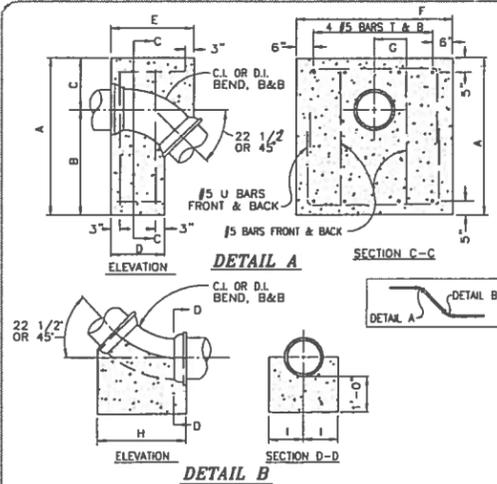


GENERAL NOTES

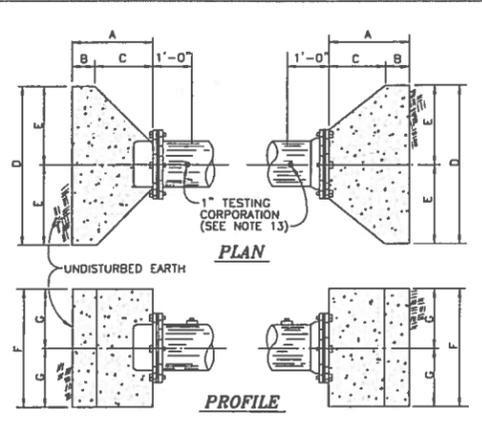
- ALL WATER MAIN AND WATER SYSTEM CONSTRUCTION SHALL CONFORM TO THE CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF FRASER. DETAILED WRITTEN SPECIFICATIONS ARE AVAILABLE AT THE CITY OFFICES.
- THE CONTRACTOR SHALL ARRANGE FOR A PRECONSTRUCTION MEETING WITH THE DEPARTMENT OF PUBLIC WORKS. VARIOUS UTILITY COMPANIES AND GOVERNMENTAL AGENCIES MUST BE NOTIFIED OF THE MEETING BY THE CONTRACTOR. (3 WORKING DAY NOTICE REQUIRED)
- THE CONTRACTOR SHALL NOTIFY MISS DIG, THE CITY OF FRASER'S DEPARTMENT OF PUBLIC WORKS AT (810) 293-1977, THE DETROIT WATER AND SEWERAGE DEPARTMENT (INSPECTION DIVISION) AT (313) 833-4882 AND ANDERSON, ECKSTEIN AND WESTRICK, INC. AT (810) 726-1234 THREE WORKING DAYS PRIOR TO CONSTRUCTION.
- DUCTILE IRON PIPE SHALL MEET THE REQUIREMENTS OF ANSI/AWWA C151/A21.5 FOR CLASS 54. DOUBLE CEMENT LINED WITH PUSH ON TYPE JOINTS. PUSH ON JOINTS SHALL BE TYTON, SUPER BELLITE OR APPROVED EQUAL.
- ALL HYDRANTS SHALL BE CITY OF FRASER STANDARD MUELLER CENTURION 200 WITH A BREAKAWAY FLANGE (OR APPROVED EQUAL). HYDRANTS SHALL OPEN COUNTERCLOCKWISE AND BE SUPPLIED WITH 2-3 1/2 INCH PUMPER NOZZLES HAVING DETROIT STANDARD THREAD.
- HYDRANTS SHALL BE OF THE "C" TYPE CONNECTION UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL VERTICAL EXTENSIONS REQUIRED TO OBTAIN THE DESIRED GRADE SHALL BE INCLUDED IN THE COST OF THE HYDRANT.
- PRIOR TO FINAL ACCEPTANCE BY THE MUNICIPALITY, ALL HYDRANTS MUST BE DETERGERED AND PAINTED. PAINT SHALL BE MARINE ENAMEL, COLOR APPROVED BY THE CITY WITH 2 APPLICATIONS.
- GATE VALVES SHALL CONFORM TO THE REQUIREMENTS OF ANSI/AWWA C-500 CURRENT SPECIFICATIONS. THE VALVE SHALL BE CAST WITH AN IRON BODY AND BRONZE MOUNTED WITH A BRONZE NON-RISING STEM, DOUBLE "O" RING REPLACEMENT SEALS AND MECHANICAL JOINTS. THE VALVE SHALL BE FURNISHED WITH A 2" SQUARE OPERATING NUT, DOUBLE DISK GATES WITH PARALLEL SEATS AND SHALL TURN CLOCKWISE TO OPEN.
- GATE VALVES AND TAPPING VALVES SHALL BE HOUSED WITHIN A PRECAST CONCRETE GATEWELL. HYDRANT VALVES SHALL BE HOUSED IN A 3-PIECE SCREW TYPE BOX (5-1/4" SHAFT) WITH AN ENLARGED BASE.
- ALL END-OF-THE-LINE GATEWELLS SHALL HAVE A CAPPED STUB EXTENDING ONE FULL LENGTH OF PIPE BEYOND THE GATEWELL. THE VALVE, PIPE AND CAP SHALL BE INSTALLED WITH RETAINER GLANDS.
- ALL FITTINGS SHALL BE DUCTILE IRON IN ACCORDANCE WITH ANSI/AWWA C153/A21.53 (COMPACT FITTINGS), 350 PSI PRESSURE RATING WITH DOUBLE CEMENT LINING, MECHANICAL JOINTS AND RETAINING GLANDS. SPLIT RETAINERS NOT ALLOWED.
- CONCRETE THRUST BLOCKS ARE REQUIRED AT ALL BENDS, TEES, CAPS OR PLUGS. CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 2500 PSI (MIN.) AT 28 DAYS.
- STEPS ARE TO BE E.J.L.W. NO. 8503, MA INDUSTRIES P.S.I. POLYPROPYLENE OR APPROVED EQUAL AND INSTALLED BY THE GATEWELL MANUFACTURER.
- ONE (1) INCH COPORATIONS SHALL BE INSTALLED, FOR TESTING PURPOSES, IN ALL STUBS AND POINTS OF CONNECTION TO THE EXISTING MAIN. UPON SUCCESSFUL COMPLETION OF THE TESTS AND WITH THE APPROVAL OF THE CITY OF FRASER'S DEPARTMENT OF PUBLIC WORKS, THE CONTRACTOR SHALL REMOVE THE TESTING COPORATION AND INSTALL PLUGS.
- THE WATER MAIN SHALL BE CONSTRUCTED WITH A MINIMUM COVER OF 6.0 FEET, MEASURED FROM THE PAVEMENT CENTERLINE ELEVATION OR THE EXISTING GROUND, WHICHEVER IS LOWER. GENERALLY, THE MAXIMUM DEPTH OF COVER SHALL NOT EXCEED 7 FEET.
- A VERTICAL CLEARANCE OF 1.5 FEET (MIN.) MUST BE MAINTAINED BETWEEN THE WATER MAIN AND ANY UTILITIES AND 5.5 FEET (MIN.) BELOW DITCHES. ADJUSTMENTS TO THE WATER MAIN DEPTH IN ORDER TO OBTAIN THE DESIRED CLEARANCES MUST BE ACCOMPLISHED WITH VERTICAL BENDS, THRUST BLOCKS AND ANCHORAGES.
- DEFLECTION OF PIPE JOINTS TO OBTAIN THE DESIRED CLEARANCES OR ALIGNMENT SHALL ONLY BE ACCOMPLISHED WITH THE OWNER'S APPROVAL. THE MAXIMUM ALLOWABLE DEFLECTION (FOR 1 FULL LENGTH OF PIPE) IS 14 INCHES FOR 4" THRU 12" PIPE AND 8 INCHES FOR 16" AND 24" PIPE.
- THE MAXIMUM PERMISSIBLE LEAKAGE, DURING HYDROSTATIC TESTING, SHALL NOT EXCEED 0.18 GAL. PER INCH DIAMETER OF MAIN PER 1000 FEET OF PIPE IN 2 HOURS AT A TEST PRESSURE OF 150 PSI. THE MAXIMUM TEST LENGTH IS 3000 FEET. THE CITY OF FRASER'S DEPARTMENT OF PUBLIC WORKS RESERVES THE RIGHT TO TEST SHORTER LENGTHS. THE CONTRACTOR IS TO SUPPLY ALL TESTING EQUIPMENT AND PERFORM THE TEST. THE CITY OF FRASER'S DEPARTMENT OF PUBLIC WORKS WILL PROVIDE THE MEASURING DEVICE AND WITNESS THE TEST.
- A DOUBLE CHECKVALVE ASSEMBLY, FOR BACKFLOW PREVENTION, SHALL BE UTILIZED ON ALL TEMPORARY LINES USED TO FILL AND FLUSH THE NEWLY INSTALLED MAIN.
- THE CONTRACTOR SHALL PROVIDE A 2 YEAR MAINTENANCE AND GUARANTEE BOND TO THE CITY, DATED FROM THE TIME OF FINAL ACCEPTANCE BY THE CITY OF FRASER, FOR 100% OF THE CONSTRUCTION COSTS.
- CONNECTIONS TO THE EXISTING WATER SYSTEM SHALL NOT BE MADE UNTIL THE NEW MAIN HAS BEEN SUCCESSFULLY PRESSURE TESTED AND HAS PASSED BACTERIOLOGICAL TESTING. FINAL CONNECTIONS SHALL BE COORDINATED WITH THE DEPARTMENT OF PUBLIC WORKS.
- VERTICAL TOLERANCES FOR HYDRANTS AND VALVES SHALL BE:

HYDRANTS (ANY LOCATION):	+ 0.25 FT.
GATE WELL NOT IN R.O.W.:	+ 0.25 FT.
GATE WELL IN R.O.W.:	- 0.00 TO + 0.30 FT.



