DESIGN AND CONSTRUCTION STANDARD

HEAT DISTRIBUTION SYSTEM

2015

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DOYON UTILITIES

Heat Distribution System Design and Construction Standard

Revisions between 2014 Standard and 2015 Standard

Item or Location	Description of Revision
SPECIFICATIONS	
Cover Sheet	Date "2014" ***changed to*** "2015"
All pages after Cover Sheet	Date in left-side footer: "2014" ***changed to*** "2015"
SECTION 3 – SPECIFIC REQUIREMENTS	
3.1 REQUIREMENTS COMMON TO UTILIDOR AND DIRECT-BURY SYSTEMS	
3.1.1 Materials	***Removed*** extra "in"
3.1.1.1. Condensate	***Inserted*** "Class 3000" for condensate fittings 1/2" thru 2"
3.1.1.1.L. 3rd bullet	***Inserted*** "A 0-150 psig" at beginning of sentence
3.1.8 Steam Traps	"bronze Class 300" ***changed to*** "forged carbon steel Class 150"
3.2 UTILIDOR & VAULT SYSTEM REQUIREMENTS	
3.2.1.B Design and Construction	"R-11" change to "R-10" to match 2" XEPS in Dwg HDS-303
3.2.1.P Manholes	Fifth bullet "12" ***changed to*** "16"
3.2.1.P Manholes	Seventh bullet ***changed*** size of hatch to match HDS-302. ***Added*** sentence DU furnished lids. ***Added*** sentence about DU site manager input on hatch swing direction.
3.4 INSTALLATION REQUIREMENTS	
3.4.3 Separation	"2', center-to-center" ***changed to*** "2' clear, outside-to-outside"
3.4.5 Trench Bedding and Pipe Cover	"4" layer of sand" changed to "6" layer of sand"
3.5 INSPECTION REQUIREMENTS	
3.5.2. Welding Inspection	"ASME/ANSI B31.1" ***changed to*** "ASME B31.1"
INDEX OF DRAWINGS	***Updated*** drawing dates
Dwg. HDS-101	***Removed*** geo-textile fabric, gravel, and perforated drainage tile from 1/HDS-101; Added "when possible" to 2/HDS-101
Dwg. HDS-102	***Removed*** geo-textile fabric and gravel

Item or Location	Description of Revision
Dwg. HDS-201	***Changed*** diameter of dripleg to “D or 6” on 1/HDS-201; material list items 4 and 5 weldolets ***changed to*** sockolets
Dwg. HDS-202	***Changed*** trap assembly piping to ¾”; ***changed*** blowdown piping to 1-1/2”; ***updated*** material list; material list sockolets “schedule 80” ***changed to*** “Class 3000”; ***added*** 4/HDS-202 to include formerly used long radius elbow connection to condensate return main ***changed*** "nust" to "must" in Notes
Dwg HDS-205	***Added*** "* Use stainless steel for floor anchors or wall anchors below 6" AFF"
Dwg. HDS-208	***Changed*** material list in order to group carbon steel and stainless steel parts together to make less confusing ***Changed*** Material List Item 14 from "3" Stainless Steel Schedule 10S Pipe" to "Carbon Steel Schedule 80 Condensate Return Line" ***Added*** "Note 6. Use dielectric union to connect stainless and carbon steel piping."
Dwg. HDS-210	***Added*** note to clarify that discharge of the heat trace connects to condensate return via a steam trap assembly
Dwg. HDS-301	***Removed*** manhole riser height above grade (covered elsewhere); ***clarified*** vent height requirements
Dwg. HDS-302	***Moved*** notes that were out of the viewport; ***added*** “KNURLED” to the ladder rung note
Dwg. HDS-303	***Changed*** compaction requirements to be more attainable, but still meet structural needs ***Changed*** Note 4 to identify "Utilidors, access vaults and manholes shall be of watertight construction. All sidewall and top surfaces of new utilidors, access vaults and manholes shall be coated with waterproofing material; Grace bituthene or approved equal."
Dwg. HDS-306	In detail 3/HDS-306 3” insulation thickness ***changed to*** 2” insulation thickness
Dwg. HDS-307	***Changed*** typo in note 3
Dwg. HDS-308	***Changed*** compaction requirements to match HDS-303; ***changed*** excavation lines to angles rather than vertical trench walls

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INTRODUCTION

Doyon Utilities (DU) prepared this Design and Construction Standard as information for the U.S. Army, and to serve as a guide for the design, construction and inspection requirements for the distribution and service lines for the referenced utility system. This Standard supplements DU's rates, charges, rules and regulations filed with the Regulatory Commission of Alaska (RCA).

This Standard is modified from time to time, generally on an annual basis during the first quarter of the year. When substantive revisions occur DU will notify the Army. This Standard will be enforced. It is the responsibility of anyone using or referencing this Standard to ensure they have the most recent version. To confirm that you have the most recent version check the DU website (www.doyonutilities.com) or contact the DU office.

DU will be responsible for planning, designing and constructing all water, wastewater, natural gas, heat, and electrical distribution and service lines owned, operated and maintained by DU, including utility system extensions and/or improvements for new government facilities. This will require close cooperation and DU involvement in the facility planning process. Without this coordination facilities constructed will have no utility service.

If you have any questions after reading this Standard please contact the DU office for clarification.

DESIGN AND CONSTRUCTION STANDARD

HEAT DISTRIBUTION SYSTEM

SECTION 1 - SCOPE

This Standard pertains to all Heat Distribution System (HDS) distribution mains and service lines owned, operated and maintained by Doyon Utilities (DU).

HDS distribution mains and service lines consist of a steam supply line and a condensate return line. Condensate return lines may be pumped (pressurized) or gravity drained. Gravity drained condensate return piping design shall ensure that hot condensate from a trap assembly is not injected into a flooded condensate return pipe.

1.1. POINT OF DEMARCATION (POD)

DU ownership of and responsibility for utility service connections extends to the Utility-Customer Point of Demarcation (POD), defined for Heat Distribution System (HDS) as follows:

1.1.1. For Condensate Service lines the POD shall be the first shutoff valve inside the facility on the condensate return line.

1.1.2. Steam Service:

A. For facilities with no meter by-pass line the POD shall be the first shutoff valve inside the facility downstream from the steam meter.

B. For facilities with a meter by-pass line the POD shall be the first shutoff valve downstream from the tee fitting on the customer side of the meter where the by-pass line joins the meter line.

SECTION 2 - GENERAL INFORMATION

2.1. SYSTEM OPERATING PARAMETERS

2.1.1. Fort Wainwright, Alaska (FWA)

A. The FWA Central Heat and Power Plant (CHPP) provides steam to the HDS supply manifold at approximately 80-to-85 PSIG and superheated to approximately 425-to-430°F. Steam distribution mains and service lines within close proximity of the CHPP will carry superheated steam at up to 85 PSIG and 458°F. In the event that CHPP turbines drop out the steam may be superheated to 650°F. This superheated steam can affect all distribution mains and service lines within an approximate 1 mile radius of the CHPP (see drawing HDS-001). Beyond a 1 mile radius from the CHPP it can generally be assumed that the HDS system provides steam in a saturated condition at approximately 70-to-80 PSIG and approximately 315-to-325°F. Steam pressures and temperatures drop away with distance from the CHPP. Consult with DU

regarding approximate steam pressure and temperature at a given location within the system.

B. Condensate is normally returned at 10-to-25 PSIG and approximately 170°F.

NOTE: A portion of the existing HDS on North Post operates at 10 PSIG. Designers and Contractors are cautioned to confirm steam supply conditions to North Post buildings. New buildings shall not be connected to the 10 PSIG steam system. When renovating an existing building connected to the 10 PSIG system the building must be disconnected from 10 PSIG system and connected to the 80 PSIG system.

2.1.2. Fort Greely, Alaska (FGA)

A. The FGA Central Heat Plant (CHP) provides steam to the FGA HDS in a saturated condition at approximately 60 PSIG and 300°F. Steam pressures and temperatures drop away with distance from the CHP. Consult with DU regarding the approximate steam pressure and temperature at a given location within the system.

B. Condensate is returned at 10-to-14 PSIG and approximately 160°F.

2.2. SYSTEM DESIGN PARAMETERS

2.2.1. Steam

The design pressure and temperature of all new HDS steam piping and associated equipment shall be 150 PSIG and 460°F.

2.2.2. Condensate

The design pressure and temperature of all new HDS condensate piping and associated equipment shall be 50 PSIG and 250°F.

2.3. SERVICE LINE SIZE

The sizes of the HDS steam supply and condensate return service lines depends on a variety of factors, including the quantity of energy needed and the intended purpose. The Customer or the Customer's Designer shall be responsible to determine the quantity of energy needed, in terms of both peak and total annual energy demand. DU will determine the service line size required based on energy demand information provided by the Customer or the Customer's Designer.

2.4. SYSTEM CONTAMINATION

The HDS at FWA and FGA are closed systems that operate on the principal that no material leaves or enters the distribution mains or service lines. The sole product is the energy that is delivered to the Customer. Cross connections to wells, building heating systems, tanks where mixtures of chemicals are stored, or any connections which can allow entry of untreated or

contaminated water, or any other fluid, into the HDS are strictly prohibited. Design or construction errors that allow foreign substances to be introduced into the HDS distribution mains or service lines can contaminate the entire system. Losses of thousands of dollars per hour can result from contamination because of the costs incurred in replacing ruined system fluid. DU reserves the right to (a) seek compensation from Designers or Contractors responsible for design or construction errors that cause system contamination, and (b) refuse HDS service to Customers or facilities that cause contamination and require repairs or corrections prior to resuming service.

2.5. METER INSTALLATION

DU will provide the HDS meter and automatic meter reading (AMR) equipment. Unless specific arrangements have been made, DU or DU contractor personnel will install this equipment.

SECTION 3 - SPECIFIC REQUIREMENTS

3.1. REQUIREMENTS COMMON TO UTILIDOR AND DIRECT-BURY SYSTEMS

3.1.1. Materials

A. All materials and equipment specified herein apply to Heat Distribution System steam and condensate piping, valves, fittings, and appurtenances installed in utilidors, manholes, vaults and building mechanical rooms, and to the internal "service" or "carrier" pipe in direct bury applications.

B. An attempt has been made to name at least two, and in most cases three manufacturers wherever products are specified. Where only one name is listed, it has been done for a specific reason. Proposers shall base their proposal on the product(s) listed. All materials and equipment are subject to approval by Doyon Utilities, LLC, and the Engineer of Record.

C. All materials and equipment shall: (a) conform to all applicable standards, codes, regulations and ordinances; (b) be in accordance with the specifications and performance characteristics listed herein; (c) be standard products of one of the approved manufacturers; and, (d) be new and in perfect condition.

Steam		
Item	**Size (inches)**	**Description**
Pipe	$^1/_2$ thru 2	Carbon steel, Schedule 40, ASTM A106, Type S, Grade B, plain ends, ASME B36.10M, socket weld joints
	3 thru 24	Carbon steel, Schedule 40, ASTM A106, Type S, Grade B, beveled ends, ASME B36.10M, butt weld joints

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Steam		
Item	**Size (inches)**	**Description**
Fittings	1/2 thru 2	Forged carbon steel, ASTM A105, long radius, ANSI Class 300, socket weld ends, ASME B16.11
	3 thru 24	Carbon steel, Schedule 40, ASTM A234, Grade WPB, long radius, ASME B16.9, butt weld ends
Nipples	1/2 thru 2	Threaded pipe: Carbon steel, Schedule 80, ASTM A106, Type S, Grade B, plain ends Welded pipe: Carbon steel, Schedule 40, ASTM A106, Type S, Grade B, plain ends
Unions	1/2 thru 2	Forged carbon steel, ASTM A105, integral seats, ANSI Class 300, socket weld ends, ASME B16.11
Flanges	1/2 thru 2	Forged carbon steel, ASTM A105, socket weld, ANSI Class 150 RF (raised face), ASME B16.5
	3 thru 24	Forged carbon steel, standard bore, ASTM A105, weld neck, ANSI Class 150 RF (raised face), ASME B16.5
Flange Bolts	Stud Bolts	Alloy steel, ASTM A193, Grade B7 Thread ASME B1.1 / B18.2.1, Class 2A
	Heavy Hex Nuts	Alloy Steel, ASTM A 194, Grade 8 Thread ASME B1.1 / B18.2.2, Class 2B
Gaskets	1/2 thru 24	1/8 inch thick ANSI Class 150, ring type, 316 stainless steel inner ring, carbon steel outer ring, 316L stainless steel winding strip, spiral wound. Approved Gaskets..... Flexitallic style CGI with “Flexite Super” filler
Ball Valves	1/2 thru 2	Full port, ANSI Class 600 Body..... Forged carbon steel Ball & Trim ..... 316 stainless steel (CF3M) Seats & Seals..... TFE (TFM-1600; PTFE) Ends ..... Socket weld, ASME B16.11 Handle..... Stainless steel tee handle with vinyl insulator Features..... Blow-out proof stem, 2-1/4 inch stem extension Approved Mfg..... Apollo; Jamesbury; Marwin; Velan

Steam		
Item	**Size (inches)**	**Description**
Gate Valves	1/2 thru 2	Full port Class 150, ASME B16.34 Body..... Forged carbon steel, ASTM A 105 Trim..... Hard faced with 13 percent chrome Ends ..... Socket weld, ASME B16.11 Features..... OS&Y, self-aligning packing gland, bolted bonnet with spiral-wound gasket, solid wedge disc, integral hard faced seats Approved Mfg..... Bonney Forge; RP&C; Velan; Vogt; Walworth
	3 thru 24	ANSI Class 150, ASME B16.34 Body..... Cast carbon steel, ASTM A 216, Type WCB Trim..... Hard faced with 13 percent chrome Ends ..... Butt weld, ASME B16.25 Features..... OS&Y, bolted bonnet with spiral-wound gasket, flex wedge disc Approved Mfg..... Jenkins; Powell; Stockham; Velan; Walworth
Globe Valves	1/2 thru 2	Full port, Class 150, ASME B16.34 Body..... Forged carbon steel, ASTM A 105 Trim..... Hard faced with 13 percent chrome Ends ..... Socket weld, ASME B16.11 Features..... OS&Y, self-aligning packing gland, bolted bonnet with spiral-wound gasket, loose disc, integral hard faced seats Approved Mfg..... Bonney Forge; RP&C; Velan; Vogt; Walworth
Check Valves	1/2 thru 2	Full port, swing type, Class 150, ASME B16.34 Body..... Forged carbon steel, ASTM A 105 Trim..... Hard faced with 13 percent chrome Ends ..... Socket weld, ASME B16.11 Features..... Horizontal installation, bolted bonnet with spiral-wound gasket Approved Mfg..... Bonney Forge; RP&C; Velan; Vogt; Walworth
	3 thru 24	Full port, disc swing type, ANSI Class 150, ASME B16.34 Body..... Cast carbon steel ASTM A 216 Grade WCB Trim..... Hard faced with 13 percent chrome Ends ..... Butt weld, ASME B16.25 Features..... Horizontal installation, bolted bonnet with spiral-wound gasket Approved Mfg..... Jenkins; Powell; Stockham; Velan; Walworth

Steam		
Item	**Size (inches)**	**Description**
Permanent Strainers	1/2 thru 2	Cast carbon steel, ANSI Class 150, "Y" pattern strainer, socket weld connections, ASTM A 216, Grade WCB, 0.045 in. perforations stainless steel screen (alternate: Monel) Approved Mfg..... Apollo; Armstrong; Keckley; Mueller; Self Cleaning Strainer Co. (Paget); Watts
	3 thru 24	Cast carbon steel, ANSI Class 150, "Y" pattern self-cleaning strainer, butt weld end connection, ASTM A 216, Grade WCB, 0.045" perforated stainless steel screen (alternate: Monel) Approved Mfg..... Mueller; Keckley; Mack Iron Works; Self Cleaning Strainer Co. (Paget)

Condensate		
Item	**Size (inches)**	**Description**
Pipe	1/2 thru 2	Carbon steel, Schedule 80, ASTM A106, Type S, Grade B, plain ends, ASME B36.10M, socket weld joints
	3 thru 24	Carbon steel, Schedule 80, ASTM A106, Type S, Grade B, beveled ends, ASME B36.10M, butt weld joints (preheated)
Fittings	1/2 thru 2	Forged carbon steel, Class 3000, ASTM A105, long radius, socket weld ends, ASME B16.11
	3 thru 24	Carbon steel, Schedule 80, ASTM A234, Grade WPB, long radius, ASME B16.9, butt weld ends (preheated)
Nipples	1/2 thru 2	Carbon steel, Schedule 80, ASTM A106, Type S, Grade B, plain ends
Unions	1/2 thru 2	Forged carbon steel, ASTM A105, integral seats, ANSI Class 150, socket weld ends, ASME B16.11
Flanges	1/2 thru 2	Forged carbon steel, ASTM A105, socket weld, ANSI Class 150 raised face, ANSI B16.5
	3 thru 24	Forged carbon steel, standard bore, ASTM A105, weld neck, ANSI Class 150 raised face, ASME B16.5
Flange Bolts	Stud Bolts	Alloy steel, ASTM A 193, Grade B7 Thread ASME B1.1 / B18.2.1, Class 2A
	Heavy Hex Nuts	Alloy Steel, ASTM A 194, Grade 2H Thread ASME B1.1 / B18.2.2, Class 2B

Condensate		
Item	**Size (inches)**	**Description**
Gaskets	1/2 thru 24	1/8 inch thick ANSI Class 150, ring type, 316 stainless steel inner ring, carbon steel outer ring, 316L stainless steel winding strip, spiral wound. Approved Gaskets..... Flexitallic style CGI with "Flexite Super" filler
Ball Valves	1/2 thru 2	Full port, ANSI Class 150 Body..... Forged carbon steel Ball & Trim ..... 316 stainless steel (CF3M) Seats & Seals..... TFE (TFM-1600; PTFE) Ends ..... Socket weld, ASME B16.11 Handle..... Stainless steel tee handle with vinyl insulator Features ..... Blow-out proof stem, 2-1/4 inch stem extension Approved Mfg..... Apollo; Jamesbury; Marwin; Velan
Globe Valves	1/2 thru 2	Full port, Class 150, ASME B 16.34 Body..... Forged carbon steel, ASTM A 105 Trim..... Hard faced with 13 percent chrome Ends ..... Socket weld, ASME B16.11 Features ..... OS&Y, self-aligning packing gland, bolted bonnet with spiral-wound gasket, loose disc, integral hard faced seats Approved Mfg..... Bonney Forge; RP&C; Velan; Vogt; Walworth
Gate Valves	1/2 thru 2	Full port, Class 150, ASME B16.34 Body..... Forged carbon steel, ASTM A 105 Trim..... Hard faced with 13 percent chrome Ends ..... Socket weld, ASME B16.11 Features ..... OS&Y, self-aligning packing gland, bolted bonnet with spiral-wound gasket, solid wedge disc, integral hard faced seats Approved Mfg..... Bonney Forge; RP&C; Velan; Vogt; Walworth
	3 thru 24	ANSI Class 150, ASME B16.34 Body..... Cast carbon steel, ASTM A 216, Type WCB Trim..... Hard faced with 13 percent chrome Ends ..... Butt weld, ASME B16.25 Features ..... OS&Y, bolted bonnet with spiral-wound gasket, flex wedge disc Approved Mfg..... Jenkins; Powell Stockham; Velan; Walworth

Condensate		
Item	**Size (inches)**	**Description**
Check Valves	$^1/_2$ thru 2	Full port, swing type, Class 150, ASME B16.34 Body ..... Forged carbon steel, ASTM A 105 Trim ..... Hard faced with 13 percent chrome Ends ..... Socket weld, ASME B16.11 Features ..... Horizontal installation, bolted bonnet with spiral-wound gasket Approved Mfg. ..... Bonney Forge; RP&C; Velan; Vogt; Walworth
	3 thru 24	Full port, disc swing type, ANSI Class 150, ASME B16.34 Body ..... Cast carbon steel ASTM A 216 Grade WCB Trim ..... Hard faced with 13 percent chrome Ends ..... Butt weld, ASME B16.25 Features ..... Horizontal installation, bolted bonnet with spiral-wound gasket Approved Mfg. ..... Jenkins; Powell Stockham; Velan; Walworth
Strainers	$^1/_2$ thru 2	Cast carbon steel, ANSI Class 150, "Y" pattern strainer, socket weld connections, ASTM A 216, Grade WCB, 0.045 in. perforations stainless steel screen (alternate: Monel) Approved Mfg. ..... Apollo; Armstrong; Keckley; Mueller; Self Cleaning Strainer Co. (Paget); Watts
	3 thru 24	Cast carbon steel, ANSI Class 150, "Y" pattern self-cleaning strainer, butt weld end connection, ASTM A 216, Grade WCB, 0.045 perforated stainless steel screen (alternate: Monel) Approved Mfg. ..... Mueller; Keckley; Mack Iron Works; Self Cleaning Strainer Co.(Paget)

3.1.2. Steam and Condensate Piping

A. Steam and condensate piping and appurtenances inside buildings, utilidors, manholes, vaults, etc. may have welded or flanged joints.

- EXCEPTION: welded joints are mandatory in all inaccessible areas inside buildings, utilidors, manholes, vaults, etc.

B. Steam and condensate piping and appurtenances NOT inside buildings, utilidors, manholes, vaults, etc. shall have welded joints.

- EXCEPTION: Use welded connections for all steam trace lines and for all service lateral connections to distribution mains.

C. Piping shall be supported on rollers, **not** on sliding guides.

D. Alignment guides shall only be of the "spider" type, **not** of the slide-plate type.

E. Alignment guides shall be mounted and adjusted in strict conformance to the manufacturer's requirements and recommendations, on adequate structural supports.

F. Steam service lines shall slope back to the distribution main, not to the building, to allow blow-down of a service line from the utilidor, manhole or vault.

G. Welding shall be performed with qualified procedures and with performance qualified welders in accordance with latest edition of ASME Boiler Pressure Vessel code and ASME B31.1. A qualified weld examiner shall perform 100% visual examination of all weld passes and 10% radiographic weld examination. 100% of direct-bury pipe welds shall receive radiographic weld examination and shall not be counted toward the 10% radiographic examination requirements for the project. Copies of daily weld examination reports shall be turned into DU Quality Assurance personnel on a daily basis. A complete weld examination report (including all daily reports) shall be provided at project conclusion as a Record Document.

H. Welded tee fittings shall be used at connection of service laterals to distribution mains and branches instead of weld-o-lets. If reducing fittings create space constraints then weld-o-lets may be allowed.

