Development Services

From Concept to Construction

Phone: 503-823-7300 Email: bds@portlandoregon.gov 1900 SW 4th Ave, Portland, OR 97201
More Contact Info (http://www.portlandoregon.gov//bds/article/519984)

APPEAL SUMMARY

Status: Decision Rendered

Appeal ID: 24530	**Project Address:** 7200 NE Airport Way
Hearing Date: 1/20/21	**Appellant Name:** Phillip Wild
Case No.: P-001	**Appellant Phone:** 5-3 816 6453
Appeal Type: Plumbing	**Plans Examiner/Inspector:** James McKenzie, Joe Blanco
Project Type: commercial	**Stories:** 2 **Occupancy:** A-2, A-3, B, M, S-1, S-2 **Construction Type:** 1-A
Building/Business Name: Port of Portland	**Fire Sprinklers:** Yes - Throughout
Appeal Involves: Erection of a new structure	**LUR or Permit Application No.:** 20-124057-UTL-01-MG
Plan Submitted Option: pdf [File 1] [File 2] [File 3] [File 4] [File 5] [File 6] [File 7] [File 8] [File 9] [File 10]	**Proposed use:** Airport

APPEAL INFORMATION SHEET

Appeal item 1

Code Section	701.2 and 1101.4
Requires	Section 701.2 and Section 1101.4 of the Plumbing Code prescribe materials approved for building sanitary drainage piping and building storm drainage piping, respectively. Ductile iron pipe is not included in Section 701.2 or Section 1101.4 as an approved material.
Code Modification or Alternate Requested	To allow for the use of ductile iron pipe for primary sanitary drainage and storm drainage conveyance piping in deep trenches under the new terminal building expansion at Portland International Airport.
Proposed Design	OVERVIEW The PDX Terminal Core Expansion project will expand the existing terminal building to the west approximately 150 feet. Sanitary drainage and storm drainage collection mainlines existing within the footprint of the building expansion will be replaced with new collection mainlines beyond the expansion. New conveyance piping laterals for sanitary drainage and storm drainage will be installed in deep trenches under the building footprint to connect to the new collection mainlines. The new conveyance laterals will serve sanitary and storm discharge lines from the existing building, maintaining services of the existing building, and will also serve sanitary and storm plumbing connections from the building expansion. Depth of the conveyance laterals below the new building floor will range from approximately 7 feet to approximately 18 feet. (See EXHIBIT A: APPROVED PERMIT SUBMITTAL and EXHIBIT B: CIVIL AND PLUMBING LAYOUT) PROPOSED DESIGN The proposed design is to install ductile iron pipe for the deep sanitary drainage and storm drainage conveyance laterals as shown in EXHIBIT B, rather than cast iron pipe or plastic pipe as

typically prescribed by the Code. The proposed ductile iron pipe is pressure-rated pipe, push-on joint with elastomeric gasket conforming to AWWA C111, cement-lined and asphalt-coated. Ductile iron piping for the conveyance laterals will be more resilient than cast iron piping, and better able to resist loads imparted by building construction activities, considering the following:

Ductile iron pipe is stronger than cast iron pipe
Ductile iron pipe connections are stronger than couplings used for cast iron pipe
Additionally, a ductile iron pipe run has fewer connections than a cast iron pipe run of the same length. Ductile iron pipe is furnished in 20-foot lengths while cast iron pipe is in 10-foot lengths, resulting in nominally half as many connections for ductile iron pipe. Given the length of the conveyance laterals, a fewer number of connections will contribute to the resiliency of the piping. A piping run with fewer and stronger connections will be better able to resist localized ground settlement that could result from vibratory pile driving and heavy equipment loads.

Reason for alternative

The reason for the proposed alternative to install ductile iron pipe for the deep sanitary drainage and storm drainage conveyance laterals rather than cast iron pipe is to ensure the best possible integrity of the deep below-ground piping systems throughout the course of the building construction. The proposed alternative is based on the following considerations:

The deep conveyance laterals must be installed prior to the start of other construction for the building, to be out of the way of building foundations.
Ground-level and below-grade construction for the building will entail deep earthwork, foundation construction, and use of heavy equipment around and over the conveyance laterals. Building construction activities of note include:
a. Transport of heavy building elements through the work area by self-propelled mobile transport vehicles (EXHIBIT C). Transport ground loading will be approximately 1,900 pounds per square foot.
b. Installation of deep building piles (EXHIBIT D). Piles will be installed by vibratory method, and will be driven to depths of approximately 150 feet below ground surface. Vibrations will be transmitted to surrounding soil.
c. For the pile driving, two cranes will be employed, each weighing approximately 367,000 pounds with a ground loading of approximately 2,500 pounds per square foot.
d. Construction of pile caps, grade beams, and columns (EXHIBIT B). The crane for this work has a weight of approximately 1,00,000 pounds, and a ground loading of approximately 5,000 pounds per square foot.