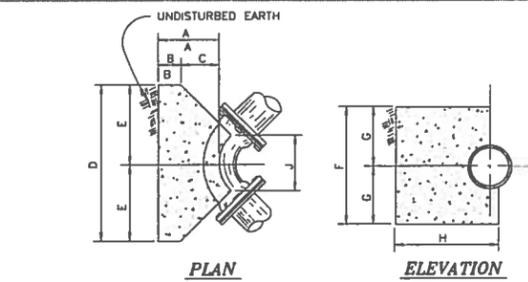
VERTICAL BEND	DIMENSION-INCHES								
DIAM. ANGLE	A	B	C	D	E	F	G	H	I
8" 22 1/2	36	20	16	16	19	32	8"	21"	12"
8" 45	48	30	18	18	20	38	10"	24"	12"
12" 22 1/2	48	30	18	19	24	48	10"	30"	12"
12" 45	54	36	18	18	28	60	11"	30"	12"
16" 22 1/2	54	34	20	19	26	60	11"	28"	18"

ANCHORAGE FOR VERTICAL BENDS



SIZE	A	B	C	D	E	F	G
8"	1'-11"	0'-9"	1'-2"	3'-0"	1'-6"	2'-0"	1'-0"
12"	2'-1"	0'-9"	1'-4"	4'-0"	2'-0"	3'-0"	1'-6"
16"	2'-8"	1'-0"	1'-8"	5'-0"	2'-6"	4'-0"	2'-0"
24"	4'-2"	1'-6"	2'-8"	6'-0"	3'-0"	4'-0"	2'-0"

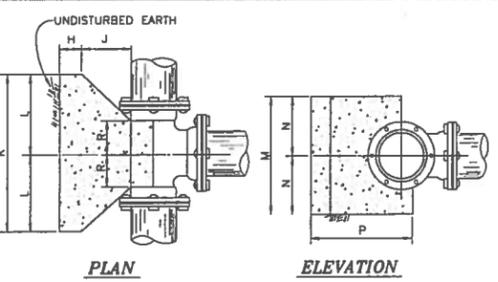
CONCRETE THRUST BLOCKS FOR CAPS



ANGLE	A (MIN.)	B (MIN.)	C	D	E	F	G	H (MIN.)	J
6" 45	1'-6"	0'-9"	0'-9"	1'-6"	0'-9"	1'-6"	0'-9"	1'-8"	0'-10"
6" 90	1'-6"	0'-9"	0'-9"	2'-0"	1'-0"	2'-0"	1'-0"	1'-8"	0'-10"
8" 45	1'-9"	0'-9"	1'-0"	2'-4"	1'-2"	2'-0"	1'-0"	1'-11"	1'-4"
8" 90	1'-9"	0'-9"	1'-0"	3'-4"	1'-8"	2'-6"	1'-3"	1'-11"	1'-2"
12" 22 1/2	1'-9"	0'-9"	1'-0"	2'-6"	1'-3"	2'-0"	1'-0"	2'-0"	1'-4"
12" 45	2'-1"	0'-9"	1'-4"	3'-6"	1'-9"	2'-6"	1'-3"	2'-4"	1'-4"
12" 90	2'-1"	0'-9"	1'-4"	5'-6"	2'-9"	3'-0"	1'-6"	2'-4"	1'-8"
16" 22 1/2	2'-8"	1'-0"	1'-8"	3'-4"	1'-8"	2'-6"	1'-3"	3'-0"	1'-2"
16" 45	2'-8"	1'-0"	1'-8"	5'-4"	2'-8"	3'-0"	1'-6"	3'-0"	2'-6"
16" 90	2'-8"	1'-0"	1'-8"	6'-0"	3'-0"	5'-0"	2'-6"	3'-0"	2'-8"
24" 90	4'-7"	1'-0"	3'-7"	10'-0"	5'-0"	7'-0"	3'-6"	5'-4"	2'-4"

CONCRETE THRUST BLOCKS FOR HORIZONTAL BENDS

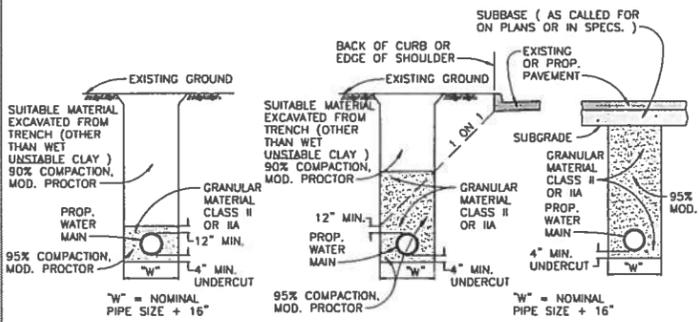
* 90° BENDS TO BE INSTALLED ONLY WITH CITY ENGINEER'S APPROVAL



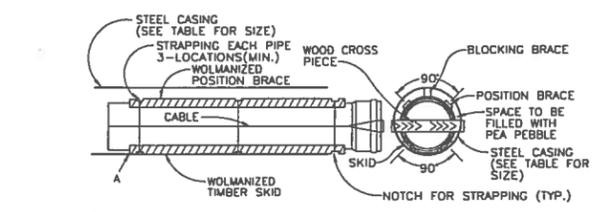
CODE	TEE SIZE		
	8"x8"	12"x12"	16"x16"
H	0'-9"	0'-9"	1'-0"
J	0'-9"	1'-3"	1'-4"
K	2'-8"	4'-0"	4'-8"
L	1'-4"	2'-0"	2'-4"
M	2'-0"	3'-0"	4'-8"
N	1'-0"	1'-6"	2'-4"
P	8"	2'-2"	
	12"	2'-6"	2'-10"
	16"	2'-10"	3'-4"
R	8"	0'-7"	
	12"	0'-8"	0'-10"
	16"	0'-8"	0'-10"

NOTE - THRUST BLOCKS FOR 6" TEES SHALL MATCH THE REQUIREMENTS FOR 8" TEES.

CONCRETE THRUST BLOCKS FOR TEES



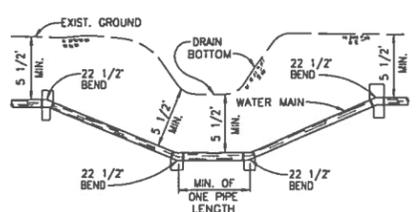
BEDDING DETAILS



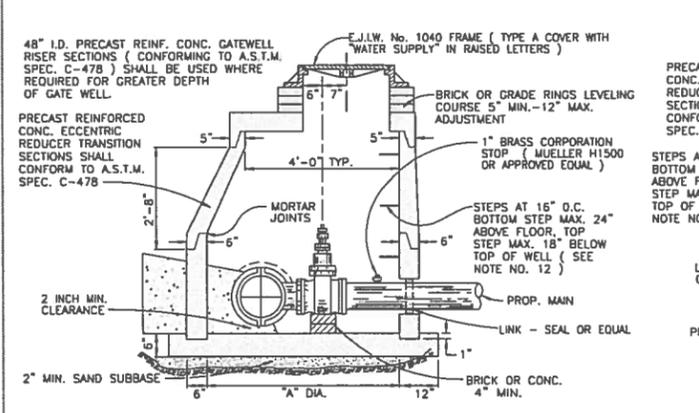
NOTE: THE ENDS OF THE CASING SHALL BE SEALED AFTER THE WATER MAIN IS INSTALLED THROUGH THE CASING

PIPE SIZE	RECOMMENDED MINIMUM CASING DIAMETER (O.D.)	MINIMUM CASING WALL THICKNESS
4"	12.75"	0.375"
6"	14"	0.375"
8"	16"	0.375"
12"	20"	0.375"
16"	24"	0.406"
24"	36"	0.532"

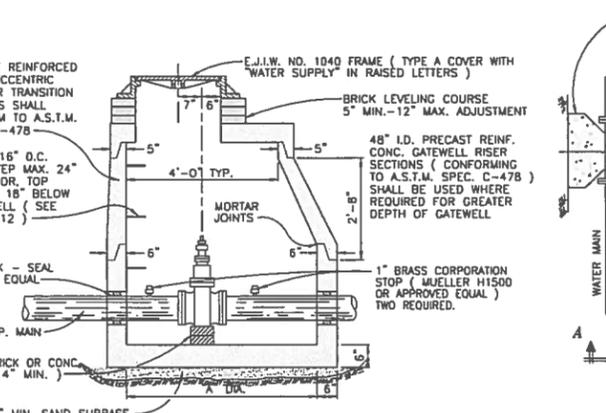
STEEL CASING REQUIREMENTS



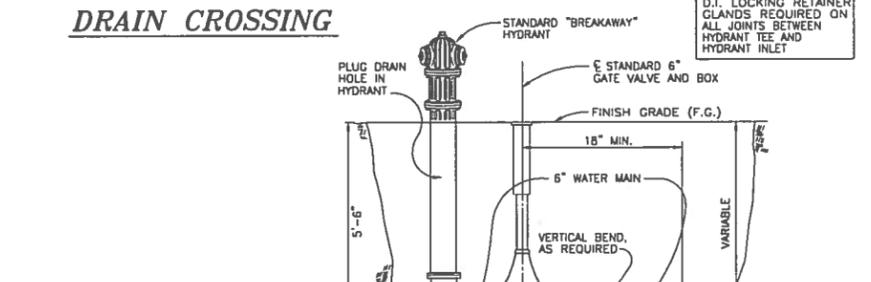
DRAIN CROSSING



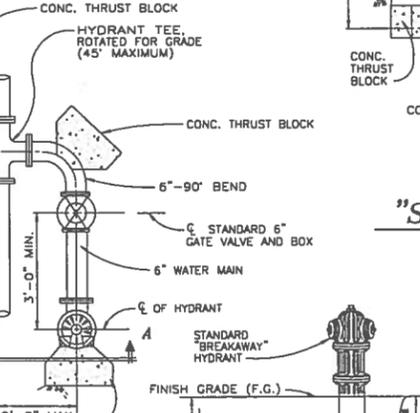
TAPPING VALVE & WELL



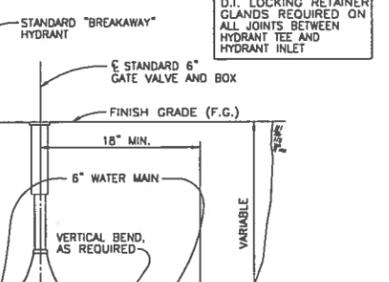
GATE VALVE & WELL



"S" HYDRANT CONNECTION



"C" HYDRANT CONNECTION



"S" HYDRANT CONNECTION

NOTE: ALL MECHANICAL JOINTS SHALL INCLUDE "COR-TEN" BOLTS WITH T-HEADS AND HEX-HEAD NUTS.

