Detroit Water and Sewerage Department
Central Services Facility
6425 Huber Street, Detroit, MI 48211

313-267-8000 • detroitmi.gov/DWSD

Letter of Transmittal

Date:	2-7-2025
Petition Map:	25-5

Type of Petition

- ☐ Outright Vacation
- ☐ Conversion to Easement
- ☐ Dedication
- ☑ Encroachment
- ☐ Berm Use
- ☐ Temporary Closing

Review Status

The above petition has been received and reviewed by this office. Please see below for the review status as marked.

- ☑ Approved Subject to Attached Provisions
- ☐ Not Approved
- ☐ Revise and Resubmit

Additional Comments (if applicable):

DWSD records indicate there is DWSD assets in the public right-of-way requested for encroachment. DWSD has no objections to the requested encroachment subject to the attached provision for encroachment is followed subject to DWSD requirement that any proposed utility crossing DWSD water mains and/or sewers perpendicularly must maintain a minimum of 18 inches vertical clearance. Any proposed utility running adjacent to DWSD water mains and/or sewers must maintain a minimum of 10 feet lateral clearance including any conduit and/or manholes walls. No utility is allowed to run along the top of the water main or/or sewer.

Attached is the DWSD provision related to the petition.

	Name	Title	Signature	Date
Reviewed by:	Mohammad Siddique	Engineer	Mohammad Siddique	2-7-2025
Approved by:	Syed Ali	Engineering Manager	Mohammad Siddique For Syed Ali	2-7-2025

PROVISIONS FOR ENCROACHMENT

1. By approval of this petition the Detroit Water and Sewerage Department (DWSD) does not waive any of its rights to its facilities located in the right of way, and at all time, DWSD, its agents or employees, shall have the right to enter upon the right of way to maintain, repair, alter, service, inspect, or install its facilities. All costs incident to the damaging, dismantling, demolishing, removal and replacement of structures or other improvements herein permitted and incurred in gaining access to DWSD's facilities for maintenance, repairing, alteration, servicing, or inspection by DWSD shall be borne by the petitioner. All costs associated with gaining access to DWSD's facilities, which could normally be expected had the petitioner not encroached into the right of way shall be borne by DWSD.

2. All construction performed under this petition shall not be commenced until after five (5) days written notice to DWSD. Seventy-two (72) hour notice shall also be provided in accordance with P.A. 53 1974, as amended, utilizing the MISS DIG one call system.

3. Construction under this petition is subject to inspection and approval by DWSD. The cost of such inspection shall, at the discretion of DWSD, be borne by the petitioner.

4. DWSD prohibits the use of heavy construction equipment or the storage of building material directly over or near DWSD facilities. DWSD also prohibits the use of cranes and balls or hydraulic rams for pavement removal where DWSD facilities are involved. If the water main or sewer facilities are broken or damaged as a result of any action on the part of the contractor, the contractor shall be liable for all costs incidental to the repair of such broken or damaged water main or sewer facilities. If DWSD facilities located within the street shall break or be damaged as the result of any action on the part of the petitioner, then in such event the petitioner agrees to be liable for all costs incident to the repair, replacement or relocation of such broken or damaged DWSD facilities.

5. The petitioner shall hold DWSD harmless for any damage to the encroaching device constructed or installed under this petition, which may be caused by the failure of DWSD's facilities.

6. If at any time in the future the petitioner shall request removal and / or relocation of DWSD's facilities in the street being encroached upon, the petitioner agrees to pay all costs for such removal and/or relocation.

7. Prior to construction, Easement Encroachment Permit (EEP) should be obtained and the insurance required by the EEP should not expire until after completion of the construction.

8. For any proposed work that involves DWSD water mains and/or sewers, an approval and a permit is required from DWSD before commencement of work.

9. It is DWSD's requirement that any proposed utility crossing DWSD water mains and/or sewers perpendicularly must maintain a minimum of 18 inches vertical clearance. Any proposed utility running adjacent to DWSD water mains and/or sewers must maintain a minimum of 10 feet lateral clearance including any conduit and/or manholes walls. No utility is allowed to run along the top of the water main or/or sewer.

10. It is DWSD's requirement that no encroachment has a vertical clearance of less than 16 feet from the ground surface over DWSD water mains and/or sewers.

Rev: 9/27/2023

giffels webster

January 16, 2025

Honorable Detroit City Council
C/o Detroit City Clerk
200 Coleman A. Young Municipal Center
2 Woodward Avenue
Detroit, Michigan 48226

RE: Giffels Webster - Request for an encroachment into the right-of-way of Lincoln St (60 ft. wide) between Baltimore St and Milwaukee Avenue.

Giffels Webster, 28 W. Adams, Suite 1200, Detroit, Michigan 48226 on behalf of Kiewit Power Constructors Co., 8900 Renner Blvd., Lenexa, Kansas, 66219 respectfully requests the following below grade encroachment into the City of Detroit public right-of-way:

- The proposed below grade encroachment is for the Henry Ford Health Central Energy Hub (CEH) hydronic piping. The CEH hydronic piping consists of six privately owned pipes: three insulated chilled water pipes with a 36-inch outside diameter and three insulated hot water pipes with a 30-inch outside diameter, with 1-foot spacing between each pipe. The system utilizes steel service pipes with polyurethane insulation and HDPE jacket. The proposed encroachment begins at the right-of-way line at the southwest corner of Milwaukee Ave and Lincoln St, extends south 24.5 ft and spans the full 60-foot width of Lincoln St to the east. The proposed encroachment begins 3.5' below grade and extends to 7.5' below grade.

Limits of the requested encroachments can be found in the attachment, enclosed herein. Additional documentation further detailing the proposed encroachment for the CEH hydronic piping, including a spec sheet for the pipe material, is attached.

Giffels Webster has been asked to facilitate the requested encroachments on behalf of Kiewit Power Constructors Co. If you should have any questions, please do not hesitate to contact me at 313.962.4442 or at rjones@giffelswebster.com.