The construction activities, which will have a multi-year duration, will impart loads on the installed conveyance laterals.
The conveyance laterals extend across the full width of the construction area, with lengths of 150 feet or more, resulting in considerable exposure to construction activities.
As noted in the Proposed Design statement, ductile iron piping for the conveyance laterals will be more resilient than cast iron piping, and better able to resist loads imparted by building construction activities.
Ductile iron pipe is proposed to be used in the sanitary and storm drainage systems only for the conveyance laterals. Connections for sanitary and storm drainage plumbing from the building above will be made using standard ductile iron wye and 45 degree (1/8th) bends, installed as illustrated in EXHIBIT E for a typical connection. The configuration of the ductile iron wye and 1/8th bend is equivalent to the standard cast iron combination wye and 1/8th bend fitting specified in ASTM A74, Standard Specification for Cast Iron Soil Pipe and Fitting, for building drainage pipe connections. EXHIBIT E includes Table 14 excerpted from ASTM A74 specifying dimensions for the cast iron combination fitting. EXHIBIT E also includes dimensional information for ductile iron fittings for comparison. As shown in this information, the radius of the bend in the ductile iron 1/8th bend fitting is larger than the specified radius of the cast iron combination fitting for the same nominal pipe size. Accordingly, the hydraulic performance of the ductile iron wye and bend will be equivalent to the performance of the cast iron combination fitting.
All piping above the ductile iron wye and 1/8th bend, and reducers as needed, will be cast iron as

illustrated in EXHIBIT E. Connections of the cast iron piping to the ductile iron piping will be made using couplings manufactured specifically for joining ductile iron and cast iron piping. Couplings will conform to ASTM C1173, Standard Specification for Flexible Transition Couplings for Underground Piping Systems. EXHIBIT F provides product information for two couplings that could potentially be used, as well as product information for the proposed ductile iron pipe.

Ductile iron pipe will also be used for a discharge force main from a new sanitary sewer pump station that will be installed in the project, and for mainline piping that will pass under the building. This ductile iron piping will match existing piping serving the same purposes.

It is noted that the new pile-supported building will be constructed with a structured ground floor slab, and thus building loads will not be imparted on the ground directly below the building.

PROPOSAL
To construct sanitary and storm drainage conveyance laterals below the future terminal expansion building of ductile iron pipe, with standard ductile iron drainage fittings to connect to cast iron plumbing systems from the building above. Ductile iron pipe will be pressure-rated push-on joint pipe, cement-lined and asphalt-coated. The proposed design to use ductile iron pipe for conveyance laterals will provide the best possible functionality and durability under construction activities necessary to build the terminal expansion, benefitting both near-term and long-term serviceability of the sanitary and storm drainage systems.

The drainage systems constructed as proposed will provide service equivalent to standard Code requirements.

Attachments to this appeal include Exhibits A thru F.

APPEAL DECISION

Use of non-approved ductile iron pipe for primary sanitary drainage and storm drainage conveyance piping: Granted as proposed.

The Administrative Appeal Board finds that the information submitted by the appellant demonstrates that the approved modifications or alternate methods are consistent with the intent of the code; do not lessen health, safety, accessibility, life, fire safety or structural requirements; and that special conditions unique to this project make strict application of those code sections impractical.

Pursuant to City Code Chapter 24.10, you may appeal this decision to the Plumbing Code Board of Appeal within 90 calendar days of the date this decision is published. For information on the appeals process, go to www.portlandoregon.gov/bds/appealsinfo, call (503) 823-7300 or come in to the Development Services Center.