CITY OF FRASER STANDARD WATER MAIN DETAILS

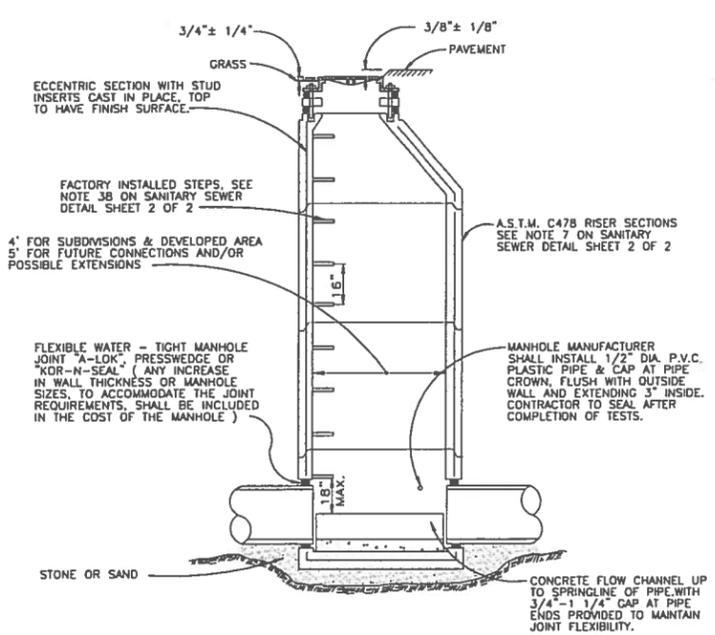
DEPARTMENT OF PUBLIC WORKS

APPROVED BY: BERNARD J. VAN FLETEREN, DIRECTOR DATE: MARCH 8, 2004

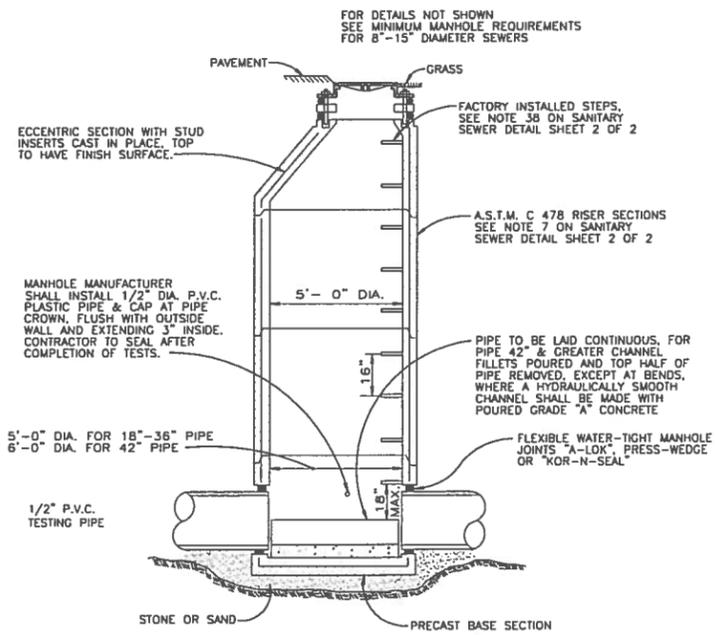
ANDERSON, ECKSTEIN AND WESTRICK, INC. Civil Engineers • Surveyors • Architects 51301 Schoenherr Road, Shelby Township, Michigan 48315 Phone 586-726-1234 Fax 586-726-8780	PROJECT NO.	SHEET NO.
	DATE MARCH 2004	A
DRAWN BY CML/KJP	CHECKED BY GFL	SCOTT LOCKWOOD PE NO. 44355

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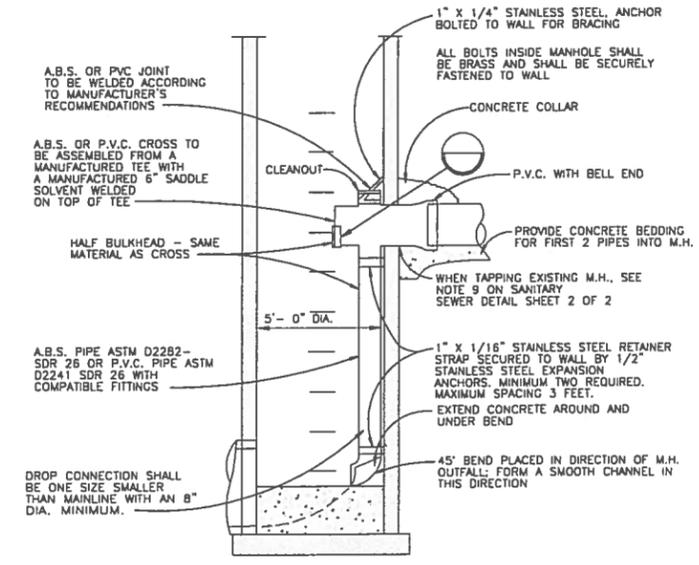
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 SHEET NO. 1 OF 1



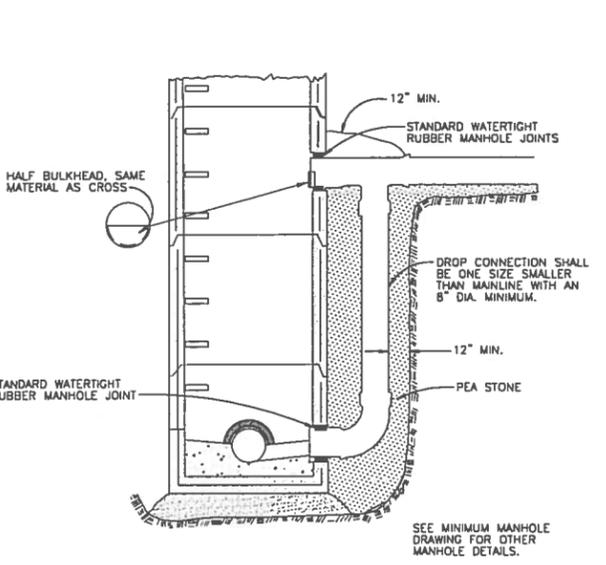
SANITARY SEWER MANHOLE
(8" THRU 15" DIA. SEWERS)



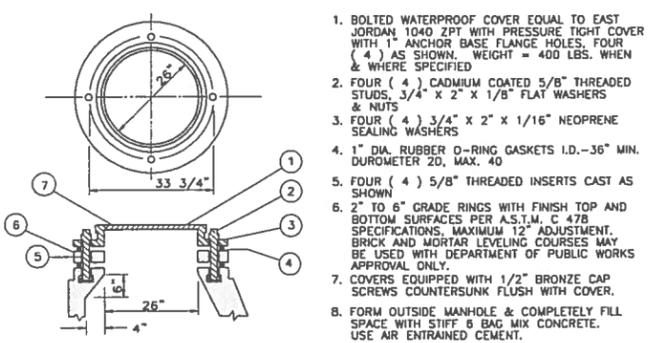
SANITARY SEWER MANHOLE
(18" THRU 42" DIA. SEWERS)



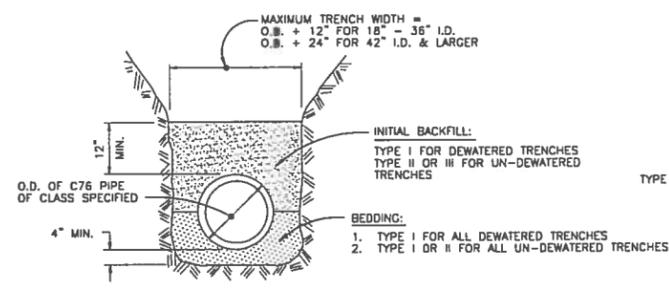
INTERIOR DROP ASSEMBLY
(ONLY WITH DEPARTMENT OF PUBLIC WORKS APPROVAL)



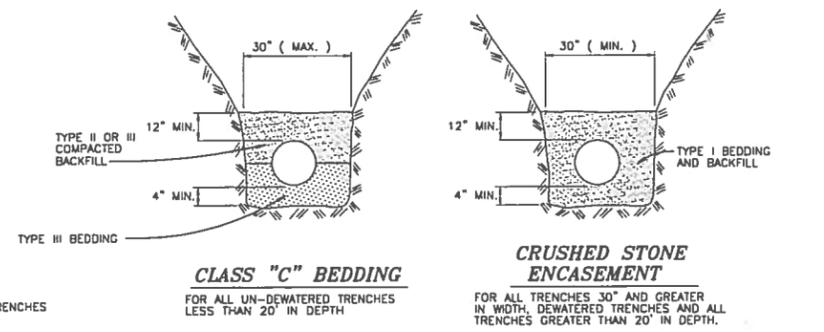
EXTERIOR DROP CONNECTION
STANDARD DROP CONNECTIONS



WATERPROOF MANHOLE FRAME & COVER



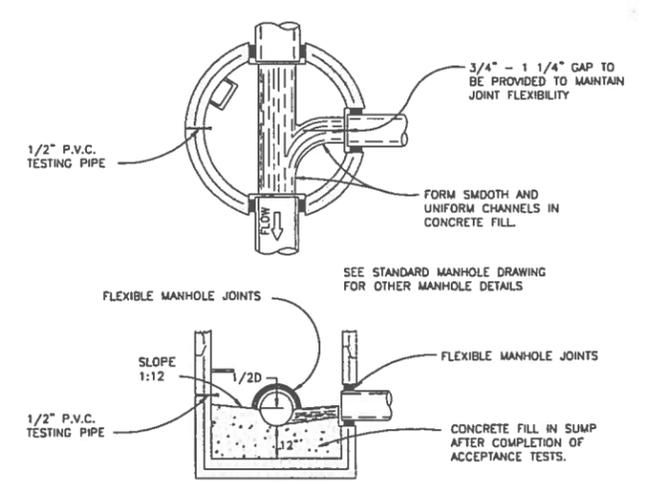
BEDDING & TRENCH DETAIL, 18" & LARGER SEWER
CLASS C