Respectfully,

Ryan Jones, PE
Project Manager

6450 STERLING

1/30/2025

Wastewater Structures - GLWA

Manhole

Wastewater Mains - GLWA

GLWA Gravity Main

Transmission System Mains - GLWA

Active Water Main

Transmission System Valves - GLWA

Blowoff

Gate

Manual Air

Tapping Sleeve

Distribution System Hydrant

Distribution System Main

Active

Abandoned

Wastewater Catch Basin

Wastewater Manhole

Wastewater Fitting

Bend/Slope Change

Blind Connection

Bulkhead/Cap

Coupling

Material/Size Change

Crown/Main Point

Wastewater Lamp Hole

Wastewater GravityMain

Active

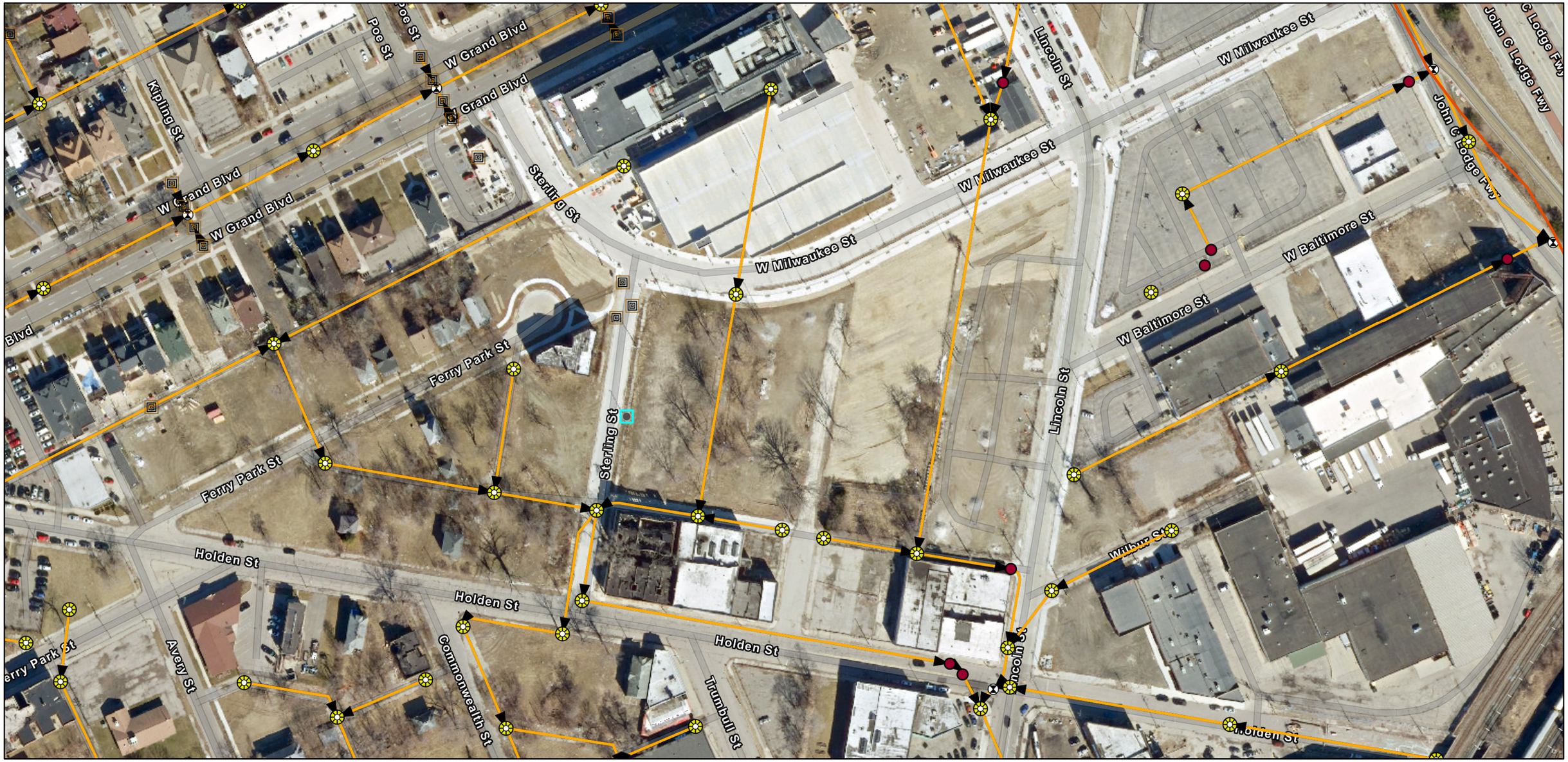
Abandoned/Inactive/Retired

1:4,514

0 0.04 0.07 0.15 mi

0 0.05 0.1 0.2 km

6450 STERLING



1/30/2025, 3:52:58 PM

Wastewater Mains - GLWA

GLWA Gravity Main

Wastewater GravityMain

Active

Abandoned/Inactive/Retired

DWSD Wastewater Flow Direction

Wastewater Lamp Hole

Wastewater Fitting

Blind Connection

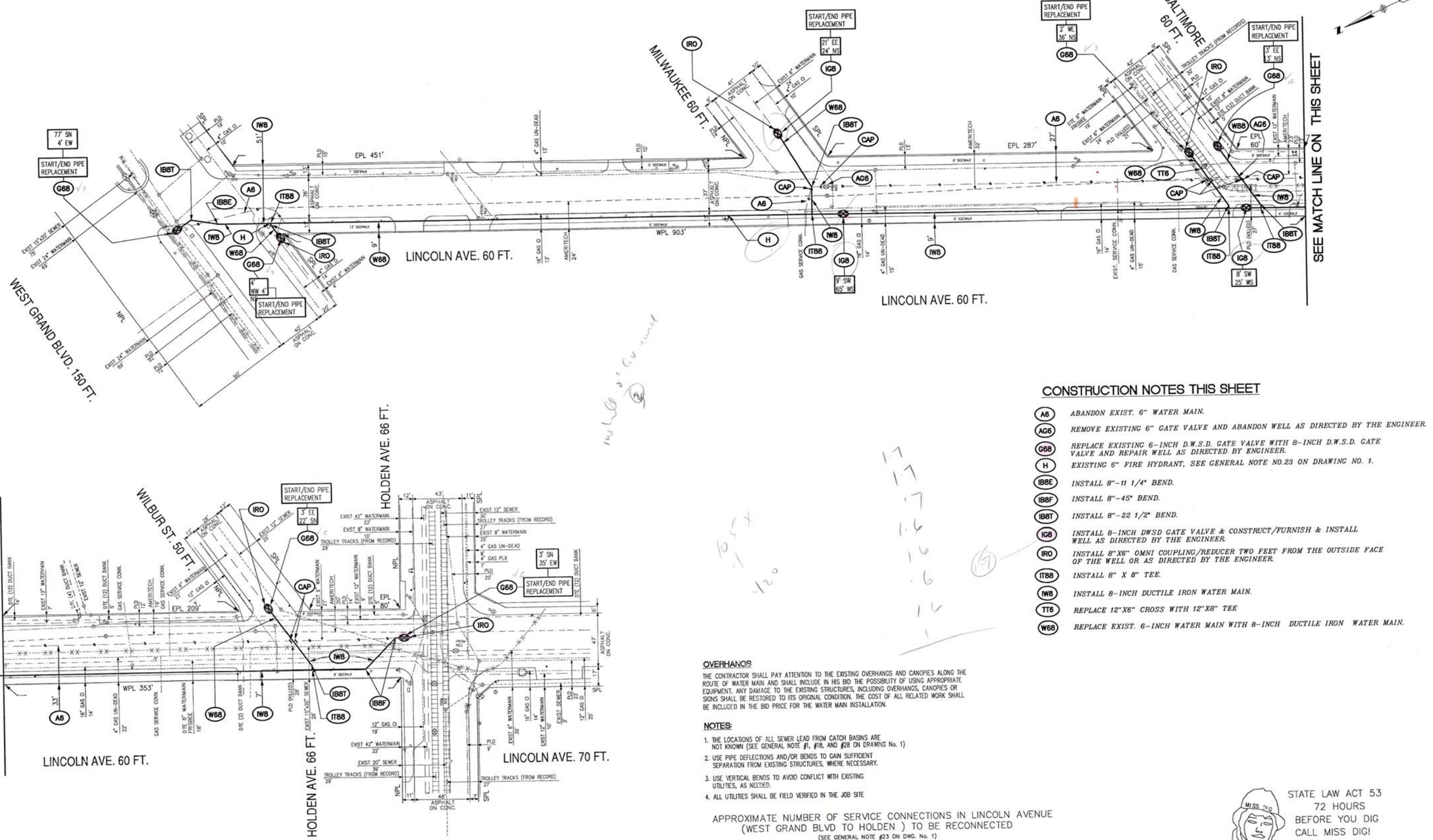
Wastewater Manhole

Wastewater Catch Basin

1:2,257

0 0.02 0.04 0.07 mi

0 0.03 0.06 0.12 km



CONSTRUCTION NOTES THIS SHEET

- (A6) *ABANDON EXIST. 6" WATER MAIN.*
- (AG6) *REMOVE EXISTING 6" GATE VALVE AND ABANDON WELL AS DIRECTED BY THE ENGINEER.*
- (G68) *REPLACE EXISTING 6-INCH D.W.S.D. GATE VALVE WITH 8-INCH D.W.S.D. GATE VALVE AND REPAIR WELL AS DIRECTED BY ENGINEER.*
- (H) *EXISTING 6" FIRE HYDRANT, SEE GENERAL NOTE NO.23 ON DRAWING NO. 1.*
- (IB8E) *INSTALL 8"-11 1/4° BEND.*
- (IB8F) *INSTALL 8"-45° BEND.*
- (IB8T) *INSTALL 8"-22 1/2° BEND.*
- (IG8) *INSTALL 8-INCH DWSD GATE VALVE & CONSTRUCT/FURNISH & INSTALL WELL AS DIRECTED BY THE ENGINEER.*
- (IRO) *INSTALL 8"X6" OMNI COUPLING/REDUCER TWO FEET FROM THE OUTSIDE FACE OF THE WELL OR AS DIRECTED BY THE ENGINEER.*
- (IT88) *INSTALL 8" X 8" TEE.*
- (IW8) *INSTALL 8-INCH DUCTILE IRON WATER MAIN.*
- (TT6) *REPLACE 12"X6" CROSS WITH 12"X6" TEE*
- (W68) *REPLACE EXIST. 6-INCH WATER MAIN WITH 8-INCH DUCTILE IRON WATER MAIN.*

