

GUIDELINES

HAS/PDC/Design Division
Houston, Texas

[Project Title]
[Proj./CIP No.]

(These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer/Contractor/Installation Team.)

SECTION 270543 EXTERIOR COMMUNICATION PATHWAY (REV. 03-06-2024-SJS)

PART 1 GENERAL

1.01 PROJECT SCOPE SUMMARY

Designer shall provide a detailed narrative of the tasks to be performed under this specification section

Provide all materials and labor for the installation of a pathway system for outside plant communications circuits. Work in this section includes excavation and trenching, conduit (raceway) construction, cutting and patching, concrete, maintenance hole and handhole construction, and landscaping.

1.02 SECTIONS INCLUDES

- A. This section includes specifications for the installation of exterior communications pathways.
- B. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division - 1 Specification sections, apply to the work of this section.
- C. Exterior Communication Pathways are defined to include, but are not limited to innerduct, flexible multi-cell innerduct, conduit, manholes, handholes, concrete encased ductbanks racking material, manhole and handhole lids.

1.03 REFERENCES

- A. Related Sections: Use these Specifications for all related work not specifically covered in this specification.
 - 1. Section 270526: Telecommunication Grounding and Bonding
 - 2. Section 270528: Interior Communication Pathways
 - 3. Section 270553: Identification and Labeling of Communication Infrastructure
 - 4. Section 271100: Communication Cabinets and Equipment Rooms
 - 5. Section 271300: Backbone and Riser Media Infrastructure
 - 6. Section 271500: Horizontal Media Infrastructure
 - 7. Section 272100: Data Communication Network Equipment
 - 8. Section 272200: PC, Laptop, Servers and Equipment
 - 9. Section 275113: Audio Communication System
 - 10. Section 281300: Access Control System
 - 11. Section 232313: Video Surveillance Control and Management System
- B. Building Industry Consulting Services International (BICSI):
 - 1. Telecommunications Distribution Methods Manual (Latest Issue)

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2. Customer Owned Outside Plant Design Manual (Latest Issue)
- C. HS20 (AASHTO) highway Fatigue Loading
- D. American National Standards Institute/Telecommunications Industry Association/Electronic Industries Association (ANSI/TIA/EIA):
 1. 569 Commercial Building Standard for Telecommunications Pathways and Spaces
 2. 758 Customer-Owned Outside Plant Telecommunications Cabling Standard
- E. Conflicts:
 1. Between referenced requirements: Comply with the one establishing the more stringent requirements.
 2. Between reference requirements and contract documents: Comply with the one establishing the more stringent requirements.

1.04 SUBMITTALS

- A. Submit plan and section drawings detailing proposed communication pathway routing prior to installation. Communication pathway installation plan to include but not limited:
 1. Room penetration plan.
 2. Communication pathway extension plan.
 3. Conduit chase plan.
 4. Duct bank pathway
 5. Handhole/Manhole Details
 6. Handhole/Manhole Lids
- B. Shop Drawings shall be submitted and approved before implementation is started. Shop Drawings shall be submitted in accordance with Specification 01340.
- C. Submit calculations associated with sizing and arrangements of ducts and cables.
- D. Manufacturers' data: To include but not limited to part numbers, data sheets and detailed descriptions, for ALL proposed equipment and material.
- E. Submit a schematic with the COMM Vault/MH/HH duct bank layout showing the wall-to-wall, center to center and a MH butterfly detail down to individual flexible innerduct and hard innerduct assignments in AutoCAD.
- F. Submit plan and section drawings detailing proposed vault specifications.
- G. Copy of Building Industry Consulting Services International (BICSI) Registered Communication Distribution Designer (RCDD) certificate for Contractor's on-site RCDD supervisor. RCDD shall always supervise all parts of communications installation.

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1.05 QUALITY ASSURANCE

- A. Verify duct banks does not interfere with existing or new underground facilities. Follow Section 01761.
- B. Follow Appendix B of National Electrical Code.
- C. Assure that the "as installed" system is correct and complete per construction documents: including engineering drawings, manuals, and operational procedures in such a manner as to support maintenance and future expansion of the system.
- D. Contractor Qualifications:
 - 1. The Contractor shall submit references and other related evidence of installation experience for a period of three years prior to the issue date of this Specification.
 - 2. ALL work shall be supervised on-site by a BICSI RCDD. Must demonstrate knowledge and compliance with all BICSI, TIA/EIA, UL, and NEC standards and codes.
 - 3. Submit a copy of the delivery receipt for each concrete delivery. Include date, strength ordered, and location used.
- E. HAS retains the right to access and inspect all work during the entire duration of the project and any items that do not adhere to the standards, reference, contract, bid, or project documents will be corrected immediately at the expense of the contractor.

1.06 SHIPPING AND HANDLING

- A. Follow Section 01450.
- B. Clearly mark containers "For Communication Material Only".

PART 2 PRODUCTS

2.01 General

- A. Materials shall consist of fill, topsoil, concrete formwork, concrete, raceway, maintenance holes, handholes and other incidentals and accessories as required.