EXHIBIT B: CIVIL AND PLUMBING LAYOUT

NEW EXPANSION

EXISTING TERMINAL

155' - 9"

71' - 8"

84' - 1"

37' - 6 1/2"

10' - 6"

22' - 1 1/2"

30' - 1 1/2"

73' - 2"

24' - 10"

89' - 3"

67' - 3"

23' - 6"

65' - 11"

36' - 3 1/2"

114' - 6 1/2"

13' - 7"

66' - 6"

130' - 10"

13' - 7 1/2"

STORM AND SANITARY DRAINAGE MAINLINES

SEE EXHIBIT B PAGE 2 FOR DETAILED PLAN OF THIS AREA

STORM AND SANITARY DRAINAGE MAINLINES

SANITARY SEWER PUMP STATION

DUCTILE IRON CONVEYANCE LATERAL DRAINAGE LINES -TYPICAL

CAST IRON BUILDING PLUMBING - TYPICAL

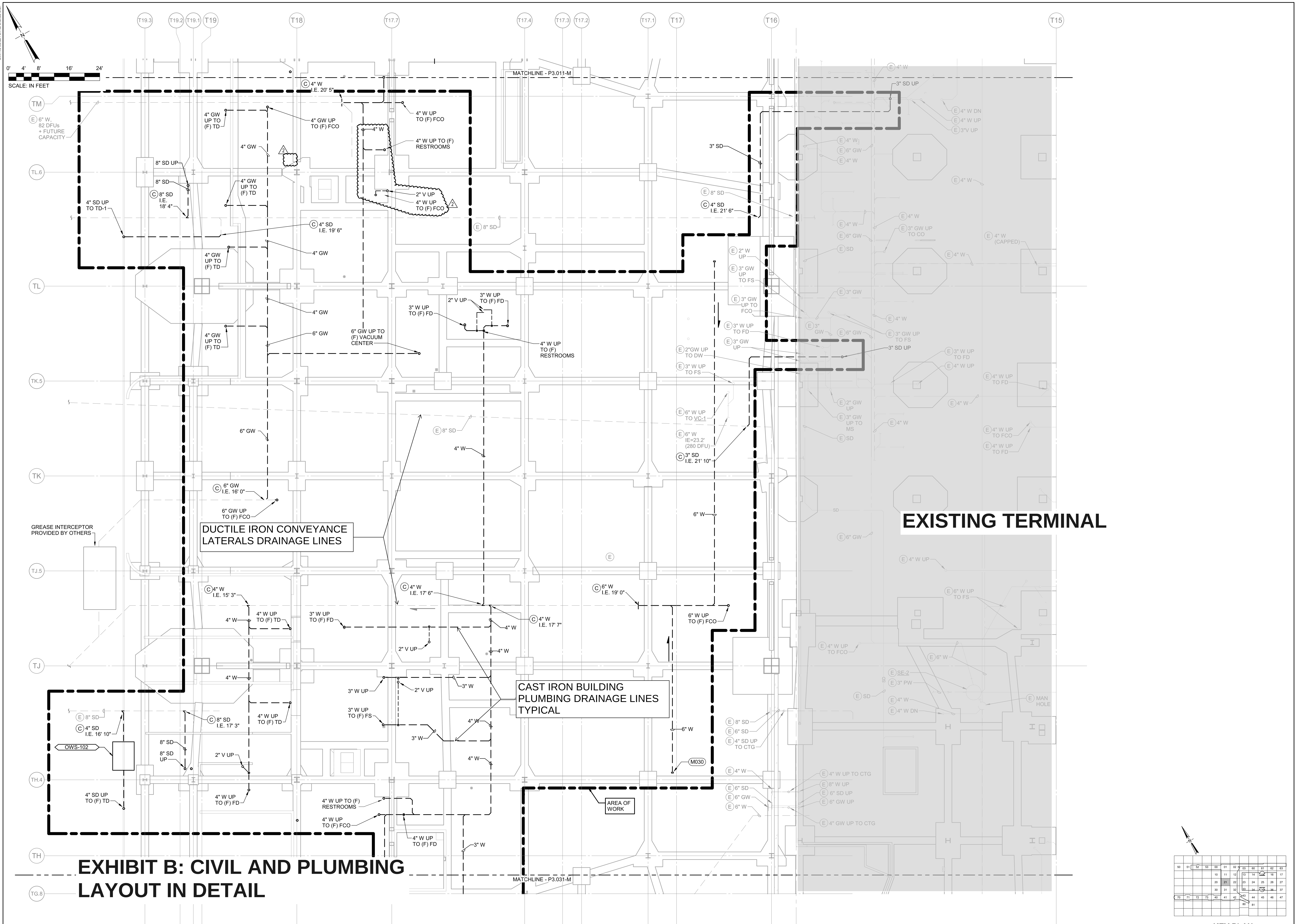
DISCHARGE FORCE MAIN

Limits of concrete removal where water table is 10' below existing grade

T19 T18 T17 T16

TR TQ TP.6 TP TN.6 TN TM.2 TM TL.6 TL TK.5 TK TJ.5 TJ TH.4 TH TG.8 TG TF.3 TF TE.2 TE TD TC.8 TC

1 Crossing Points dimensional details - OVER ALL
1/16" = 1'-0"



CAN YOU SEE THE AIRPLANES? THE ADJACENT SAMPLES SHOW THREE DIFFERENT LEVELS OF SHADING. SETTINGS FOR VIEWING AND PRINTING DRAWING CONTENT ARE OPTIMIZED WHEN ALL THREE PLANES ARE VISIBLE. THIS GUIDANCE IS PROVIDED FOR REFERENCE ONLY.

