

CONCRETE MANHOLE

NOTES:
 1. LIFTING INSERTS AS REQUIRED.
 2. ALL JOINTS SHALL BE SEALED WITH RAM-NEK OR APPROVED EQUAL.
 3. MANHOLES TO BE PLACED ON 12" OF CEMENT-STABILIZED SAND.
 4. CONCRETE DESIGN STRENGTH SHALL BE 4000 PSI AT 28 DAYS, RATED FOR H-20 LOADING.
 5. FOR USE WITH PIPE 72" DIAMETER AND SMALLER ONLY.

CONCRETE JUNCTION BOX

NOTES:
 1. LIFTING INSERTS AS REQUIRED.
 2. ALL JOINTS SHALL BE SEALED WITH RAM-NEK OR APPROVED EQUAL.
 3. MANHOLES TO BE PLACED ON 12" OF CEMENT-STABILIZED SAND.
 4. CONCRETE DESIGN STRENGTH SHALL BE 4000 PSI AT 28 DAYS, RATED FOR H-20 LOADING.
 5. WIDTH VARIES ACCORDING TO PIPE SIZE.

I BEAM SECTION

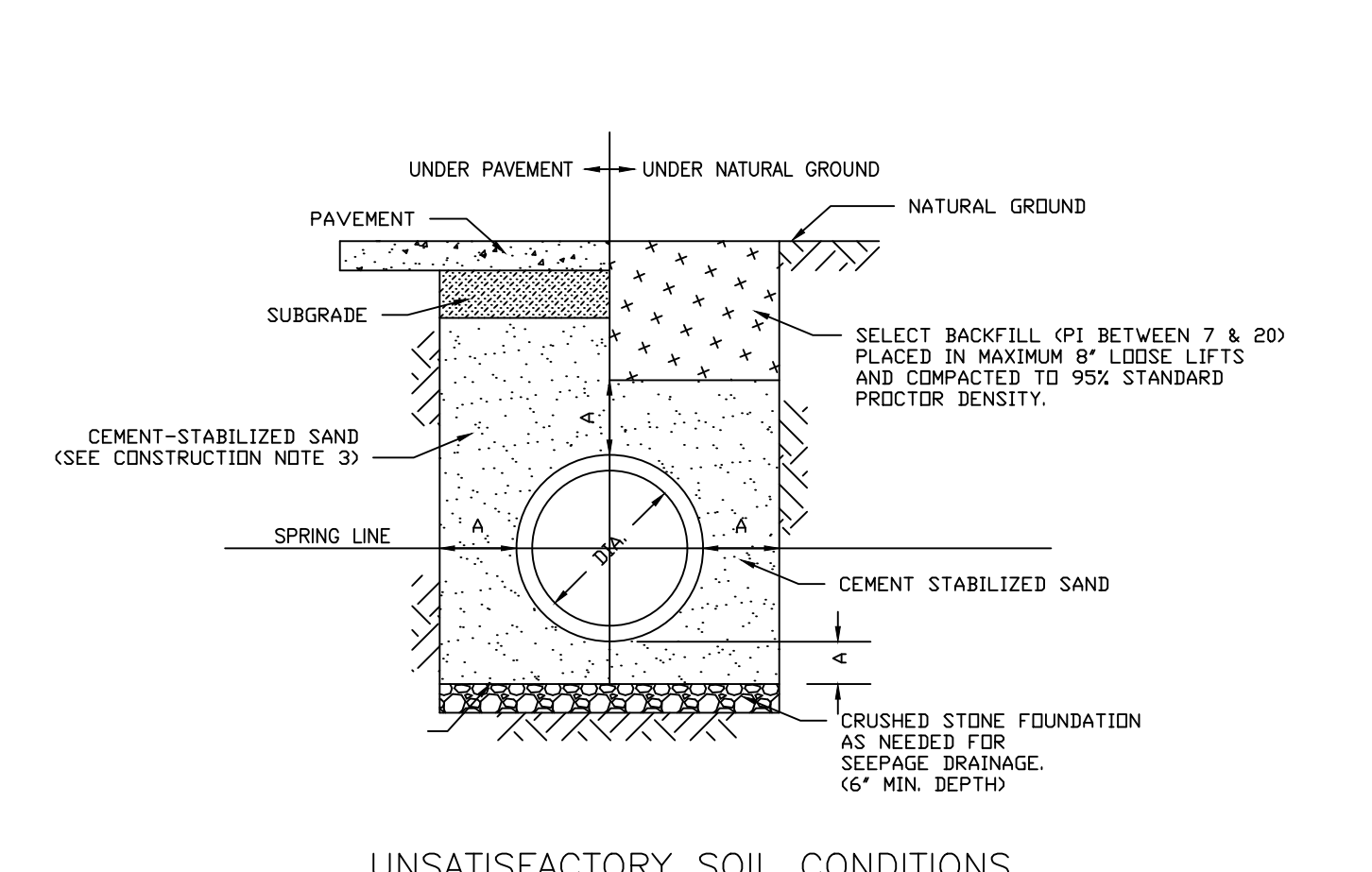
TYPE B AND B-B INLET

NOTES:
 1. USE STANDARD CAST IRON FRAME AND GRATES.
 2. LEADS SHALL LEAVE INLET AT LOCATION AND GRADE REQUIRED.
 3. DIMENSION VARIES BASED ON PIPE DIAMETER AND WALL THICKNESS.
 4. CENTER STEEL BEAM ON INLET AND CAST WALLS AS SHOWN (B-B INLET ONLY).
 5. TYPE B AND B-B INLETS ARE FOR RESIDENTIAL USE ONLY.

MANHOLE FOR BOX SEWERS

NOTES:
 1. 1" INLET GRATE MAY BE USED IN PLACE OF MANHOLE COVER.
 2. CONNECT MANHOLE TO TOP BY USING KEYWAY, DOWELING OR PRECAST JOINT.