I. All main line items requiring maintenance (including valves and expansion joints) shall have flanged end connections. Service branches may require welded connection; designer should discuss need for welded connections with DU.

J. Metal composition spiral wound lead faced gaskets shall be used for steam and condensate service.

K. Service laterals shall connect to top of distribution mains where possible. Within utilidors a service lateral shall not tie-in on the back side of a distribution main where access to valves is restricted.

L. Each section of steam distribution main that can be isolated for maintenance purposes shall incorporate the following design features to allow for safe supervised start-up of steam system:

- A drip leg with blow-down valve shall be provided at each end of each section of steam distribution main that can be isolated OR on both sides of all steam isolation valves.
- Each section of steam distribution main must have more than one blow-down to avoid vapor lock that could prevent free drainage of condensate.
- A 0-150 psig pressure gauge shall be provided on both sides of each isolation valve installed on the steam distribution main and on the building side of service lateral isolation valves. Pressure gauges shall include "pig-tail" snubbers and isolation valves.
- Install a 0-60 psig pressure gauge on the condensate line at each manhole. Pressure gauges shall include "pig-tail" on steam piping, and pressure

"snubbers" on condensate return lines, and isolation valves for both steam and condensate applications.

- A 1” blow-down valve shall be provided on the **building** side of steam service lateral isolation valves.
- A 1” drain valve shall be provided on the **building** side of condensate service lateral isolation valves.

3.1.3. Steam Trace Piping

A. All steam trace piping beyond the temp control valves and isolation valves and traps shall have welded joints, even in accessible areas.

B. Back-welding of threaded fittings is NOT allowed.

C. Use of socket-welded fittings is limited to small bore welded piping only.

3.1.4. Valves

A. All valves shall be located in utilidors, manholes, vaults or buildings. Direct bury valves are not permitted. Refer to the DU Heat Distribution System Design and Construction Standard HDS-200 series and HDS-300 series drawings for requirements.

B. Steam isolation valves 6” and larger shall be provided with a valved warm-up bypass.

C. Steam and condensate service laterals shall include isolation valves located as near as practical to the connection to the distribution main, and aligned to allow for operation and maintenance.

D. All steam and condensate valves on distribution mains and service laterals shall be cast steel flanged Class 150.

E. Socket welded forged carbon steel valves shall be installed on blowdowns and trap assemblies when less than 2".

- Threaded piping shall not be installed between the valve and the distribution main drip leg.

3.1.5. Pipe Anchors

A. Anchors and installation method for anchors shall be designed and stamped by a Professional Engineer registered in Alaska. The design and installation method for anchors shall accept the loads imposed on them by expansion loops, alignment guides and any static thrust due to the hydrostatic testing and normal operation internal pressure in the piping system(s), inclusive of all new and existing piping systems.

B. The areas of outer jacket within 3’ of the anchor must be insulated with internal pipe insulation material (mineral wool) capable of withstanding an internal pipe operating temperature 250°F continuously. To the extent possible, pipe

anchors on direct buried piping with expansion loops should be installed in undisturbed soil.

C. Flange anchors are prohibited on steam/condensate piping.

3.1.6. Expansion Compensation

A. Expansion compensation for steam and condensate piping shall be provided for the thermal expansion from the ambient installation temperature to the final operating temperature. Expansion compensation shall be provided through the use of expansion loops and other piping offsets, unless space limitations or other considerations require the use of an expansion joint. Direct bury expansion joints are not permitted under any circumstances. All expansion joints must be located in a utilidor, manhole, vault or building, including when necessary to add a new expansion joint to an existing distribution main.

B. There shall be no offsets in piping that will impose non-axial loads on new or existing expansion joints. Design of new service line connections to existing distribution mains shall consider the effect of the new service lines on the expansion of the existing distribution mains and the effect of the expansion of the existing distribution mains on the new service lines. New anchors, expansion joints, alignment guides, drip legs and associated appurtenances shall be provided as necessary on existing distribution mains. Anchors and alignment guides shall be located with respect to expansion joints per manufacturer's installation requirements. Anchor bases can be used for distribution main anchors if desired and can be either floor or wall mounted in utilidors, manholes, vaults or buildings.

C. Expansion joints shall have welded end or flanged end connections and shall be slip-type with "gun-pakt" or injectable packing type similar to the Hyspan 6500 model or Adsco RJ model. The use of bellows-type expansion joints is not permitted unless specifically authorized by DU. (Note that during expansion joint installation space must be provided to allow for removal of injection plungers and installation of packing.)

D. Instead of double-end style expansion joints (which are not permitted unless specifically authorized by DU) use two (2) single-end style expansion joints with a pup joint and full sized drip leg and blow down/ trap assembly between the expansion joints.

E. Unless stated otherwise by DU in writing, the design engineer of record for a new addition to the HDS, and/or a modification to the existing HDS, shall be responsible for field verifying the existence, location, capacity and condition of existing motion compensation equipment such as anchors, guides, and expansion joints, etc., that may influence or act upon piping and equipment to be installed as a part of the project.

F. Anchors and alignment guides shall be located with respect to expansion joints per manufacturer's installation requirements.

3.1.7. Drains and Vents

A. A drain with a normally closed manual isolation valve shall be provided at the ends and at all low points of the outer conduit piping system to allow draining of groundwater or condensate that may leak into the piping system annular space if there is a failure in the outer conduit or the carrier pipe.

B. A drain with a normally closed manual isolation valve shall be provided at the ends and at all low points of condensate carrier piping in utilidors, vaults, manholes, and building entry pits.

C. Drains are normally not provided on steam piping. Blowdown valves at the drip legs typically used for this function

D. An air vent with a normally open manual isolation valve shall be provided at all high points and all piping offsets in the outer conduit piping system. Air vents shall be piped to discharge to a safe location.

E. An air vent with a normally open manual isolation valve shall be provided at all high points and all piping offsets for steam and condensate carrier piping in utilidors, vaults, manholes, and building entry pits.

F. All drains and vents shall be located in utilidors, manholes, vaults or building entry pits. Refer to the DU Heat Distribution System Design and Construction Standard HDS series drawings indexed at the end of this document for requirements.

3.1.8. Steam Traps

A. Steam traps shall be sized for and spaced along run for operating condensate load (not start-up).

B. Trap stations shall incorporate the following features:

- Steam traps shall be thermodynamic type (Spirax Sarco TD-52 or equal), generally, for steam lines 2” and smaller use 3/8” traps and for steam lines larger than 2” use ½” traps.
- Provide forged carbon steel Class 150 minimum isolation valves, unions for trap removal, strainers ahead of the trap and a check valve at the trap outlet.
- Provide test tee on trap discharge piping.
- Trap piping shall be Schedule 80 with fittings to match.
- Traps shall discharge to an unvented sparge tank prior to discharging to condensate return main. Sparge tank shall include blow down valve at bottom. Multiple trap discharges shall be piped to a common header before going through the sparge tank to minimize need for additional tanks in confined spaces.
- Trap discharge piping should connect to top of condensate return main.

- Trap stations shall not be located on "soft" (moving) side of expansion joints.
- Trap assembly piping may need to incorporate swing joints to account for differential rates of expansion between steam and condensate return mains along run.
- Trap stations shall be installed such that they can be maintained without having to reach through the mainline piping.
- Trap stations shall be installed such that they do not block passage of personnel through utilidor.

3.1.9. Steam Line Drip Legs

A. All drip leg and steam trap assemblies shall be located in utilidors, manholes, vaults or buildings. Refer to the DU Heat Distribution System Design and Construction Standard HDS-200 series and HDS-300 series drawings for requirements.

B. Provide a drip leg with a steam trap assembly on steam distribution mains at a maximum interval of 300’ apart, at the low points of any isolatable section of piping, and on one side of all steam distribution main isolation valves.

C. Provide a drip leg for each steam trap assembly.

D. Steam and condensate piping shall be anchored at each drip leg location.

E. All changes in grade of steam distribution mains shall include drip leg, blow-down valve and trap assembly at base of riser.

F. Drip leg diameter shall be the same as the steam distribution main, for steam main sizes up to 6" in diameter. For main sizes 8” or 10” the drip leg shall be 6” in diameter. For main sizes 12" and above, drip leg diameter shall be half the diameter of the steam distribution main.

G. Drip legs shall be constructed of welded tee fittings ONLY.

H. Drip leg shall be of adequate length (12” preferred, 6” is absolute minimum).

I. Drip leg shall be oriented straight down from the steam distribution main ONLY.

J. Steam trap assemblies shall tie into the side of the drip leg, at the half-point of its height.

K. Only use weld-o-lets or sock-o-lets for trap line and blow-down valve connections to drip leg.

L. Reduce mainline piping insulation thickness by 1/2 the normal thickness for 1’ length on each side of blow-down, trap assembly, and trace-line connections at mainlines.

M. Blow down valves:

- Each section of steam distribution main must have more than one blow-down to avoid vapor lock that could prevent free drainage of condensate.
- Each drip leg shall be provided with a 1-1/2" blow-down valve, installed using a welded-on weld-o-let or sock-o-let from the bottom of the drip leg.
- There shall be no 90 degree fittings between blow-down valve and drip leg.
- When possible, blow-down valves must be oriented accessible from the manhole vault.
- Blow-down discharge must be directed down the tunnel, away from operator, and it cannot block egress from the manhole.

3.2. UTILIDOR & VAULT SYSTEM REQUIREMENTS

3.2.1. Design and Construction

A. Utilidors, manholes and vaults shall be of watertight construction. Exteriors shall be coated with waterproofing.

B. Extruded Polystyrene (XEPS) foam board insulation (R-10, 25 PSI density) shall be applied to exterior surfaces of utilidors and manholes. Do not apply to interior surfaces. (XEPS) is the only insulation type allowed for utilidor applications contacting the earth. Expanded Polystyrene foam board (EPS) is NOT PERMITTED.

C. Install waterproof concrete expansion/contraction joints every 80 LF.

D. Provide a 1-1/2" x 5-1/2" floor drainage channel in all new utilidor construction.

- Do not locate the drainage channel in the walking path, which is generally in the center of the utilidor, unless conditions dictate otherwise.

E. Utilidor lids shall be removable with lifting loops and shall weigh no more than 4,000 lbs. Lifting loops in the lids should be galvanized and no more than 3” high and 4” wide.

F. Utilidor wall-to-lid joints shall be sealed with a generous (3/4" high x 4" wide) layer of "fibered roof coating" and two runs of marine-grade oakum filler material on top of wall pressed into mastic. Fibered roof coating shall be:

- Atco product #A300 (comply with ASTM D 4586-07 Class 2 Type 1); or
- Ace Hardware Product #17897; or
- approved equal.

G. No structural elements, piping or equipment shall be supported from removable utilidor or manhole lids.

H. Anticipate that utilidor renovation work will require 10% of existing lids to be replaced, due to damage and age.

I. Do not install communications or electrical conduit over utilidors with removable lids.

J. Pipe support racks in accessible utilidors shall be designed to provide clear center aisle walkways from one manhole to the next. Stagger support racks so the vertical struts are not directly across from each to maximize clearance. Stagger vertical struts of support racks by at least 5 feet so the vertical struts are not directly across from each to maximize clearance.

K. Pipe support racks shall be (ASTM 123) hot dip galvanized and slotted to allow drainage. Pipe supports and anchors should be asphalt coated within 6" of utilidor floor for additional corrosion protection.

L. A draft stop cut-off wall, constructed of concrete masonry units, shall be provided at connections of service utilidors to buildings. Pipe penetrations of cut-off wall shall be through appropriate pipe sleeve and sealed.

M. Provide a gradual transition (5:1) between structural fill and frost susceptible soils where utilidors are being installed under roads and parking areas to prevent differential frost heaving.

N. Utilidors shall slope to low point sumps in accordance with State of Alaska Regulations 18 AAC 72 & 80.

O. Sumps Pumps:

- Electric submersible sump pumps shall be provided at manholes that are low points in utilidor system.
- Sump pumps should be rated for condensate temperatures.
- Sump pumps shall have high level alarm light, and audible alarm, located above ground. The high level alarm shall be minimum 90 dB, with a local silencing button. The alarm light and audible alarm shall be on a dedicated circuit breaker, separate from the sump pump, so that pump malfunctions do not affect the alarm power.

P. Manholes:

- A manhole shall be provided at all connections between service laterals and distribution mains.
- All items requiring maintenance including valves, expansion joints, blow-downs, trap stations, clean-outs, pumps, etc. shall be located in manholes. Where valves or expansion joints would be installed in a manhole that does not allow for the removal by hoist or other rigging due to size constraints or other blockage, the valve or expansion joint shall be located under removable lids. This may be allowed in the tunnel area with approval of Doyon Utilities.
- Manholes shall be adequately sized to provide complete access around piping and allow for simple removal of equipment. Manholes shall not have piping runs that block access from manhole side through piping to tunnel side of utilidor.
- Manhole ladders shall be fabricated of *steel*, shall have *knurled rungs*, and shall be *hot-dip galvanized after fabrication*.

- Manhole access shaft shall extend above grade a minimum of 16" and not exceed 18".
- Manholes shall be provided with two natural convection style vents located at opposite corners. Vents shall be minimum 8” diameter, capped and a maximum 36" and not less than 24" above finished grade. One vent shall draw from approximately 6” below manhole ceiling and the other from 12” above manhole floor. Vents shall be provided with a manual damper located inside manhole.
- Manhole access lids shall be single leaf design 1/4” aluminum diamond plate and adequately sized for ease of access, minimum 36” x 42 inside clear dimensions, and must permit opening from inside of manhole WITHOUT a key. Use DU furnished custom access lids. Designer should indicate on drawings that contractor shall receive input from DU site manager before deciding which way access hatch should face due to prevailing wind.

Refer to the DU Heat Distribution System Design and Construction Standard HDS-200 series and HDS-300 series drawings for additional requirements.

3.2.2. Pipe Insulation

A. Calcium silicate with aluminum jackets and stainless steel bands shall be used for insulating steam and condensate pipe in manholes.

B. Insulation for steam and condensate piping within utilidors shall be rigid fiberglass with vapor barrier jacket and bands.

C. All calcium silicate pipe insulation should be provided with aluminum jacketing, with a kraft paper backing.

D. All steam & condensate pipe insulation in manholes shall receive aluminum jacketing, secured with stainless steel bands and self-tapping screws.

E. Banding shall be placed so that clips and cut ends are not in walkway of tunnel.

F. Valves and expansion joints shall be insulated with removable blankets secured with nylon straps and buckles.

G. Reduce mainline piping insulation thickness by one-half the normal thickness, at 1 foot of each side of blowdown, trap assembly, and trace-line connections at mainlines.

3.2.3. Inspection and Testing

All pumps, alarms, controls, and other operable items will be operated to verify proper operation and compliance with the specifications. After these tests are completed utilidor water removal tests will be conducted with the following guidance:

A. Tests will be conducted before utilidor and valve manhole covers are placed. Dirt and debris will be removed prior to testing.

B. Verification will be made to ensure that water does not pond between high and low points, gravity drainage is functioning, and that drained low points are operational either by use of sump pumps or by gravity drainage to storm drains.

C. Test will be witnessed and documented.

D. Utilidor tops will be placed and sealed immediately after Doyon Utilities acceptance.

3.3. DIRECT-BURY SYSTEM REQUIREMENTS

3.3.1. Piping System

A. A pre-engineered, pre-insulated, welded, Class A, Drainable-Dryable-Testable (DDT) piping system shall be used for all new direct bury HDS distribution mains and service lines. The system supplier shall have at least 5 years' experience fabricating systems of the composition defined herein. All straight sections, fittings, anchors and other accessories shall be factory prefabricated to job dimensions. Each system layout shall be computer analyzed by the piping system manufacturer to determine stresses and movement of the service pipe. The system design shall be in strict conformance with ASME B31.1, latest edition, and stamped by a Registered Professional Engineer.

B. Acceptable systems include, but are not necessarily limited to:

- Multi-Therm 500, by PERMA-PIPE, Inc. (www.permapipe.com)
- Insul 800, by Rovanco Piping Systems, Inc. (www.rovanco.com)
- Duo-Therm 505, by Thermacor Process, L. P. (www.thermacor.com)

C. Other manufacturers' systems must be reviewed and approved by DU.

D. Follow the piping system manufacturer's design and installation requirements, guidelines and recommendations. Conflicts between this Standard and the manufacturer's requirements, guidelines or recommendations shall be brought to DU's attention for resolution.

E. When possible, slope steam piping up to the building. Where condensate must counter-flow against steam flow that pipe shall be oversized to facilitate condensate drainage.

3.3.2. Internal ("Service" or "Carrier") Pipe, Valves, Fittings and Appurtenances

See Section 3.1.1.

3.3.3. Outer Conduit Pipe Material

The outer conduit pipe material shall be smooth wall, welded steel conduit. Minimum thicknesses shall be as follows:

Outer Conduit Diameter	Conduit Thickness
6" – 26"	10 Gauge
28" - 36"	6 Gauge
38" - 42"	4 Gauge

Changes in outer conduit size, as required at oversized conduit to allow for carrier pipe expansion, shall be accomplished by eccentric and/or concentric fittings and shall provide for continuous drainage.

3.3.4. Internal Pipe Supports

All pipes within the outer conduit shall be supported at intervals not exceeding 10'. These supports shall be designed to allow for continuous airflow and drainage of the outer conduit in place. The straight supports shall be designed to occupy not more than 10% of the annular air space. Supports shall be of the type where insulation thermally isolates the internal pipe from the outer conduit.

3.3.5. Internal Pipe Insulation Material

Internal pipe insulation shall be mineral wool. Split insulation shall be held in place by stainless steel bands installed not more than 18" apart. The insulation shall have passed the boiling test requirements specified in the Federal Agency Guidelines.

3.3.6. Outer Conduit Insulation Material

A. All outer conduit welds, including elbows, anchors, tees and end seals, shall be air tested at 15 PSIG by the installing contractor to assure conduit tightness prior to insulating. Air test records shall be submitted to DU for review and approval.

B. Outer conduit insulation shall be spray applied polyurethane foam or polyisocyanurate foam rated for 300°F service, having a nominal 2 Lbs./Cu. Ft. density for all straight lengths and fittings. The insulation thickness shall be 1-1/2" minimum. Insulation must completely fill the annular space between the outer conduit and the outer jacket.

C. The piping system supplier shall provide written temperature performance certification from the insulation manufacturer and an Independent Testing Agency Report and Certification that the insulation meets the referenced performance standards.

3.3.7. Insulation Thickness

The piping system shall be insulated as necessary to limit heat loss to a maximum of 60 BTU/Hr./Ft. on the hottest pipe, based on a 4' burial depth, and an average soil temperature of +20°F.

3.3.8. Outer Jacket

A. The outer jacket shall be:

- Minimum 0.175 mil thick fiberglass applied directly onto the outer conduit foam insulation; or
- Heavy-weight, seamless, minimum 0.175 mil thickness, high impact, polyethylene conforming to ASTM D1248 & D3350.

B. PVC jacket material is prohibited.

C. All straights and fittings shall be factory jacketed.

3.3.9. Subassemblies

End seals, gland seals and anchors shall be designed and factory prefabricated to prevent the ingress of moisture into the system. All subassemblies shall be designed to allow for complete draining and drying of the outer conduit system.

3.4. INSTALLATION REQUIREMENTS

3.4.1. General

A. All components of the pre-engineered piping system shall be handled and installed per the manufacturer's/supplier's instructions and as specified in the project specific construction documents.

B. Direct Bury HDS piping and components shall be:

- Designed installed with sufficient provision for expansion and contraction so that the system will not be subjected to excessive stress during startup and shutdown;
- Suitably supported during installation, providing adequate support to prevent sags and to maintain proper grade;
- Suitably anchored to restrict movement of the system during startup and shutdown to that allowed by expansion loops.

3.4.2. Bury Depth

Direct bury HDS piping shall be installed with a minimum of 4' of soil cover. If 4' of soil cover cannot be provided, DU may authorize less cover provided that additional insulation is furnished for all piping not located below pavement (i.e., street, alley,

parking lot, etc.). All HDS piping located below pavement shall have a minimum of 4' of soil cover.

3.4.3. Separation

Unless recommended otherwise by a specific pre-engineered piping system manufacturer, maintain a minimum horizontal separation distance of 2' clear, outside-to-outside, between underground HDS distribution mains (steam and condensate) throughout their entire length.

A. Maintain a minimum horizontal separation distance of 4', center-to-center, between an underground HDS distribution main (steam or condensate) and all or other utilities.

B. Maintain a minimum vertical separation distance of 12" between the bottom and top of the insulation jacket on a HDS distribution main (steam or condensate) and any crossing wastewater distribution main or service line, or storm drain line.

3.4.4. Field Joints

All field joints shall be constructed per the system supplier's recommendations. The air space between the internal pipe insulation and the outer conduit pipe shall remain continuous.

3.4.5. Trench Bedding and Pipe Cover

A 6" layer of sand or fine gravel shall be placed and tamped in the bottom of the trench, to provide uniform bedding for the system. The entire trench shall be evenly backfilled with the same material in 6" compacted lifts to a minimum height of 6" above the top of the piping system. The remainder of the trench shall be backfilled as directed elsewhere in this Standard.

3.4.6. Manholes and Vaults

Manholes or vaults shall be installed at all service line-to-distribution main connections, distribution main valves, drip legs, and trap station. Manholes or vaults shall also be installed at a minimum separation of 300' on straight runs of direct bury Heat Distribution System mains.

3.4.7. Water Seal

Provide a Link-Seal or approved equivalent at utilidor, manhole, vault, building entry pit and building wall penetrations to prevent water from entering into the piping system insulation jacket and/or into the premises.

3.5. INSPECTION REQUIREMENTS

3.5.1. General

Test shall be witnessed by DU and documented by the installing of testing Contractor and by DU.

3.5.2. Welding Inspection

In general, all welding inspection shall be conducted in accordance with the current edition of ASME B31.1 Power Piping Code. This code specifies necessary inspection and examination requirements, and references the necessary AWS qualifications for inspection and examination.

3.5.3. Outer Jacket Inspection

DU personnel must inspect all underground pipes prior to backfill. The outer jacket shall be smooth and even, with no recesses that can hold or trap water.

3.5.4. Operable Equipment Verification

All valves, traps, alarms, controls and other operable items will be operated to verify proper operation and compliance to specifications.

3.5.5. Temporary Strainers

A temporary strainer with a 100 mesh screen should be installed at all equipment and control valves prior to cleaning of piping, hydrostatic, or operating tests to prevent clogging. The original screens should be saved and replaced no less than 2 months after that section of utilidor has been placed back into operation.