OVERHANGS

THE CONTRACTOR SHALL PAY ATTENTION TO THE EXISTING OVERHANGS AND CANOPIES ALONG THE ROUTE OF WATER MAIN AND SHALL INCLUDE IN HIS BID THE POSSIBILITY OF USING APPROPRIATE EQUIPMENT. ANY DAMAGE TO THE EXISTING STRUCTURES, INCLUDING OVERHANGS, CANOPIES OR SIGNS SHALL BE RESTORED TO ITS ORIGINAL CONDITION. THE COST OF ALL RELATED WORK SHALL BE INCLUDED IN THE BID PRICE FOR THE WATER MAIN INSTALLATION.

NOTES:

1. THE LOCATIONS OF ALL SEWER LEAD FROM CATCH BASINS ARE NOT KNOWN (SEE GENERAL NOTE #1, #18, AND #28 ON DRAWING No. 1)
2. USE PIPE DEFLECTIONS AND/OR BENDS TO GAIN SUFFICIENT SEPARATION FROM EXISTING STRUCTURES, WHERE NECESSARY.
3. USE VERTICAL BENDS TO AVOID CONFLICT WITH EXISTING UTILITIES, AS NEEDED.
4. ALL UTILITIES SHALL BE FIELD VERIFIED IN THE JOB SITE

APPROXIMATE NUMBER OF SERVICE CONNECTIONS IN LINCOLN AVENUE (WEST GRAND BLVD TO HOLDEN) TO BE RECONNECTED

(SEE GENERAL NOTE #23 ON DWG. No. 1)

	COPPER & LARGE SERVICES TO BE RECONNECTED	LEAD SERVICE TO BE REPLACED TO PROPERTY LINE WITH COPPER SERVICE
EAST	NONE	3-5/8"
WEST	1-2"	1-5/8", 1-3/4"

STATE LAW ACT 53
72 HOURS
BEFORE YOU DIG
CALL MISS DIG!
TOLL FREE
800-482-7171

F				
E				
D				
C				
B				
A	DESCRIPTION	CHECKED	APPROVED	DATE
	REVISIONS			

DESIGNED BY *S. RIFAI*
DRAWN BY *T. BARKHO*
CHECKED BY *J. MEHTA*
PROJECT MANAGER *J. MEHTA*

STATE OF MICHIGAN
TIMOTHY W. ROE
ENGINEER
No. 27223
REGISTERED PROFESSIONAL ENGINEER

WATER SYSTEM IMPROVEMENTS
VARIOUS STREETS THROUGHOUT THE CITY

LINCOLN AVENUE
BETWEEN WEST GRAND BLVD AND HOLDEN

SCALE: 1" = 40'
DATE: FEBRUARY 2012

CITY OF DETROIT
WATER AND SEWERAGE DEPARTMENT
ENGINEERING DIVISION

NTH Consultants, Ltd.
Infrastructure Engineering and Environmental Services

SIGMA CONSULTING ENGINEERS
Sigma Associates, Inc.
535 Griswold Street
Suite 1700
Detroit, MI 48226
Tel: 313.963.9700 Fax: 313.963.7626

SECTION MAP	TOWN	RANGE	SECTION	PORTION CODE
19 L				

FAMIS NO. (DESIGN) (CONST)