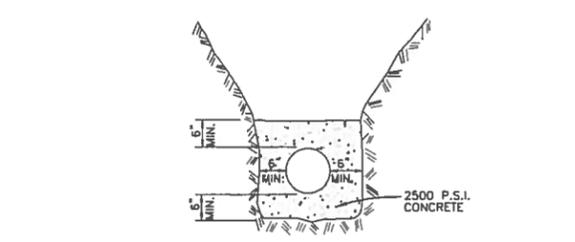
BEDDING & TRENCH DETAIL, 6" - 15" SEWERS

GENERAL PIPE BEDDING & TRENCH NOTES

- THE CONTRACTOR SHALL INSTALL THE PIPE IN ACCORDANCE WITH THE CLASS BEDDING DETAIL REQUIRED FOR THE TYPE OF PIPE, PIPE DEPTH (MEASURED AT THE TOP OF THE PIPE), AND TRENCH WIDTH (MEASURED ACROSS THE TRENCH AT THE TOP OF THE PIPE) CONSTRUCTED. A CONTRACTOR MAY ALWAYS USE A HIGHER QUALITY BEDDING CLASS THAN REQUIRED. ANY OTHER VARIATIONS MUST BE APPROVED IN WRITING BY THE ENGINEER.
- CRUSHED STONE ENCASUREMENT SHALL BE UTILIZED FOR ALL DEWATERED GROUND TRENCHES AND SHALL UTILIZE A TRENCH WIDTH OF 30" (MINIMUM).
- BACKFILL MATERIAL SHALL BE AS FOLLOWS:
 TYPE I: ANY MATERIAL INCORPORATED SHALL PROVIDE A MINIMUM OF 90% CRUSHED MATERIAL. MDOT COURSE AGGREGATES 6A, 6AA, 6A, 17A & 25 SERIES ARE APPROVED FOR USE IF THEY ARE MANUFACTURED WITH SUFFICIENT CRUSHED MATERIAL AND NO STONE IS LARGER THAN 1 INCH IN DIAMETER. SPADING THE HAUNCH AREA IS THE ONLY DENSITY EFFORT REQUIRED.
 TYPE II: SHALL CONSIST OF WELL GRADED COURSE SANDS AND GRAVEL (1 INCH MAXIMUM DIAMETER) CONTAINING A SMALL PERCENTAGE OF FINES. THE MATERIAL SHALL CONFORM TO MDOT AGGREGATES 20 SERIES, 21 SERIES, 22 SERIES, 23A, 26A, 28 SERIES & 31 SERIES. 95% MINIMUM DENSITY REQUIRED. TYPE II MAY BE SUBSTITUTED FOR TYPE III BACKFILL.
 TYPE III: SHALL CONSIST OF FINE SAND AND GRAVELS CONFORMING TO MDOT CLASS II OR III GRANULAR MATERIAL AND SHALL INCLUDE PEA PEBBLE. IT SHALL NOT CONTAIN ANY STONE LARGER THAN 1 INCH IN DIAMETER AND SHALL REQUIRE 95% MINIMUM DENSITY.

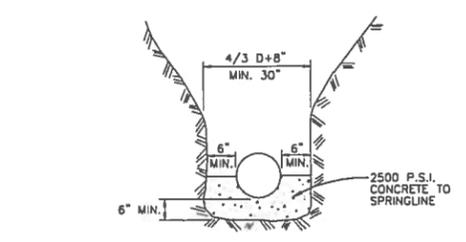


SUMP MANHOLE
FOR TESTING, CLEANING & DEWATERING



CONCRETE ENCASUREMENT DETAIL

- PLACE 2500 PSI CONCRETE AGAINST UNDISTURBED EARTH FOR ENTIRE WIDTH OF TRENCH.
- CONCRETE ENCASUREMENT SHALL BE USED UNDER ALL RIVERS OR COUNTY DRAINS WHERE THE WIDTH FROM TOP OF BANK TO TOP OF BANK IS IN EXCESS OF 10 FEET & CROWN OF SEWER IS NOT COVERED BY 5 FEET.
- CONCRETE ENCASUREMENT SHALL EXTEND A DISTANCE OF 10 FEET BEYOND THE TOP OF BANK ON EACH SIDE OF THE STREAM. (MINIMUM ENCASUREMENT 30 FEET).
- FOR SANITARY SEWER IN EXCESS OF 15 INCHES IN DIAMETER CLASS V REINFORCED PIPE MAY BE SUBSTITUTED FOR CONCRETE ENCASUREMENT, WITH OWNER'S APPROVAL.



CONCRETE CRADLE DETAIL

- CONCRETE CRADLE MAY BE SPECIFIED AT OWNER'S DISCRETION WHERE THE TRENCH WIDTH IS EXCESSIVE, OR WHERE THE TRENCH IS NOT SUITABLE FOR PIPE LAYING.
- THE USE OF CONCRETE CRADLE FOR THESE PURPOSES WILL NOT BE CONSIDERED AS A PAY ITEM FOR THE CONTRACT UNLESS SPECIFICALLY DESIGNATED BY THE SPECIFICATIONS.

CITY OF FRASER
STANDARD SANITARY SEWER DETAILS (1 OF 2)

DEPARTMENT OF PUBLIC WORKS

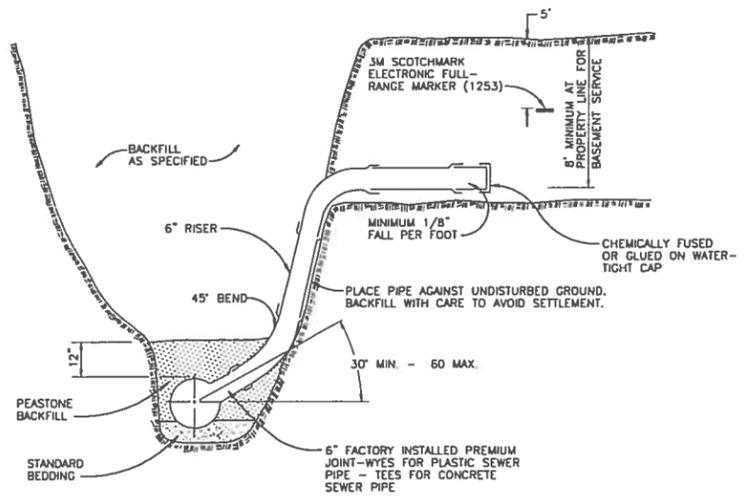
APPROVED BY : _____ DATE : MARCH 8, 2004
BERNARD J. VAN FLETEREN, DIRECTOR

PROJECT NO.	SHEET NO.
DATE: MARCH 2003	B
DRAWN BY: CML/KJP	CHECKED BY: GFL

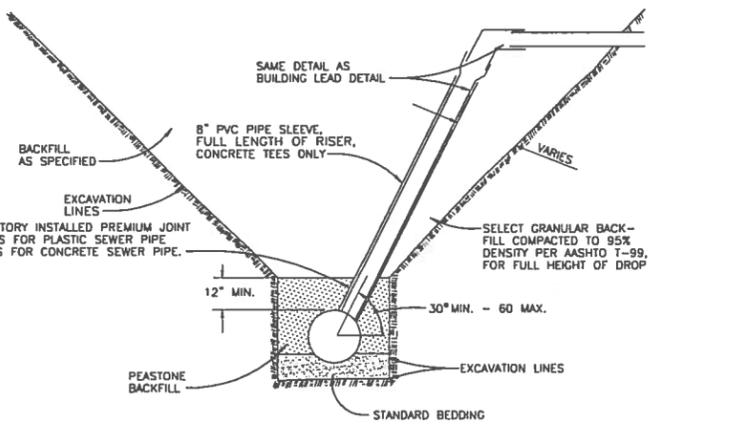
SCOTT LOCKWOOD PE NO. 44355

ANDERSON, ECKSTEIN AND WESTRICK, INC.
Civil Engineers • Surveyors • Architects
81301 Schoenherr Road, Shelby Township, Michigan 48315
Phone 586-726-1234 Fax 586-726-0780

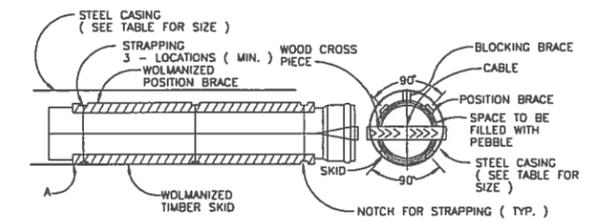
SANITARY SEWER CONSTRUCTION NOTES



BUILDING LEAD DETAIL
0' - 15' COVER



BUILDING LEAD DETAIL
GREATER THAN 15' COVER



NOTE:
THE ENDS OF THE CASING SHALL BE SEALED AFTER THE SEWER IS INSTALLED THROUGH THE CASING

PIPE SIZE	RECOMMENDED MINIMUM CASTING DIAMETER	MINIMUM WALL THICKNESS
6"	12"	.375
8"	16"	.375
10"	18"	.375
12"	20"	.375
15"	24"	.406
18" & 21"	36"	.532
24"	42"	.563
27" & 30"	48"	.625

STEEL CASING REQUIREMENTS

- ALL CONSTRUCTION SHALL CONFORM TO THE CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF FRASER DEPARTMENT OF PUBLIC WORKS. ALL SANITARY SEWER CONSTRUCTION SHALL HAVE COMPETENT FULL TIME INSPECTION PROVIDED BY OR CAUSED TO BE PROVIDED BY THE CITY OF FRASER DEPARTMENT OF PUBLIC WORKS.
- AT ALL CONNECTIONS TO CITY OF FRASER SANITARY SEWERS OR TO EXTENSIONS THEREOF, AND BEFORE START OF CONSTRUCTION, THE CONTRACTOR MUST REQUEST AND HAVE IN HIS POSSESSION AN APPROVED CONNECTIONS PERMIT ISSUED BY THE CITY OF FRASER DEPARTMENT OF PUBLIC WORKS. THE CONTRACTOR SHALL NOTIFY THE CITY OF FRASER DEPARTMENT OF PUBLIC WORKS 48 HOURS PRIOR TO THE BEGINNING OF ANY CONSTRUCTION.
- NO SEWER INSTALLATION SHALL HAVE AN INFILTRATION EXCEEDING 50 GALLONS PER INCH OF DIAMETER PER MILE OF PIPE PER 24 HOUR PERIOD. EXFILTRATION TESTING SHALL BE CONDUCTED WHERE GROUND WATER IS INSUFFICIENT. ALL INSTALLATIONS SHALL ALSO PASS LOW PRESSURE AIR TEST AS SPECIFIED IN THE DEPARTMENT OF PUBLIC WORKS SPECIFICATIONS.