3.5.6. Flushing

Prior to connection to the existing HDS, and prior to pressure testing described in the following section, the installing contractor shall be responsible for flushing all new piping with potable water from inside the utility customer's facility, to remove foreign particles and objects that could cause damage during pressure testing. Piping should be flushed at a velocity no less than 2.0 feet per second. The installing contractor shall be responsible for collecting and properly disposing of the flushing water.

3.5.7. Pressure Testing

A. For field testing, water piping, steam piping, and condensate piping are considered to be separate systems. Tests will only be performed on one system at a time.

B. Prior to connection to the existing HDS, the installing contractor shall be responsible for pressure testing all new piping and equipment. The outer

conduit shall be tested with air at 15 PSIG pressure. The internal pipe shall be tested with water at 1.5 times the operating pressure or at 200 PSIG, whichever is greater (see Item 2.1 SYSTEM OPERATING PARAMETERS): Test pressure gauges shall have dials indicating not less than 1.5 times, and not more than 3 times the test pressure. The test pressures shall be held for a minimum duration of 4 hours. During hydrostatic testing, pipes should be filled slowly and vented during fill. All air will be expelled before hydrostatic testing occurs. Install caps, blind flanges, or plugs as necessary at the ends of each test section. Testing against closed valves is not permitted. If no perceptible pressure loss is recorded during the test interval, and no visual evidence of leakage exists, the pressure test will be considered acceptable.

3.5.8. Cleaning

After successfully pressure testing the system, the installing contractor shall be responsible for cleaning the all new internal ("carrier" or "service") pipe, including distribution mains and service laterals, by filling with a 5% solution of trisodium phosphate (TSP), allowing it to stand for 2 hours, and then flushing the system clear from inside the utility customer's facility using potable water. Piping should be flushed at a velocity no less than 2.0 feet per second. Following the potable water flush, the system shall be slowly filled with steam and continuously drained to remove residual contamination. The installing contractor shall be responsible for collecting and properly disposing of the cleaning solution.

3.5.9. Inspection after Connection

All HDS services are subject to periodic inspection and review after connection. DU may take samples for identification of sources of condensate contamination. Based on the results of the investigation, DU may require the Customer to take corrective measures.

3.5.10. Conductivity Test

Immediately after any new HDS piping is energized the installing contractor shall withdraw a sample of condensate and test it for contamination. The conductivity must not exceed 10 $\mu\Omega$ (micro-ohms) and the iron content must not exceed or 0.02 PPM (parts per million). If contamination is detected the new HDS piping, including distribution mains and service laterals, must be flushed with potable water from inside the utility customer's facility until the contamination is reduced to below the referenced limits. If flushing is necessary the installing contractor shall be responsible for collecting and properly disposing of the flushing water. Piping should be flushed at a velocity no less than 2.0 feet per second.

DESIGN AND CONSTRUCTION STANDARD

HEAT DISTRIBUTION SYSTEM

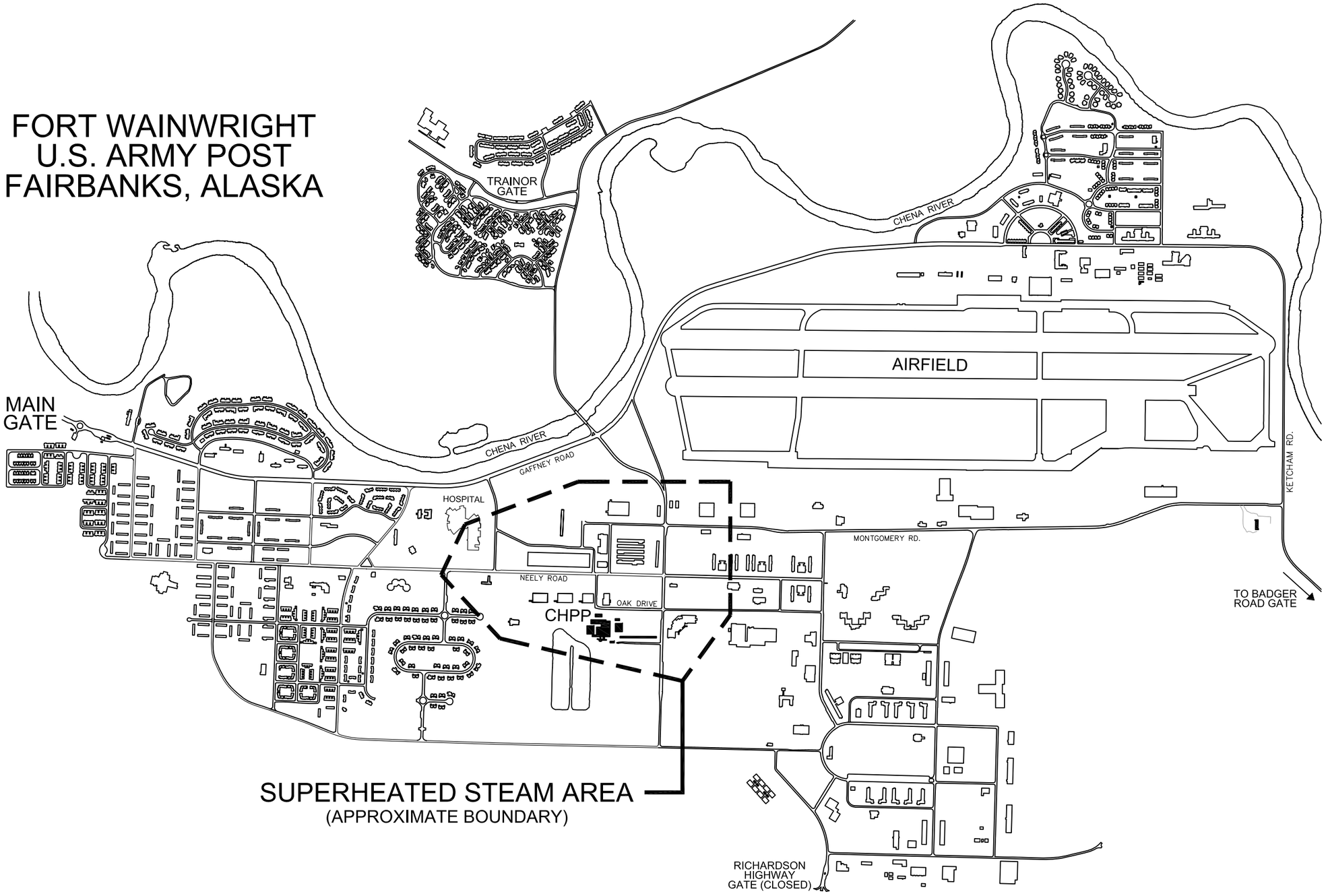
INDEX OF DRAWINGS

(Please note that the original size of all drawings is 11” x 17”.)

Direct-Bury and Utilidor Heat Distribution Systems

End of Index of Drawings

FORT WAINWRIGHT
U.S. ARMY POST
FAIRBANKS, ALASKA

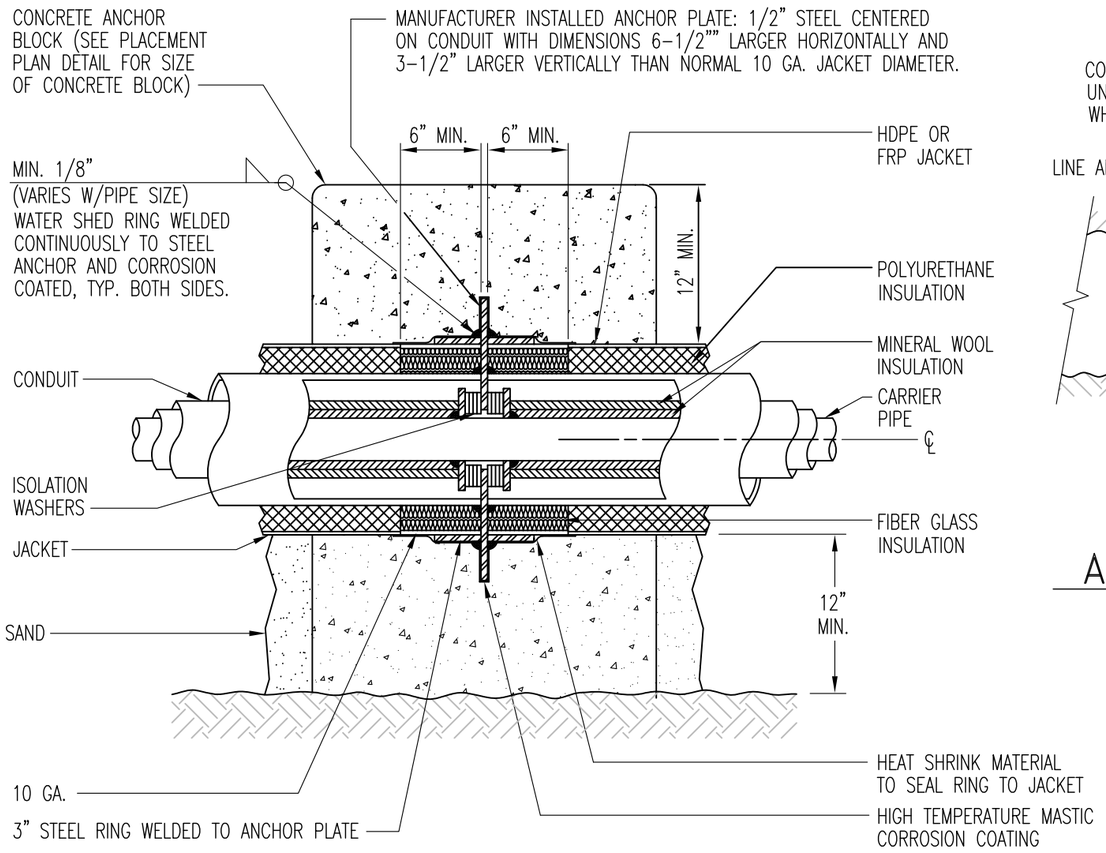


DOYON UTILITIES LLC

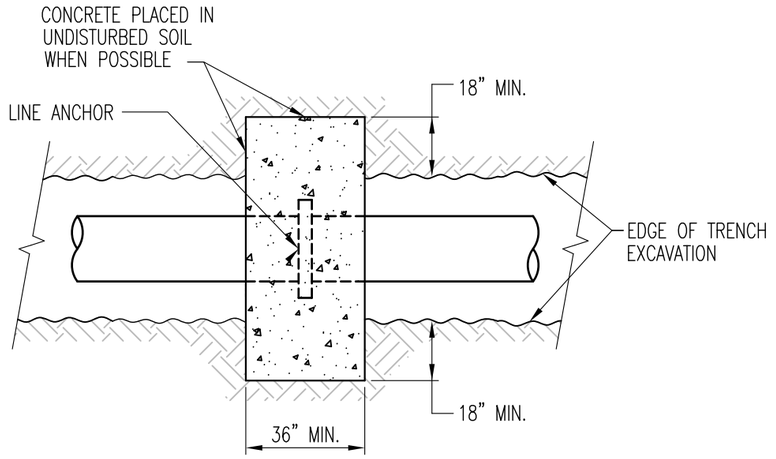
FORT WAINWRIGHT SUPERHEATED STEAM AREA

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM

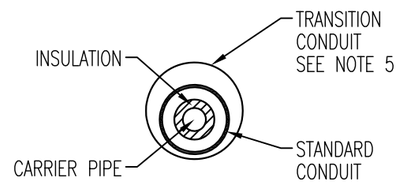
Drawing No.
HDS-001
26 JULY 2012



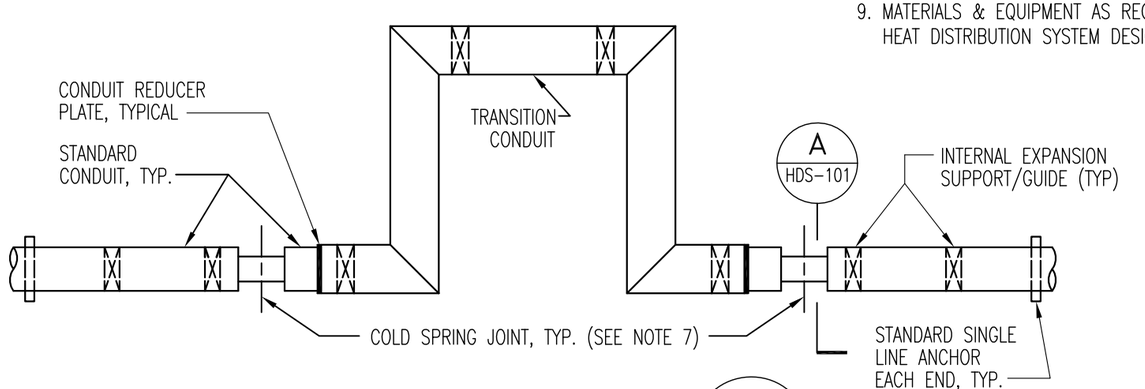
LINE ANCHOR SECTION 1 HDS-101



ANCHOR PLACEMENT PLAN 2 HDS-101



OUTER CONDUIT TRANSITION SECTION A HDS-101



SINGLE PIPE EXPANSION LOOP 3 HDS-101

NOTES:

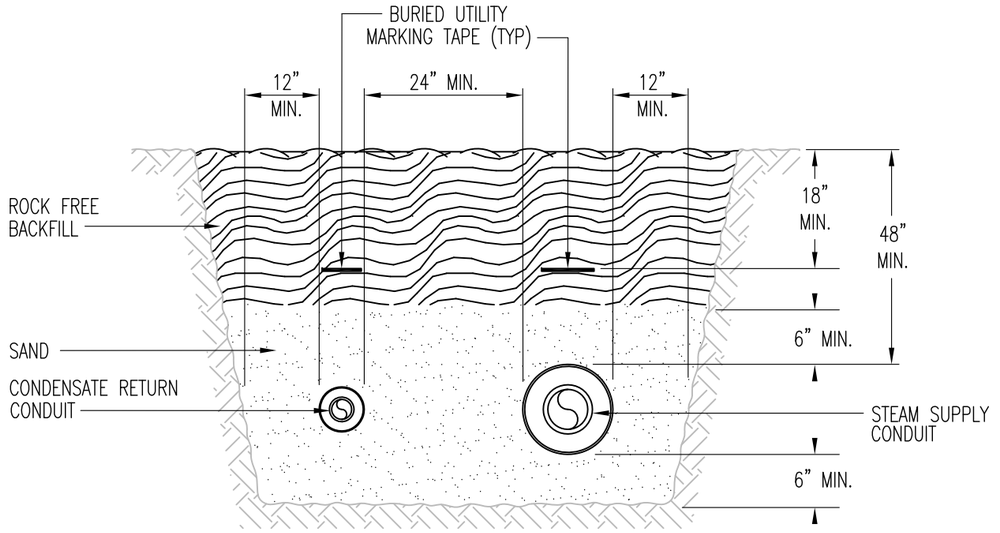
1. SIZE OF EXPANSION LOOPS SHALL BE BASED ON JOB REQUIREMENTS.
2. SPECIFIC JOBSITE REQUIREMENTS AND DIFFERING FIELD CONDITIONS WILL DICTATE WHICH TYPE OF OVERSIZED TRANSITION CONDUIT WILL BE UTILIZED (CIRCULAR OR ELLIPTICAL).
3. EXPANSION TYPE SUPPORTS SHALL BE UTILIZED TO COMPENSATE FOR THE NECESSARY THERMAL EXPANSION WHEREVER A CHANGE OF DIRECTION (90° ELLS, 45° ELLS, ZEES, TEES, LOOPS, ETC.) OCCURS IN THE CONDUIT SYSTEM. THIS INCLUDES EXPANSION SUPPORTS IN EACH LEG AS NECESSARY TO COMPENSATE FOR THERMAL EXPANSION IN BOTH DIRECTIONS.
4. OVERSIZED TRANSITION CONDUIT SHALL ALLOW FOR MOVEMENT OF CARRIER PIPE.
5. TRANSITION CONDUIT SHALL BE 10 GA. THICK CARBON STEEL WELDED AT BOTH CONDUITS IF REQUIRED FOR EXPANSION.
6. DO NOT REMOVE FACTORY INSTALLED SHIPPING BRACES AT EXPANSION LOOP JOINTS UNTIL ALL CARRIER PIPE WELDS HAVE BEEN COMPLETED.
7. COLD SPRING OF CARRIER PIPE SHALL BE PERFORMED IN THE FIELD AFTER ALL PIECES ARE WELDED/INSTALLED AND ATTACHED TO ANCHOR POINTS. POINT OF COLD SPRING SHALL TYPICALLY BE AT SECOND FIELD JOINT FROM 90° ELBOW DUE TO ALIGNMENT AND STIFFNESS OF THE PIPE. CARRIER PIPE OFFSETS, INSTALLATION OF CARRIER PIPE OFF-CENTER, CAN BE USED IN LIEU OF COLD SPRINGING IN THE FIELD. ALL PIPE OFFSETS MUST BE PERFORMED AT THE FACTORY BEFORE SHIPPING TO JOBSITE.
8. ANCHOR PLATE SHALL HAVE OPENINGS TO ALLOW SYSTEM TO BE VENTED AND DRAINED.
9. MATERIALS & EQUIPMENT AS REQUIRED IN CURRENT DOYON UTILITIES HEAT DISTRIBUTION SYSTEM DESIGN AND CONSTRUCTION STANDARD.

DOYON UTILITIES LLC

ANCHOR & EXPANSION LOOP DETAILS

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / DIRECT BURY

Drawing No.
HDS-101
11 SEPT 2014



TRENCH SECTION 1 / HDS-102

NOTES:

1 PIPE BEDDING MATERIAL AND INSTALLATION PROCEDURES SHALL BE AS SPECIFIED BY THE DIRECT BURY PIPE MANUFACTURER.

2 BACKFILL MATERIAL ABOVE THE PIPE BEDDING MATERIAL SHALL BE NATIVE MATERIAL IF IT COMPLYS WITH ALASKA DOT SECTION 204 – 2.01, TYPE C.

3 BACKFILL COMPACTION SHALL COMPLY WITH ALASKA DOT SECTION 301 – 3.03. MOISTURE/DENSITY RELATIONS OF SOILS SHALL BE CALCULATED IN ACCORDANCE WITH AASHTO T 99 OR T 180.

DOYON UTILITIES LLC

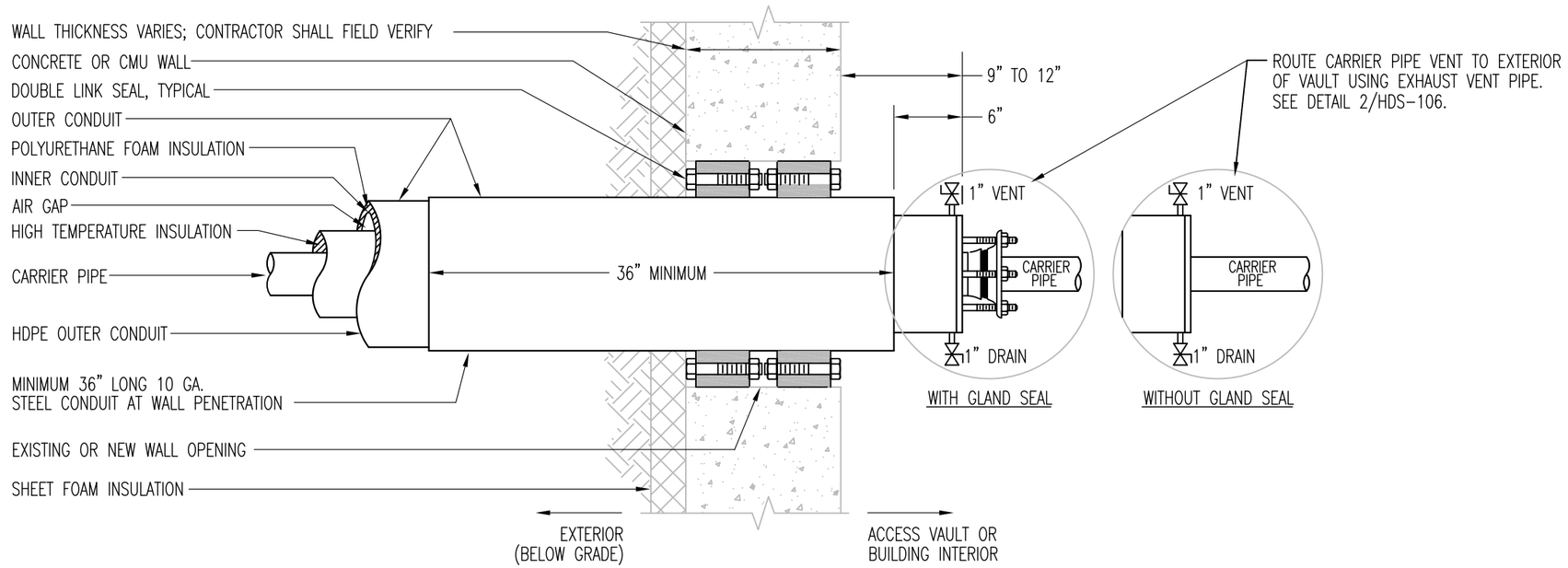
TRENCHING AND BACKFILL

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / DIRECT BURY

Drawing No.
HDS-102
11 SEPT 2014

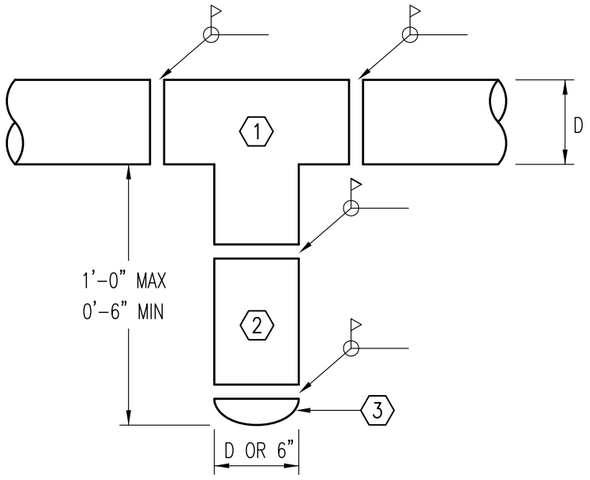
NOTES:

1. PREFERRED METHOD OF WALL PENETRATION IS CORE DRILLING.
2. CORE DRILL WALL. PROVIDE SMOOTH ROUND SURFACE FOR COMPRESSION OF LINK SEAL BETWEEN WALL AND SERVICE PIPE.
3. MATERIALS & EQUIPMENT AS REQUIRED IN CURRENT DOYON UTILITIES HEAT DISTRIBUTION SYSTEM DESIGN AND CONSTRUCTION STANDARD.