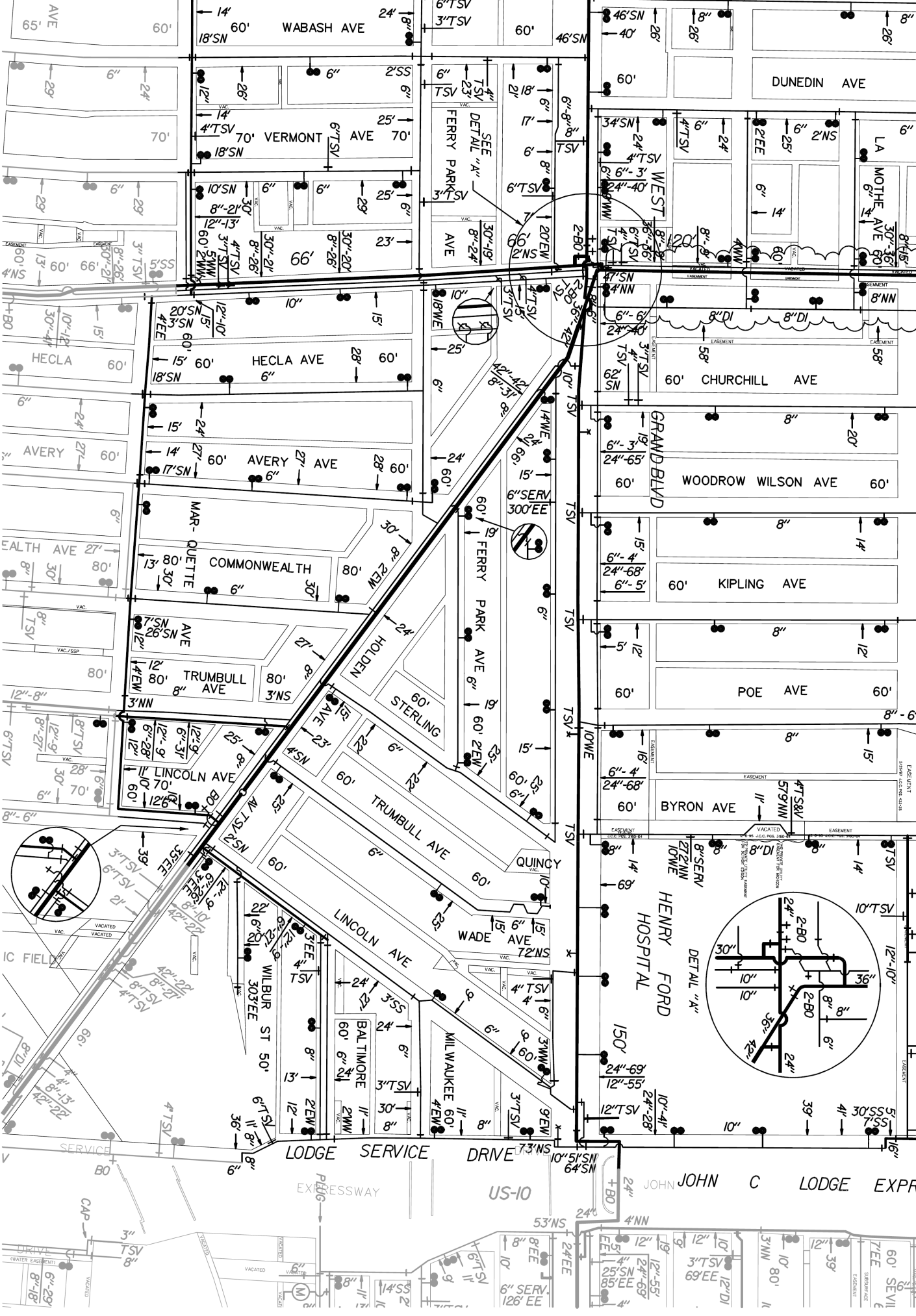
M.D.P.H./D.N.R PERMIT NO.
REF. NO. CS-1372: TASK #39
CONTRACT NO.
FILE NO.
DRAWING NO. 13 OF 27

CS1372-C13-R Feb 21, 2012

SIGMA G:\PROJECTS\1279\CS\372-C13-R.DWG Tue., 21 Feb. 2012 11:34:25AM BY RMCKAY

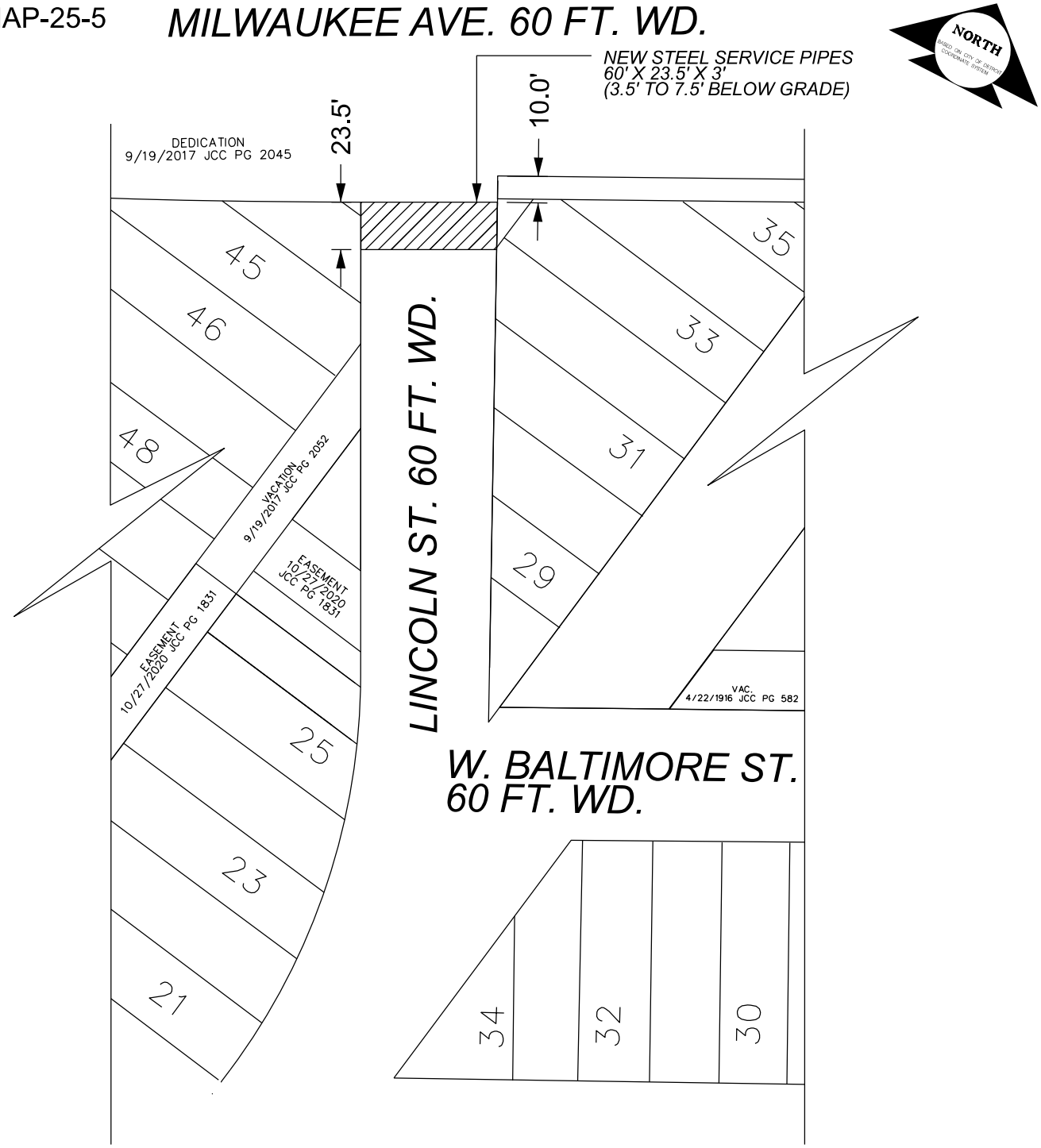
Last Saving of: Fri, 17 Feb 2012 2:53:51 pm by: RMCKAY


