRED AND PRIOR TO PLACING THE SURFACE COURSE, THE BITUMINOUS AGGREGATE BASE COURSE SHALL BE SURFACE TESTED BY THE CONTRACTOR. ANY VARIATIONS IN THE SURFACE OF THE BITUMINOUS AGGREGATE BASE COURSE EXCEEDING ONE HALF (1/2") INCH SHALL BE CORRECTED BY THE REMOVAL AND REPLACEMENT OF ANY SUB-STANDARD AREAS OR THE CONSTRUCTION OF CORRECTIVE LEVELING COURSE AT THE DIRECTION OF THE
- C. AFTER THE INSTALLATION OF THE AGGREGATE BASE COURSE, ALL TRAFFIC SHALL BE KEPT OFF THE AGGREGATE BASE UNTIL THE BITUMINOUS AGGREGATE BASE COURSE IS LAID. AFTER INSTALLATION OF THE BITUMINOUS AGGREGATE BASE COURSE AND UPON THE COMPLETION OF INSPECTION OF SAME AND APPROVED BY THE ENGINEER AND OWNER, THE PAVEMENT SHALL BE CLEANED, PRIMED AND THE INTERMEDIATE AND SURFACE COURSES LAID. ALL DAMAGED AREAS IN THE BITUMINOUS AGGREGATE BASE COURSE, AGGREGATE BASE OR CURB AND GUTTER SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER AND OWNER, PRIOR TO LAYING THE SURFACE COURSE. THE PAVING CONTRACTOR SHALL PROVIDE WHATEVER EQUIPMENT AND MANPOWER IS NECESSARY, INCLUDING THE USE OF POWER BROOMS, TO PREPARE THE PAVEMENT FOR APPLICATION OF THE SURFACE COURSE. EQUIPMENT AND MANPOWER FOR CLEANING SHALL BE CONSIDERED AS INCIDENTAL TO THE COST OF THE CONTRACT OR AS NOTED IN THE PROPOSAL.
- D. AFTER COMPLETION OF THIS ITEM, AN **ASPHALT-SEALING BAND** SHALL BE PLACED AT ALL INTERSECTIONS, FEATHERS, TRANSITIONS AND ASPHALT DRIVEWAYS.

46. PAVEMENT MARKING

- PAINT LINE WORK ON ASPHALTIC PAVING, CONCRETE CURBS, WALKS, AND RAMPS AS SHOWN. PAINT SHALL BE FACTORY MIXED, QUICK DRYING, NON-BLEEDING TRAFFIC MARKING PAINT COMPLYING WITH AASHTO M248, TYPE S. COLOR SHALL BE WHITE, EXCEPT WHERE ANOTHER COLOR IS REQUIRED BY CODE.
- CLEAN SURFACE IN AREAS TO RECEIVE MARKINGS. PAINT MARKINGS AND SYMBOLS WITH TRAFFIC MARKING PAINT. APPLY PAINT WITH MECHANICAL EQUIPMENT TO PRODUCE UNIFORM STRAIGHT EDGES. APPLY TWO COATS AT MANUFACTURERS RECOMMENDED RATES.

47. HANDICAPPED PARKING SIGNS

CLEAN SIGNS OF ALL FOREIGN MATTER.

- A. MINIMUM 12 INCH, X 18 INCH X 18 GA. COLD ROLLED GALVANIZED STEEL, TREATED WITH A BAKED ENAMEL FINISH. COLORS, TEXT AND DESIGN AS SHOWN ON DETAILS.
- B. SIGN SHALL BE MOUNTED ON A SINGLE 2 INCH SQUARE STEEL POST WITH PAINTED ENAMEL
- C. SIGNS SHALL BE SET PLUMB AND LEVEL. TOUCH-UP ANY ABRASIONS TO FINISH. COMPLETELY

TRAFFIC SIGNS SHALL COMPLY WITH THE PERTINENT STATE AND LOCAL REQUIREMENTS FOR THE SIGN TYPE(S) DESIGNATED ON DRAWINGS.

48. TRAFFIC SIGNS

49. SEEDING

50. DISPOSAL

DEBRIS, AND WASTE MATERIALS.

REMOVE FROM OWNER'S PROPERTY AND LEGALLY DISPOSE OF EXCESS EXCAVATED MATERIAL, TRASH,

DISTURBED AREAS (EXCLUDING PAVEMENT AND BUILDING AREAS) SHALL RECEIVE MINIMUM 4 INCHES

OF SALVAGED TOPSOIL, FERTILIZER, LIME, SEED, AND MULCH. SEE EROSION AND SEDIMENT CONTROL

NO. DATE DESCRIPTION **REVISIONS**

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