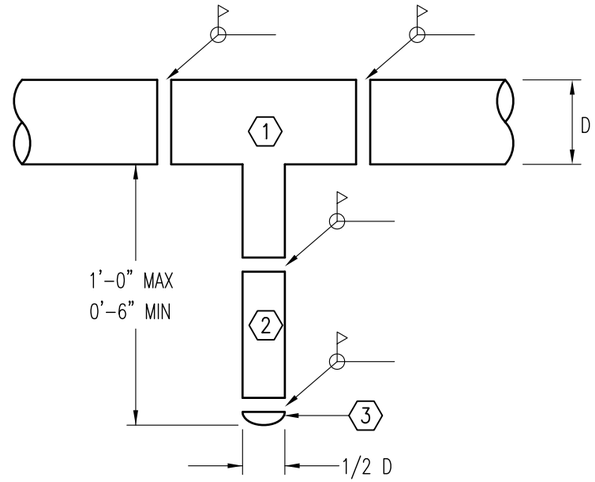
WALL PENETRATION 1 / HDS-103

DOYON UTILITIES LLC	WALL PENETRATION DETAIL DESIGN & CONSTRUCTION STANDARDS HEAT DISTRIBUTION SYSTEM / DIRECT BURY	Drawing No. HDS-103 26 JULY 2012



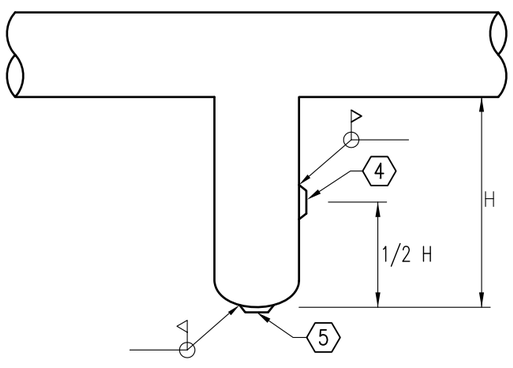
DRIPLEG CONSTRUCTION, 10" DIAMETER & SMALLER STEAM MAIN

1
HDS-201



DRIPLEG CONSTRUCTION, 12" DIAMETER & LARGER STEAM MAIN

2
HDS-201



WELD-O-LET ATTACHMENT TO STEAM MAIN DRIPLEG

3
HDS-201

MATERIAL LIST:

MATERIALS & EQUIPMENT AS REQUIRED IN CURRENT DOYON UTILITIES HEAT DISTRIBUTION SYSTEM DESIGN AND CONSTRUCTION STANDARD.

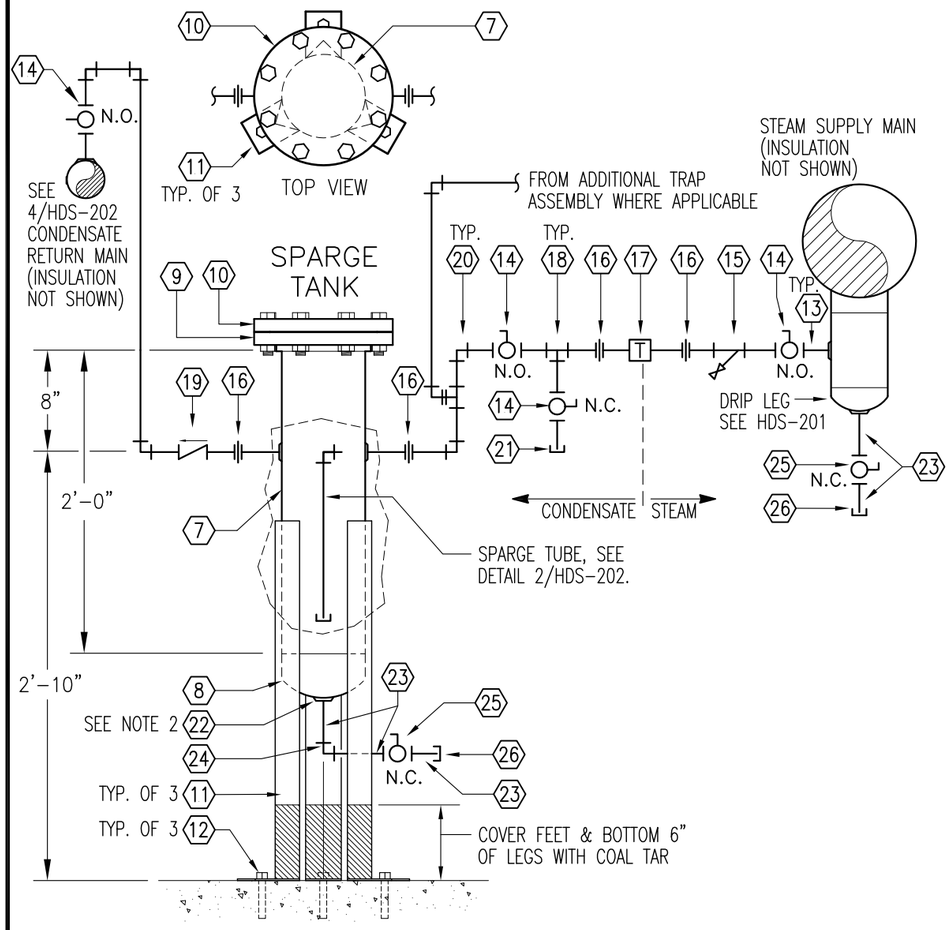
ITEM	DESCRIPTION	COMMENTS
1	STANDARD WALL THICKNESS TEE	BEVELED ENDS
2	STANDARD WALL THICKNESS NIPPLE	BEVELED ENDS
3	STANDARD WALL THICKNESS CAP	BEVELED ENDS
4	CLASS 3000 3/4" SOCKOLET	3/4" STEAM TRAP ATTACHMENT
5	CLASS 3000 1-1/2" SOCKOLET	1-1/2" BLOW DOWN VALVE ATTACHMENT

DOYON UTILITIES LLC

STEAM MAIN DRIPLEG DETAILS

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / UTILIDORS

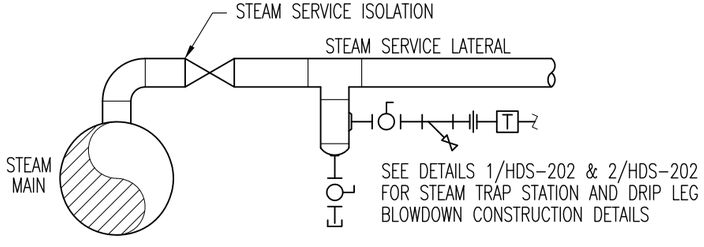
Drawing No.
HDS-201
11 SEPT 2014



TYPICAL STEAM TRAP STATION CONNECTION TO CONDENSATE RETURN VIA SPARGE TANK

1 HDS-202

NO SCALE



TYP. STEAM SERVICE LATERAL DRIP LEG & TRAP STATION IN UTILIDOR OR VAULT

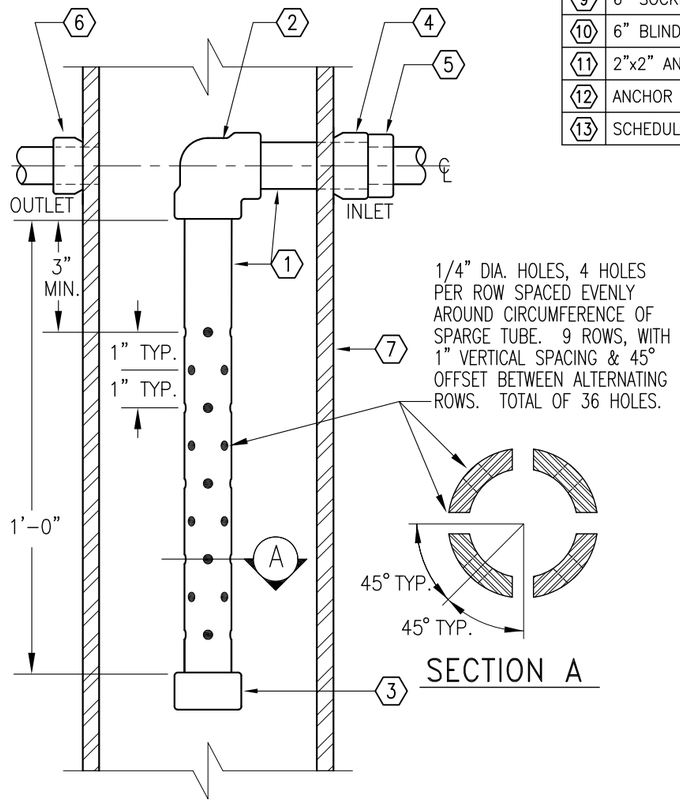
3 HDS-202

NO SCALE

NOTES:

CONSTRUCTION OF SPARGE TANK & TUBE MUST COMPLY WITH ASME B31.1 POWER PIPING, INCLUDING, BUT NOT LIMITED TO:

1. PER ASME B31.1, 104.4.1: SPARGE TUBE ENDS MUST COMPLY WITH ASME B31.1 TABLE 125.1 – FITTINGS.
2. PER ASME B31.1, 104.4.2: DIAMETER OF OPENING IN END CAP MUST BE LESS THAN 1/2 INSIDE DIAMETER OF END CAP.
3. WELDS MUST COMPLY WITH ASME B31.1, FIGURE 127.4.8.
4. REINFORCE IN ACCORDANCE WITH REQUIREMENTS FOR A BRANCH CONNECTION, PER ASME B31.1, 104.3.10 AND 104.4.2.



SPARGE TANK & SPARGE TUBE DETAIL

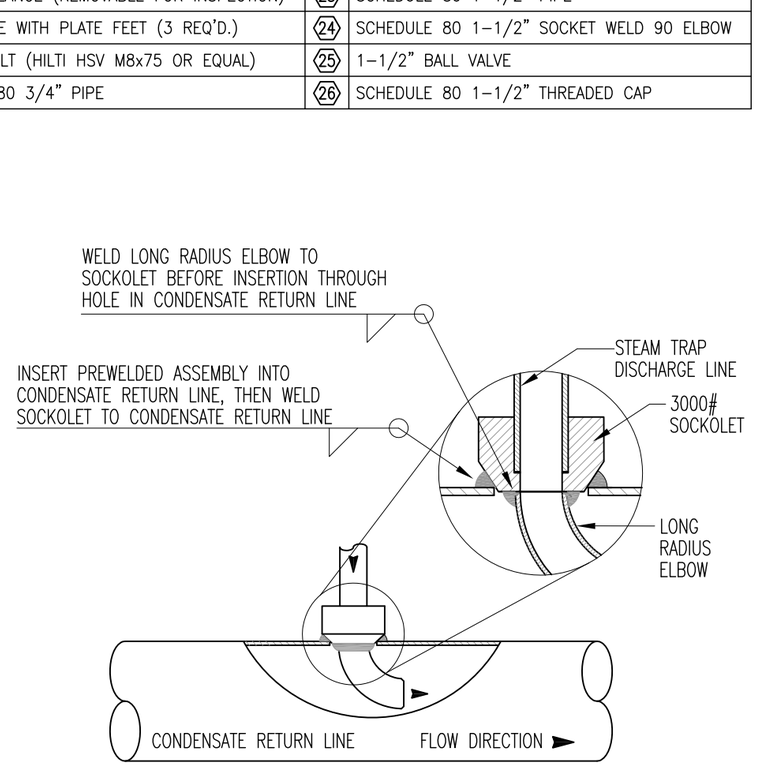
2 HDS-202

NO SCALE

MATERIALS LIST:

MATERIALS & EQUIPMENT AS REQUIRED IN CURRENT DOYON UTILITIES HEAT DISTRIBUTION SYSTEM DESIGN & CONSTRUCTION STANDARD.

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	SCHEDULE 80 1" PIPE	14	3/4" CARBON STEEL BALL VALVE
2	CLASS 3000 1" SOCKET WELD 90° ELBOW	15	3/4" WYE STRAINER
3	CLASS 3000 1" SOCKET WELD CAP	16	3/4" UNION
4	CLASS 3000 1" SOCKOLET (SEE NOTES 3 & 4)	17	THERMODYNAMIC STEAM TRAP
5	CLASS 3000 1"x3/4" SW REDUCER INSERT	18	3/4"x3/4"x3/4" TEE
6	CLASS 3000 3/4" SOCKOLET	19	3/4" CHECK VALVE
7	SCHEDULE 80 6" PIPE (2'-0" LONG)	20	SCHEDULE 80 3/4" SOCKET WELD 90 ELBOW
8	6"xH PIPE CAP (SEE NOTE 1)	21	SCHEDULE 80 3/4" THREADED CAP
9	6" SOCKET WELD PIPE FLANGE	22	SCHEDULE 80 1-1/2" SOCKOLET
10	6" BLIND FLANGE (REMOVABLE FOR INSPECTION)	23	SCHEDULE 80 1-1/2" PIPE
11	2"x2" ANGLE WITH PLATE FEET (3 REQ'D.)	24	SCHEDULE 80 1-1/2" SOCKET WELD 90 ELBOW
12	ANCHOR BOLT (HILTI HSV M8x75 OR EQUAL)	25	1-1/2" BALL VALVE
13	SCHEDULE 80 3/4" PIPE	26	SCHEDULE 80 1-1/2" THREADED CAP



CONDENSATE MAIN CONNECTION DETAIL

4 HDS-202

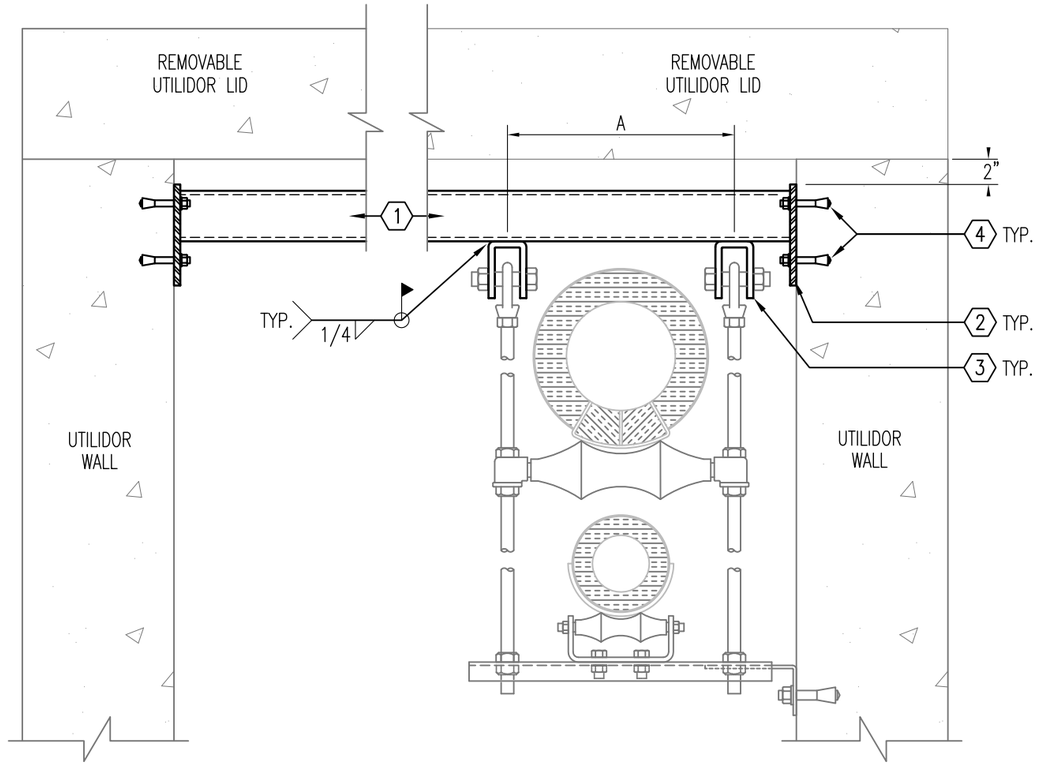
NO SCALE

DOYON UTILITIES LLC

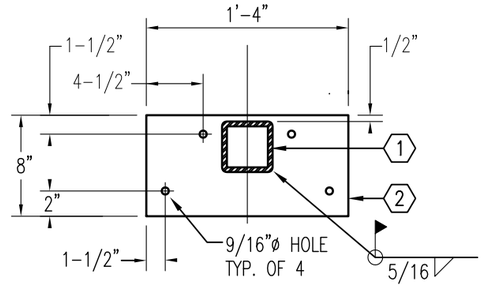
STEAM TRAP STATION & SPARGE TANK DETAILS

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / UTILIDORS

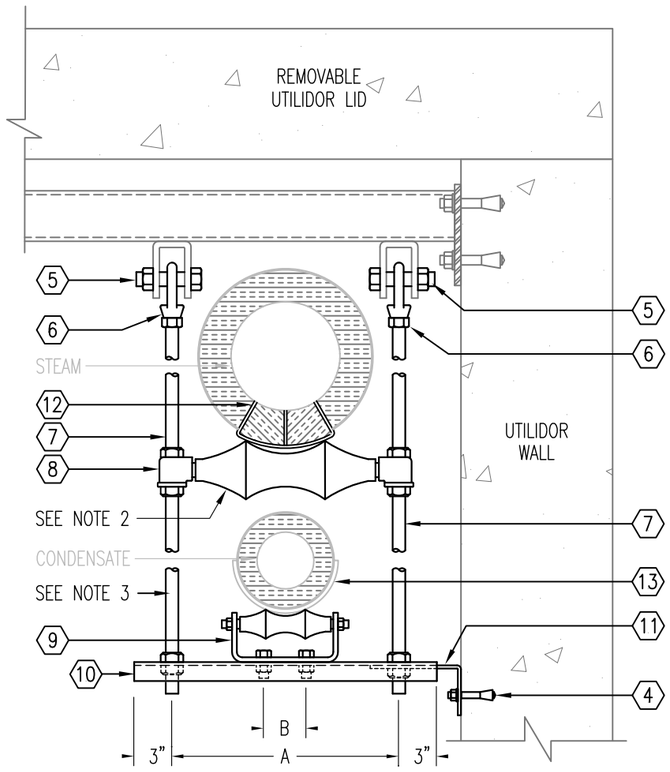
Drawing No.
HDS-202
18 NOV 2014



HANGER SUPPORT DETAIL 2 / HDS-203



WALL PLATE DETAIL 1 / HDS-203



PIPE HANGER DETAIL 3 / HDS-203

MATERIAL LIST:

MATERIALS & EQUIP. AS REQ'D. IN CURRENT DOYON UTILITIES HEAT DISTRIBUTION SYSTEM DESIGN & CONSTRUCTION STANDARD.

ITEM	DESCRIPTION	ITEM	DESCRIPTION
⟨1⟩	4"x4"x3/8" STRUCTURAL TUBING	⟨8⟩	ANVIL FIG. 171 PIPE ROLL
⟨2⟩	1'-4"x8"x3/8" STEEL WALL PLATE	⟨9⟩	ANVIL FIG. 175 ROLLER CHAIR
⟨3⟩	ANVIL FIG. 66 WELDED BEAM ATTACHMENT	⟨10⟩	C3x5
⟨4⟩	1/2"øx4" HILTI STAINLESS STEEL QUICK BOLT 3	⟨11⟩	1/4"x1-1/2" SEISMIC SWAY BRACE
⟨5⟩	SEE TABLE ON LEFT	⟨12⟩	PIPE SADDLE
⟨6⟩	ANVIL FIG. 290 WELDLESS EYE NUT	⟨13⟩	METAL SHIELD
⟨7⟩	SEE TABLE ON LEFT		

DIMENSIONS:

PIPE SIZE	⟨5⟩ BOLT SIZE	⟨7⟩ THREADED ROD	A	B
2"	7/8"x3"	3/4"ø	11-15/16"	3-3/8"
3"	1"x4"	7/8"ø	14-1/16"	5-1/4"
4"	1"x4"	7/8"ø	14-1/16"	5-1/4"
6"	1"x4"	7/8"ø	15-13/16"	5-1/2"
8"	1-1/8"x4-1/2"	1"ø	17-3/4"	6-1/2"
10"	1-1/8"x4-1/2"	1"ø	19-3/4"	8-1/4"
12"	1-1/8"x4-1/2"	1"ø	21-7/8"	9-1/4"
14"	1-3/8"x5"	1-1/4"ø	24-1/4"	10-1/4"
16"	1-3/8"x5"	1-1/4"ø	28-5/8"	12-1/4"
18"	1-5/8"x5-3/4"	1-1/2"ø	28-5/8"	12-1/4"
20"	1-5/8"x5-3/4"	1-1/2"ø	28-5/8"	15-3/8"
24"	1-5/8"x5-3/4"	1-1/2"ø	35-1/2"	15-3/8"

NOTES:

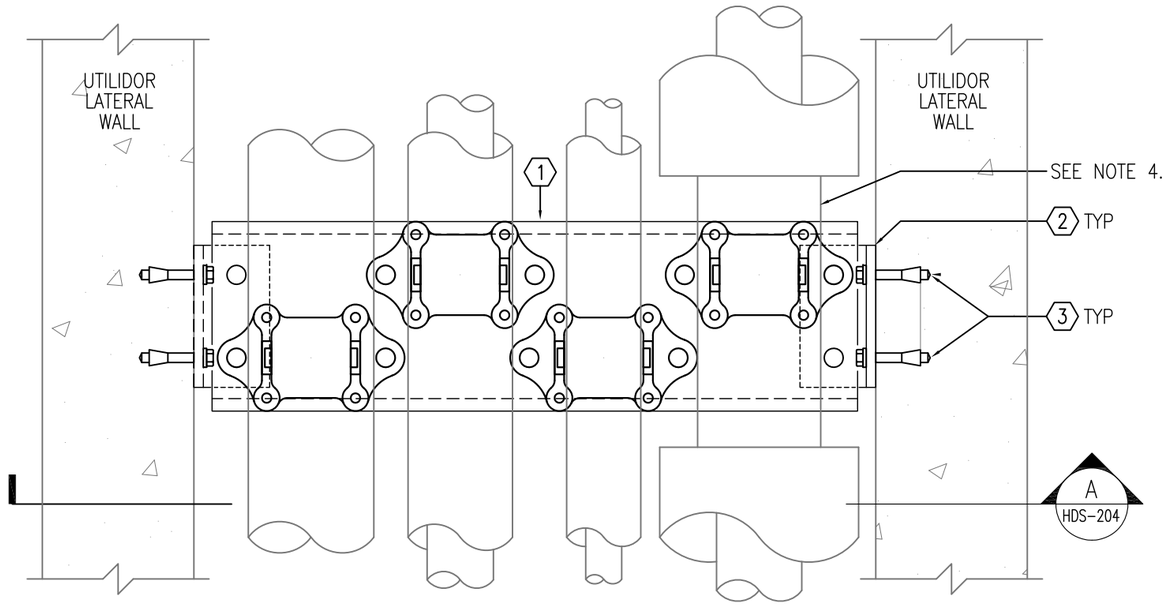
1. ITEMS ⟨1⟩,⟨2⟩,⟨3⟩ AND ⟨10⟩ SHALL BE SANDBLASTED AND EPOXY COATED AFTER FABRICATION.
2. PIPE ROLL SIZE IS DETERMINED BY DIAMETER OF PIPE PLUS THICKNESS OF INSULATION.
3. ROD SIZES ARE DETERMINED BY SIZE OF STEAM PIPE ROLL.
4. PROVIDE SLOTTED HOLES LONGITUDINALLY IN C3x5 FOR 1" HORIZONTAL ADJUSTMENT.
5. TOUCH-UP PAINT REQUIRED FOR AREAS DAMAGED DURING INSTALLATION.
6. IF SPACE PERMITS IN THE MAIN UTILIDOR, CONTRACTOR MAY INSTALL ALL UTILITY SERVICES ALONG ONE WALL. CONTRACTOR SHALL FIELD VERIFY SIZE AND CAPACITY OF HANGER ATTACHMENT MODIFICATIONS AND SUBMIT TO DU FOR REVIEW.