2.02 MANUFACTURERS

- A. Conduit Measuring Tape:
 - 1. Neptco

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2. Greenlee
 3. Garvin Industries
- B. Caution Tape:
1. Reef Industries
 2. Repnet
 3. Panduit
- C. Maintenance/Hand Hole Covers
1. Dabico Inc
 2. Ejco
 3. Locke Solutions
 4. Neehan Foundry
 5. Oldcastle
- D. Flexible Multi-cell Innerduct
1. MaxCell
 2. Or HAS approved equivalent
- E. Plastic Innerduct: HAS-IT approval required before installation.
1. Carlon
 2. Pyramid
 3. Or HAS approved equivalent

2.02 MATERIALS

- A. Ducts: Schedule 40 rigid PVC following this section, with non-magnetic universal interlocking type spacers for both horizontal and vertical duct arrangements. Duct bank will be encased in concrete with orange color dye.
- B. Duct Spacers and Hardware: On all conduit arrays, the contractor shall furnish and install a conduit spacer system as required to maintain uniform conduit spacing. The system shall consist of plastic spacers that interlock vertically and horizontally. A spacer assembly shall consist of base spacers, intermediate spacers and top spacers to provide a completely enclosed and locked in conduit assembly. Install spacers per manufacturer's instructions and provide at 5-foot intervals.
- C. Plastic conduit and fittings shall conform to the requirements of Fed. Spec. W-C-1094 and shall be rigid PVC Schedule 40, with non-magnetic universal interlocking type spacers for both horizontal and vertical duct arrangements.
- D. Fittings:

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- a. Sweeps: Factory manufactured with a single arc of not less than a 15-foot radius.
 - b. End Caps (Plugs): Pre-manufactured and watertight. Tape is not an acceptable end cap or cover.
 - c. Warning Tape: Continuous Tape for Underground Conduit: orange warning ribbon, PVC tape (detectable, i.e., containing metallic tracings), minimum 5 mils thick and 3 inches wide, permanently imprinted with "CAUTION--BURIED COMMUNICATIONS LINE BELOW" in black letters, minimum 1-inch high.
- E. Maintenance Hole (MH) shall be a minimum 144" x 72" x 84" and shall be designed as needed.
- F. Hand Hole (HH) shall be minimum 48" x 48" x 48" constructed with a minimum 5-inch-thick concrete (or HAS approved equivalent).
1. HH shall be pre-formed
 2. Include a minimum 12" sump drain
 3. Include stainless steel bonding ribbon and /or 1" knockout for ground stainless steel rod connection.
 4. Fitted with pulling irons at each end.
5. All HH internal components such as racking and ground strips shall be field installable and shall meet the requirements of ANSI/TIA/EIA, NEC, and HAS requirements.
 6. All walls shall have a minimum of 2- 3 x 3" saddle Throat openings cable rack supports, yellow in color (3SR3N).
 7. All walls shall include 4" duct terminators minimum of 2 wide x 2 height terminators verses a 24" x 24" x 4' thin wall K.O. window on each wall.
- G. HH cover: Shall require a maximum 35-lb lift to open and close
1. Cover and service lettering shall be abrasion, corrosion, chemical resistant and slip resistant surface.
 2. Door shall use a non-load bearing, internally mounted hinge mechanism and shall have a high visibility warning label affixed to the underside
 3. The cover shall be removable from the cover frame assembly with a minimum opening clearance size of 36" x 36" (See attached figure 1 part number 8197)
 4. A prototype test report for each cover style to be installed shall be submitted. The testing shall be conducted by an independent testing company and shall conform to the following:
 - a. Carry a proof load of 29,250 lbs. applied at 150 psi without deformation or injury to the cover
 - b. Carry a maximum HS20 service load, applied at 100 psi for a minimum of 525,000 cycles without losing its service life