ABS COMPOSITE PIPE AND ANY APPROVED PLASTIC PIPE SHALL BE SUBJECT TO DEFLECTION TEST 30 DAYS AFTER CONSTRUCTION WITH A NINE SIDED MANDEREL. THE CONTRACTOR MUST SUPPLY THE MANDEREL AND PERFORM THE TEST. THE OWNER WILL WITNESS THE TEST. DEFLECTION SHALL NOT EXCEED 5%. THE OWNER RESERVES THE RIGHT TO TEST THE SEWER FOR DEFLECTION NOT TO EXCEED 7% DURING THE PERIOD OF THE MAINTENANCE BOND. ANY SEWER FOUND EXCEEDING THESE LIMITS SHALL BE REPLACED BY AND AT THE CONTRACTOR'S EXPENSE.

AS PART OF THE FINAL INSPECTION, THE CONTRACTOR SHALL PROVIDE FOR TELEVISION INSPECTION OF THE SANITARY SEWER LINES INSTALLED UNDER THIS CONTRACT. THE CONTRACTOR SHALL ARRANGE FOR, ENGAGE AND PAY ALL EXPENSES INVOLVED FOR THE SERVICES OF A COMPETENT COMPANY TO PERFORM THIS TELEVISION INSPECTION. THE INSPECTION SHALL BE CARRIED OUT UNDER THE DIRECT SUPERVISION OF THE ENGINEER WITH ALL TELEVISION INSPECTION BEING OBSERVED BY REPRESENTATIVES OF THE OWNER OR ENGINEER AND THE CONTRACTOR. ANY TELEVISION VIEWING PERFORMED IN THE ABSENCE OF THE ENGINEER OR A REPRESENTATIVE OF THE OWNER SHALL NOT BE CONSIDERED A PART OF THE FINAL INSPECTION. ALL TELEVISION INSPECTION SHALL BE RECORDED ON VIDEO TAPE AND TURNED OVER TO THE OWNER FOR READY REFERENCE AT A LATER DATE. THE VIDEO RECORDING SHALL DISPLAY CONTINUOUSLY THE DATE, TIME AND ENGINEERING STATIONS AND SHALL PERIODICALLY DISPLAY THE NAME OF THE PROJECT, NAME OF THE AREA COVERED AND DIRECTION OF TRAVEL. THE TAPE MUST BE COMPATIBLE WITH VIDEO CASSETTE PLAYER 1/2 INCH VHS FORMAT.
- INFILTRATION SHALL BE TESTED BY THE OWNER UTILIZING CALIBRATED WEIRS OR FLUMES INSERTED IN THE PIPE FLOWLINE AT A MANHOLE. TEST SECTIONS SHALL GENERALLY BE LIMITED TO A MAXIMUM LENGTH OF 1000 FEET. THE OWNER RESERVES THE RIGHT TO TEST SHORTER PIPE LENGTH SEGMENTS IF HE DEEMS IT NECESSARY TO ASSURE THAT NO SEGMENT EXCEEDS THE INFILTRATION LIMITS.
- BUILDING LEAD PIPE, WYES AND CAPS SHALL BE SOLID WALL PLASTIC PIPE, ABS (A.S.T.M. D-2751, SDR 23.5) OR PVC (A.S.T.M. D-2241, SDR 23.5 OR A.S.T.M. D-2466, SCH. 40) WITH JOINTS AS SPECIFIED IN NOTE #15. THE JOINT BETWEEN TWO DISSIMILAR SIZES OR TYPES OF BUILDING LEAD PIPE SHALL BE MADE WITH A PROPER SIZE FERROUS DONUT, OR APPROVED EQUAL, WITH POLYVINYL JOINT SEALER. A RUBBER BOOT WITH CLAMPS IS NOT ACCEPTABLE.
- ALL SEWER PIPE SHALL BE INSTALLED IN CLASS "C" BEDDING OR BETTER, IN CONFORMANCE WITH THE DETAILS PROVIDED.
- ALL NEW MANHOLES SHALL HAVE DEPARTMENT OF PUBLIC WORKS APPROVED FLEXIBLE, WATER-TIGHT SEALS WHERE PIPES PASS THROUGH WALLS. MANHOLES SHALL BE PRECAST REINFORCED CONCRETE IN ACCORDANCE WITH ASTM C478 CURRENT SPECIFICATIONS. PRECAST MANHOLE JOINTS AND GASKETS SHALL BE MODIFIED TONGUE AND GROOVE IN ACCORDANCE WITH ASTM C361 CURRENT SPECIFICATIONS. PRECAST MANHOLE CONE SECTIONS SHALL BE CITY OF FRASER DEPARTMENT OF PUBLIC WORKS APPROVED MODIFIED ECCENTRIC CONE TYPE. ALL MANHOLES SHALL BE PROVIDED WITH BOLTED, WATER-TIGHT COVERS. MANHOLE STEPS SHALL NORMALLY BE PROVIDED ON A BACK WALL OF THE MANHOLE FURTHEST FROM TRAFFIC.
- AT THE CONNECTIONS TO MANHOLES, SEWERS OR EXTENSIONS THERETO, DROP CONNECTIONS WILL BE REQUIRED WHEN THE DIFFERENCE IN INVERT ELEVATIONS EXCEEDS 18 INCHES. THE DROP CONNECTIONS WILL EITHER BE INTERIOR OR EXTERIOR AS APPROVED BY THE SEWER DEPARTMENT. THE DETERMINATION WILL BE BASED UPON MANHOLE SIZE, GROUND WATER AND SOIL CONDITIONS AT THE LOCATION WHERE THE TAP WILL BE PERFORMED.
- EXISTING MANHOLES SHALL BE TAPPED WITH THE "KOR-N-SEAL" METHOD FOR SEWERS 6" THRU 15" IN DIAMETER. MANHOLE TAPS FOR 18" DIAMETER SEWERS AND LARGER SHALL HAVE HOLES DRILLED AT 4 INCHES CENTER TO CENTER AROUND THE PERIPHERY OF THE OPENING TO CREATE A PLANE OF WEAKNESS BEFORE BREAKING OUT THE SECTION. NON-SHRINK GROUT SHALL BE USED TO SEAL THE OPENING AND A CONCRETE COLLAR SHALL BE POURED 12 INCHES AROUND THE PIPE AND EXTEND 12 INCHES BEYOND THE OPENING.
- NEW MANHOLES CONSTRUCTED DIRECTLY ON CITY OF FRASER DEPARTMENT OF PUBLIC WORKS SEWERS SHALL BE PROVIDED WITH COVERS READING "SANITARY SEWER" IN RAISED LETTERS. NEW MANHOLES BUILT OVER ANY EXISTING SANITARY SEWERS SHALL HAVE MONOLITHIC POURED BOTTOMS.
- NO GROUND WATER, STORM WATER, CONSTRUCTION WATER, DOWNSPOUT DRAINAGE OR WEEP TILE DRAINAGE SHALL BE ALLOWED TO ENTER ANY SANITARY SEWER INSTALLATION.
- PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL TELEPHONE MISS DIG (1-800-482-7171) FOR THE LOCATION OF UNDERGROUND GAS AND CABLE FACILITIES AND SHALL ALSO NOTIFY REPRESENTATIVES OF OTHER UTILITIES LOCATED IN THE VICINITY OF THE WORK.