DOYON UTILITIES LLC

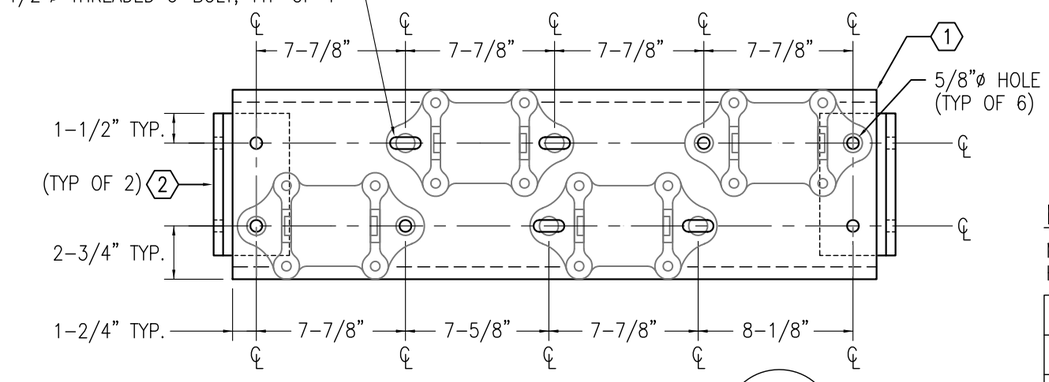
STEAM & CONDENSATE MAIN HANGER DETAILS

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / UTILIDORS

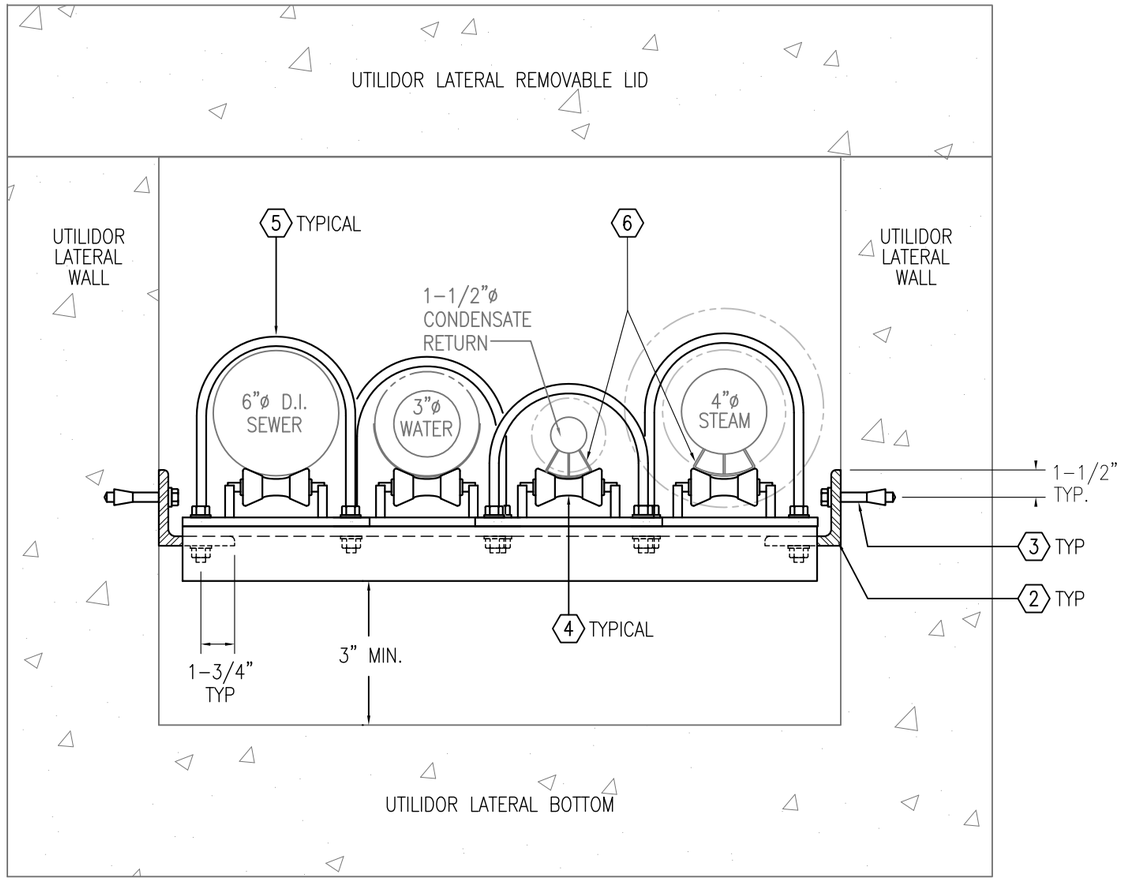
Drawing No.
HDS-203
26 JULY 2012



PLAN VIEW – PIPE SUPPORTS (1 / HDS-204)



PLAN VIEW – CHANNEL (2 / HDS-204)



SECTION A (HDS-204)

NOTES:

1. ITEMS ⟨1⟩ AND ⟨2⟩ ARE TO BE SANDBLASTED AND EPOXY COATED.
2. PIPE ROLL SIZE IS DETERMINED BY DIAMETER OF PIPE AND THICKNESS OF INSULATION.
3. WIDTH OF SUPPORT IS BASED ON A 36" WIDE UTILIDOR LATERAL.
4. REDUCE 14" LONG SECTION OF INSULATION ON STEAM PIPE TO 1" THICK AT PIPE SUPPORT.
5. TOUCH-UP PAINT REQUIRED FOR AREAS DAMAGED DURING INSTALLATION.

MATERIAL LIST:

MATERIALS & EQUIPMENT AS REQUIRED IN CURRENT DOYON UTILITIES HEAT DISTRIBUTION SYSTEM DESIGN AND CONSTRUCTION STANDARD.

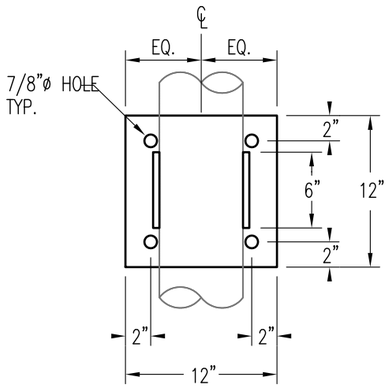
ITEM	DESCRIPTION
⟨1⟩	C10x25
⟨2⟩	L4"x4"x1/2"x7-1/2" LONG (PLACE BELOW CHANNEL WEB)
⟨3⟩	1/2"øx4" HILTI STAINLESS STEEL QUICK BOLT 3
⟨4⟩	ANVIL FIG. 271 PIPE ROLL
⟨5⟩	U-BOLT WITH WASHERS AND NUTS. U-BOLT MADE FROM 1/2"ø THREADED ROD
⟨6⟩	ANVIL PIPE COVERING PROTECTIVE SADDLE FIG. 160 THRU 165

DOYON UTILITIES LLC

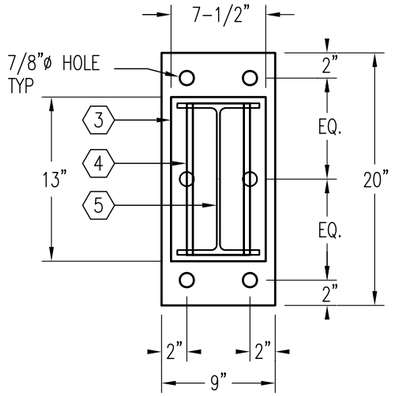
UTILIDOR LATERAL PIPE SUPPORT DETAILS

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / UTILIDORS

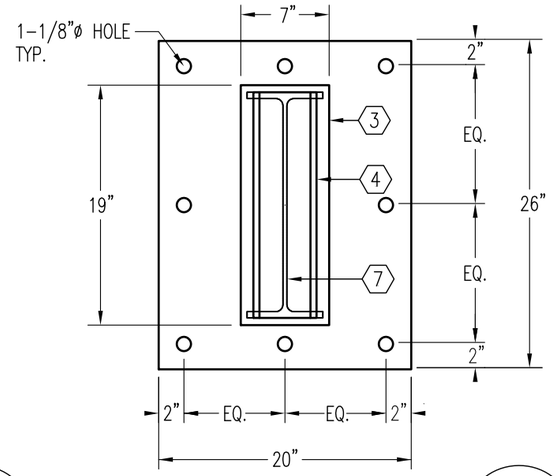
Drawing No.
HDS-204
26 JULY 2012



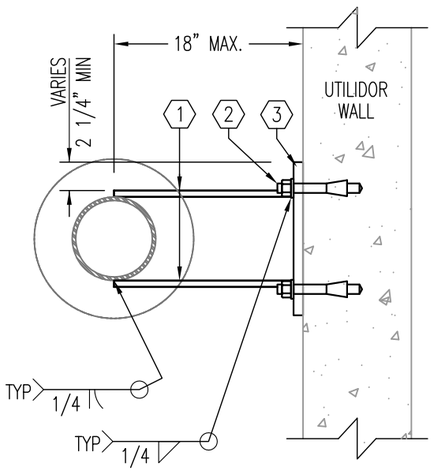
ANCHOR A PLAN 1 HDS-205



ANCHOR B PLAN 2 HDS-205

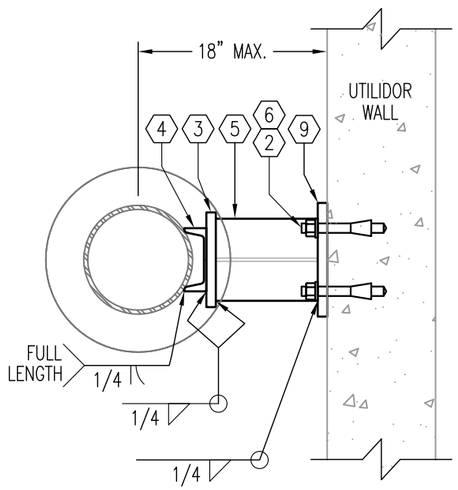


ANCHOR C PLAN 3 HDS-205



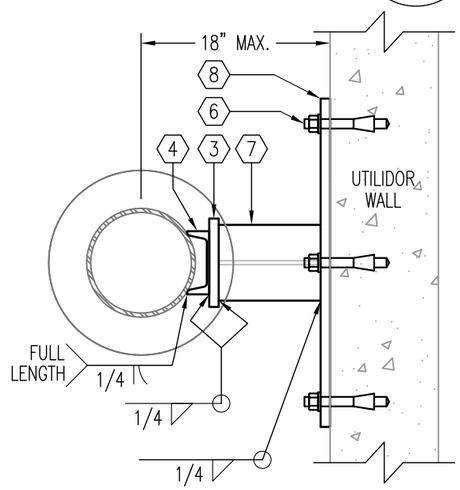
ANCHOR A SECTION 4 HDS-205

NOTES:
1. ANCHOR RATED FOR 2000 LBS. CAPACITY
2. 3/4"ø ANCHOR BOLT TO BE DESIGNED FOR A MINIMUM OF THE FOLLOWING:
   - 2.1. 754 LB SHEAR
   - 2.2. 3267 LB TENSION



ANCHOR B SECTION 5 HDS-205

NOTES:
1. UTILIZING A 3/4" THICK BASE PLATE, ANCHOR RATED FOR 5500 LBS. CAPACITY
   - 1.1. 3/4"ø ANCHOR BOLTS TO BE DESIGNED FOR A MINIMUM OF THE FOLLOWING:
     - 1.1.1. 1381 LB SHEAR
     - 1.1.2. 3848 LB TENSION
2. UTILIZING A 1" THICK BASE PLATE, ANCHOR RATED FOR 7000 LBS. CAPACITY
   - 2.1. 1"ø ANCHOR BOLTS TO BE DESIGNED FOR A MINIMUM OF THE FOLLOWING:
     - 2.1.1. 1758 LB SHEAR
     - 2.1.2. 4899 LB TENSION



ANCHOR C SECTION 6 HDS-205

NOTES:
1. ANCHOR RATED FOR 14250 LBS. CAPACITY
2. 1"ø ANCHOR BOLT TO BE DESIGNED FOR A MINIMUM OF THE FOLLOWING:
   - 2.1. 2685 LB SHEAR
   - 2.2. 5031 LB TENSION

NOTES:

1. ITEMS ⟨1⟩ ⟨3⟩ ⟨4⟩ ⟨5⟩ ⟨7⟩ ⟨8⟩ & ⟨9⟩ SHALL BE SANDBLASTED AND EPOXY COATED AFTER FABRICATION. ADDITIONALLY, PIPE ANCHORS WITHIN 6" OF THE FLOOR SHALL BE COATED WITH ASPHALT FOR ADDITIONAL PROTECTION.
2. ANCHOR BOLT DESIGN IS RESPONSIBILITY OF CONTRACTOR & PROJECT ENGINEER WITH THE FOLLOWING INFORMATION:
   - 2.1. CONCRETE TO BE A MINIMUM OF 4 KSI MATERIAL, 6" THICK & CRACKED CONCRETE DESIGN CRITERIA.
   - 2.2. BOLTS TO BE DESIGNED FOR SEISMIC CONDITIONS AND SHALL BE RATED FOR SUCH CONDITIONS IN THE ICC-ESR REPORT
   - 2.3. ALL BOLTS TO BE INSTALLED PER MANUFACTURER REQUIREMENTS AS DETAILED IN ICC-ESR REPORTS
   - 2.4. NO ANCHOR SHALL BE INSTALLED WITHIN 2'-0" OF A COLD JOINT, CONSTRUCTION JOINT OR CORNER WITHOUT PRIOR WRITTEN PERMISSION FROM ENGINEER OF RECORD.
   - 2.5. SEE NOTES BELOW EACH ANCHOR FOR DESIGN REQUIREMENTS BASED ON MAXIMUM LOADING CAPACITY.
   - 2.6. ANY ANCHOR FORCES GREATER THAN SHOWN VALUES SHALL BE DESIGNED BY AN ENGINEER WITHIN THE STATE OF WORK PERFORMED.
3. RATED ANCHOR CAPACITY IS BASED ON AXIAL LOADING, BOLT VALUES SHOWN INCLUDE A 10% GRAVITY FROM MAXIMUM AXIAL
4. ALL PIPE ANCHORS SHALL BE WELDED TO PIPE AS SHOWN. BOLTED CONNECTIONS ARE PROHIBITED.
5. TOUCH-UP PAINT REQUIRED FOR AREAS DAMAGED OR WELDED DURING INSTALLATION.
6. HDS-205 IS ONLY AN ALLOWED OPTION WITH PRIOR APPROVAL FROM DU PROJECT MANAGER. SEE HDS-211 FOR THROUGH BOLTING OPTION, WHICH IS THE PREFERRED OPTION.

MATERIAL LIST:

MATERIALS & EQUIPMENT AS REQ'D. ON CURRENT DOYON UTILITIES HEAT DISTRIBUTION SYSTEM DESIGN AND CONSTRUCTION STANDARD.

ITEM	DESCRIPTION
⟨1⟩	1/2" THICK STEEL PLATE.
⟨2⟩	3/4"ø GALVANIZED OR STAINLESS STEEL* ANCHORS, SEISMICALLY RATED (SEE NOTES)
⟨3⟩	3/4" THICK STEEL PLATE.
⟨4⟩	C5x6.7 CHANNEL WELDED TO 3/4" PLATE AND CARRIER PIPE.
⟨5⟩	W12x35 CENTERED ON PLATE
⟨6⟩	1"ø GALVANIZED OR STAINLESS STEEL* ANCHORS, SEISMICALLY RATED (SEE NOTES)
⟨7⟩	W18x35 CENTERED ON PLATE
⟨8⟩	1" THICK STEEL PLATE.
⟨9⟩	3/4" OR 1" THICK STEEL PLATE (SEE NOTES).

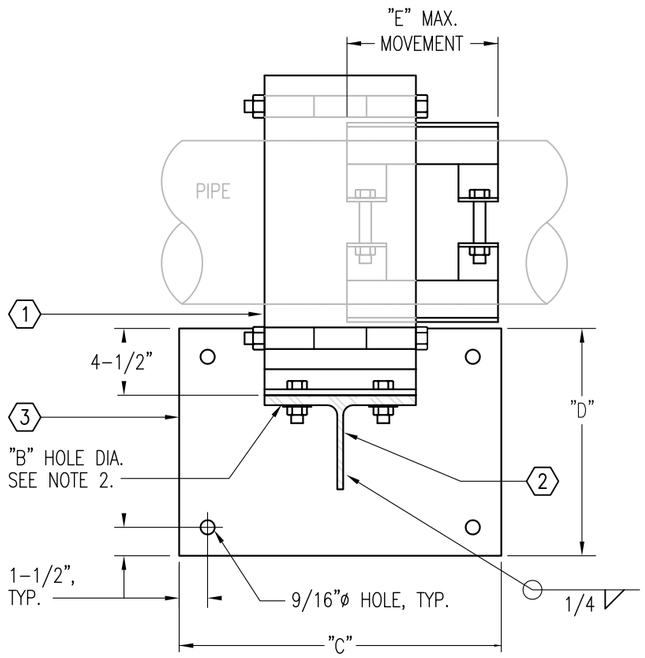
*USE STAINLESS STEEL FOR FLOOR ANCHORS OR WALL ANCHORS BELOW 6" A.F.F.

DOYON UTILITIES LLC

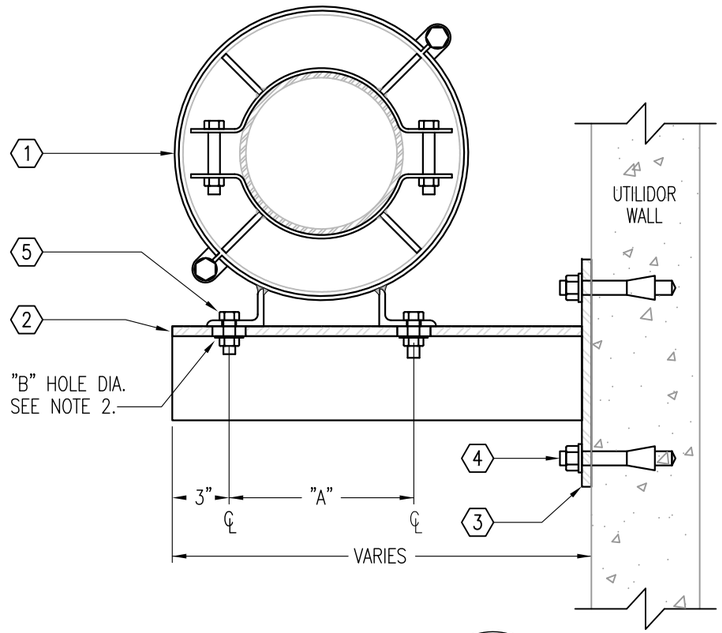
STEAM & CONDENSATE MAIN ANCHOR DETAILS

DESIGN & CONSTRUCTION STANDARDS HEAT DISTRIBUTION SYSTEM / UTILIDORS

Drawing No.
HDS-205
18 NOV 2014



WALL PLATE 1 HDS-206



PIPE GUIDE 2 HDS-206

NOTES:

1. ITEMS ⟨2⟩ AND ⟨3⟩ ARE TO BE SANDBLASTED AND EPOXY COATED AFTER FABRICATION.
2. PROVIDE SLOTTED BOLT HOLES LONGITUDINALLY FOR 1" HORIZONTAL ADJUSTMENT ON PIPE GUIDE SUPPORT PRIOR TO GALVANIZING.
3. PIPE GUIDE SIZE NUMBER IS DETERMINED BY DIAMETER OF PIPE AND THICKNESS OF INSULATION.
4. TOUCH-UP PAINT REQUIRED FOR AREAS DAMAGED DURING INSTALLATION.

DIMENSIONS:

PIPE SIZE	GUIDE SIZE *	⟨2⟩			⟨3⟩		⟨1⟩	⟨5⟩
		STRUCTURAL TEE	A	B HOLE DIA.	C	D	E	BOLT SIZE
2"	C	WT5x19.5	7-7/8"	5/8"	15"	10"	6"	1/2"øx2"
3"	C	WT5x19.5	7-7/8"	5/8"	15"	10"	6"	1/2"øx2"
4"	C	WT5x19.5	7-7/8"	5/8"	15"	10"	6"	1/2"øx2"
6"	E	WT5x19.5	9-3/4"	3/4"	15"	10"	8"	5/8"øx2"
8"	E	WT5x19.5	9-3/4"	3/4'	15"	10"	8"	5/8"øx2"
10"	F	WT6x25	14-1/8"	1"	15"	12"	8"	3/4"øx2"
12"	F	WT6x25	14-1/8"	1"	15"	12"	8"	3/4"øx2"
14"	G	WT6x25	15-7/8"	1"	15"	12"	8"	3/4"øx2"
16"	G	WT6x25	15-7/8"	1"	15"	12"	8"	3/4"øx2"
18"	H	WT8x44	16-3/8"	1"	18"	14"	10"	3/4"øx2"
20"	H	WT8x44	16-3/8"	1"	18"	14"	10"	3/4"øx2"
24"	J	WT8x44	17-1/8"	1"	18"	14"	10"	3/4"øx2"

* GUIDE SIZE BASED ON STEAM PIPE DIAMETER PLUS 3" THICK INSULATION.