MANHOLE FRAME AND COVER



UNSATISFACTORY SOIL CONDITIONS

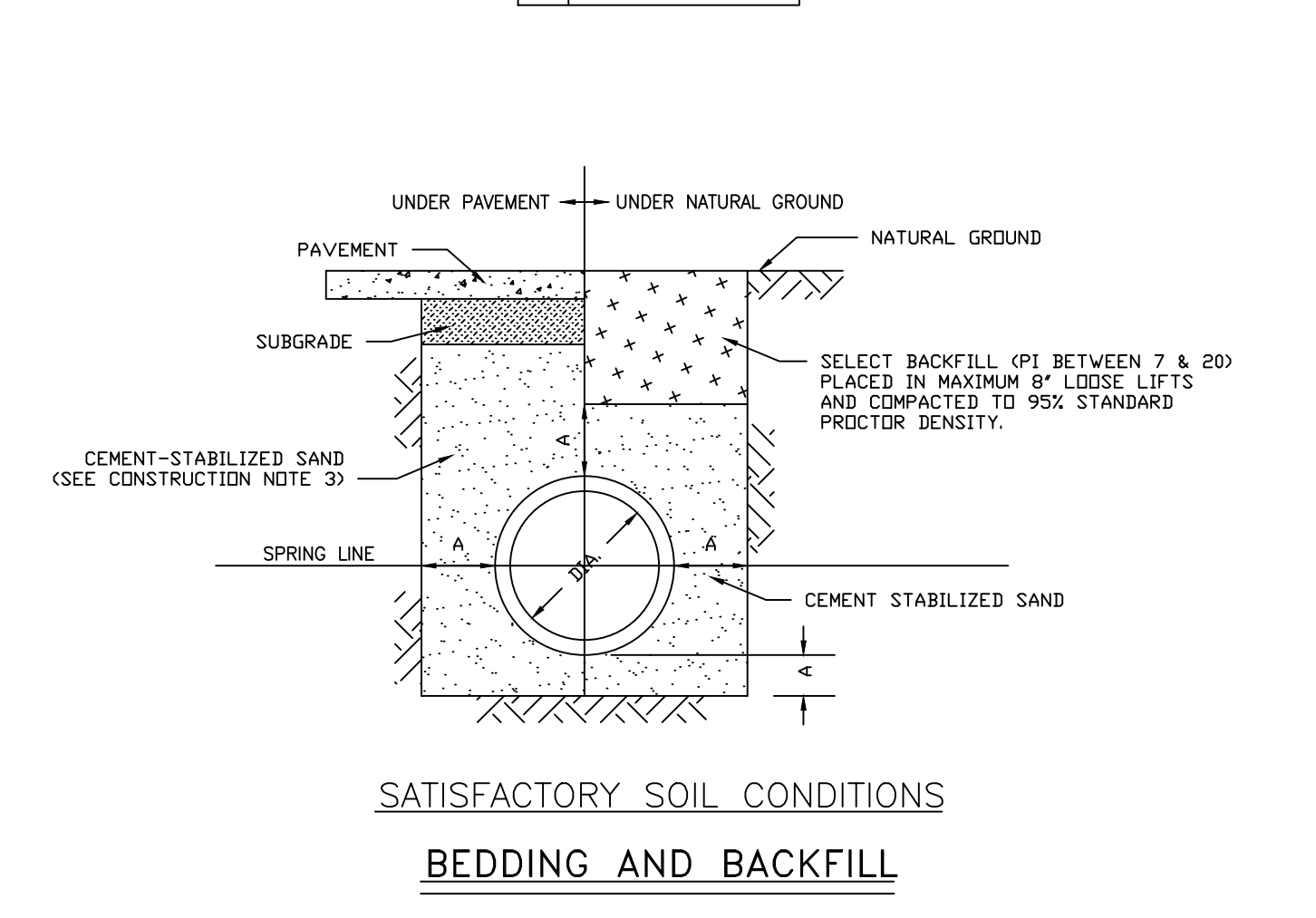
SELECT BACKFILL (P1 BETWEEN 7 & 20) PLACED IN MAXIMUM 8" LODGE LIFTS AND COMPACTED TO 95% STANDARD PROCTOR DENSITY.

CEMENT-STABILIZED SAND (SEE CONSTRUCTION NOTE 3)