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- c. Carry a maximum HS20 service load applied continuously at 100 psi for twelve continuous hours without exhibiting an increase in residual deflection, as measured at the center of the cover, of more than 0.4% (0.004)
 - d. Covers have a modulus of elasticity of, at least, 3,500,000 psi, a flexural strength of 53,000 psi, and a compressive strength of 62,000 psi.
 5. All HH covers shall include the following (see attached figure 1):
 - a. Slip Resistant surface
 - b. Four (4) ½-13 x 2 ¼” Hex bolts with Stainless Steel washers
 - c. “HOUSTON AIRPORT SYSTEM” shall be casted on the lid ½” FLAT FACE GOTHIC. (See attached figure 1).
 - d. “HAS COMMUNICATIONS” shall be casted on lid ¼” FLAT FACE GOTHIC. (See attached figure 1).
 - e. “TELECOM” shall be cast on lid 2” FLAT FACE GOTHIC. (See attached figure 1).
 - f. Submit proof for approval prior to customizing covers.
 - g. Obtain permanent HH number from HAS IT. Field punch or weld MH number at time of installation.
 - h. Submit cross reference table with construction MH number and permanent MH number.
 - i. All covers shall have lift assist hinge hardware which shall be stainless steel.
 - j. All covers shall have a Security camlock and MPIC multi-tool pick bar.
 - k. All covers shall have EON Locks (See attached Figure 2)
 - l. Ram-Nek shall be installed in between the handhole, frame and cover.
 - m. All covers shall a self-engaging safety bar and a stainless-steel mechanical spring strut for lift assist. Cover shall open to 105 degrees; safety catch and removal at 90 degrees.
 6. AOA covers shall meet or exceed FAA loading standards.
- H. AOA HH shall be 48” x 48” x 48” and constructed of 8-inch-thick concrete covered with 250 psi, aircraft rated cover plates containing an approved locking device with a 35-pound lift to open and close.
- I. Concrete and Reinforcing Steel for Encase Ductbanks: Furnish products following Section 01610 and Division 3 except strengths as follows:
1. Compressive Strength: 2500 psi at 28 days, class A.
 2. Flexural Strength: 500 psi at 28 days.
 3. Dye concrete encasement “ORANGE” to identify Communication Duct banks.
- J. Flexible Innerduct: *(Designer to ensure cell size matches cable requirements)*
1. Flexible innerduct is the HAS standard for multi-path applications within conduit.
 2. All backbone fiber shall be installed in flexible innerduct.
 3. All backbone copper cable 1 inch and smaller will be installed in flexible innerduct.

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4. All flexible innerduct shall be installed per manufacture requirements.
5. Only manufacturer's fittings, transition adapters, terminators, accessories, and installation kits shall be used.
6. All flexible innerduct cells will be populated with a measured pull tape.
7. All flexible innerduct shall be OSP rated.
8. Flexible innerduct shall only be used when installed in conduit

MaxCell 4" 3 Cell

Min Conduit ID	Suggested Product	# of Packs Required	Max # of Cables	Maximum Cable Diameter per Cell	Rec. Pull Length*	Max Pull Length*
3"	MaxCell 4" 3 Cell	1	3	1.34"	1500'	2000'
4"	MaxCell 4" 3 Cell	2	6	1.34"	1500'	2500"
5"	MaxCell 4" 3 Cell	3	9	1.34"	1500'	2500'
6"	MaxCell 4" 3 Cell	4	12	1.34"	1500'	2500'

*Use of OFNR cable may result in reduced pulling lengths

MaxCell 3" 3 Cell

Min Conduit ID	Suggested Product	# of Packs Required	Max # of Cables	Maximum Cable Diameter per Cell	Rec. Pull Length*	Max Pull Length*
3"	MaxCell 3" 3 Cell	2	6	1.03"	1200'	2000'
4"	MaxCell 3" 3 Cell	3	9	1.03"	1500'	2500"
5"	MaxCell 3" 3 Cell	4	12	1.03"	1500'	2500'
6"	MaxCell 3" 3 Cell	5	15	1.03"	1500'	2500'

*Use of OFNR cable may result in reduced pulling lengths

MaxCell 2" 3 Cell

Min Conduit ID	Suggested Product	# of Packs Required	Max # of Cables	Maximum Cable Diameter per Cell	Rec. Pull Length*	Max Pull Length*
2"	MaxCell 2" 3 Cell	1	3	.70"	800'	1500'

*Use of OFNR cable may result in reduced pulling lengths

- K. All Plastic innerduct shall be approved by HAS prior to installation.

2.03 ACCESSORIES

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- A. Continuous Tape for Underground Conduit: orange warning ribbon, PVC tape (detectable, i.e., containing metallic tracings), minimum 5 mils thick and 3 inches wide, permanently imprinted with "CAUTION--BURIED COMMUNICATIONS LINE BELOW" in black letters, minimum 1-inch high.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify materials are on site in proper condition and of sufficient quantity.
- B. Verify proper excavation depth; verify width route and support of work. (Division 2). Ducts shall be installed so that the tops of all ducts are at least 36 inches below the finished grade. Verify proper location of hand holes and MH (maximum every 600 feet). Communications facilities must be placed in separate MH/HH from electrical facilities.
- C. Trenches greater than or equal to 5 feet deep:
 - 1. Shall be shored to prevent cave-in.
 - 2. Shall have 2 feet clearance from the dirt pile.
- D. Minimum electrical/communications underground cable separation:
 - 1. Concrete: 3 inches
 - 2. Masonry: 4 inches
 - 3. Well-tamped earth: 12 inches
 - 4. Electrical: 12 inches
- E. Before encasement, verify ducts are free of debris and properly installed in support and spacer system, are properly fitted together and hold-down hardware is properly installed.
- F. Directional boring (**HAS IT prior approval required**) is a suitable substitute when **trenching is impractical or impossible**. High Density Polyethylene (HDPE) conduits shall be required as followed:
 - 1. A Minimum of 2-2" SDR 11/Scheduled 80 Smoothwall conduit with tape
 - 2. Or a Minimum of 2-4" SDR 13.5/ Scheduled 80 Smoothwall conduit with tape shall be required.
- G. All above listed conduits shall be filled with the proper Maxcell cells.
- H. Casings shall be installed when boring conduits under streets, roadways, runways and or taxiways.