MATERIAL LIST:

MATERIALS & EQUIPMENT AS REQUIRED IN CURRENT DOYON UTILITIES HEAT DISTRIBUTION SYSTEM DESIGN AND CONSTRUCTION STANDARD.

ITEM	DESCRIPTION
⟨1⟩	ANVIL FIG. 256 PIPE GUIDE
⟨2⟩	STRUCTURAL TEE. SEE TABLE THIS SHEET.
⟨3⟩	1/2" THICK STEEL WALL PLATE. SEE TABLE THIS SHEET.
⟨4⟩	1/2"øx4" HILTI STAINLESS STEEL QUICK BOLT 3.
⟨5⟩	STAINLESS STEEL MOUNTING BOLT, WASHERS AND NUT (TYP. OF 4). SEE TABLE THIS SHEET FOR SIZE.

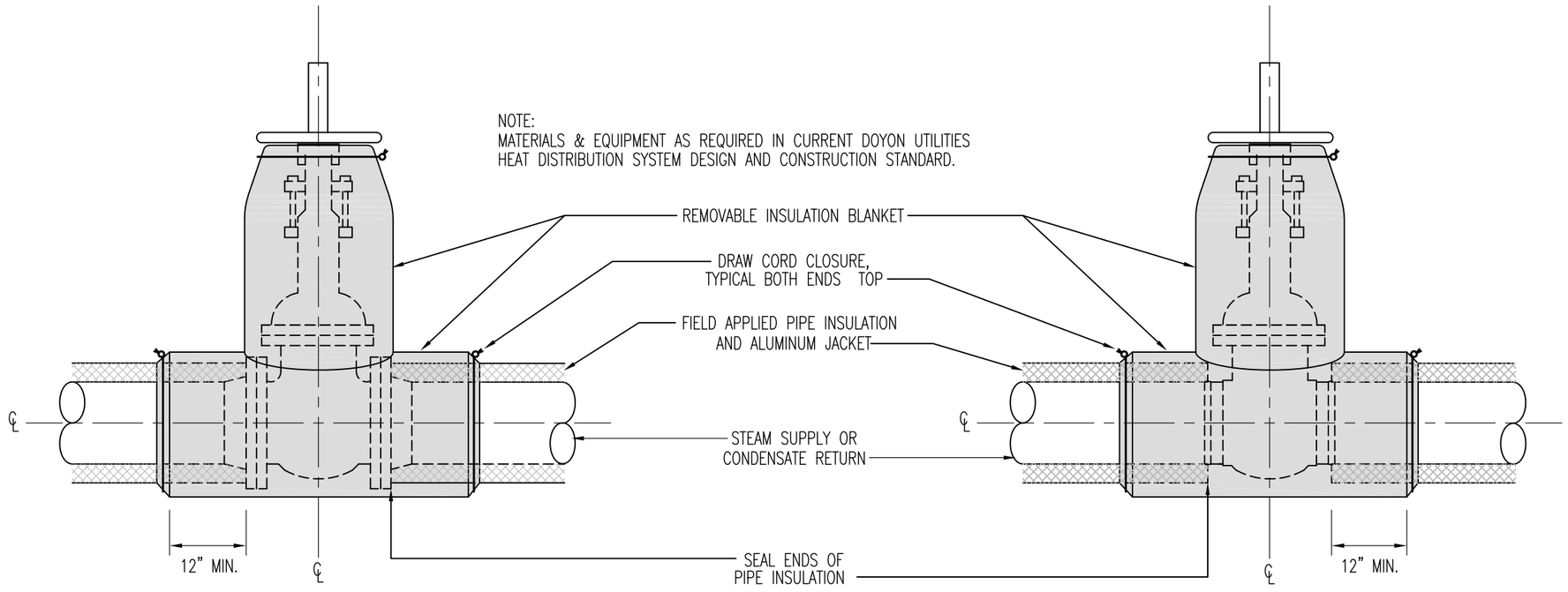
DOYON UTILITIES LLC

STEAM & CONDENSATE SUPPORT GUIDE DETAILS

DESIGN & CONSTRUCTION STANDARDS HEAT DISTRIBUTION SYSTEM / UTILIDORS

Drawing No.
HDS-206
26 JULY 2012

NOTE:
MATERIALS & EQUIPMENT AS REQUIRED IN CURRENT DOYON UTILITIES HEAT DISTRIBUTION SYSTEM DESIGN AND CONSTRUCTION STANDARD.



TYPICAL FLANGED VALVE INSULATION DETAIL — 1 / HDS-207

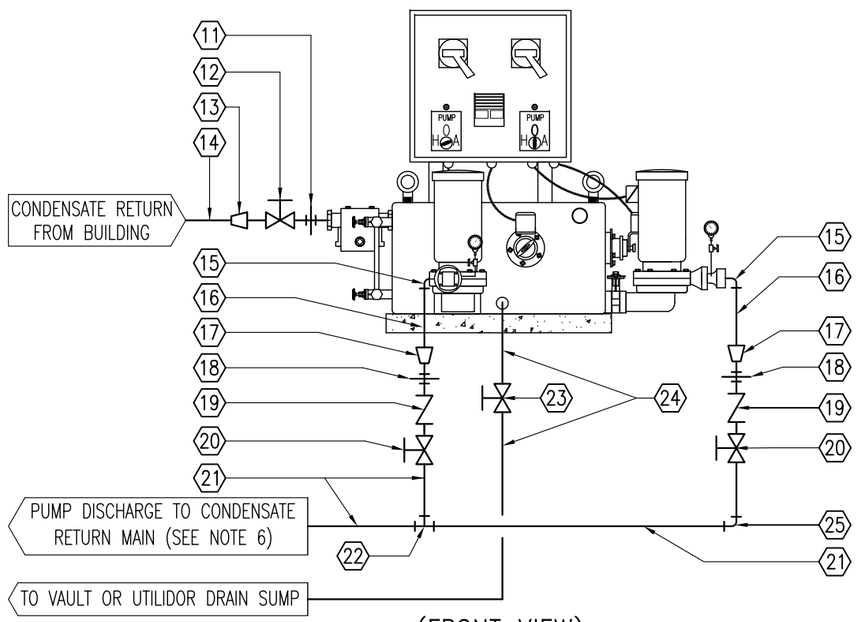
TYPICAL BUTT-WELD VALVE INSULATION DETAIL — 2 / HDS-207

DOYON UTILITIES LLC

VALVE INSULATION DETAILS

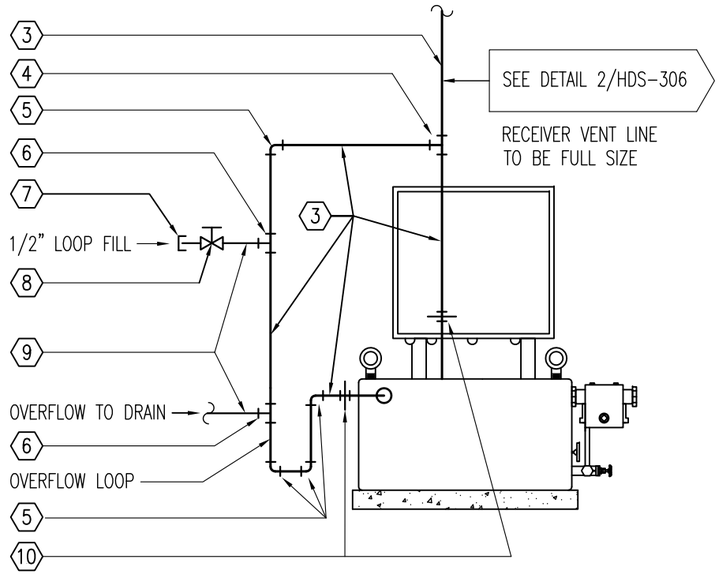
DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / UTILIDORS

Drawing No.
HDS-207
26 JULY 2012



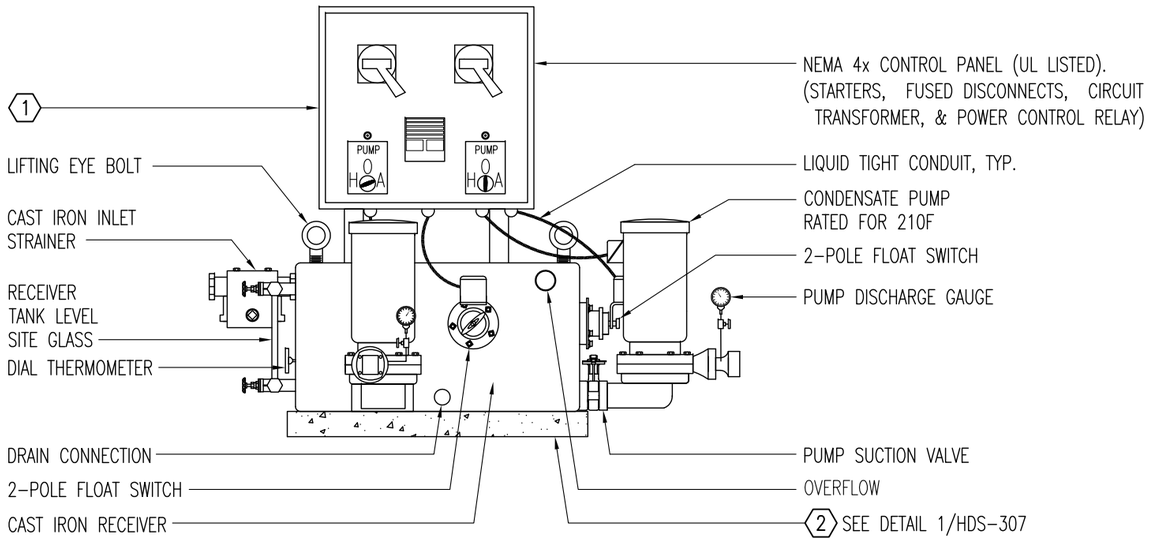
(FRONT VIEW)

CONDENSATE & DRAIN PIPING SCHEMATIC



(REAR VIEW)

VENT & OVERFLOW PIPING SCHEMATIC



(FRONT VIEW)

CONDENSATE RECEIVER PUMP PACKAGE DETAILS

1
HDS-208

NOTES:

1. UNIT TO BE FACTORY ASSEMBLED AND TESTED.
2. UNIT TO BE FACTORY DISASSEMBLED AND COMPONENTS SHIPPED LOOSE.
3. UNIT TO BE REASSEMBLED & RETESTED BY INSTALLING CONTRACTOR ON SITE.
4. PIPE SIZES WILL VARY BASED ON CONDENSATE RECEIVER BEING USED.
5. BASIS OF STANDARD DRAWING IS DOMESTIC 36CB9-30 DUPLEX UNIT.
6. USE DIELECTRIC UNION TO CONNECT STAINLESS AND CARBON STEEL PIPING.

MATERIAL LIST:

MATERIALS & EQUIPMENT AS REQUIRED COPY IN CURRENT DOYON UTILITIES HEAT DISTRIBUTION SYSTEM DESIGN AND CONSTRUCTION STANDARD.

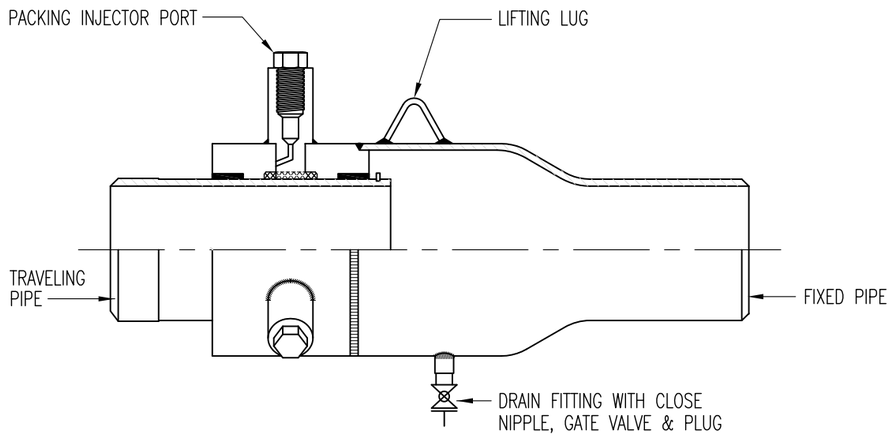
ITEM	DESCRIPTION
1	CONDENSATE RECEIVER PUMP PACKAGE
2	4" CONCRETE PAD
3	2" CARBON STEEL STANDARD WEIGHT PIPE
4	2"x2"x2" CARBON STEEL STANDARD WEIGHT TEE
5	2" CARBON STEEL STANDARD WEIGHT 90° ELBOW
6	2"x2"x1/2" CARBON STEEL STANDARD WEIGHT TEE
7	1/2" CARBON STEEL STANDARD WEIGHT THREADED CAP
8	1/2" CARBON STEEL SHUT OFF VALVE
9	1/2" CARBON STEEL STANDARD WEIGHT PIPE
10	2" CARBON STEEL UNION
11	3" STAINLESS STEEL UNION
12	3" SIZE STAINLESS STEEL BALL VALVE
13	LINE SIZE-TO-3" STAINLESS STEELREDUCER OR ENLARGER AS REQ'D.
14	CARBON STEEL SCHEDULE 80 CONDENSATE RETURN LINE
15	2" STAINLESS STEEL SCHEDULE 10S 90° ELBOW
16	2" STAINLESS STEEL SCHEDULE 10S PIPE
17	2"x1-1/2" STAINLESS STEEL SCHEDULE 10S REDUCER
18	1-1/2" STAINLESS STEEL UNION
19	1-1/2" CHECK STAINLESS STEEL VALVE
20	1-1/2" STAINLESS STEEL BALL VALVE
21	1-1/2" STAINLESS STEEL SCHEDULE 10S PIPE
22	1-1/2" x 1-1/2" x 1-1/2" STAINLESS STEEL SCHED. 10S TEE
23	1" STAINLESS STEEL SHUT OFF VALVE
24	1" STAINLESS STEEL SCHEDULE 10S PIPE
25	1-1/2" STAINLESS STEEL SCHEDULE 10S 90° ELBOW

DOYON UTILITIES LLC

CONDENSATE RETURN UNIT DETAILS

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / UTILIDORS

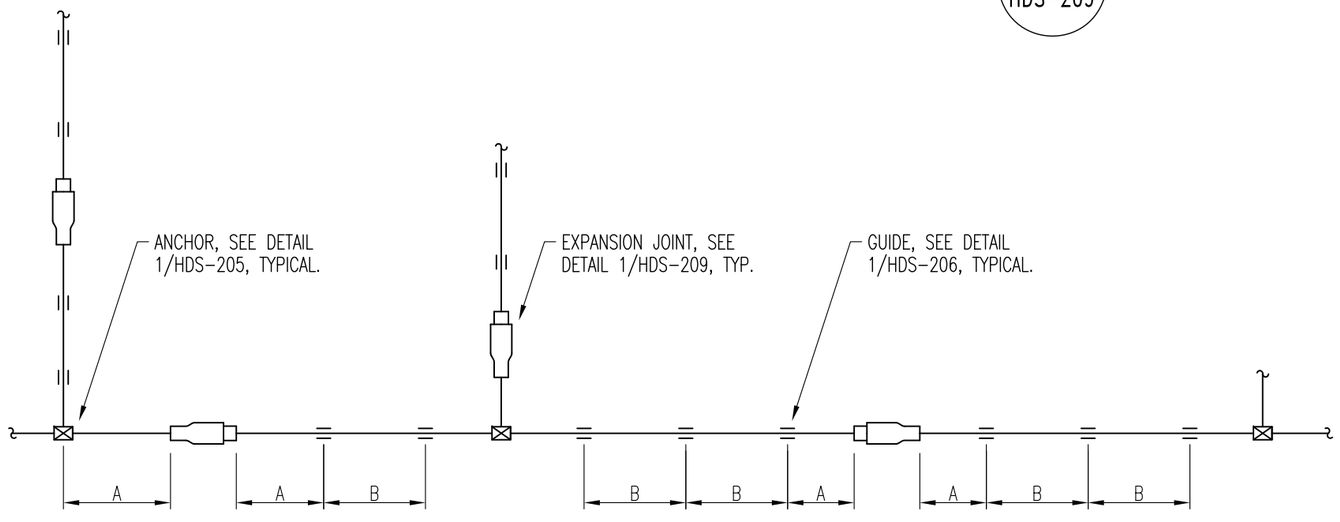
Drawing No.
HDS-208
18 NOV 2014



WELDED ENDS

SLIP–TYPE EXPANSION JOINT DETAIL

1
HDS–209



NOTE: SPACING OF GUIDES IS DEPENDENT ON PIPE SIZE. SEE TABLE ABOVE FOR "GENERAL" DISTANCES.

STANDARD ARRANGEMENT FOR SLIP–TYPE EXPANSION JOINTS, GUIDES & ANCHORS

1
HDS–209

GUIDE DISTANCES:

PIPE ø	"A" DISTANCE TO FIRST GUIDE (FEET)	DISTANCE TO ADDITIONAL GUIDES (FEET)
1"	2	12
1–1/2"	2	17
2"	3	18
3"	4	22
4"	5	30
6"	7	40
8"	10	50
10"	12	62
12"	15	68
14"	16	70
16"	18	78
18"	21	88
20"	23	93
24"	28	102

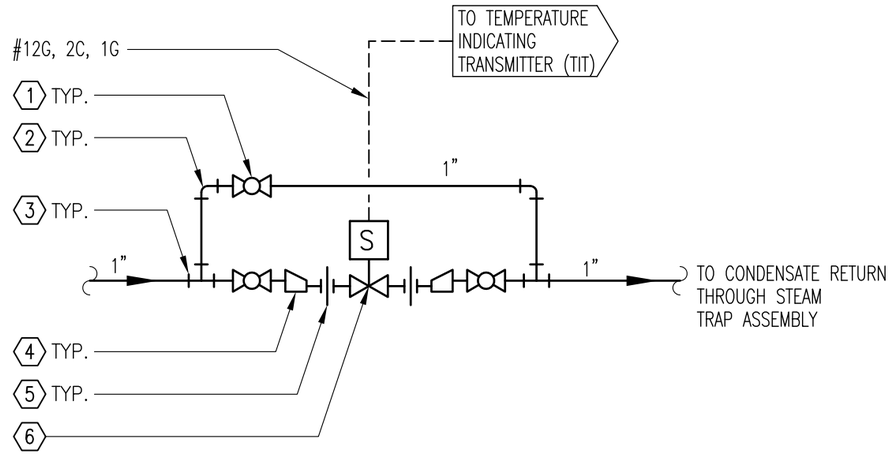
NOTE:
MATERIALS & EQUIPMENT AS REQUIRED IN CURRENT DOYON UTILITIES HEAT DISTRIBUTION SYSTEM DESIGN AND CONSTRUCTION STANDARD.

DOYON UTILITIES LLC

EXPANSION JOINT DETAILS

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / UTILIDORS

Drawing No.
HDS-209
26 JULY 2012



MATERIAL LIST:

MATERIAL & EQUIPMENT AS REQ'D. IN CURRENT DOYON UTILITIES HEAT DISTRIBUTION SYSTEM DESIGN AND CONSTRUCTION STANDARD.

ITEM	DESCRIPTION
1	1" CARBON STEEL BALL VALVE
2	1" CARBON STEEL STANDARD WEIGHT 90° ELBOW
3	1"x1"x1" CARBON STEEL STANDARD WEIGHT TEE
4	1"x1/2" CARBON STEEL ECCENTRIC REDUCER
5	1/2" CARBON STEEL UNION
6	1/2" CARBON STEEL CONTROL VALVE

HEAT TRACE CONTROL VALVE & BYPASS LINE DETAIL

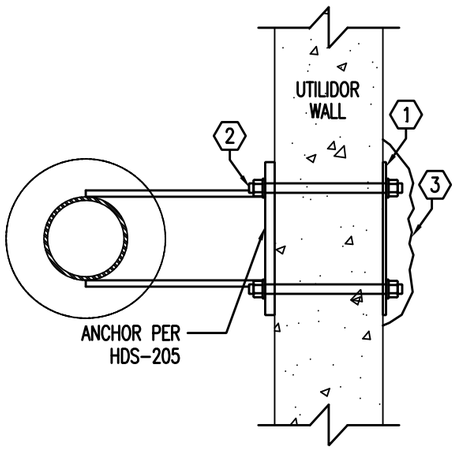
1
HDS-210

DOYON UTILITIES LLC

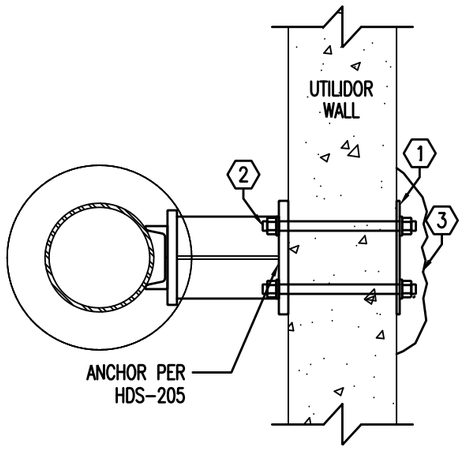
HEAT TACE DETAILS

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / UTILIDORS

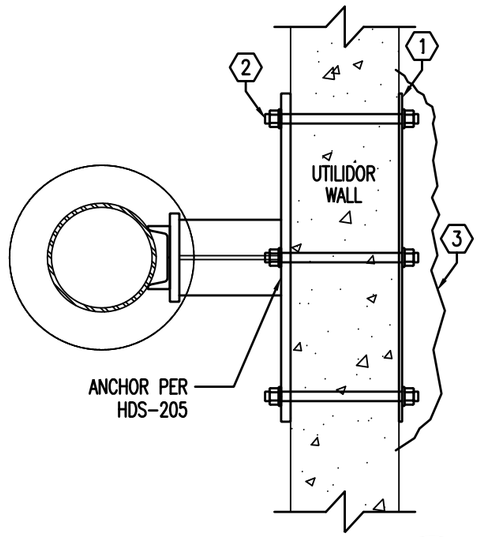
Drawing No.
HDS-210
10 SEPT 2014



ANCHOR A SECTION 1 HDS-211



ANCHOR B SECTION 2 HDS-211



ANCHOR C SECTION 3 HDS-211

NOTES:

1. SEE NOTES AND DETAILS ON HDS-205 FOR ANCHOR CONSTRUCTION DETAILS AND LOADING CAPACITIES.
2. BOLTS SHOWN ON THIS SHEET TO BE A193 GR. B7 MATERIAL; NUTS TO BE A194 GR. 2H MATERIAL
   2.1. HOLES TO BE FILLED WITH EPOXY PRIOR TO BOLT INSERTION, EPCON C6 OR PRE-APPROVED EQUAL
3. EXTERIOR PLATES TO BE 1/4" A36 STEEL
4. EXTERIOR PLATES CAN BE LEVELED WITH NON-SHRINK GROUT AS REQUIRED, NOT TO EXCEED 1" THICKNESS.
5. CEILING BASE PLATES CAN BE THROUGH BOLTED WHERE POSSIBLE, FILL HOLES WITH EPOXY AND WEATHER SEAL SIMILAR TO DETAIL
6. EXTERIOR SURFACE OF CONCRETE SHALL BE CLEANED OF ALL DEBRIS PRIOR TO INSTALLATION OF EXTERIOR PLATE AND URETHANE COATING.
7. ALL BOLTS SHALL HAVE A MINIMUM OF 2 THREADS EXPOSED FROM END OF NUT.