SPRING LINE

CEMENT STABILIZED SAND

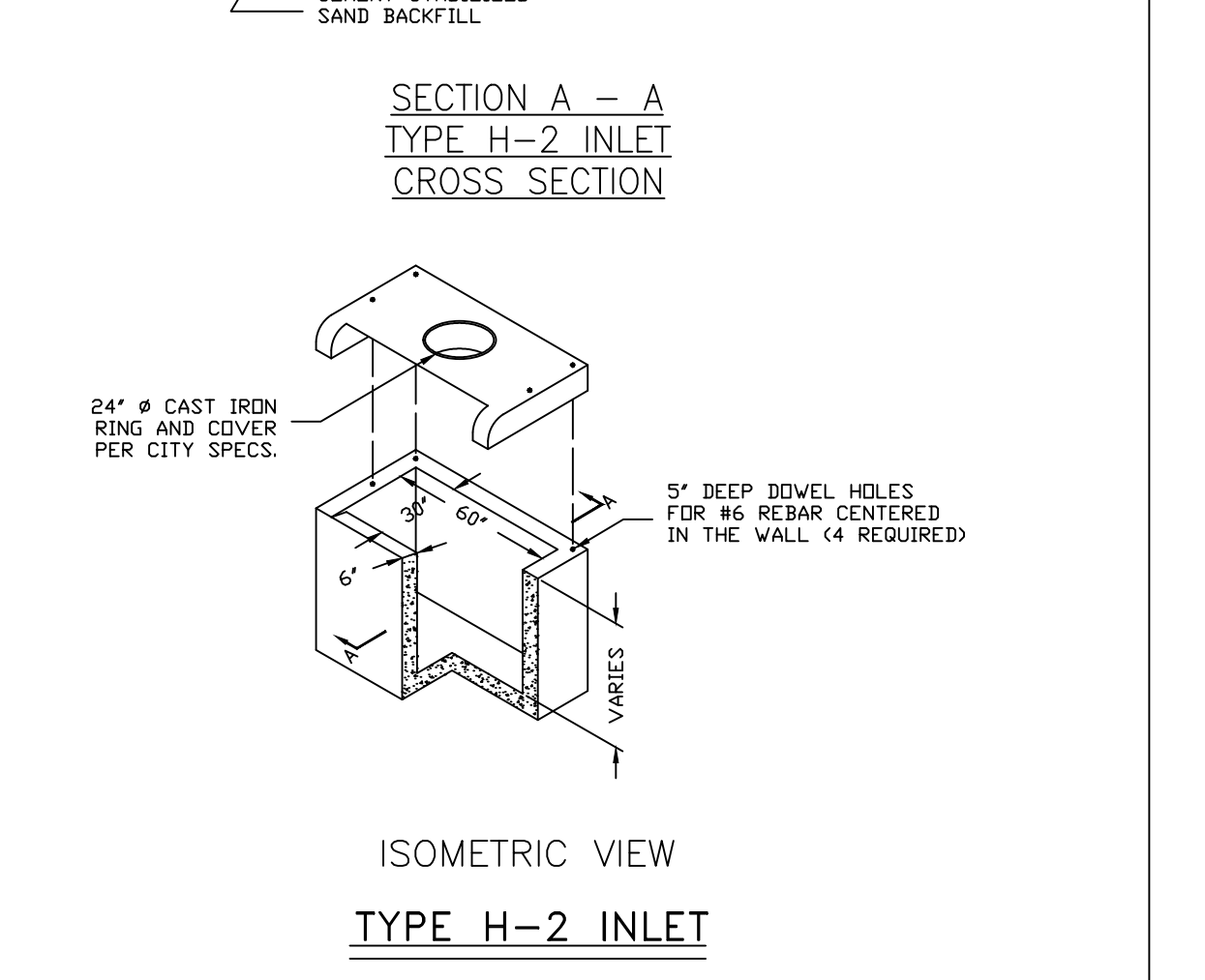
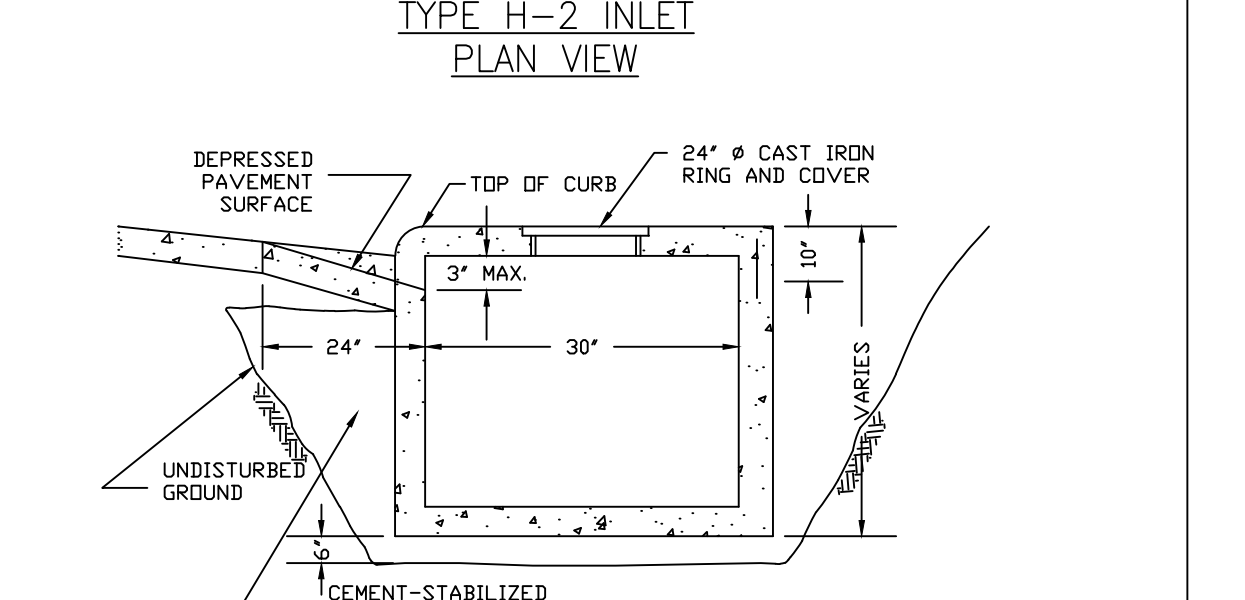