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- I. Bore logs shall be submitted as deliverables along with the GPS/GIS data information to include but not limited to, depth every 10-12 feet, x and y coordinates. Refer spec section 270553 for the GIS data collocation deliverable.
- J. A 6-gauge trace wire shall be installed with the conduit for locating purposes.

3.02 INSTALLATION

- A. Prior to installation, the contractor shall comply with Specification 270553 referencing GIS GPS requirements during the installation of all manholes / handholes and duct banks.
- B. Install all work following drawings, manufacturer's instructions and approved submittal data.
- C. Do not exceed 90 degrees for an individual sweep.
- D. Where unique construction requirements for bend radius or arc length do not permit the use of factory-manufactured sweeps, sweeps shall be field-manufactured using factory-recommended equipment. The internal diameter of the sweep shall not be changed during the sweep field-manufacturing process.
- E. A conduit section shall have not more than the equivalent of two 90-degree sweeps (a total of 180 degrees) between pull points. The 180-degree maximum shall include kicks and offsets. Where it is not possible to construct a section of conduit within the 180-degree sweep maximum, an intermediate MH/HH shall be installed.
- F. Two 90-degree sweeps separated by less than 10 feet is not permissible.
- G. Cut conduit ends square and ream to remove burrs and sharp ends. Extend conduits the maximum distance into fittings, couplings, and/or connectors. Tighten fittings securely and seal watertight.
- H. Provide end caps on conduit ends throughout construction to prevent the intrusion of water or debris. Install end caps on conduit that is not directly being worked on during the workday and on conduits at night. Leave end caps in place upon final completion of the work.
- I. Provide end bells for terminating conduit in maintenance holes and handholes. Install protective end bells on conduits flush with MH/HH walls.

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- J. Install conduit in excavations following Drawings. If directional boring is utilized, cable or flexible conduits can be attached to the unit and pulled back to the origination point (after the drilling unit reaches its destination).
- K. HH shall be 48" x 48" x 48" and shall be constructed of two-inch thick concrete covered with 3/8-inch steel plate. The HH or MH shall rest on a 4-inch blanket of 2 sack stabilized sand, and 4 inches around the side walls shall be filled with 2 sack stabilized sand. Refer to Division 02321.
- L. Each MH/HH that contains a pedestal will have four bollards installed 18 inches diagonally from each corner, with a cross member welded at 30 inches connecting the Four Corners. These barriers will be constructed of 4-inch ridged conduit filled with concrete, driven four feet in the ground and extending 36 inches above the protective cover.
- M. Install watertight penetrations through foundation, HH, and MH walls. Wherever a hand hole is used to simply pass through, the conduit entrances and exits shall be situated at opposite ends of the hand hole instead of 90-degree angles.
- N. All reinforced ducts shall be on a bed of 2" sac stabilized sand.
- O. Assemble duct banks with non-magnetic saddles, spacers and separators. Position separators for 2-inch minimum concrete separation between outer surfaces of adjacent ducts.
 - 1. Make uniform required bends with a minimum of a 24-inch radius for conduits less than 3-inch diameter, and a 48-inch radius for conduits 3 inches and larger.
 - 2. Maintain vertical or horizontal separations of 12 inches of well-packed topsoil from any electrical service conduit run parallel to Communications conduits.
- P. Install reinforcing. Install concrete encasement surrounding reinforcing steel and ducts. Follow Section 03315 using one-inch maximum size course aggregate concrete.
 - 1. Unless otherwise noted on the drawings, reinforce with No. 4 longitudinal steel bars placed at each corner and along each face at maximum parallel spacing of 12 inches o.c. and No. 3 tie-bars transversely placed at 12 inches o.c. maximum longitudinal. Maintain maximum clearance of 2 inches from bars to edge of forms and ducts.
 - 2. Mix ORANGE colorants into concrete.
 - a. ORANGE: For Telecommunications.
 - 3. Place concrete with minimum 3-inch cover surrounding ducts and reinforcement.
 - 4. Maintain ducts in proper place during concrete placement.
- Q. Transition from non-metallic to PVC coated metallic conduit where duct banks enter structures or turn upward for continuation above grade.