MATERIAL LIST:

MATERIALS & EQUIPMENT AS REQ'D. ON CURRENT DOYON UTILITIES HEAT DISTRIBUTION SYSTEM DESIGN AND CONSTRUCTION STANDARD.

ITEM	DESCRIPTION
1	1/4" THICK STEEL PLATE, MATCH STD BASE PLATE AS SHOWN ON HDS-205.
2	BOLT TO MATCH DIAMETER CALLED OUT ON HDS-205.
3	URETHANE COATING - RIM-SPRAY OR PRE-APPROVED EQUAL (MIN 1/2" THICK)

DOYON UTILITIES LLC

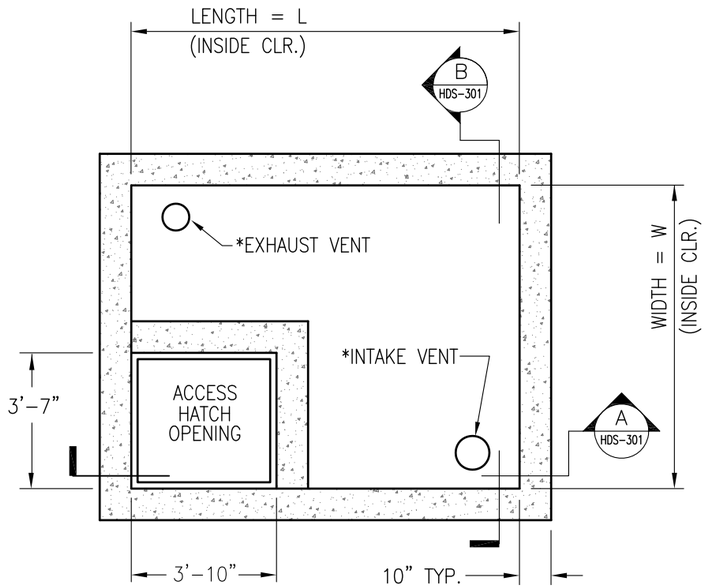
STEAM & CONDENSATE MAIN ANCHOR DETAILS

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / UTILIDORS

Drawing No.
HDS-211
18 JANUARY 2013

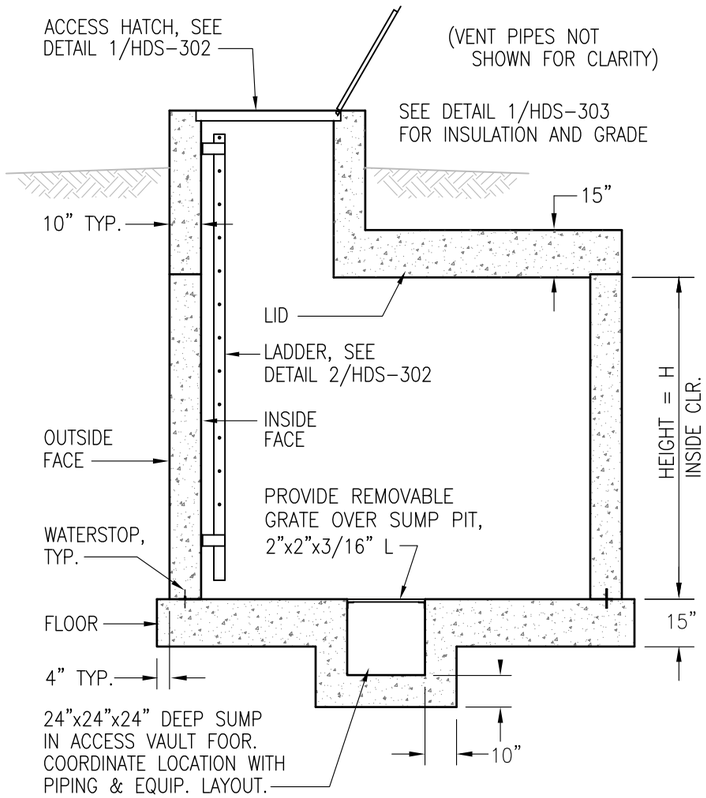
ACCESS VAULT SCHEDULE:

MH #	Detail #	Vault Size			Lid			Wall				Floor	
		W	L	H	Depth	Reinf (E.W.)		Width	Reinf (OUTSIDE FACE)	Reinf (INSIDE FACE)		Depth	Reinf (E.W.)
						Top	Bot		Horiz & Vert	Vert	Horiz		Top and Bot
EXAMPLE		15'-0"	12'-0"	10'-8"	1'-3"	#7 @ 1'-0"	#5 @ 1'-0"	10"	#5 @ 1'-3"	#5 @ 1'-0"	#5 @ 1'-3"	1'-3"	#5 @ 1'-3"

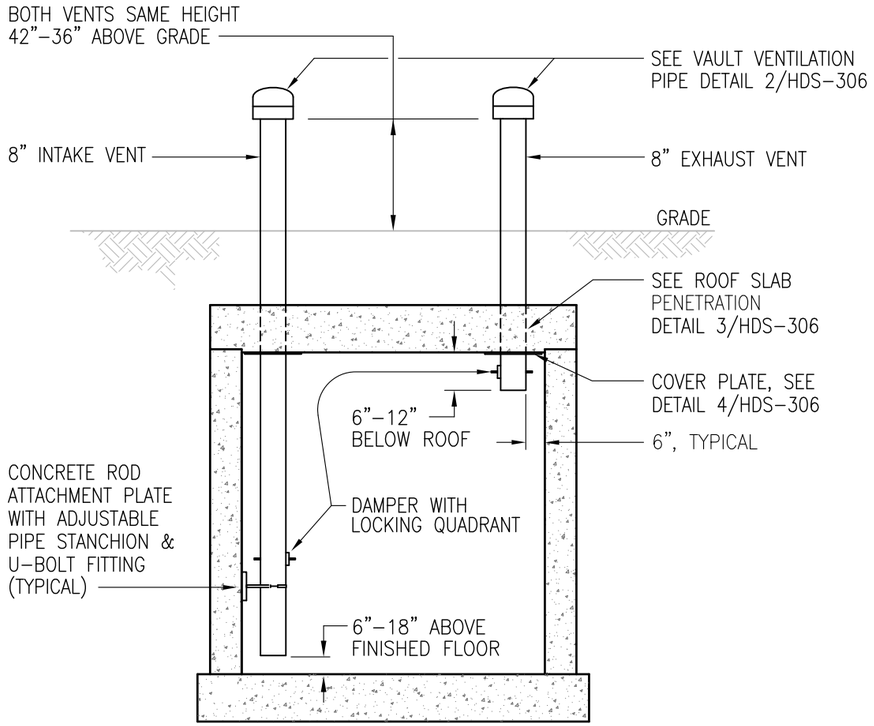


*COORDINATE VENT LOCATIONS WITH EQUIPMENT LAYOUT

PLAN VIEW 1 HDS-301



SECTION A HDS-301



(RISER FOR ACCESS HATCH NOT SHOWN FOR CLARITY)

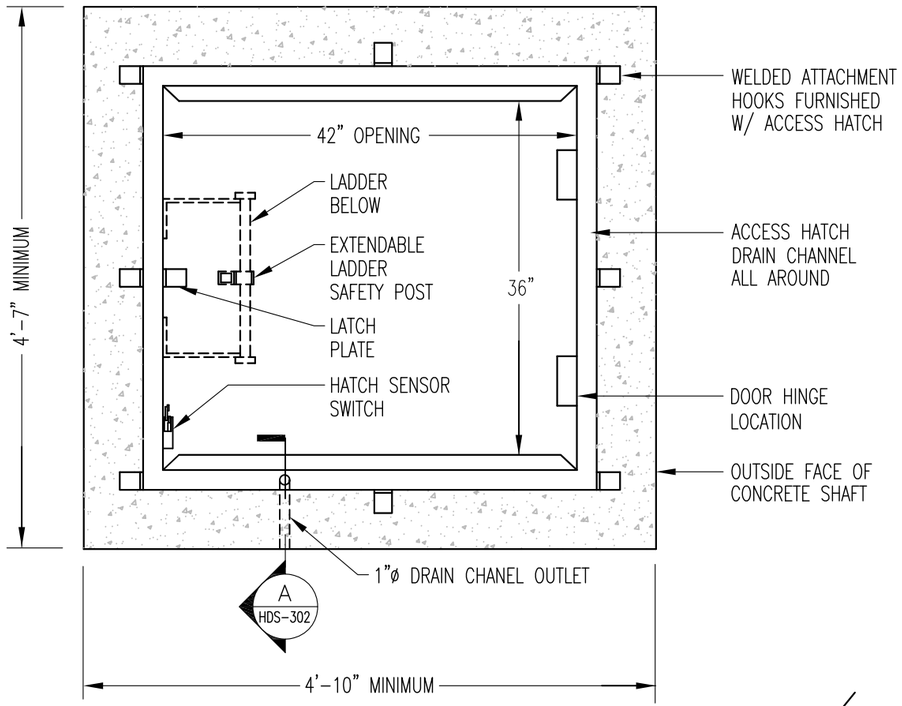
SECTION B HDS-301

DOYON UTILITIES LLC

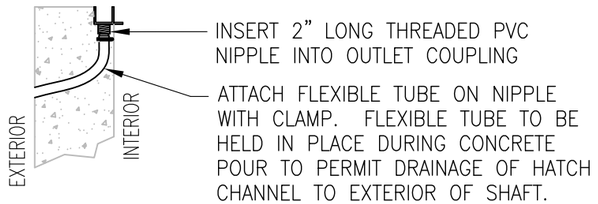
ACCESS VAULT SCHEDULE & DETAILS

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / UTILIDORS

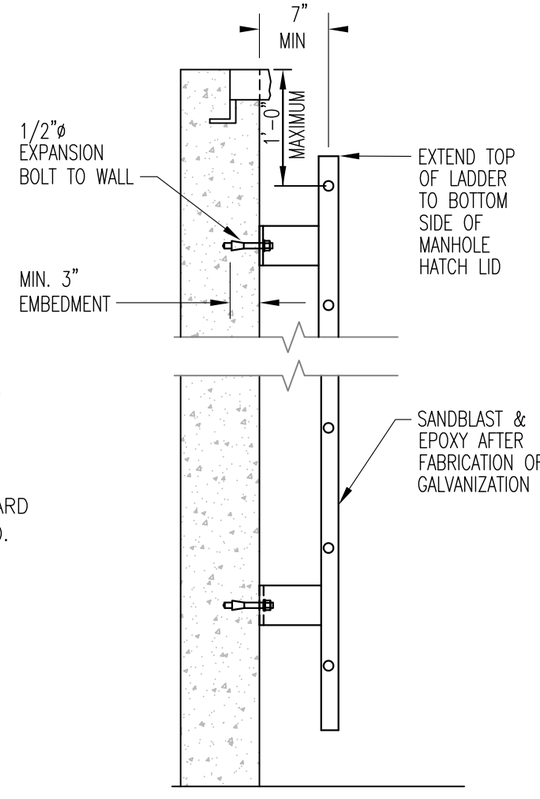
Drawing No.
HDS-301
20 AUG 2014



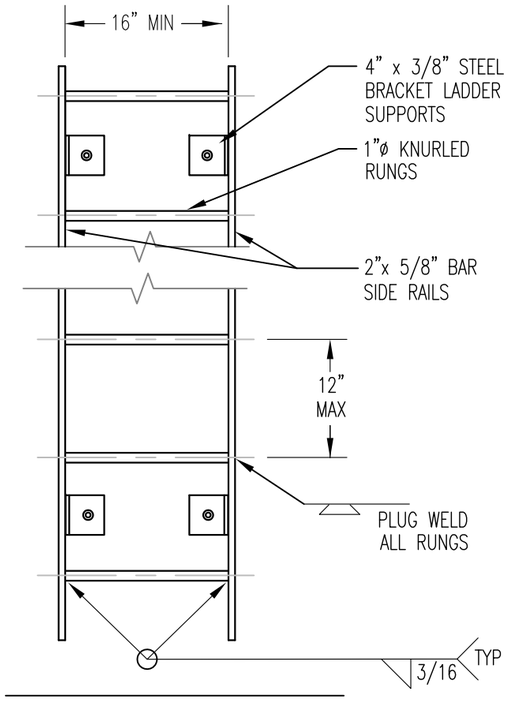
PLAN



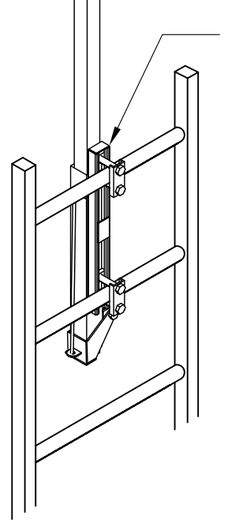
SECTION A HDS-302



SIDE ELEVATION

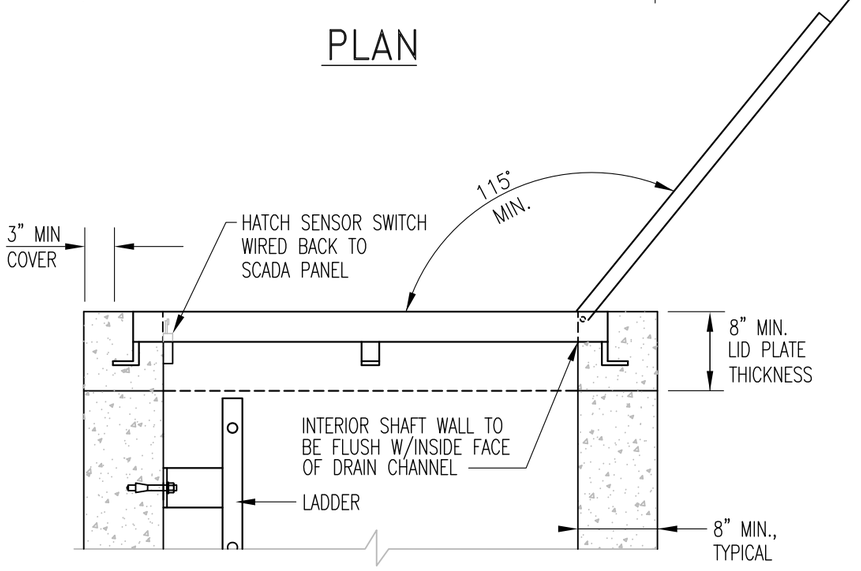


FRONT ELEVATION



LADDER SAFETY POST 2 HDS-302

LADDER DETAIL 3 HDS-302



SECTION

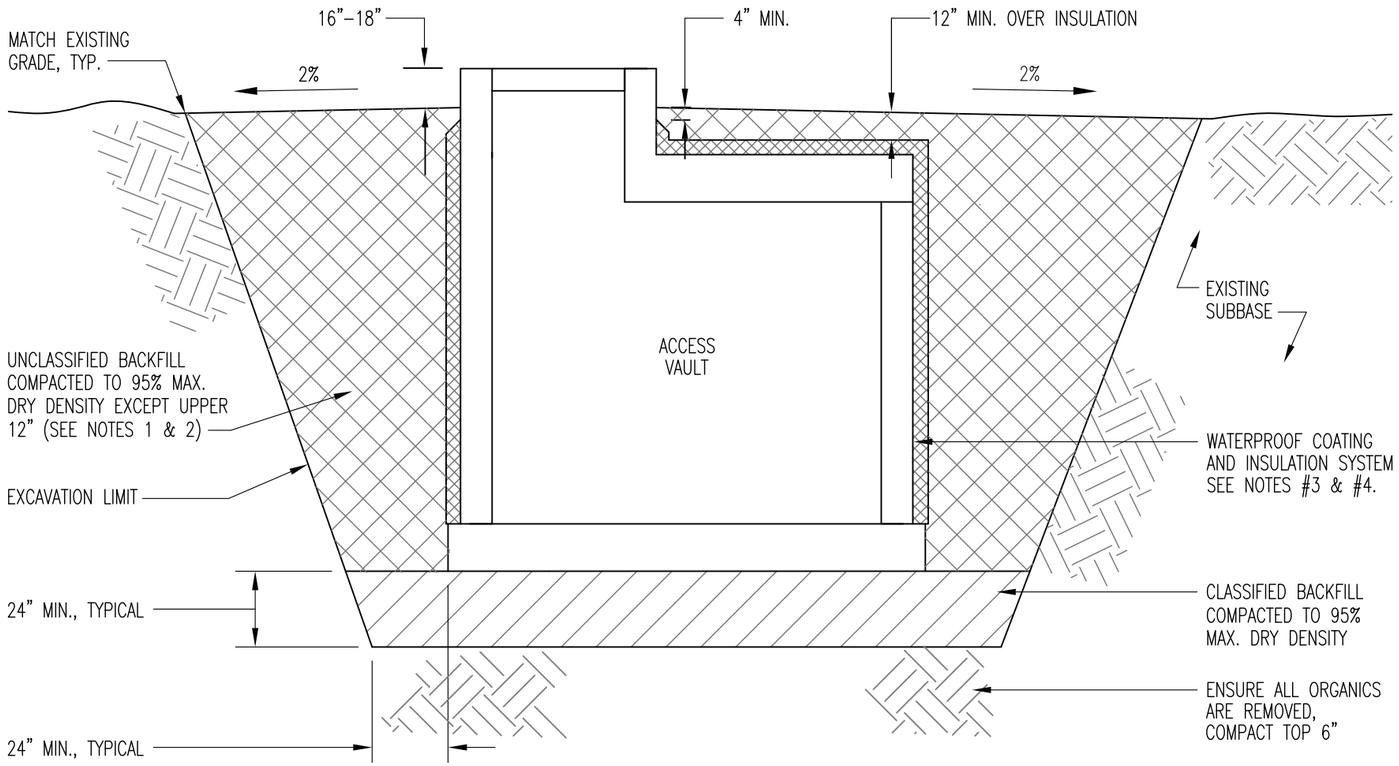
ACCESS HATCH DETAIL 1 HDS-302

DOYON UTILITIES LLC

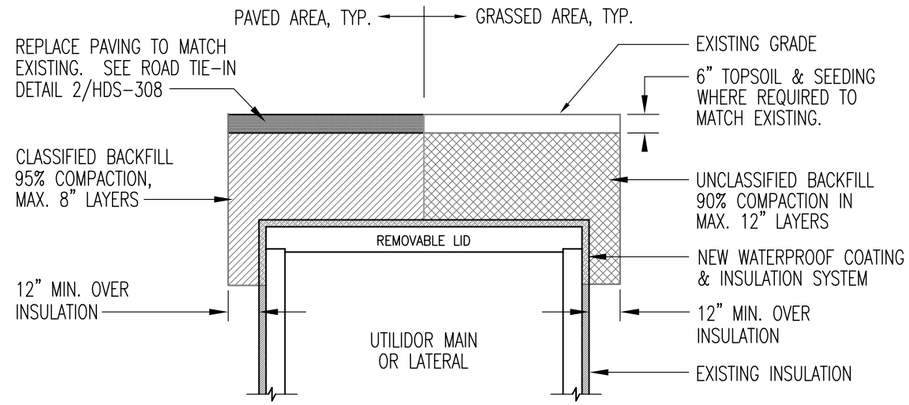
ENTRY HATCH & LADDER DETAILS

DESIGN & CONSTRUCTION STANDARDS HEAT DISTRIBUTION SYSTEM / UTILIDORS

Drawing No.
HDS-302
20 AUG 2014



ACCESS VAULT EARTHWORK SECTION DETAIL 1 HDS-303



UTILIDOR EARTHWORK SECTION DETAIL 2 HDS-303

NOTES:

1. THE TOP 12" OF BACKFILL IN AREAS TO BE TOPSOILED OR SEEDED SHALL BE COMPACTED TO 90%.
2. ALL AREAS DESIGNATED TO RECEIVE TOPSOIL OR SURFACING SHALL BE UNDERCUT OR UNDER FILLED TO ALLOW FOR PLACEMENT OF SAME SO THAT DESIGN FINISH GRADE ELEVATIONS ARE MET.
3. APPLY 2" THICK EXTRUDED POLYSTYRENE INSULATION TO EXTERIOR SURFACES OF UTILIDORS, ACCESS VAULTS AND MANHOLES. DO NOT INSULATE INTERIOR CONCRETE SURFACES.
4. UTILIDORS, ACCESS VAULTS AND MANHOLES SHALL BE OF WATERTIGHT CONSTRUCTION. ALL EXTERIOR SIDEWALL AND TOP SURFACES OF NEW UTILIDORS, ACCESS VAULTS AND MANHOLES SHALL BE COATED WITH WATERPROOFING MATERIAL; GRACE BITUTHENE OR APPROVED EQUAL.