NO.	DATE	BY	REVISIONS	APP'VD	CK'D
2	JANUARY		Sheet REVISED by CC #TBD		

NO.	DATE	BY	REVISIONS	APP'VD	CK'D
2	TBD		Sheet REVISED by CC #TBD		
1	11/11/20		Sheet ADDED by CC #24.1		

PORT OF PORTLAND
PORTLAND, OREGON

ZGF
1223 SW Washington Street, Suite 200
Portland, OR 97205

PAE

2016D006 DESIGN NUMBER
102191 PROJECT NUMBER

DESIGNED BY	T. LEWIS / R. WICK
DRAWN BY	T. JOHNSON
CHECKED BY	D. NACHTRIEB
DATE	NOVEMBER 2020
SCALE	1/8" = 1'-0"

PORTLAND INTERNATIONAL AIRPORT

TCORE - DEMOLITION, UNDERSLAB MEP AND REFEED EXISTING MEP
UNDERGROUND - SECTOR 21 - FLOOR PLAN - PLUMBING

SUBMITTED BY	TYPE	DRAWING NO.	SHEET NO.	DISC. SHT. NO.
STEVE JANNSEN, PROJECT ENGINEER	CD	PDX 2020-515		P3.021-M

PRINTED: 1/11/2021 11:03:40 AM BIM 360://P22711.next - PDXNext Terminal Core Redevelopment/PDX-102191-PLUMB.rvt

DRAWING SCALE IS REDUCED 50% WHEN SHEET SIZE IS 22" x 17".