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1. With prior HAS/IT APPROVAL. For conduit runs (1" to 4") a special LBD conduit (Crouse-Hinds or approved equal) may be used for exterior wall penetration where a swept 90 will not work. LBD condulets are designed for communications cable installation to maintain bend radius requirements.
- R. Where ducts enter structures such as HH, MH, pull boxes, or buildings, terminate ducts in proper end bells, provide insulated L-bushings and grout walls at the conduit entrance points. Terminators or bells shall be installed at the wall for a flush installation. All ducts shall be sealed with Meyers hubs or couplings on steel conduits ducts and/or sealed with watertight mechanical plugs with a max back Air Pressure 17 PSI, Max Back Pressure 40 ft of Head.
- S. Extend below grade conduits to 4 inches above the finished floor inside a building.
- T. Tag conduits entering pull boxes with stamped stainless-steel tags following cable and conduit schedule.
- U. Install continuous, orange warning ribbon, PVC tape (detectable, i.e., containing metallic tracings), 3 inches wide, permanently imprinted with "CAUTION - BURIED COMMUNICATIONS LINE BELOW" in black letters, approximately 12 inches below finished grade following line of duct banks.
- V. Expansion Fittings:
 1. Raceways shall be provided with expansion fitting where necessary to compensate for thermal expansion and contraction.
 2. Use expansion-deflection fittings on conduit crossing structural expansion joints and on exposed conduit runs where necessary. Provide bonding jumpers across fittings in metal raceways systems

3.03 BACKFILLING

- A. Backfill following Division 02320 after concrete cures 24 hours. After concrete encased ducts have been properly installed, and the concrete has had time to set, the trench shall be backfilled in at least two layers with excavated material, not larger than four inches in diameter, thoroughly tamped, and compacted to at least the 95% of maximum density. Trenches shall not be excessively wet and shall not contain pools of water during backfill operations. The trench shall be completely backfilled and compacted level with the adjacent surface. Any excess excavated material shall be removed and disposed of offsite at the contractor's expense.
- B. Type 'C' Backfill Cement Stabilized Sand
Two (2) sack stabilized sand is authorized only with HAS IT Infrastructures prior approval. Compact 2 sack stabilized sand in 6" to 8" lifts to a 95% of maximum density as

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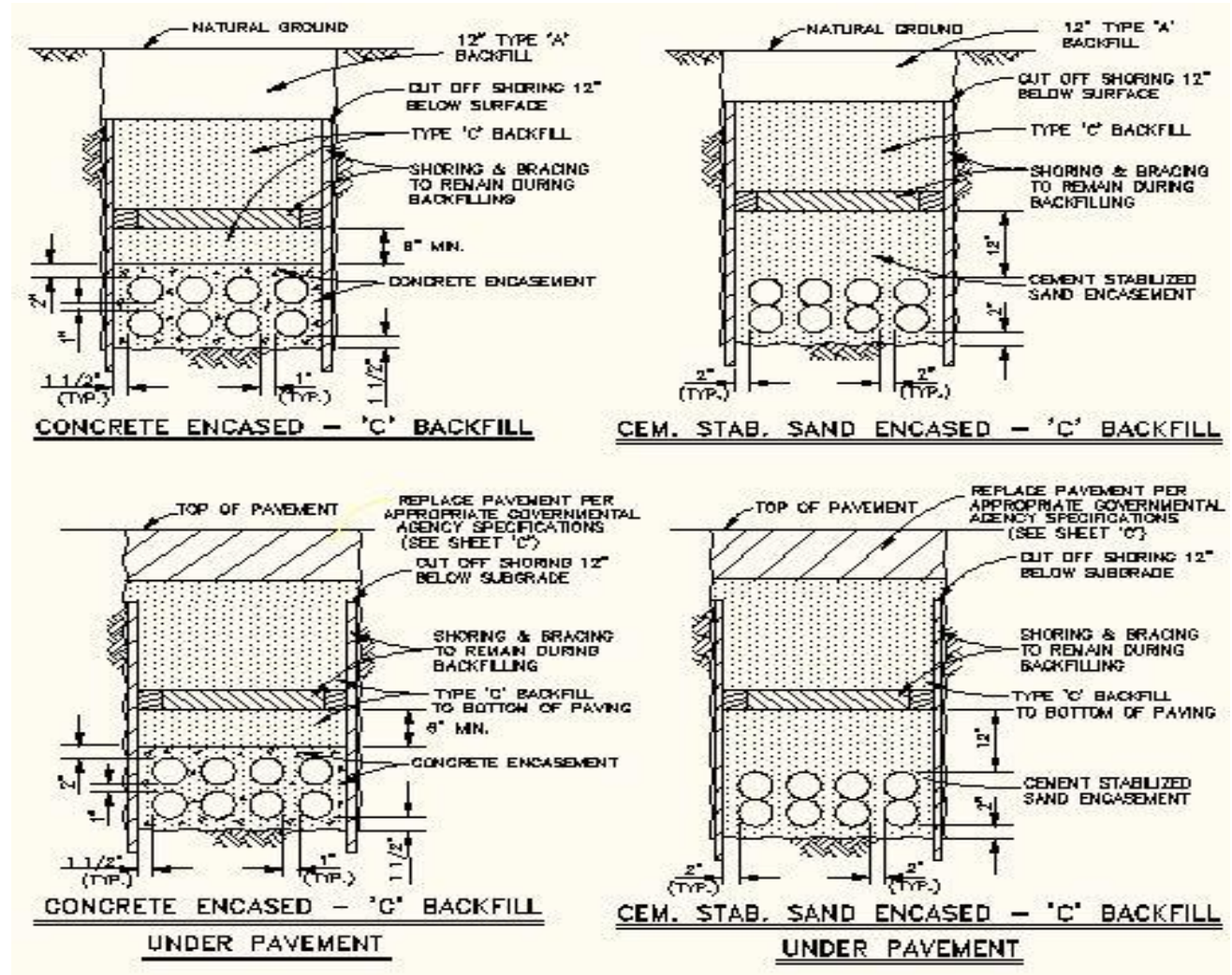
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determined in accordance with ASTM D558, ASTM D698 and ASTM D1633, unless otherwise specified in spec section 02321. Perform and complete compaction of 2 sack stabilize cement mixture within 4 hours from the load delivery receipt.