THE CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR THE PROTECTION OF ALL EXISTING UTILITIES DURING CONSTRUCTION. ALL COSTS FOR LOCATING, REMOVING AND REPLACING OR RELOCATING THESE UTILITIES SHALL BE INCLUDED IN THE COST OF CONSTRUCTING THE SANITARY SEWER. ALL UTILITIES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED WITH LIKE MATERIAL. THE CONTRACTOR SHALL VERIFY THE DEPTH AND HORIZONTAL LOCATION OF ALL EXISTING UTILITIES BEFORE ANY WORK IS STARTED. THE EXACT LOCATION OF EXISTING UTILITIES SHALL BE DETERMINED BY HAND DIGGING.
- THE CONTRACTOR SHALL MAINTAIN ALL EXISTING SANITARY SEWER, WATER OR STORM SEWER SERVICE CONNECTIONS DURING CONSTRUCTION. ANY ADJUSTMENTS OR REPAIRS TO THESE SERVICES SHALL BE MADE BY THE CONTRACTOR AND THE COST SHALL BE INCLUDED IN THE COST FOR CONSTRUCTING THE SANITARY SEWER, UNLESS OTHERWISE PROVIDED IN THE CONTRACT.
- THE CONTRACTOR IS REQUIRED TO CONTACT THE INSPECTION SECTION OF DETROIT WATER AND SEWERAGE DEPARTMENT AT (313) 833-4682, THREE WORKING DAYS PRIOR TO START OF ANY SANITARY SEWER CONSTRUCTION.
- SEWER PIPE MATERIAL:
 - 8" THROUGH 15" PIPE SHALL BE A.B.S. (ACRYLONITRILE-BUTADIENE-STYRENE) OR P.V.C. (POLY-VINYL-CHLORIDE) COMPOSITE SEWER PIPE CONFORMING TO THE CURRENT ASTM D2680 SPECIFICATIONS WITH TYPE SC JOINTS FOR ABS AND GASKETED JOINTS FOR PVC. SOLID WALL PIPE SHALL BE SDR 23.5.
 - 18" AND LARGER PIPE SHALL BE REINFORCED CONCRETE CIRCULAR SEWER PIPE CONFORMING TO THE CURRENT ASTM SPECIFICATION C-76 (WALL C) WITH SIZE AND CLASS AS INDICATED ON THE PLANS. ALL REINFORCED CONCRETE SEWER PIPE SHALL BE CAST WITH REINFORCING STEEL EXTENDING INTO THE SPIGOTS. ALL JOINTS AND GASKETS SHALL BE MODIFIED TONGUE AND GROOVE, CONFORMING WITH THE REQUIREMENTS OF ASTM (C 361).
 - DUCTILE IRON PIPE-DOUBLE CEMENT LINED CLASS 54 PER ANSI A21.51 AND A21.4. JOINTS AND GASKETS SHALL BE PUSH-ON TYPE PER ANSI A21.11 (TYTON, BELL, TITE, FAST TITE OR APPROVED EQUAL).
- IN INDUSTRIAL AREAS, PRIVATE SERVICE CONNECTIONS MADE TO THE SERVICE LEAD MUST HAVE AN ACCESSIBLE SAMPLING AND MONITORING MANHOLE. THE MANHOLE SHALL BE LOCATED ON PRIVATE PROPERTY AT A LOCATION APPROVED BY THE CITY OF FRASER DEPARTMENT OF PUBLIC WORKS. VITRIFIED PIPE MAY NOT BE USED.
- BUILDING LEAD CONNECTIONS SHALL BE MADE WITH 6" WYES FOR A.B.S. AND P.V.C. PIPE AND 6" TEES FOR CONCRETE PIPE. WYES FOR ABS AND P.V.C. PIPE SHALL BE FACTORY FABRICATED (NOT EXTRUDED) AND SHALL BE CHECKED FOR IRREGULARITIES WHICH COULD AFFECT THE DEFLECTION TEST PRIOR TO INSTALLATION.
- A CITY, ROAD COMMISSION OF MACOMB COUNTY, AND/OR MICHIGAN DEPARTMENT OF TRANSPORTATION PERMIT IS REQUIRED FOR ALL CONSTRUCTION WITHIN THEIR ROAD RIGHT-OF-WAYS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SECURE ALL PERMITS AND BONDS PRIOR TO CONSTRUCTION, OR INSURE THAT ALL REQUIRED PERMITS AND BONDS HAVE BEEN OBTAINED PRIOR TO CONSTRUCTION.
- THE CONTRACTOR SHALL ABIDE BY ALL THE REQUIREMENTS OF THE ROAD RIGHT-OF-WAY OWNER REGARDING CONSTRUCTION OF WATER AND SEWER MAINS, MAINTAINING TRAFFIC, BARRICADING, BORING, BACKFILL AND RESTORATION. THERE WILL BE NO ADDITIONAL COMPENSATION DUE TO THE CONTRACTOR FOR COMPLYING WITH THESE REQUIREMENTS.
- NO WASTE EXCAVATION MATERIAL SHALL BE DISPOSED OF BY PLACING IT IN ANY FLOODPLAIN OR WET LAND OF THE STATE UNLESS APPROPRIATE PERMITS HAVE BEEN ISSUED. THE CONTRACTOR OR PROPERTY OWNER MUST OBTAIN LOCAL FILL PERMITS FOR ANY MATERIALS DEPOSITED UPON LANDS WITHIN ANY CITY, VILLAGE OR TOWNSHIP.
- THE CONTRACTOR SHALL COMPLY WITH ALL PROVISIONS OF THE APPROVED SOIL EROSION CONTROL PLAN UNDER THE ACT 347 PRIOR TO MAKING ANY EARTH CHANGES.
- PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR SHALL FURNISH MATERIAL CERTIFICATES TO THE OWNER VERIFYING THAT ALL THE MATERIALS USED ON THE PROJECT ARE IN ACCORDANCE WITH THE SPECIFICATIONS.
- COMPACTED SAND BACKFILL IS TO BE USED EXCLUSIVELY AT ALL ROAD CROSSINGS, DRIVEWAYS AND SIDEWALKS THROUGHOUT THE COURSE OF THE PROJECT. IN ROADWAYS AND DRIVEWAYS, THE TOP 12 INCHES OF THE EXCAVATION SHALL BE FILLED WITH 21AA LIMESTONE. EXCEPT AS PROVIDED IN THE SPECIFICATIONS, THERE WILL BE NO ADDITIONAL COMPENSATION FOR COMPLYING WITH THIS REQUIREMENT.
- IF AN EXISTING GRAVEL ROAD IS DISTURBED BY CONSTRUCTION EQUIPMENT OR BY STOCKPIILING OF MATERIALS OUTSIDE THE EXCAVATION AREA, A MINIMUM OF 250 POUNDS PER SQ.YD. OF 21AA LIMESTONE SHALL BE USED TO REPLACE THE DISTURBED AREAS.
- THE CONTRACTOR'S ATTENTION IS DIRECTED TO THOSE PARCELS DESIGNATED WITH AN ASTERISK (*) THROUGHOUT THE CONSTRUCTION PLANS. THIS DESIGNATION REPRESENTS SPECIAL EASEMENT CONDITIONS WHICH THE CONTRACTOR MUST ADHERE TO DURING CONSTRUCTION. SAID SPECIAL EASEMENT CONDITIONS SHALL BE INCLUDED IN THE COST OF CONSTRUCTING THE SANITARY SEWER, AND NO ADDITIONAL COMPENSATION WILL BE CONSIDERED FOR THE CONTRACTOR TO COMPLY WITH THESE REQUIREMENTS.
- ALL CONSTRUCTION CHANGES MUST HAVE WRITTEN APPROVAL OF THE PROJECT ENGINEER.
- THE CONTRACTOR SHALL BE REQUIRED TO COMPLETE ALL WORK IN AN EXPEDITIOUS MANNER AND SHALL NOT STOP CONSTRUCTION EXCEPT FOR REASONS BEYOND HIS CONTROL SUCH AS, BUT NOT LIMITED TO STRIKES, WEATHER AND UNAVAILABILITY OF MATERIALS.
- THE CONTRACTOR SHALL PROVIDE A 2 YEAR MAINTENANCE AND GUARANTEE BOND TO THE CITY, DATED FROM THE TIME OF FINAL ACCEPTANCE BY THE CITY OF FRASER.
- THE CONTRACTOR SHALL HAVE THE OPTION OF STARTING CONSTRUCTION AT THE FIRST MANHOLE UPSTREAM OF THE POINT OF CONNECTION TO THE EXISTING SYSTEM. A TEMPORARY TEST MANHOLE MAY BE USED NEAR THE POINT OF CONNECTION RATHER THAN A PERMANENT ONE. AND THE CONTRACTOR MAY LEAVE THE BASE OF THE TEMPORARY MANHOLE IN PLACE. LINES UP TO 400 FEET IN LENGTH (TOTAL LENGTH OF EXTENSION) MAY BE TESTED WITHOUT PLACEMENT OF THE MANHOLE BASE PROVIDED THE LINES ARE TESTED AND PUT IN SERVICE IMMEDIATELY FOLLOWING CONSTRUCTION.
- THE ENTIRE PROJECT AREA OF PUBLICLY FUNDED PROJECTS, AND ALL AREAS NOT UNDER THE OWNERSHIP OF ANY PRIVATE DEVELOPER FOR PRIVATELY FUNDED PROJECTS, SHALL BE VIDEO TAPED IN COLOR PRIOR TO THE START OF CONSTRUCTION. THE TAPE SHALL BE UTILIZED BY THE CITY TO DETERMINE CONSTRUCTION RELATED DAMAGE AND TO ASSURE ADEQUATE RESTORATION. THE TAPE SHALL BE STANDARD 1/2" VHS FORMAT.
- ALL PRECAST MANHOLES, SLAB BASES AND CONCRETE PIPE SHALL BE MANUFACTURED WITH TYPE II, IP OR IIA CEMENT. ALL CONCRETE FOR CHANNELIZATION SHALL BE MADE WITH TYPE II, IP OR IIA CEMENT.
- ALL TERMINAL MANHOLES AND ANY INTERMEDIATE MANHOLES WHERE FUTURE DROP CONNECTIONS ARE A POTENTIAL SHALL BE 1 FOOT LARGER IN DIAMETER THAN WOULD OTHERWISE BE REQUIRED, AND SHALL BE NO SMALLER THAN 5 FEET IN DIAMETER.
- DUCTILE IRON PIPE SHALL BE USED FOR THE SANITARY SEWER AT ALL WATER MAIN AND SANITARY SEWER CROSSINGS WITH LESS THAN 2 (TWO) FEET OF VERTICAL CLEARANCE AND WHERE THE WATER MAIN CROSSES BELOW THE SEWER, REGARDLESS OF VERTICAL CLEARANCE DISTANCE. THE DUCTILE IRON PIPE SHALL BE OF EQUAL SIZE AS THE PROPOSED SEWER. LENGTH OF DUCTILE IRON INSTALLATION SHALL BE DETERMINED BY D.P.W.
- TRENCH DETAIL "A" (T.D.-A) - BACKFILL TO A POINT 12" ABOVE THE PIPE SHALL BE AS SPECIFIED ON THE PLANS. THE REMAINDER OF THE BACKFILL SHALL BE MADE WITH SUITABLE EXCAVATED MATERIAL (EXCLUDING BLUE CLAY) PLACED IN ONE-FOOT LAYERS WITH EACH LAYER BEING THOROUGHLY COMPACTED BY APPROVED MECHANICAL METHODS, OR OTHER EFFECTIVE MEANS HAVING THE APPROVAL OF THE ENGINEER, TO A DENSITY EQUIVALENT TO THE UNDISTURBED ADJACENT SOIL, OR 90% OF MAX. UNIT WEIGHT, WHICHEVER IS GREATER. SPECIAL BACKFILL WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF CONSTRUCTING THE SANITARY SEWER. WHEN TRENCH DETAIL "A" IS SPECIFIED, THERE WILL BE NO ADDITIONAL COMPENSATION FOR SAND BACKFILL (T.D.-B) OF GRAVEL, SLAG OR HARD SURFACED PRIVATE DRIVEWAYS, PARKING LOTS OR SIDEWALKS, WHICH SHALL BE INCLUDED IN THE COST OF CONSTRUCTING THE SANITARY SEWER (SEE NOTE 23). ALL AREAS OF SUCH TRENCH DETAIL A SHALL BE SURFACED WITH STONE, PAVEMENT OR TOPSOIL IN ACCORDANCE WITH THE REQUIREMENTS OF RESTORATION (SEE NOTE 24).
- TRENCH DETAIL "B" (T.D.-B) - BACKFILL TO A POINT 12" ABOVE THE PIPE SHALL BE AS SPECIFIED ON THE PLANS. THE REMAINDER OF ALL TRENCHES UNDER PUBLIC ROADWAYS AND WITHIN THAT AREA BELOW A LINE PROJECTED AT A 1 ON 1 SLOPE DOWN AND AWAY FROM A POINT 3 FEET OUTSIDE OF THE BACK OF CURB, EDGE OF PAVEMENT OR EDGE OF SHOULDER AREA, OR AS SPECIFIED ON THE PLANS, SHALL BE BACKFILLED WITH POROUS MATERIAL MEETING THE REQUIREMENTS OF BACKFILL TYPE II. DETAIL SHEET I, AND IS TO BE COMPACTED TO 95% OF MAX. UNIT WEIGHT. WHEN TRENCH DETAIL B IS IN A DITCH OR TURF AREA, IT SHALL BE SURFACED WITH 2" TO 12" OF ORGANIC CLAY MATERIAL AND WITH 4" OF TOPSOIL. ALL OTHER AREAS OF TRENCH DETAIL B SHALL BE SURFACED WITH STONE OR PAVEMENT IN ACCORDANCE WITH THE REQUIREMENTS OF RESTORATION (SEE NOTE 24).
- THE END OF A SANITARY LEAD SHALL BE CONSTRUCTED TO A DEPTH OF 6 FEET BELOW THE FINISH GRADE AS SHOWN ON THE BUILDING LEAD DETAIL. THE LEAD LOCATION SHALL BE MARKED WITH A "SCOTCHMARK" ELECTRONIC FULL-RANGE WASTEWATER MARKER (1253) FROM 3M CORPORATION. THE FULL-RANGE MARKERS ARE TO BE SUPPLIED AND INSTALLED BY THE DEVELOPER AND/OR CONTRACTOR AT NO COST TO THE CITY. ALL MARKERS THAT ARE UNEARTHED DURING THE CONNECTION SHALL BECOME THE PROPERTY OF THE CITY OF FRASER.