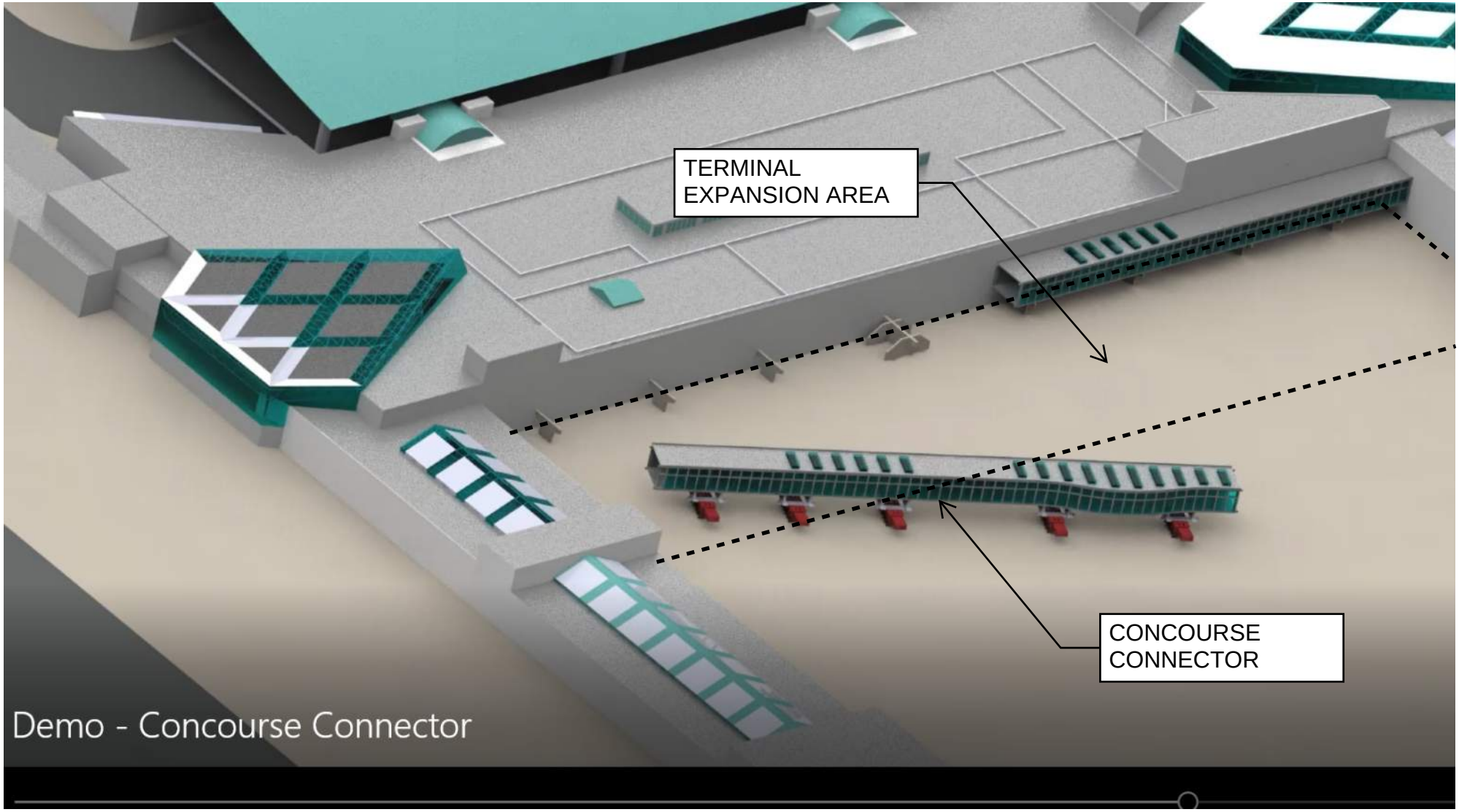
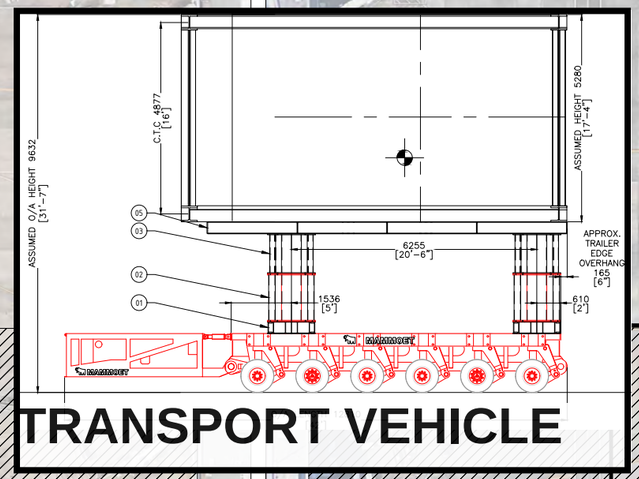