- C. Bedding: Do not exceed 4" depth of bedding lifts/layers before compacting
- D. Backfill: Do not exceed 6" depth of backfill lifts/layers before compacting.
- E. Compaction: Compact using a vibratory plate or roller or other mechanical device. Compaction through jetting and/or pounding is not acceptable.
 - a. Bedding: Compact material to a dense state equaling at least 95% of the maximum dry density per ASTM D1557.
 - b. Backfill: Compact material up to two (2) feet below the finished grade with a minimum relative compaction of 90% of the maximum dry density

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per ASTM D1557. Compact material from two (2) feet below the finished grade up to the finished grade with a minimum relative compaction of 95% of the maximum dry density per ASTM D1557.

- F. If trench is in a grassy area: sod and pin to match the original condition.

3.04 MAINTENANCE HOLES / HANDHOLES

- A. Installation shall be in accordance with the manufacturer's requirements. Top of MH/HH cover shall be set ¼ inch above finished pavement or one inch above finished grade.
- B. MH/HH shall be bedded on four inches of 2 sack stabilized sand with ¾ inch gradation.
- C. Ducts shall enter the MH/HH at the lowest knockout window available. Ducts shall stub flush into the MH/HH with end bells flush with the inside walls.
- D. MH/HH shall be fitted on each wall with cable racks and struts. Each rack shall be provided with a minimum of four rack type arms. Rack arms shall be made of non-flammable polymer.
- E. MH/HH shall be provided with a pulling eye on each end and a drainage sump in the bottom.
- F. MH/HH shall be provided with a ¾ inch by 10-foot stainless steel ground rod in each. See Section 270526 for ground rod specification. Do not install the ground rod through the drain sump. Install through a prepared opening and grout fill after installation.
- G. All vacant ducts shall be sealed with an HAS and Industry approved water-tight and gas-tight mechanical plugs with max back Air Pressure 17 PSI, Max Back Pressure 40 ft of Head.
- H. All flexible innerducts and plastic innerducts shall be sealed with an HAS and Industry approved watertight and gas-tight plugs.
- I. All occupied ducts shall be sealed with Triplex duct plugs, Quadplex duct plugs or HAS and Industry approved water-tight and gas-tight plugs.
- J. Where more than one innerduct is routed in a conduit, each innerduct shall consist of a different color (ex. Orange, Blue, Black and White). HAS-IT approval required before installation.

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- K. When populating duct bank with plastic innerduct the following apply: HAS-IT approval required before installation.
 - 1. Innerduct to be OSP rated
 - 2. 4" duct to be populated with no less than 3-1.25 inch innerducts
 - 3. 4" duct to be populated with no less than 4-1 inch innerducts
- L. All fiber cables shall be placed in flexible innerduct and comply with 271300 guidelines.
- M. All copper cables 100 pairs or less shall be placed in flexible innerduct.
- N. A 12-inch-long mandrel shall be swabbed through all ducts to remove debris until shown clean (1/4 inch smaller than duct diameter).
- O. A conduit measuring tape, with a minimum test rating of 1250 pounds of pulling tension shall be installed in all underground conduits, flexible innerducts and plastic innerduct when applicable. Label each end of the duct bank in every MH to ensure continuity per specification 270553.
- P. Apply grout in a manner to ensure filling of voids in the joints being sealed. Apply grouting to conduit entrances, risers, and covers in addition to any other voids.
- Q. Racking and Hardware: Install racking and hardware and incidental materials. Provide three (3) cable racks per longitudinal side (six (6) racks total) per maintenance hole.
- R. Clean and dry the MH/HH after construction activity is complete and prior to releasing the MH/HH to the Owner for the Owner's use.
- S. Prove out each conduit with a minimum 16 inch long test mandrel that is ¼ inch smaller than the inside diameter of the conduit. Pull the test mandrel after backfilling but prior to the replacement of landscaping. Repair or replace any conduit that does not prove out at no cost to the Owner.