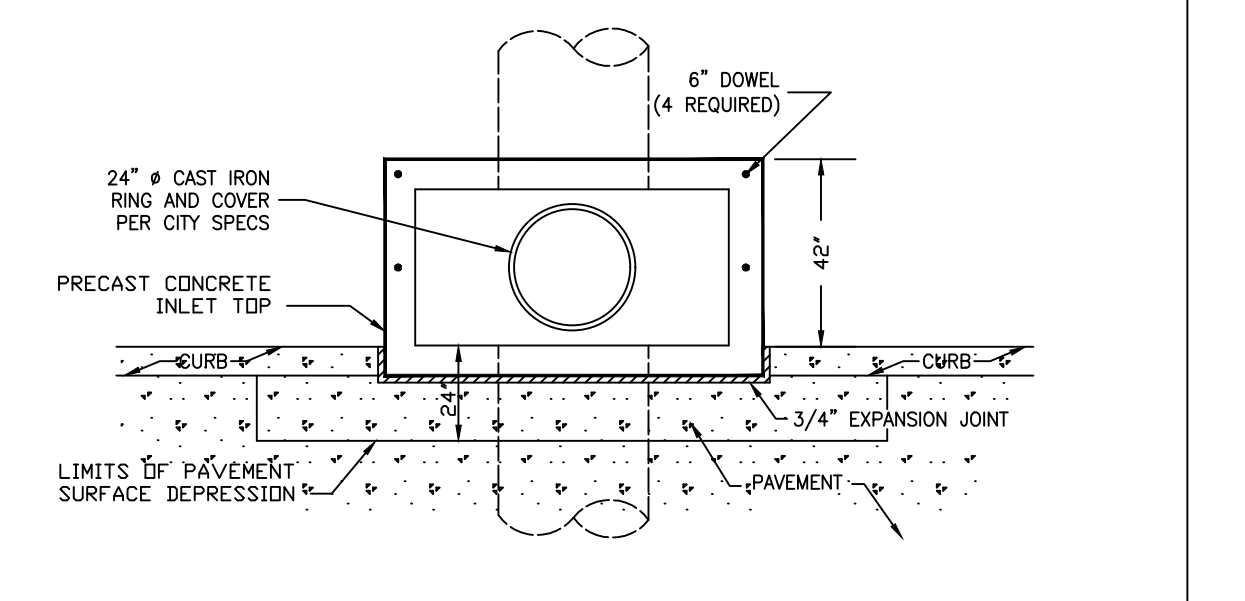
CRUSHED STONE FOUNDATION AS NEEDED FOR SEEPAGE DRAINAGE. 6" MIN. DEPTH.