GRAND BLVD WEST
WEST GRAND BLVD
18" PIPE
20" PIPE
24" PIPE
12" PIPE
10" PIPE
1912
(PRV)
*2358
15"x20"
1885
EASEMENT 12-6-95 J.C.C. PGS. 3160-64
BASE MAPS DON'T MATCH
DWG*1969
12" PIPE 1866
JOHN
2'-8"x4'-0"
BUILT PRIVATELY UNDER DPW SUPERVISION 1904
*1547-1904
150'
FR. SECT. 36 T.1S. R.11E.
LOTHROP
DUFFIELD
ROLL 6890
SEWER *1580
1905
FERRY PARK AVE 60'
R/W *211
12" PIPE
PARK AVE
*1540-1904
12" PIPE *365-1892
STERLING AVE
*1497-1904
SEWER *2294 ROLL 7604 1912
TRUMBULL AVE
PSF 1913
PSF 1919
PSF 1924
WADE
*2101 PVT 10" PIPE 1910 AVE
WILLIAM
CHOPE'S SUB'N
*1742-1906
LINCOLN AVE 60'
DPW 1949
PSF 1902
15'-6" CYL
2'-0"x3'-0"
PSF 1922
12" PIPE
*629 1894
PSF 1925
PSF 1951 8" CONN
MILWAUKEE AVE 60'
PSF PSF PSF PSF PSF
1906 1909 1913 1917 1916
MORAN & MOROSS SUB'N
WEBER'S SUB'N
MILWAUKEE
24" PIPE 1952
1887
HECLA AVE
AVERY AVE
FORDYCE'S SUB'N
BLK. C
R-324 1892
R-3223 1894
15" PIPE - ROLL 3223 - 12" PIPE
COMMONWEALTH AVE
24" CR *4253 1925
24" CR
15"x20" 1888
VANHUSAN'S SUB'N
PRIVATE LINCOLN AVE
15"x20" 1888
L.E. MAIRE'S SUB'N
BALTIMORE AVE 60'
*1009-1898
BLK. 6
LOT A. 1FT.WD.
LOT C. 1FT.WD.
BALTIMORE
EUGENE
ROBINSON'S
12" PIPE 1894
15" PIPE
ROLL 2844
WILBUR ST 50'
HOLDEN AVE
20" PIPE 1904
18" PIPE 1904
MH DPW 1958
36" DMH
16.7' 18" PIPE 10.0'
*7200 1967
TRUMBULL AVE
R8464
10" PIPE
*5192 DPW 1928
15" PIPE
10" PIPE
R1876
MARQUETTE
MAR-QUETTE AVE
6'-3" CYL
PSF 1909
*3773-1923
28.0' DWG *442
18" PIPE DWG *422
18" CR 1923 DPW *3773
R3223 *3773 DPW 1923
3'-0"x4'-6"
DPW 1957
12" PIPE *247
ASSESSED OF LOTS 22 & 23
12" PIPE 1892
ASSD
110'
SUB'N OF THE LABROSSE FARM
MISSING RR ROW FROM BASE MAP
PSF 1907
PSF 1910
3'-6"x3'-4"
EXPRESSWAY
LODGE DRIVE
SERVICE
1966
CYL
15'-6"
PSF 1920
ASSD
15" PIPE 66'
*2132 - 1910 DPW
3'-0"x4'-0"
36"
R8257
15"x20"
GRAND
NEW MICH
DEWEY
VACATED
DAVENPORT'S SUB'N
10" PIPE
10097
15"x20" PRV
ROLL 6659
ROLL 3090
R-395 1895 12" PIPE
*5109 - 1928
12" PIPE
LINCOLN AVE
R1876 1893
1888
1887
PSF 1891
PSF 1913
PSF 1898
PSF 1913
PSF 1896
PSF 4-19-46 12" CONN
DPW 1963
EXCEPTED FROM PLAT
P.C. 248
P.C. 246
P.C. 24
P.C. 23
P.C. 247


WABASH AVE
VERMONT AVE
FERRY PARK AVE
DUNEDIN AVE
WEST GRAND BLVD
CHURCHILL AVE
HECLA AVE
AVERY AVE
MARQUETTE
COMMONWEALTH
WOODROW WILSON AVE
KIPLING AVE
POE AVE
BYRON AVE
TRUMBULL AVE
LINCOLN AVE
HOLDEN AVE
STERLING
QUINCY
WADE AVE
WILBUR ST
BALTIMORE
MILWAUKEE
HENRY FORD HOSPITAL
DETAIL "A"
SEE DETAIL "A"
LODGE SERVICE DRIVE
JOHN C LODGE EXPR
EXPRESSWAY
US-10

MAP-25-5

MILWAUKEE AVE. 60 FT. WD.



- REQUEST ENCROACHMENT
(For New Steel Service Pipes)

(FOR OFFICE USE ONLY)

CARTO 31 D

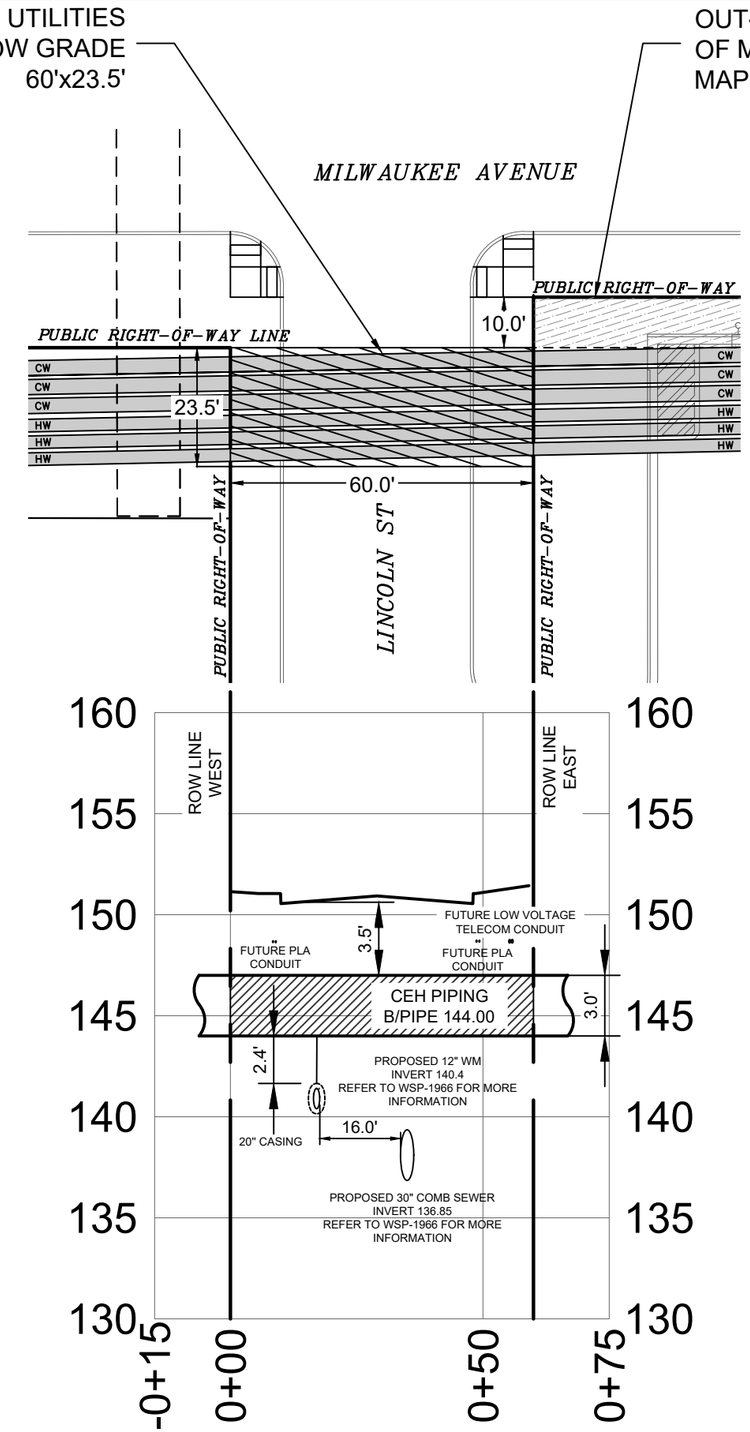
B					
A					
DESCRIPTION		DRWN	CHKD	APPD	DATE
REVISIONS					
DRAWN BY AP		CHECKED LC / TS			
DATE 01-17-2025		APPROVED GE			