3.05 IDENTIFIERS, LABELS AND LABELING SYSTEM

- A. All Identification and Labeling shall follow Specification: 270553–Identification and Labeling of Communication Infrastructure. **Any deviation from the specification must be approved by HAS IT prior to installation.**

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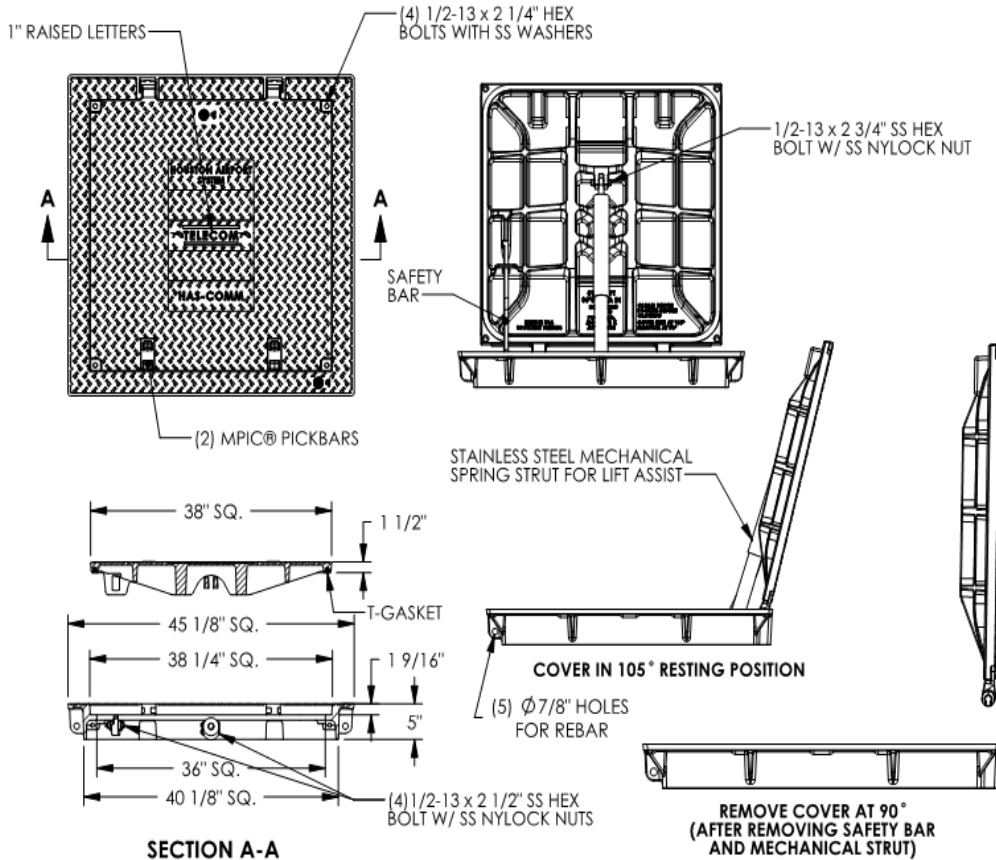
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(These Guidelines are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer/Contractor/Installation Team.)

Figure 1

8197 Assembly



Product Number
00819766B01

Design Features

- Materials
 - Hatch Frame Ductile Iron (70-50-05)
 - Hatch Cover Ductile Iron (80-55-06)
- Design Load
 - Airport Extra Heavy Duty (Proof Load Tested to 200,000lbs.)
- Open Area
 - n/a
- Coating
 - Dipped
- √ Designates Machined Surface
- Slip Resistant Surface with the LLLL® registered trademark

Certification

- ASTM A536
- Country of Origin: USA

Major Components

00819712
00819766

Drawing Revision

12/2/2010 Designer: SMM
02/06/2012 Revised By: DEF

Disclaimer

Weights (lb/kg), dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

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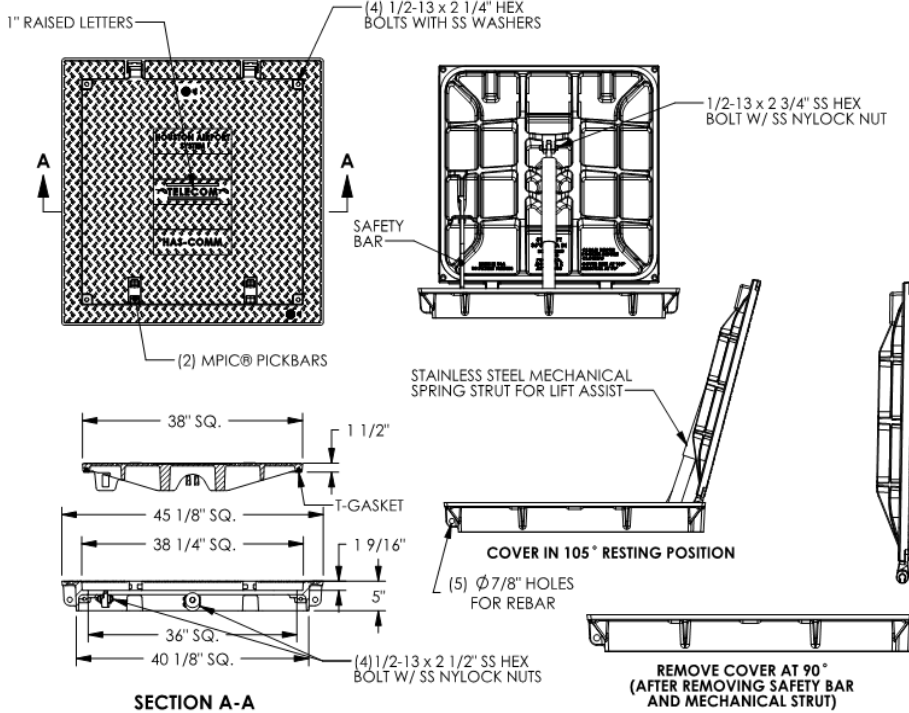
GUIDELINES