SATISFACTORY SOIL CONDITIONS

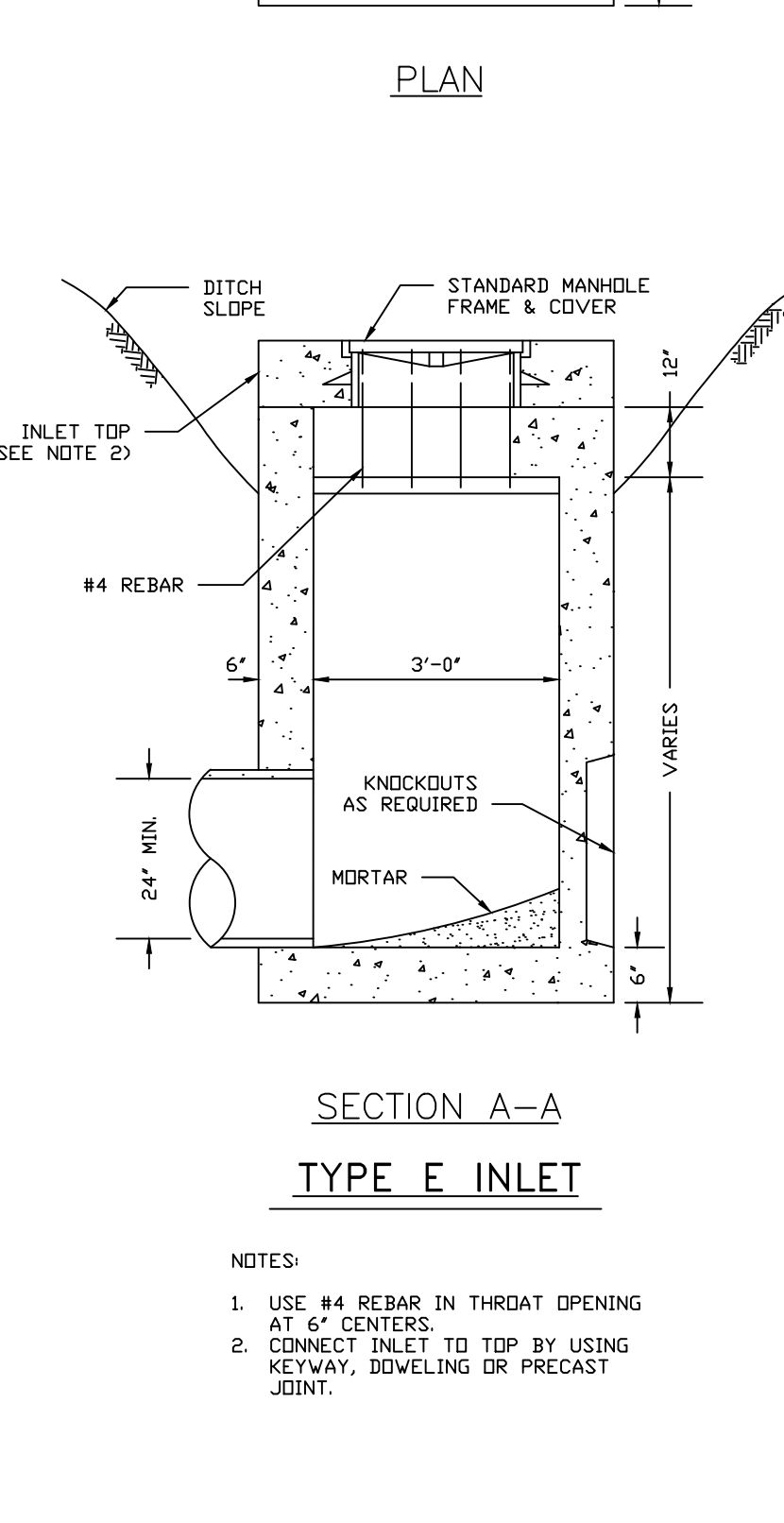
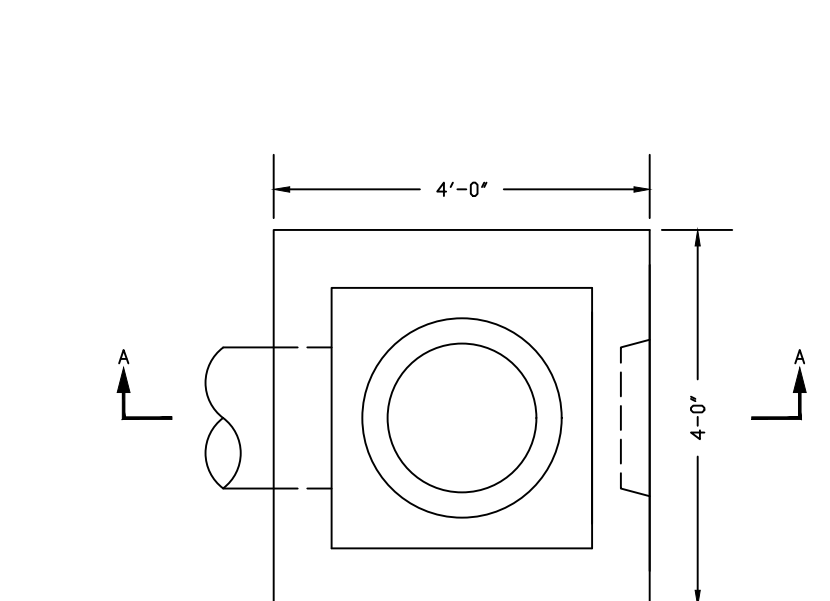
BEDDING AND BACKFILL