EXHIBIT C: CONSTRUCTION ACTIVITY -
CONCOURSE CONNECTOR SALVAGE

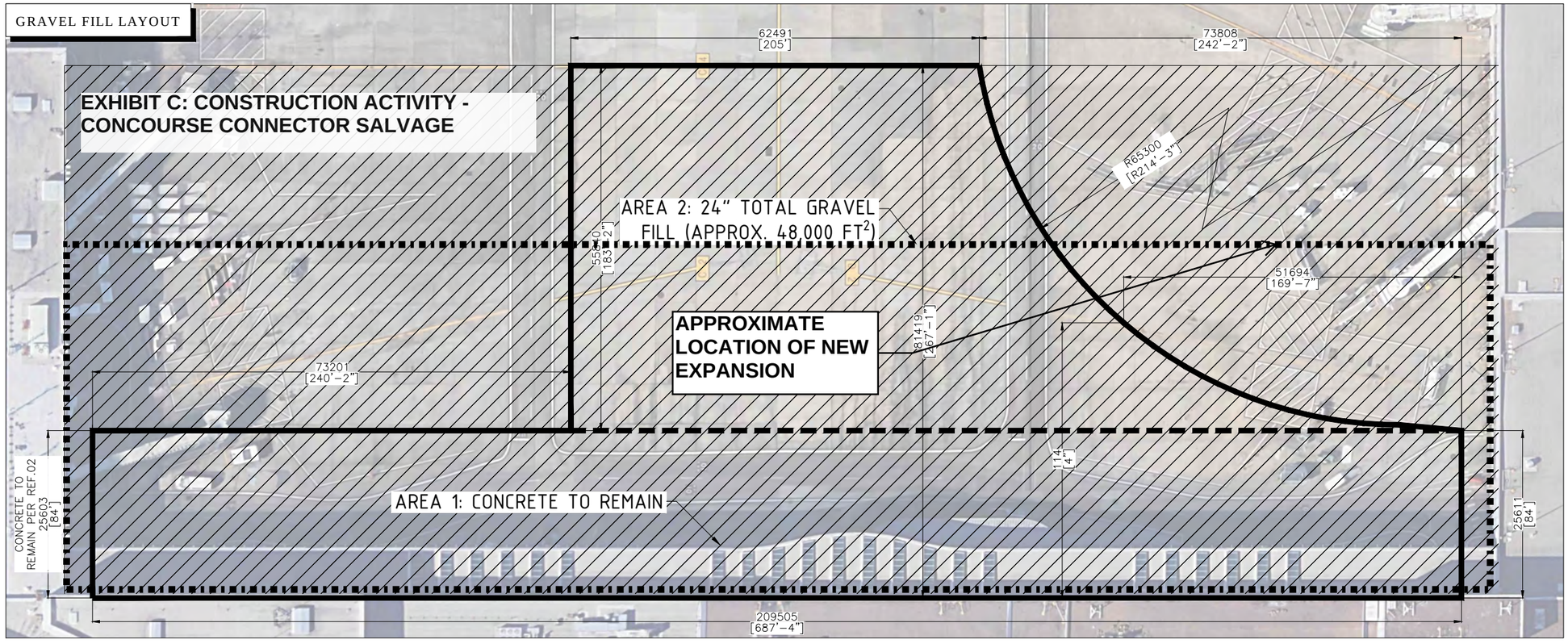
FIRST CONNECTOR MOVE

SECOND CONNECTOR MOVE



TRANSPORT VEHICLE - TYP

GRAVEL FILL LAYOUT



GENERAL NOTES

1	THE CLIENT IS RESPONSIBLE FOR THE PREPARATION OF THE TRANSPORT AREA TO ENSURE THAT IT IS CAPABLE OF ACCOMMODATING THE LOADS GENERATED BY THE TRAILERS DURING ALL TRANSPORT / LOADING / UNLOADING OPERATIONS. GROUND TO BE SUITABLE COMPACTED & LEVELED FOR SAFE & CONVENIENT TRANSPORT OPERATION.
2	THE CLIENT IS RESPONSIBLE FOR THE STRUCTURAL INTEGRITY OF THE LOAD TO BE TRANSPORTED.
3	THE CLIENT IS TO IDENTIFY AND CONFIRM THE SUITABILITY OF THE SUPPORT POINTS TO BE UTILIZED DURING THE TRANSPORT OF THE LOAD.
4	SECURE CARGO ONTO THE TRAILER USING LASHING MATERIAL TO PREVENT SLIDING AND/OR TIPPING OFF THE LOAD.
5	ALL CHAINS GRADE 70, 1/2" 11,300 lbs. CAPACITY (SINGLE) AND TIGHTENED WITH BINDERS (NOT SHOWN) 13,000 lbs. CAPACITY.
6	3/4" PLYWOOD OR ANTI SLIP MATERIAL TO BE USED BETWEEN ALL STEEL CONTACT AREAS TO INCREASE FRICTION.
7	CLIENT SHALL NOTIFY IF THERE IS ANY HINDRANCE OF THE TRAILER POSITIONING WITH FOUNDATIONS, STEEL STRUCTURES AND EQUIPMENT ETC., IN ORDER TO RECTIFY THIS DRAWING TO AVOID ANY HOLDING IF POSSIBLE.
8	ALL TONNES SHOWN ARE METRIC (1 TE = 2,205 LBS).
9	EQUIPMENT IS SUBJECT TO CHANGE BASED ON AVAILABILITY AND MAY BE SUBSTITUED WITH SUITABLE ALTERNATIVES.
10	SUPERVISOR TO VERIFY GROUND IS LEVEL AND SUITABLE TO CARRY OUT LIFT PROCEDURE.
11	OPERATION TO BE PERFORMED UNDER THE DIRECT SUPERVISION OF A MAMMOET SUPERVISOR WHO CAN MAKE MINOR FIELD ADJUSTMENTS AS NEEDED FOR A SAFE OPERATION.
12	THIS DRAWING IS PREPARED ON THE INFORMATION RECEIVED FROM CLIENT.
13	CLIENT SHALL VERIFY AND CONFIRM THAT THE REFERENCE DRAWINGS ARE CORRECT AND ACCORDING TO LATEST REVISIONS.