DOYON UTILITIES LLC

EARTHWORK DETAILS

DESIGN & CONSTRUCTION STANDARDS HEAT DISTRIBUTION SYSTEM / UTILIDORS

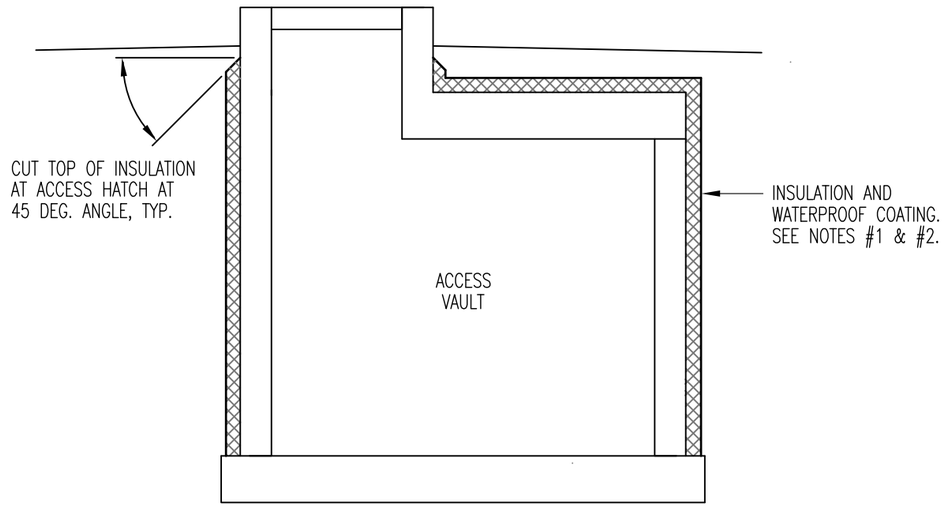
Drawing No.

HDS-303

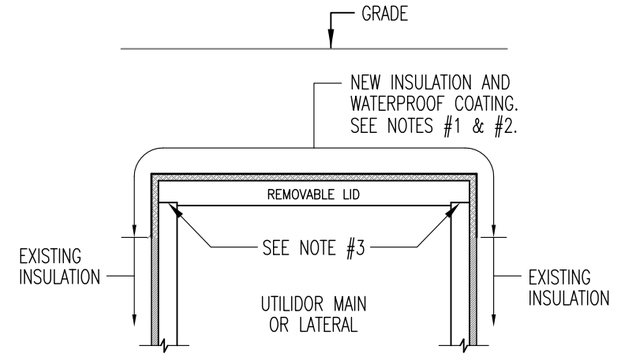
18 NOV 2014

NOTES:

1. APPLY 2" THICK EXTRUDED POLYSTYRENE INSULATION TO EXTERIOR SURFACES OF UTILIDORS, ACCESS VAULTS AND MANHOLES. DO NOT INSULATE INTERIOR CONCRETE SURFACES.
2. UTILIDORS, ACCESS VAULTS AND MANHOLES SHALL BE OF WATERTIGHT CONSTRUCTION. EXTERIOR SURFACES SHALL BE COATED WITH WATERPROOFING.
3. UTILIDOR WALL-TO-LID JOINTS SHALL BE SEALED WITH GENEROUS (3/4" HIGH X 4" WIDE) LAYER OF "FIBERED PLASTIC ROOF COATING", ACE HARDWARE PRODUCT #17897 OR APPROVED EQUAL, AND TWO (2) RUNS OF OAKUM TYPE FILLER MATERIAL ON TOP OF WALL PRESSED INTO MASTIC.
4. UTILITOR LID-TO-LID JOINTS SHALL BE SEALED BY PRESSING INTO JOINT ONE (1) OR TWO (2) RUNS OF OAKUM TYPE FILLER AS A BACKER MATERIAL, THEN TROWEL IN A GENEROUS LAYER OF "FIBERED PLASTIC ROOF COATING". ACE HARDWARE PRODUCT #17897 OR APPROVED EQUAL.



ACCESS VAULT INSULATION AND WATERPROOFING SECTION DETAIL 1 / HDS-304



UTILIDOR INSULATION AND WATERPROOFING SECTION DETAIL 2 / HDS-304

DOYON UTILITIES LLC

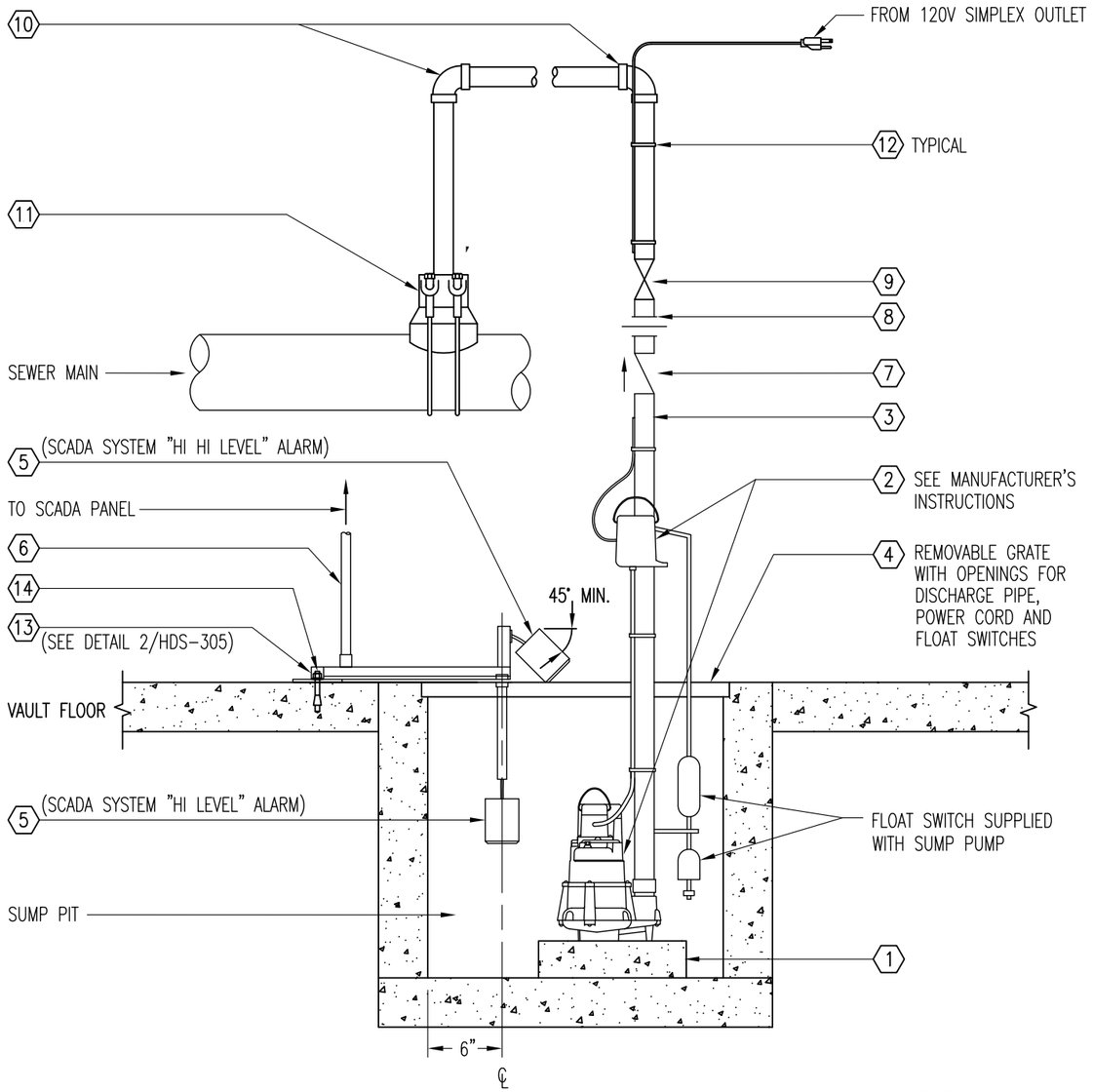
INSULATION & WATERPROOFING DETAILS

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / UTILIDORS

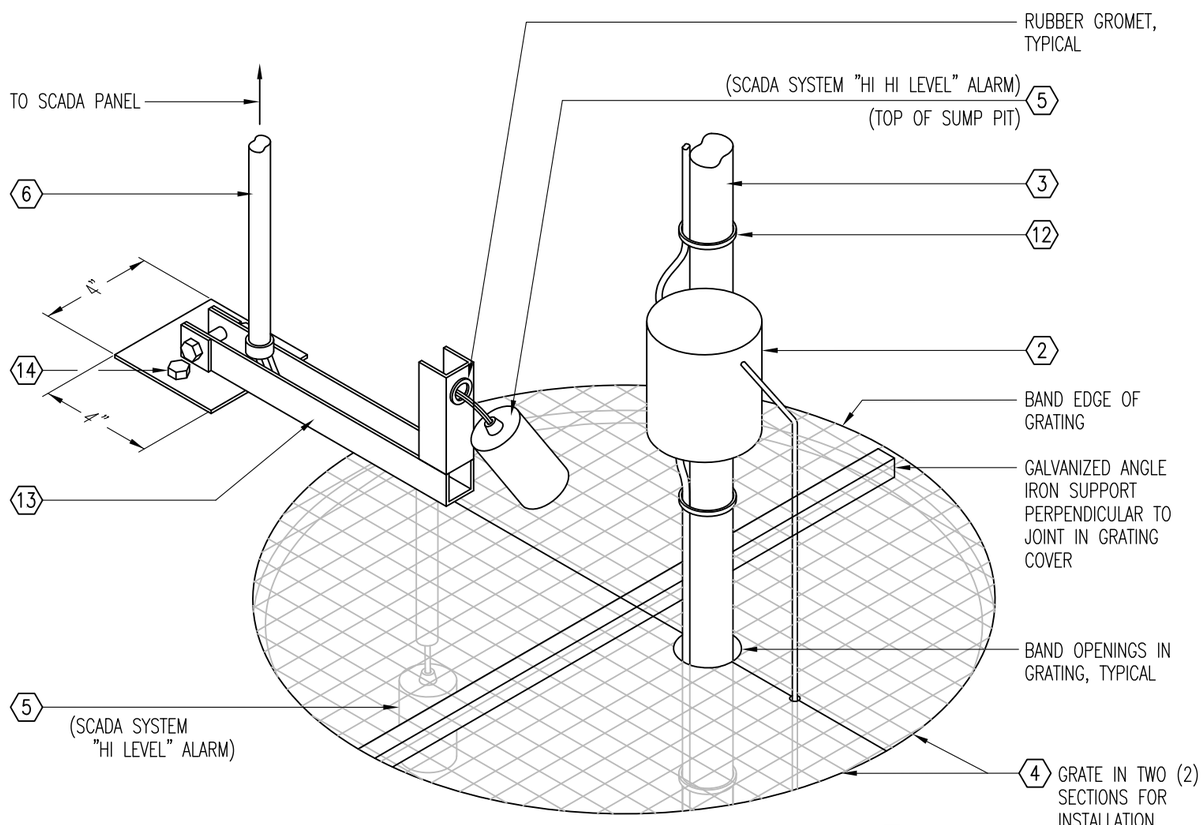
Drawing No.
HDS-304
20 NOVEMBER 2012

MATERIAL LIST:

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	3"x12"x12" CONCRETE PAD	8	1-1/2" CARBON STEEL UNION
2	HI TEMPERATURE SUMP PUMP PACKAGE WITH FLOAT SWITCHES	9	1-1/2" CARBON STEEL BALL VALVE
3	1-1/2" CARBON STEEL SCH 40 PIPE	10	1-1/2" STANDARD WEIGHT 90° FITTING
4	GALVANIZED BAR GRATING	11	ROMAC 'CB' SADDLE WITH STAINLESS STEEL STRAPS
5	FLOAT SWITCH & 20' CABLE	12	WIRE TIES
6	3/4" PVC CONDUIT	13	STAINLESS STEEL MOUNTING 1"X1" CHANNEL BRACKET
7	1-1/2" CARBON STEEL CHECK VALVE	14	3/8"ø HILTI STAINLESS STEEL QUICK BOLT EXPANSION ANCHOR, 2" EMBEDMENT.



SUBMERSIBLE SUMP PUMP DETAIL 1 HDS-305



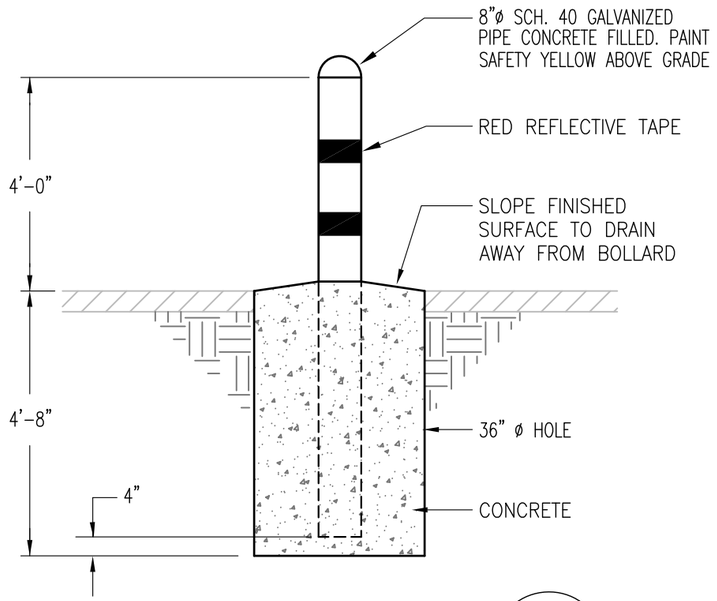
MOUNTING BRACKET DETAIL 2 HDS-305

DOYON UTILITIES LLC

SUMP & DRAINAGE DETAILS

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / UTILIDORS

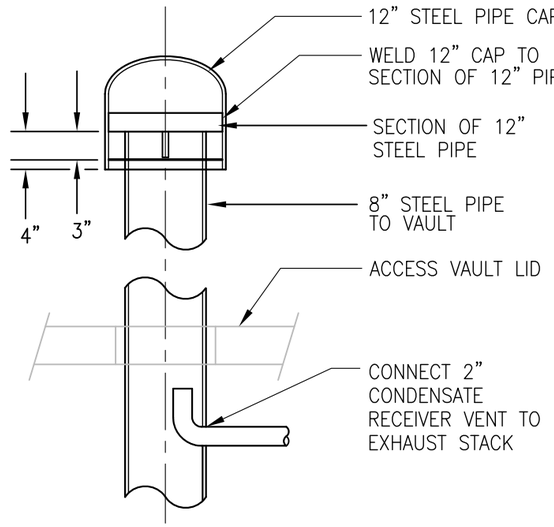
Drawing No.
HDS-305
26 JULY 2012



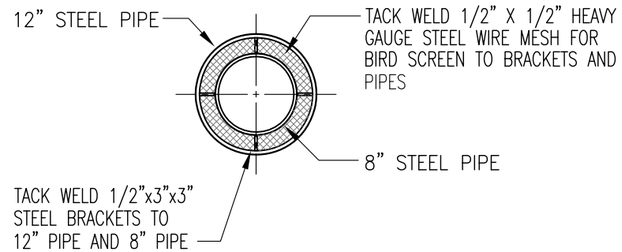
FILLED BOLLARD DETAIL 1

SCALE: 3/8" 1'-0"

HDS-306



SECTION

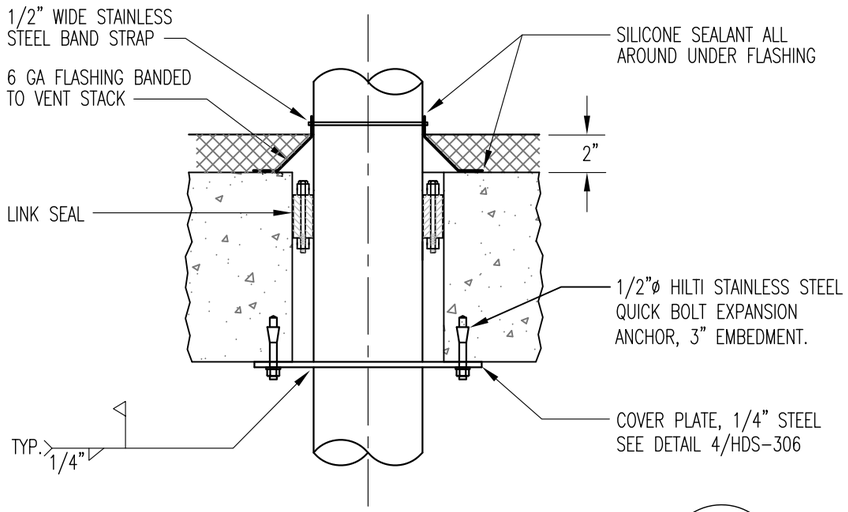


PLAN

ACCESS HATCH VENTILATION PIPE DETAIL 2

SCALE: 3/4" = 1'-0"

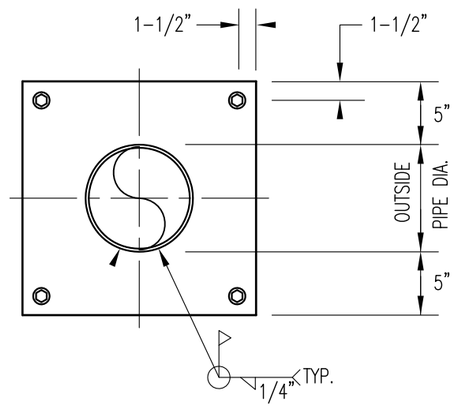
HDS-306



ROOF SLAB PENETRATION DETAIL 3

SCALE: 1/4" 1'-0"

HDS-306



COVER PLATE DETAIL VIEW LOOKING UP 4

SCALE: 1/4" 1'-0"

HDS-306

DOYON UTILITIES LLC

VENTILATION & PROTECTION DETAILS

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / UTILIDORS

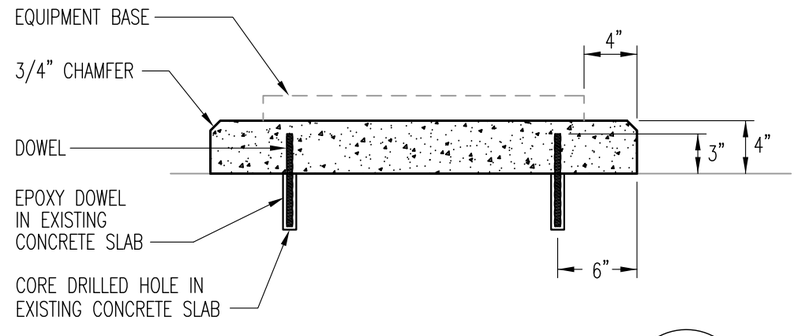
Drawing No.

HDS-306

17 SEPT 2014

NOTES:

1. NO HORIZONTAL REINFORCING REQUIRED IN NEW CONCRETE EQUIPMENT PAD.
2. CLEAN AND ROUGHEN EXISTING FLOOR SURFACE BEFORE POURING NEW CONCRETE EQUIPMENT PAD.
3. USE FOUR (4) EACH #4 REBAR DOWELS IN 4 LOCATIONS, 6" FROM THE EDGE OF. THE CONCRETE SLAB. PROVIDE A 45° CHISEL POINT ON THE BOTTOM OF EACH DOWEL FOR PROPER MIXING OF GROUTING COMPOUND.
4. DRILL HOLES USING HILTI CARBIDE TIPPED DRILL BITS OR DIAMOND CORE BITS. PROVIDE HOLES OF PROPER DEPTH AND DIAMETER IN ACCORDANCE WITH THE HILTI SPECIFICATION TABLES.
5. USE HILTI HVA CAPSULE ANCHORING SYSTEM AND FOLLOW MANUFACTURER'S WRITTEN PROCEDURE FOR GROUTING THE DOWELS INTO THE EXISTING CONCRETE SLAB.



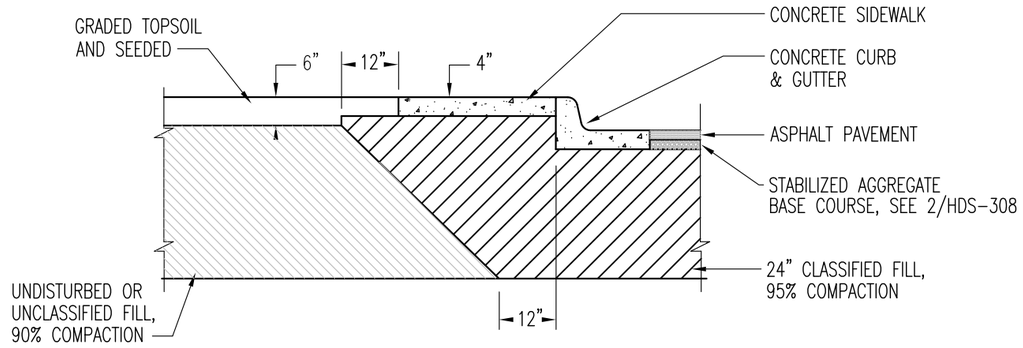
EQUIPMENT PAD DETAIL 1 HDS-307

DOYON UTILITIES LLC

EQUIPMENT INSTALLATION DETAILS

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / UTILIDORS

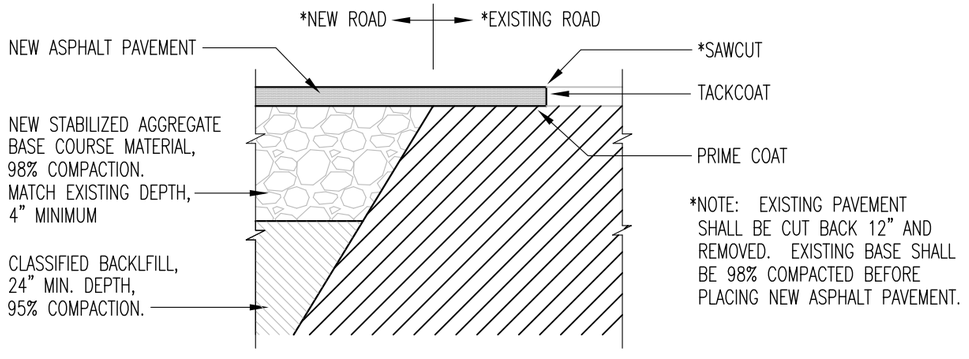
Drawing No.
HDS-307
20 AUG 2014



TYPICAL SECTION

SIDEWALK, CURB & GUTTER,
TOPSOIL & SEEDING

1
HDS-308



ROAD TIE-IN SECTION DETAIL

2
HDS-308

DOYON UTILITIES LLC

PAVEMENT REPLACEMENT DETAILS

DESIGN & CONSTRUCTION STANDARDS
HEAT DISTRIBUTION SYSTEM / UTILIDORS

Drawing No.
HDS-308
17 SEPT 2014