THE MARKER SHALL BE BURIED 5 FEET BELOW FINISHED GRADE (7 FEET MAXIMUM), APPROXIMATELY 1 FOOT ABOVE THE END OF THE LEAD.
- THE VERTICAL TOLERANCE FOR SANITARY MANHOLE RIM GRADES ARE AS FOLLOWS:

A) IN RIGHT OF WAY	0.00 FEET TO +0.25 FEET
B) NOT IN RIGHT OF WAY	+0.25 FEET
- MANHOLE STEPS SHALL BE FACTORY INSTALLED AT 16 INCHES CENTER TO CENTER SPACING. STEPS SHALL BE M.A. INDUSTRIES P.S.I. POLYPROPYLENE MSU #360 ALU POLY (OR APPROVED EQUAL).
- THE CONTRACTOR IS REQUIRED TO CONTACT THE OFFICE OF THE MACOMB COUNTY PUBLIC WORKS COMMISSIONER AT (810) 469-5325, 48 HRS. BEFORE CONSTRUCTION.

CITY OF FRASER STANDARD SANITARY SEWER DETAILS (2 OF 2)

DEPARTMENT OF PUBLIC WORKS

APPROVED BY: _____ DATE: MARCH 8, 2004
BERNARD J. VAN FLETEREN, DIRECTOR

ANDERSON, ECKSTEIN AND WESTRICK, INC.
Civil Engineers • Surveyors • Architects
61001 Schoenherr Road, Shelby Township, Michigan 48316
Phone 588-726-1234 Fax 588-726-8780

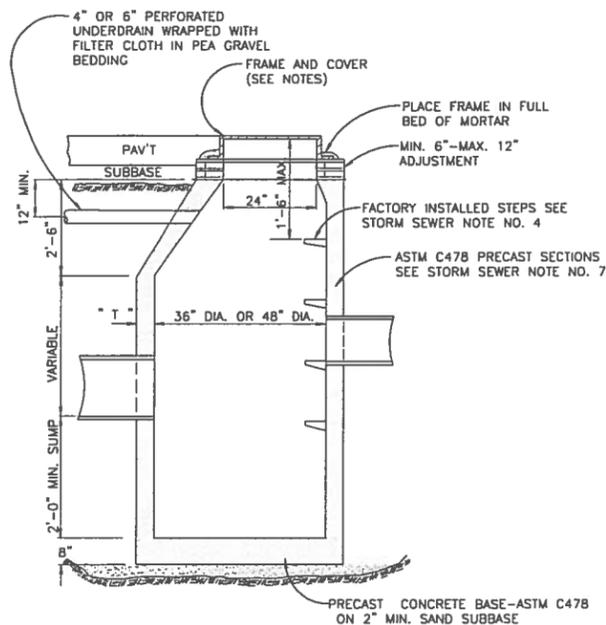
PROJECT NO.	SHEET NO.
DATE	MARCH 2003
DRAWN BY	CFL
CHECKED BY	CFL

SCOTT LOCKWOOD PE NO. 44355

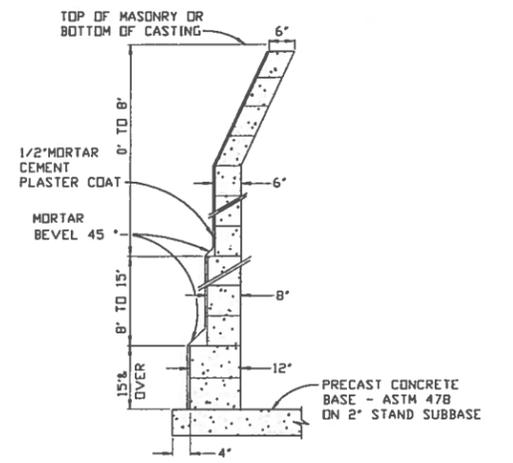
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GENERAL NOTES