CIVIL IMPROVEMENTS REQUIREMENTS ORDER OF INSTALLATION (BASED ON ASSUMED 2.5' DEEP EXCAVATION)

AREA 2

1) 18" FILL OF VIBRATION COMPACTED #57 GRAVEL INSTALLED IN 6" LIFTS

2) ONE LAYER OF GEOFABRIC

3) 6" OF VIBRATION COMPACTED AND WATERED #610 GRAVEL

4) TOP WITH ONE LAYER OF 6" LAMINATED MATS

REFERENCE DRAWINGS

REF	DRAWING NUMBER	REV
01	CONCOURSE CONNECTOR DEMOLITION PLAN 8.17.2020signed.pdf	0
02	Client Email 11/12/2020 Concrete to Remain in Move Out Area	-

DRAWING STATUS

ISSUED FOR APPROVAL

REV.	DESCRIPTION:	DATE:	DRAWN:	CHECKED:
01	Updated per Ref.02	08DEC20	ACar 942365	JLaw 940062
00	First Issue	26AUG20	ACar 942365	JLaw 940062

Without authorized signatures this document is uncontrolled, not binding and for indicative purposes only.

CLIENT: NORTHSTAR CONTRACTING GROUP

PROJECT: PORTLAND PDX - BLUE SKY JR.

TITLE: MOVING WALKWAY RELOCATION CIVIL IMPROVEMENTS FOR EXCAVATED AREA

MAMMOET
MAMMOET USA
20526 FM 521, Rosharon, TX 77583
Tel. +1 (281) 369-2200 / Fax. +1 (281) 369-2178
www.mammoet.com

SCALE: NTS	SIZE: D	DRAWING NUMBER
SAP No: 7000229743	PROJECT No: 15074848	SUB: P030 - DOC: D - PART: G01 - SHT: 1/1 - REV: 01

0' 30' 60' 120' 180'

SCALE: IN FEET

EXHIBIT D: CONSTRUCTION ACTIVITY - PILE DRIVING

DUCTILE IRON CONVEYANCE LATERAL DRAINAGE LINES UNDER TRAVEL PATHS - TYPICAL

CONCEPTUAL PILE DRIVING TRAVEL PATHS (RED)