REQUEST ENCROACHMENT
INTO LINCOLN ST. 60 FT. WD.
BETWEEN
MILWAUKEE AVE. AND W. BALTIMORE ST.

CITY OF DETROIT
CITY ENGINEERING DIVISION
SURVEY BUREAU

JOB NO. 25-5

DRWG. NO.



LEGEND

BELOW GRADE ENCROACHMENT

PREVIOUSLY APPROVED OUT-RIGHT VACATION ENCROACHMENT
MAP-23-149, X2024-168

STEEL SERVICE PIPES

PROJECT INFORMATION

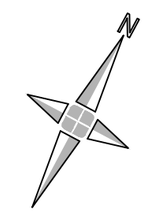
20203.19D CENTRAL ENERGY HUB (CEH)

THIS PROJECT LOCATION IS BOUND BY WEST GRAND BLVD, SOUTHBOUND JOHN C LODGE SERVICE DRIVE, AND HOLDEN ST.

THIS EXHIBIT INCLUDES A BELOW GRADE ENCROACHMENT FOR THE CEH HOT AND CHILLED STEEL SERVICE PIPES WITH POLYURETHANE INSULATION AND HDPE JACKET.

Encroachment L x W x D:

60.0' x 23.5' x 3.0'



SCALE: 1" = 30'

giffels webster
Engineers
Surveyors
Planners
Landscape Architects
28 West Adams Road
Suite 1200
Detroit, MI 48226
p (313) 962-4442
f (313) 962-5068
www.giffelswebster.com