NOTES:
 1. THE SATISFACTORY SOIL CONDITIONS METHOD SHALL BE USED FOR STORM SEWER PIPE WHERE THE SOIL CONDITIONS ARE AS FOLLOWS:
 1.A. STRATA FROM THE SPRING LINE TO 3 FT BELOW THE FLOWLINE OF THE PIPE CONSIST OF NON-WATERBEARING COHESIVE SOILS HAVING A SHEAR STRENGTH OF 1000 PSF OR GREATER.
 1.B. NO WET SAND STRATA EXIST IN AREA FROM 1 FT ABOVE THE TOP OF THE PIPE TO 3 FT BELOW THE FLOWLINE.
 2. FOR ALL OTHER SOIL CONDITIONS USE THE DETAIL FOR UNSATISFACTORY CONDITIONS SHOWN ABOVE.



TYPE H-2 INLET

NOTES:
 1. H-2 TYPE 1 LENGTH = 5'-0", H-2 TYPE 2 LENGTH 10'-0".
 2. THIN WALL KNOCK-OUTS OR THRU HOLES FOR PIPE PER JOB REQUIREMENTS.
 3. REFER TO PAVING DETAIL SHEET FOR INSTALLATION OF H-1 TYPE 1 5'-0" CURB INLET.
 4. INLET WALLS MAY BE EXTENDED USING PRECAST RISER SECTION.
 5. INLET TOPS SHALL BE SECURED TO THE INLET WALL USING #6 DOWELS DRILLED AND GROUTED A MINIMUM DEPTH OF 5" INTO THE INLET WALL.
 6. INLET BACKFILL SHALL BE CEMENT-STABILIZED SAND TO THE TOP OF THE INLET FIRST STAGE.
 7. GRADE 60, #4 REINFORCEMENT BARS TO CONFORM TO ASTM A615 ON REQUIRED CENTERS OR EQUAL.
 8. GROUT ALL EXPOSED LIFT HOLES.



TYPE E INLET

NOTES:
 1. USE #4 REBAR IN THROAT OPENING AT 6" CENTERS.
 2. CONNECT INLET TO TOP BY USING KEYWAY, DOWELING OR PRECAST JOINT.