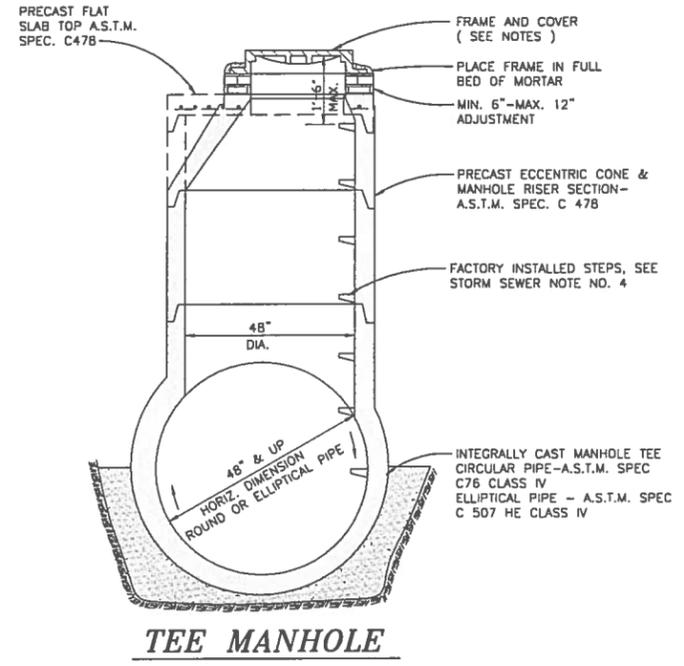
- ALL STORM SEWER CONSTRUCTION SHALL CONFORM TO THE CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF FRASER DEPARTMENT OF PUBLIC WORKS, COUNTY PUBLIC WORKS OFFICE AND COUNTY ROAD COMMISSION AS APPLICABLE.
- THE CONTRACTOR SHALL ARRANGE FOR A PRECONSTRUCTION MEETING WITH THE DEPARTMENT OF PUBLIC WORKS, VARIOUS UTILITY COMPANIES AND GOVERNMENTAL AGENCIES MUST BE NOTIFIED OF THE MEETING BY THE CONTRACTOR. (3 WORKING DAY NOTICE REQUIRED).
THE CONTRACTOR SHALL NOTIFY MISS DIG, THE CITY OF FRASER DEPARTMENT OF PUBLIC WORKS AT (810) 293-1977, THE COUNTY PUBLIC WORKS OFFICE AT (810) 469-5910, THE COUNTY ROAD COMMISSION AT (810) 463-8671 AND ANDERSON, ECKSTEIN AND WESTRICK, INC. AT (810) 726-1234 THREE WORKING DAYS PRIOR TO CONSTRUCTION, AS APPLICABLE.
- THE CONTRACTOR SHALL PROVIDE A 2 YEAR MAINTENANCE AND GUARANTEE BOND TO THE CITY OF FRASER, DATED FROM THE TIME OF FINAL ACCEPTANCE BY THE CITY OF FRASER, FOR 100% OF THE CONSTRUCTION COSTS.
- STEPS ARE TO BE E.J.I.W. NO. 8503, MA INDUSTRIES P.S.I. POLYPROPYLENE OR APPROVED EQUAL WITH A MAXIMUM SPACING OF 16 INCHES CENTER TO CENTER. ALL PRECAST STRUCTURES SHALL HAVE THE STEPS INSTALLED BY THE STRUCTURE MANUFACTURER.
- PIPE MATERIAL:
 - CONCRETE PIPE - ASTM C-76 (WALL B) OF THE SIZE AND CLASS INDICATED ON THE PLANS. PIPE JOINTS SHALL BE MODIFIED TONGUE AND GROOVE WITH RUBBER "O"-RING GASKETS.
 - PLASTIC PIPE - ASTM F949 FOR CORRUGATED PVC PIPE, ASTM D1785 SCHEDULE 40 OR ASTM D3034 SDR 23.5 FOR PVC SOLID WALL PIPE AND ASTM 2751 SDR 23.5 FOR ABS SOLID WALL. ALL PLASTIC PIPING SHALL HAVE A MINIMUM PIPE STIFFNESS OF 50 PSI. PIPE JOINTS SHALL BE GASKETED MEETING THE WATER TIGHTNESS REQUIREMENTS OF D3212.
 - COMPOSITE PIPE: ASTM D2680 WITH TYPE SC JOINTS FOR ABS AND GASKETED JOINTS FOR ABS AND GASKETED JOINTS FOR PVC. COMPOSITE PIPE MAY ONLY BE USED WHERE SPECIFIED ON THE PLANS AND WHEN THE PIPE WILL NOT BE SUBJECT TO CRUSHING LOADS FROM CONSTRUCTION EQUIPMENT.
- SUMP LEADS SHALL BE 3 INCH PVC OR ABS PIPE WITH A MINIMUM LENGTH OF 10 FEET. ALL SUMP LEADS SHALL BE CONNECTED TO A MANHOLE OR CATCHBASIN. PRECAST STRUCTURES SHALL HAVE HOLES CORED FOR SUMP LEAD CONNECTIONS. BLIND TAPS INTO DRAINAGE PIPE WILL NOT BE PERMITTED.
- DRAINAGE STRUCTURES SHALL BE CONSTRUCTED COMPLETELY OF SOLID CONCRETE BLOCK AND MORTAR OR PRECAST SEGMENTS IN ACCORDANCE WITH THE DETAILS SHOWN AND CONFORMING TO ASTM C478. ALL CATCH BASINS SHALL HAVE 2'-0" SUMPS.
- UNDERDRAINS SHALL MEET THE REQUIREMENTS OF ASTM F758 PS46 FOR SMOOTH WALL PVC AND ASTM F949 FOR CORRUGATED PVC. ALL UNDERDRAINS SHALL BE INSTALLED WITH A GEOTEXTILE FABRIC SOCK AND BACKFILLED WITH PEA GRAVEL. LARGE DIAMETER (8" AND OVER PERFORATED PIPE MAY NOT BE USED UNLESS SPECIFICALLY AUTHORIZED BY THE DPW DIRECTOR OR THE CITY ENGINEER.
- EXISTING DRAINAGE STRUCTURES SHALL BE TAPPED BY CORING THE STRUCTURE FOR ALL PIPES 15 INCH DIAMETER AND SMALLER. TAPS FOR LARGER DIAMETER SEWERS SHALL HAVE HOLES DRILLED INTO THE STRUCTURE AT 4 INCHES ON CENTER AROUND THE PERIPHERY OF THE OPENING TO CREATE A PLANE OF WEAKNESS BEFORE BREAKING OUT THE SECTION. NON-SHRINK GROUT SHALL BE USED TO SEAL THE OPENING BETWEEN THE STRUCTURE AND THE PIPE. THE DPW DIRECTOR OR AUTHORIZED REPRESENTATIVE MAY REQUEST THAT THE DRAIN STRUCTURE BE RECONSTRUCTED IF DAMAGED DURING THE TAP.
- DRAINAGE STRUCTURE FRAME AND COVERS SHALL BE AS FOLLOWS:
 - MANHOLE : E.J.I.W. 1040 WITH TYPE A COVER, OR EQUAL
 - CATCHBASIN:
 - IN PAVEMENT : E.J.I.W. 5080 WITH TYPE M1 OR M2 GRATE, OR EQUAL
 - NOT IN PAVEMENT: E.J.I.W. 1040 WITH TYPE N GRATE, OR EQUAL
- THE VERTICAL TOLERANCES FOR DRAINAGE STRUCTURE RIM GRADES ARE AS FOLLOWS:
 - MANHOLES:
 - IN R.O.W. : 0.00 TO +0.30 FEET
 - NOT IN R.O.W.: +.25 FEET
 - CATCHBASIN:
 - IN R.O.W. : 0.00 TO -0.30 FEET
 - NOT IN R.O.W.: 0.00 TO -0.30 FEET



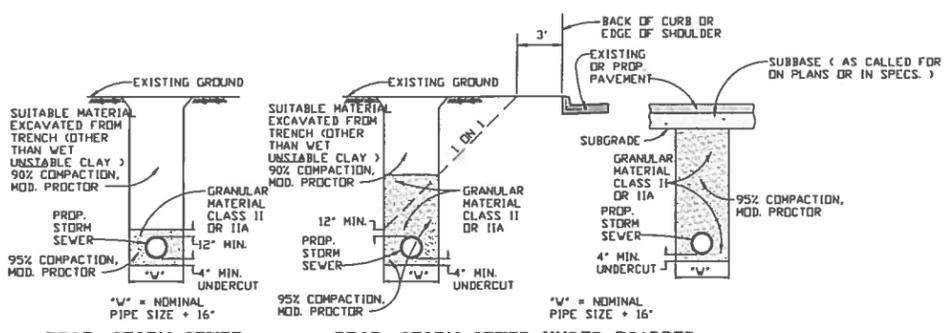
CATCH BASIN



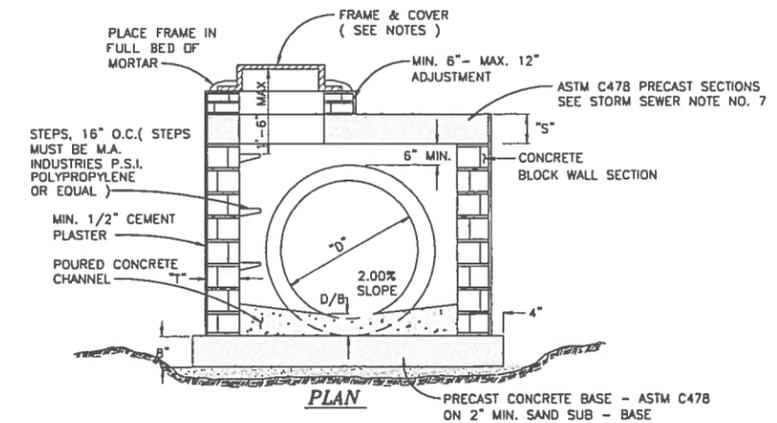
TYPICAL WALL SECTION FOR 4'-0" DIAMETER DRAINAGE STRUCTURE
(ALL MASONRY UNITS TO BE RADIAL BLOCK)



TEE MANHOLE



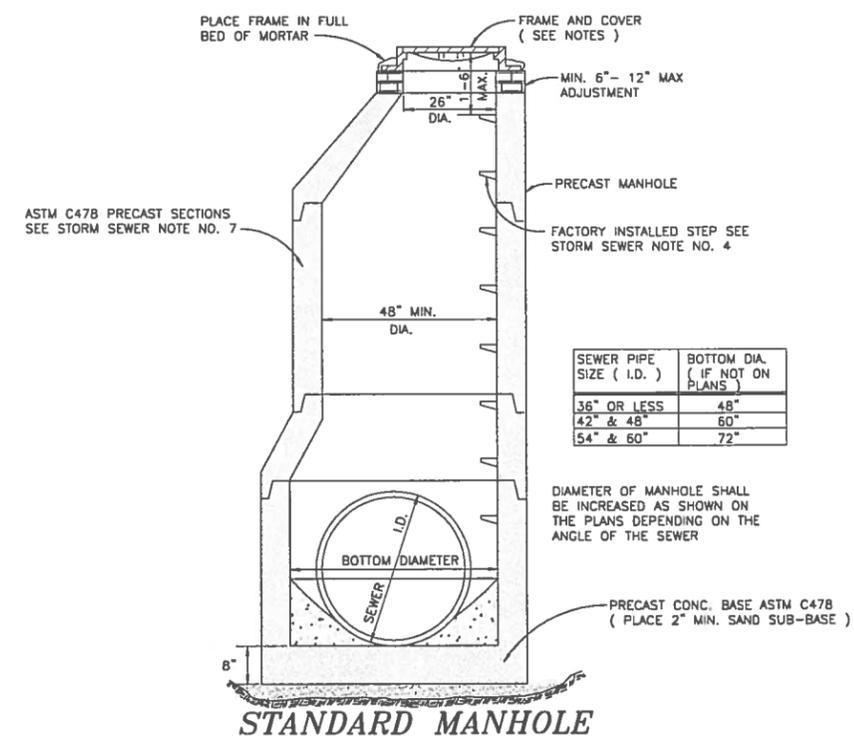
STANDARD BEDDING



OUTLET "D"	M.H. I.D.*	TOP SLAB "S"	WALL "T"
36" OR LESS	4	9"	12"
42"	5	10"	12"
48"- 54"	6	11"	12"
60" OR LARGER	7	12"	12"
	8	12"	12"

*DIAMETER OF MANHOLE SHALL BE INCREASED AS SHOWN ON THE PLANS DEPENDING ON THE ANGLE OF THE SEWERS

CONCRETE BLOCK MANHOLE



STANDARD MANHOLE

CITY OF FRASER
STANDARD STORM SEWER DETAILS

SEWER AND WATER DEPARTMENT

APPROVED BY: BERNARD J. VAN FLETEREN, DIRECTOR DATE: MARCH 8, 2004

ANDERSON, ECKSTEIN AND WESTRICK, INC.
Civil Engineers • Surveyors • Architects
51301 Schoenherr Road, Shelby Township, Michigan 48315
Phone 586-726-1234 Fax 586-726-8780

PROJECT NO. _____ SHEET NO. **D**
DATE: MARCH 2003
DRAWN BY: CML/KJP CHECKED BY: GFL

SCOTT LOCKWOOD PE NO. 44355

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REVISIONS	DATE	DESCRIPTION

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