Executive:	MM
Manager:	RMJ
Designer:	JH/US

811 Know what's below. Call before you dig.

DATE:	ISSUE:
2025-01-16	Petition

Developed For:
KIEWIT POWER CONSTRUCTORS
8900 RENNER BLVD
LENEXA, KANSAS, 66219

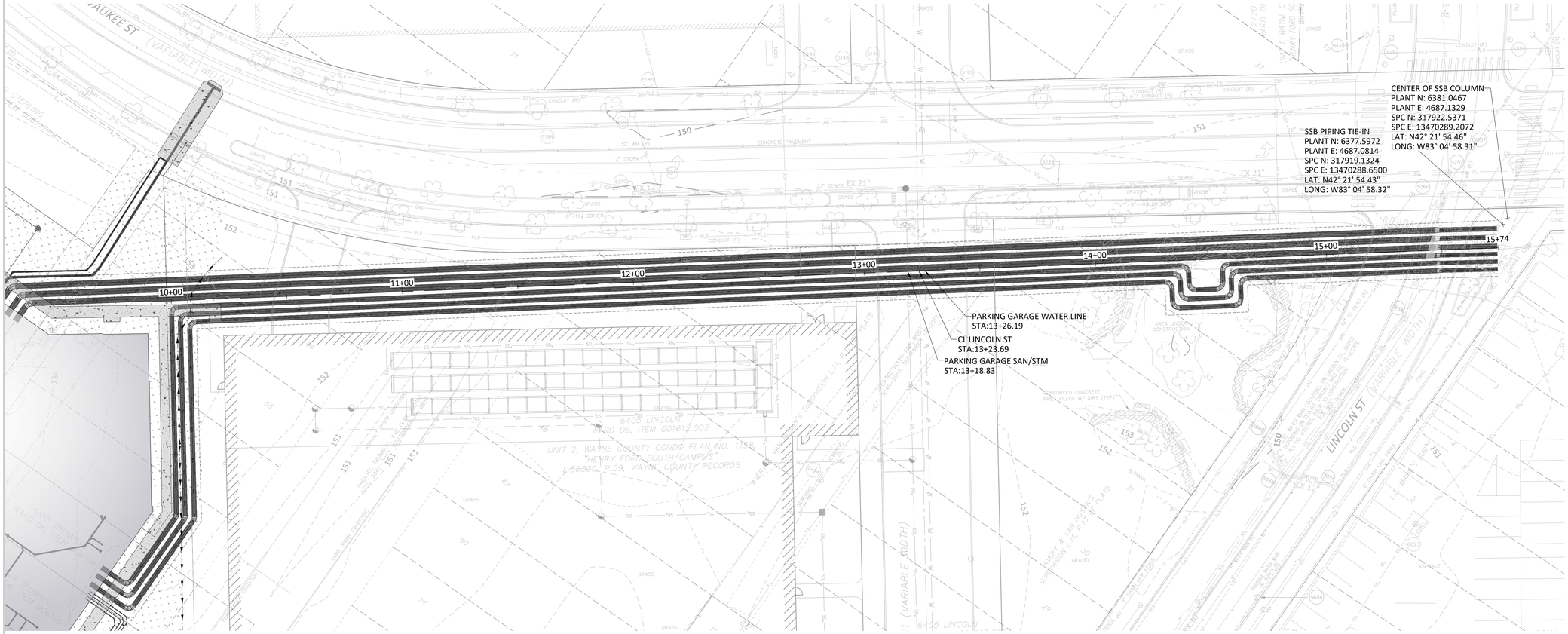
EXHIBIT

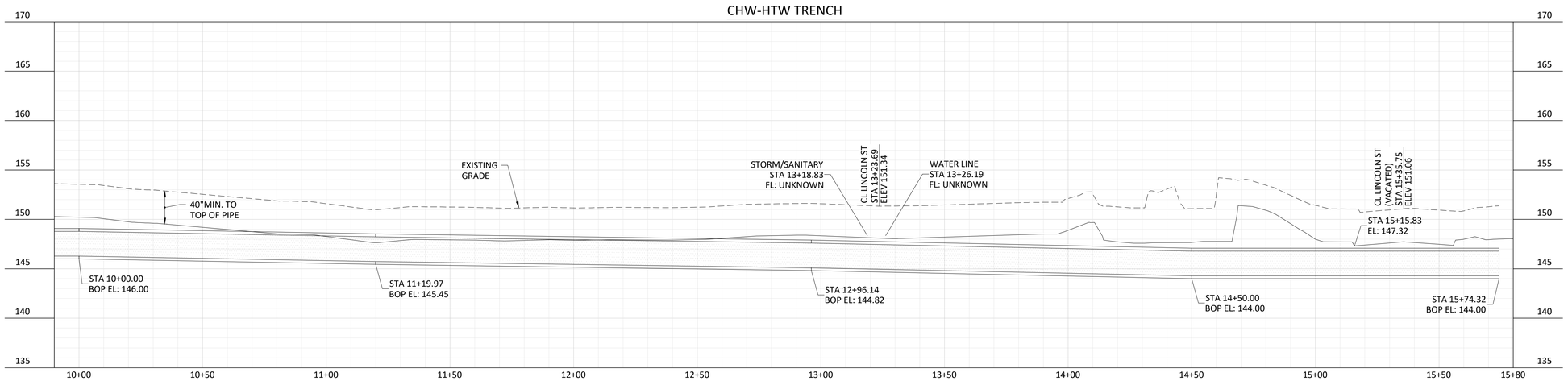
CEH PIPING ENCROACHMENT PACKAGE

CITY OF DETROIT
WAYNE COUNTY
MICHIGAN

Date:	2025-01-16
Scale:	1"=30'
Sheet:	A
Project:	20203.19D

V:\20203.19D HFH Central Energy Hub\Design\CAD\Work Sheets\CEH Piping Encroachment Package.dwg





- PRELIMINARY -
NOT FOR CONSTRUCTION

REV	DESIGN BY	CHECKED BY	DATE
C	ISSUED FOR REVIEW		
	D. LEWIS	R. JOHNSON	04-25-24
B	ISSUED FOR REVIEW		
	D. LEWIS	R. JOHNSON	04-09-24
A	ISSUED FOR REVIEW		
	D. LEWIS	R. JOHNSON	04-08-24

HENRY FORD HEALTH
SOUTH CAMPUS CENTRAL ENERGY HUB

HENRY FORD HEALTH ENERGY PARTNERS

Kiewit

CW-HW TRENCH PLAN AND PROFILE

ENGINEER/DESIGN ORIGINATOR	D. LEWIS
LEAD ENG	R. JOHNSON
ENG MGR	J. HEALD
PROJ MGR	R. McNIFF

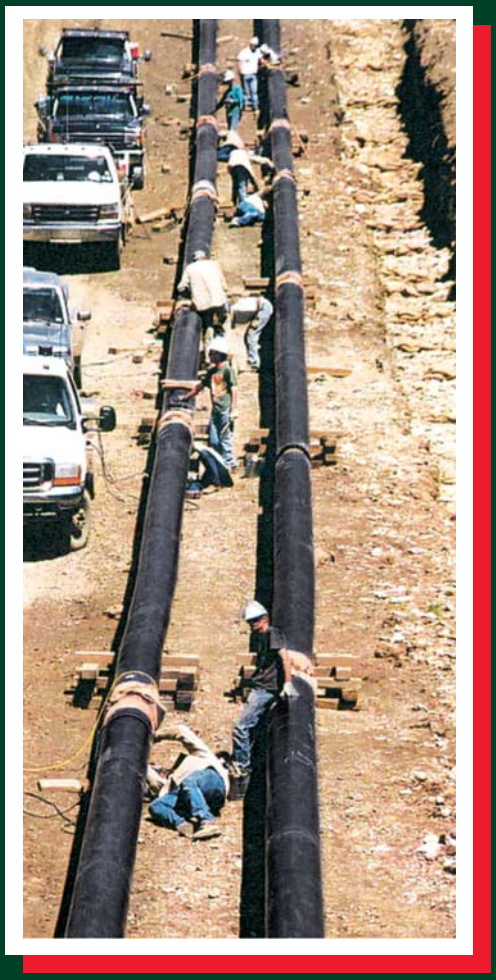
DRAWING NUMBER

20049484-SKC-111

XTRU-THERM®

Polyethylene Jacketed Polyurethane Insulated Piping System

The most advanced insulated piping system for the distribution of hot and cold fluids.



PERMA-PIPE®

XTRU-THERM APPLICATIONS

District Heating & Cooling
Domestic Hot Water Systems
Condensate Return
Chilled Water Distribution
Cryogenic Piping
Process Fluid Piping
Geothermal Collection & Distribution
Waste Heat Recovery
Solar Collection & Distribution
Fuel & Heavy Oil Transport

XTRU-THERM insulation prior to the application of the seamless HDPE jacket

SEAMLESS EXTRUDED HDPE JACKET

PERMA-PIPE's extrusion process produces a high strength, seamless, high density polyethylene (HDPE) jacket over the insulation for maximum insulation protection from the environment.

Elbow insulation jackets are constructed of seamless, molded HDPE. Tee insulation jackets are extrusion welded construction.

PERMA-PIPE applies this high strength HDPE jacket to systems having an outside insulation diameter as large as 42 inches. The XTRU-THERM jacket is an excellent choice for both underground and above ground installations.

HIGH QUALITY INSULATION

The XTRU-THERM insulation is a high thermal efficient polyurethane foam insulation, suitable for medium temperature to cryogenic applications.

In contrast to foam injected insulated piping systems, the XTRU-THERM spray process assures void-free insulation. By applying insulation before the jacket is applied, a complete visual inspection of the insulation is performed, assuring void-free insulation and therefore, providing maximum thermal efficiency.

SERVICE PIPE MATERIALS FOR ANY APPLICATION

Steel, stainless steel, copper, ductile iron and plastics can all be supplied with the XTRU-THERM system. These materials can be supplied in a wide range of sizes, with the exact insulation thickness to meet the needs of your application.

FULLY ENGINEERED

The XTRU-THERM piping system is completely engineered by PERMA-PIPE's experienced engineering staff. Straight lengths, elbows, tees, anchors and end seals are all preengineered components.

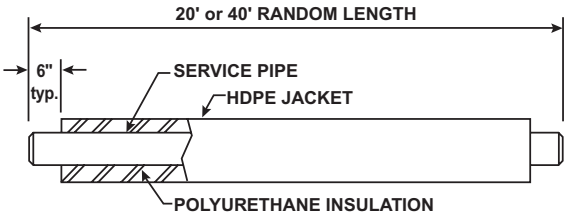
Thermal stress and displacement, heat loss/gain, soil loading calculations and layout drawings can be provided. The XTRU-THERM system is engineered to reduce field costs by providing factory fabricated fittings and components to reduce field connections, as compared to the field kit method.