HAS/PDC/Design Division
Houston, Texas

[Project Title]
[Proj./CIP No.]

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8197 Assembly



- Product Number**
00819766B01
- Design Features**
- Materials
 - Hatch Frame
Ductile Iron (70-50-05)
 - Hatch Cover
Ductile Iron (80-55-06)
 - Design Load
Airport Extra Heavy Duty
(Proof Load Tested to 200,000lbs.)
 - Open Area
n/a
 - Coating
Dipped
 - √ Designates Machined Surface
 - Slip Resistant Surface with the LLLL® registered trademark
- Certification**
- ASTM A536
 -
 - Country of Origin: USA
- Major Components**
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Ductile Iron Hinged Hatch Access Assembly

Ductile iron access hatches have been designed for improved ergonomics, and are available in heavy duty and airport extra heavy duty applications. On a cover that can weigh as much as 550 lbs, the lifting force required to open the cover is less than 35 lbs due to the uniquely designed mechanical strut. The self-engaging safety bar provides added protection while the underground infrastructure is accessed, and safety grates can be specified for added fall through protection.

Features

- Ductile iron frame and cover
- Cover opens to 105°, safety catch and removal at 90°
- Self-engaging safety bar
- EONLOCK®
- MPIC® multi-tool pick bar
- Bolting

Options

- Mechanical lift assist (standard feature for airport rated models)
- Top and bottom flange designs
- Safety grates
- INFRA-RISER® adjustment riser
- Farming skat

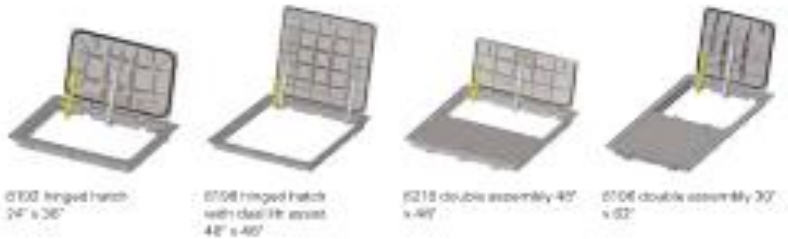


8197 grate option
30" x 30"



Wide Availability of Sizes

Shown below are just a sample of the various cover openings and sizes. See the table below for the full range of available clear opening sizes and load ratings.



Ductile Hinged Hatch Clear Opening Options

Clear Opening Size	Airport Extra Heavy Duty Series No.	Heavy Duty Series No.
24 x 24	8105	8215
24 x 36	8102	8212
30 x 30	8196	8218
30 x 62	8106—Double	8216—Double
36 x 36	8197	8217
36 x 74	—	8217—Double
48 x 48	8108	—
48 x 48	—	8218—Double

Note: All dimensions are in inches.

Figure 2

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Double Hatch (Hinged Hatch) Access Assembly

EON LOCK®



Cavity and rubber plug retain the nut, which locks, allowing the user to lift and tip the hatch.

Patented Self-engaging Safety Bar



Optional Safety Grate

Provides additional safety features:
 - Doors cannot be closed unless the full through protection has been set back in place (preventing the user's feet from slipping).
 - Visual inspection and limited maintenance can be done while safety grate is left in place.
 - Orange safety grates create a visual barrier around the pit, an orange upper warning area as an overview of the hazard and provides a durable frame.
 - Grate can be locked independently of the hatch, adding an additional level of security when needed.

Removable Center Beam



Removable center beam provides a much greater clear opening access on several double hatch models. Removal/Replacement is simple with 4 bolts securing the beam to the frame.

Frame Options



Top Range Frame



Bottom Range Frame

Lift Assist

Lift Assist is a corrosion-resistant stainless steel mechanical spring strut. The rugged design is clean and maintenance free. The strut takes up less space in the clear opening than a traditional spring assist. It is fully self-contained, protecting coils from exposure to the elements.

Made without harmful gases or oils, the struts have an effective operating temperature range of -30° F to 400° F. The durability has been tested at over 150,000 cycles.



Optional Cam Lock



Security stem lock and wrench driven. Wrench is only removable when door is in the locked position.



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END OF SECTION