- STORM SEWER CONSTRUCTION NOTES:**
1. STORM SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS AND STANDARD DETAILS, LATEST REVISIONS.
 2. ALL STORM SEWER PIPE SHALL BE REINFORCED CONCRETE PIPE (RCP), ASTM C-76, CLASS III, TONGUE AND GROOVE, UNLESS OTHERWISE NOTED AND APPROVED BY THE CITY.
 3. REINFORCED CONCRETE STORM SEWER (PIPE, BOX, ETC.) SHALL BE INSTALLED, BEDDED AND BACKFILLED IN CONFORMITY WITH THE CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS AND STANDARD DETAILS. STORM SEWER INSTALLED UNDER PROPOSED PAVEMENT SHALL BE BACKFILLED WITH CEMENT-STABILIZED SAND (1.1 SACKS OF CEMENT PER TON OF SAND, TO THE BOTTOM OF THE SUBGRADE. STORM SEWER INSTALLED UNDER EXISTING PAVEMENT SHALL BE BACKFILLED WITH CEMENT-STABILIZED SAND TO THE BOTTOM OF THE PAVEMENT.
 4. CONCRETE FOR INLETS AND MANHOLES SHALL BE CLASS A AND SHALL HAVE A MINIMUM STRENGTH OF 4000 PSI AT 28 DAYS AND HAVE REINFORCING BARS TO MEET AASHTO H20-44 LOADING REQUIREMENTS.
 5. ALL MANHOLES SHALL BE ADJUSTED TO FINISHED GRADE.
 6. MINIMUM STORM SEWER SIZE IS TWENTY-FOUR (24) INCH INSIDE DIAMETER. MINIMUM ROADSIDE DITCH CULVERT IS EIGHTEEN (18) INCH INSIDE DIAMETER OR APPROVED EQUAL.
 7. ALL STORM SEWER MANHOLES SHALL INCLUDE THE WORDS "STORM SEWER" AND "CITY OF FRIENDSWOOD." MANHOLE COVERS SHALL CONFORM TO THE STANDARD DETAILS SHOWN ON THIS SHEET.
 8. CONTRACTOR SHALL PROVIDE A MINIMUM OF SIX (6) INCHES OF CLEARANCE AT ALL UTILITY CROSSINGS WITH STORM SEWER.
 9. ALL INLETS, AT ROADWAY PAVEMENT IN RESIDENTIAL DEVELOPMENTS, SHALL BE TYPE "B", "B-B" OR "H-2". ALL INLETS IN COMMERCIAL DEVELOPMENTS, AND/OR ON MAJOR THOROUGHFARES SHALL BE TYPE "H-2" ONLY, UNLESS OTHERWISE APPROVED BY THE CITY OF FRIENDSWOOD.
 10. ALL DISTURBED AREAS IN DRAINAGE EASEMENTS OR DETENTION PONDS, SHALL BE HYDRO-MULCHED AS PER TECHNICAL SPECIFICATION SECTION 02910 - HYDROMULCH SEEDING OR APPROVED EQUAL.
 11. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO EXCAVATION. DURING THE COURSE OF ANY AND ALL CLEARING, GRUBBING, FILL, GRADING, EXCAVATION OR OTHER CONSTRUCTION, THE CONTRACTOR SHALL ENSURE THAT STORM DRAINAGE PATHWAYS REMAIN OPEN AND ARE MAINTAINED TO ENSURE POSITIVE DRAINAGE. CONVEYANCES ARE NOT TO BE IMPEDED OR BLOCKED IN ANY WAY. STORM SEWER INLETS SHALL BE PROTECTED FROM ENTRY OF SILT, TRASH, DEBRIS AND ANY OTHER SUBSTANCES THAT MAY DAMAGE THE STORM SEWER SYSTEM AND/OR WATERWAYS RECEIVING STORM WATER RUNOFF. AT COMPLETION OF WORK, THE CONTRACTOR SHALL FILL ALL LOW SPOTS, GRADE ALL RIGHTS-OF-WAY, AND UTILITY EASEMENTS, AND REGRADE/RESTORE DITCHES AS NECESSARY TO MAINTAIN AND/OR ESTABLISH POSITIVE DRAINAGE.

STORM SEWER STANDARD DETAILS			DEPARTMENT OF ENGINEERING & PROJECTS	
FILE NAME: SWSSD1 - 2017.DWG	DATE APPROVED: JULY 1, 2017		PROJECT NUMBER:	DATE SUBMITTED:
SCALE: NTS		REVISED DATE: OCTOBER 2019		