FULLY BONDED SYSTEM

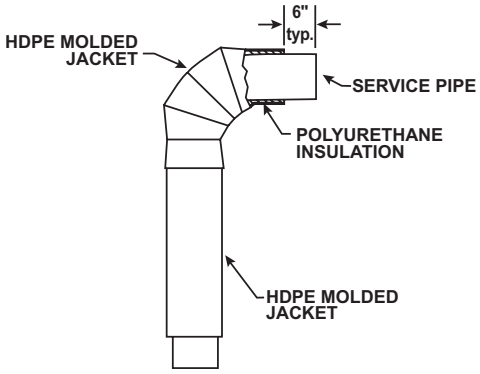
PERMA-PIPE treats the HDPE jacket so that it bonds to the polyurethane foam insulation. This bonding, along with the insulation bond to the service pipe, results in a completely bonded system. All components expand and contract as a system. There are no gaps for water to travel through, which can degrade the insulation or service pipe.

XTRU-THERM SYSTEM FEATURES

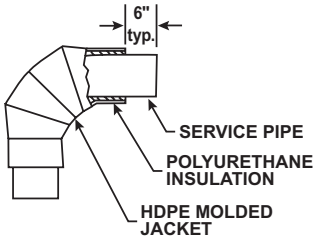
Seamless Extruded HDPE Jacket
Low Thermal Conductivity Polyurethane Insulation
Insulation Thickness to Meet Application Needs
Fully Bonded Jacket / Insulation / Service Pipe System
Available in a Variety of Service Pipe Materials
Stocked in Common Sizes and Materials for Quick Delivery
Preengineered Components



STANDARD STRAIGHT LENGTH



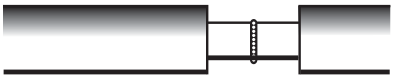
90° ELBOW WITH EXTENDED LEG FOR EXPANSION LOOPS



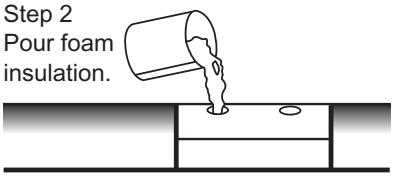
STANDARD 90° ELBOW FOR DIRECTION CHANGES

FIELD JOINT CLOSURE

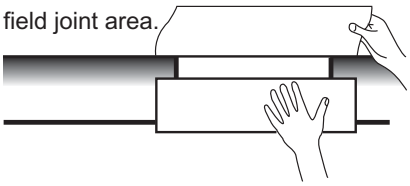
Step 1
Complete service pipe joint.



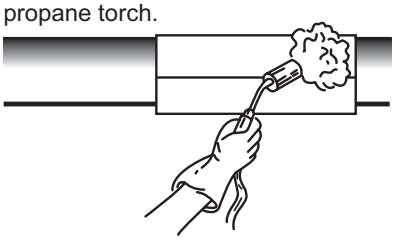
Step 2
Pour foam insulation.



Step 3
Wrap shrink sleeve around field joint area.



Step 4
Shrink sleeve using propane torch.



RECOMMENDED XTRU-THERM INSULATION THICKNESS

Pipe Size (in)	Minimum Insulation Thickness (in)	
	Chilled Water	Hot Water
1 to 8	1	1
10 to 12	1	1.5
14 to 36	1.5	2

TYPICAL PROPERTIES OF POLYURETHANE INSULATION AND HDPE JACKET

Polyurethane Insulation		HDPE Jacket Material	
Density	> 2 lb/ft^3	Density	≥ 58.7 lb/ft^3
Thermal Conductivity	≤ 0.16 Btu-in/hr-ft^2-°F	Tensile Strength	≥ 3,200 psi
Compressive Strength	> 30 psi	Elongation	> 500%
Closed Cell Content	≥ 90%	Hardness	> 60 Shore D
		Color	Black (2% carbon black for UV / weather resistance)

SPECIFICATION GUIDE

GENERAL

All underground and above ground chilled water, condensate return and hot water lines shall be XTRU-THERM, as manufactured by PERMA-PIPE. All straight sections, fittings, anchors and other accessories shall be factory fabricated, insulated and jacketed. Field insulation of fittings shall not be allowed. The piping system layout shall be analyzed by the piping system manufacturer, to determine the stresses and displacements of the service pipe. The piping system design and manufacture shall be in strict conformance with ASME B31.1, latest edition. Installation of the piping system shall be in accordance with the manufacturerís instructions. Factory trained field technical assistance shall be provided for critical periods of installation, unloading, field joint instruction and testing.

SERVICE PIPE*

The service pipe shall be standard weight ASTM A53 Gr. B, ERW carbon steel, except for condensate return lines, which shall be Schedule 80. All joints shall be butt welded for 2.5 inches and larger, and socket welded for 2 inches and smaller. Where possible, straight sections shall be supplied in 40 foot random lengths, with piping exposed at each end for field joint fabrication.

ACCESSORIES

Elbows, tees, reducers, anchors, field joints and end seals shall be designed and factory fabricated to prevent the ingress of moisture into the system.

INSULATION

The service pipe insulation shall be polyurethane foam with 2 lb/ft^3 minimum density, 90% minimum closed cell content and maximum initial thermal conductivity of 0.18 Btu-in/hr-ft^2- F. The insulation shall completely fill the annular space between the service pipe and jacket and shall be bonded to both. Systems using open cell insulation or a nonbonded design shall not be allowed. The insulation shall be provided to the minimum thickness specified below:

Pipe Size (in)	Minimum Insulation Thickness (in)	
	Chilled Water	Hot Water
1 to 8	1	1
10 to 12	1	1.5
14 to 36	1.5	2

INSULATION JACKET

The outer protective insulation jacket shall be seamless high density polyethylene (HDPE) in accordance with ASTM D3350 minimum cell classification PE 345444 C. PVC or tape materials are not allowed. The minimum thickness of the HDPE jacket shall be as follows:

Jacket OD (in)	Minimum Jacket Thickness (in)
OD ≤ 12	0.080
12 < OD ≤ 24	0.120
OD > 24	0.160

FITTINGS

All fittings shall be factory prefabricated and pre-insulated. Straight tangent lengths shall be added to all ends, so that all field joints are at straight sections of pipe. Elbow insulation jackets shall be molded HDPE. Tee insulation jackets shall be extrusion welded or butt fusion welded HDPE. Gluing, taping or hot air welding of the insulation jacket shall not be allowed.

FIELD JOINTS

The service pipe shall be hydrostatically tested to 150 psig or 1.5 times the design pressure whichever is greater. Insulation shall then be poured in place into the field joint area. All field applied insulation shall be placed only in straight sections of pipe. Field insulation of fittings is not acceptable. The installer shall seal the field joint area with a heat shrinkable adhesive backed sleeve. Backfilling shall not begin until the heat shrink sleeve has cooled. All insulation and jacketing materials for the field joint shall be furnished by PERMA-PIPE.

BACKFILL

A 4 inch layer of sand or fine gravel shall be placed and tamped in the trench, to provide a uniform bedding for the pipe. The entire trench width shall be evenly backfilled with a similar material as the bedding in 6 inch compacted layers to a minimum height of 6 inches above the top of the insulated pipe. The remaining trench shall be evenly and continuously backfilled and compacted in uniform layers with suitable excavated soil.

**For alternate service pipe selections, contact PERMA-PIPE for specification details.*

PERMA-PIPE®

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