EXISTING TERMINAL

EXISTING TERMINAL

EXISTING TERMINAL

VEHICLE SERVICE ROAD

CONCOURSE D

CONCOURSE C

CONCOURSE E

CONCOURSE B

TERMINAL

PARKING GARAGE

D9 D8 D7 D6 D5 D4 D3 D2 D1 E1 E2 E3 E4 E5 E6

C12 C11 C10 C9 C7 C6 C5 C4 C3 C2 C1 B1 B2

W LINE E, SEE PLAN AND PROFILE 2 C4.010-B

WF LINE E, SEE PLAN AND PROFILE 2 C4.013-B

STS LATERAL L SEE PROFILE 2 4.018-B

STS LATERAL P, SEE PROFILE 2 4.019-B

SS LATERAL V, SEE PROFILE 1 C4.030-B

STS LATERAL U, SEE PROFILE 1 C4.029-B

W LINE D, SEE PLAN AND PROFILE 1 C4.010-B

WF LINE D, SEE PLAN AND PROFILE 1 C4.013-B

SS LATERAL P, SEE PROFILE 2 C4.026-B

STS LATERAL Q, SEE PROFILE 3

SS LATERAL R, SEE PROFILE 4 C4.026-B

SS LINE D, SEE PLAN AND PROFILE 1 C4.023-B

STS LATERAL K, SEE PROFILE 1 C4.018-B

SS LINE J, SEE PROFILE 2 C4.025-B

SS LATERAL O, SEE PROFILE 1 C4.026-B

SS LATERAL I, SEE PROFILE 1 C4.025-B

STS LATERAL I, SEE PROFILE 3 C4.017-B

STS LATERAL H, SEE PROFILE 1 C4.017-B

SS LATERAL G, SEE PROFILE 3 C4.024-B

SS LATERAL F, SEE PROFILE 2 C4.024-B

STS LATERAL D, SEE PROFILE 2 C4.016-B

STS LATERAL E, SEE PROFILE 3 C4.016-B

SS LATERAL E, SEE PROFILE 1 C4.024-B

STS LATERAL C, SEE PROFILE 1 C4.016-B

STS LATERALS W & X, SEE PROFILES 3 & 4 C4.029-B

SS LATERALS X & Y, SEE PROFILES 3 & 4 C4.030-B

SS LINE C, SEE PLAN AND PROFILE 1 C4.022-B

STS LINE S, SEE PLAN AND PROFILE 5 C4.019-B

STS LATERAL J, SEE PROFILE 4 C4.017-B

W LINE C, SEE PLAN AND PROFILE 1 C4.009-B

WF LINE C, SEE PLAN AND PROFILE 1 C4.009-B

SS LATERAL H, SEE PROFILE 4 C4.024-B

STS LATERAL R, SEE PROFILE 4 C4.019-B

AF LINE A, SEE PLAN AND PROFILE 1 C4.027-B 1 C4.028-B

W, E 2 C4.030-B

4.016-B

C4.020-B

STS LINE A, SEE PLAN AND PROFILE 1 C4.014-B

WF LATERAL A, SEE PROFILE 1 C4.013-B

STS LINE B, SEE PLAN AND PROFILE 1 C4.015-B

SS LINE C, SEE PLAN AND PROFILE 1 C4.023-B

WF LINE B, SEE PLAN AND PROFILE 2 C4.011-B

W LINE B, SEE PLAN AND PROFILE 2 C4.008-B

SS LATERAL U, SEE PROFILE 7 C4.026-B

SS LATERAL K, SEE PROFILE 3 C4.025-B

STS LATERAL M, SEE PROFILE 3 C4.018-B

SS LINE SEE PLA PROFILE 1 C4.021-B

5 C4.025-B

STS LATERAL V, SEE PROFILE

STS LATERAL N, SEE PROFILE 4 C4.018-B

SS LATERAL L, SEE PROFILE 4 C4.025-B

14 DEICE DISCHARGE SEE PROFILE 5 C4.029-B

SS LATERAL S SEE PROFILE 5 C4.026-B

W LINE A, SEE PLAN AND PROFILE 1 C4.008-B

WF LINE G, SEE PLAN AND PROFILE 2 C4.031-B

SS LATERAL Z, SEE PROFILE 5 C4.030-B

SS LATERAL T, SEE PROFILE 6 C4.026-B

WF LINE F, SEE PLAN AND PROFILE 1 C4.031-B

EDGE OF SOUTH ENPLANING LEVEL EXPANSION

ELECTRICAL VAULT MV - TC01

1 .011-B

6 .019-B

AIRFIELD FEEDER DUCTBANK, SEE PLAN AND PROFILE 1 C2.202-B 1 C2.203-B 1 C2.204-B

KEY PLAN

SCALE: N.T.S.

CAN YOU SEE THE ARROWS? THE ADJACENT SAMPLES SHOW THREE DIFFERENT LEVELS OF SHADING. SETTINGS FOR VIEWING AND PRINTING DRAWING CONTENT ARE OPTIMIZED WHEN ALL THREE PLANES ARE VISIBLE. THIS GUIDANCE IS PROVIDED FOR REFERENCE ONLY.

NO.	DATE	BY	REVISIONS	APP'VD	CK'D
14	12/16/20		Sheet REVISED by RFI #388		
13	12/14/20		Sheet REVISED by RFI #373		
12	11/20/20		Sheet REVISED by RFI #559		
11	11/17/20		Sheet REVISED by RFI #370		
10	11/13/20		Sheet REVISED by RFI #375, #376		
9	11/23/20		Sheet REVISED by RFI #476		
8	10/30/20		Sheet REVISED by RFI #374		
7	10/29/20		Sheet REVISED by RFI #384		
6	10/21/20		Sheet REVISED by RFI #385		
5	9/23/20		Sheet REVISED by RFI #382		
4	9/15/20		Sheet REVISED by RFI #331, #371		
3	8/24/20		Sheet REVISED by RFI #321		
2	6/03/20		Sheet REVISED by CC #15.1		
1	3/02/20		Set ADDED by CC #15		

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PORTLAND, OREGON

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2016D006 DESIGN NUMBER

102191 PROJECT NUMBER

REGISTERED PROFESSIONAL ENGINEER 95780PE Digitally Signed OREGON MARCH 9, 1999 HANS N. CONRADT EXPIRES: 12-31-21

DIGITALLY SIGNED
ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

DESIGNED BY	R. CARSON
DRAWN BY	N. HATCHER
CHECKED BY	H. CONRADT
DATE	MARCH 2020
SCALE	1" = 60'

PORTLAND INTERNATIONAL AIRPORT

TCORE - CIVIL
UTILITY PLAN AND PROFILE KEY PLAN

SUBMITTED BY	TYPE	DRAWING NO.	SHEET NO.	DISC. SHT. NO.
KERI GESNER, PORT ENGINEER	CD	PDX 2020-509	65	C4.007-B

DRAWING SCALE IS REDUCED 50% WHEN SHEET SIZE IS 22" x 17".

PRINTED: 12/17/2020 12:10:05 PM

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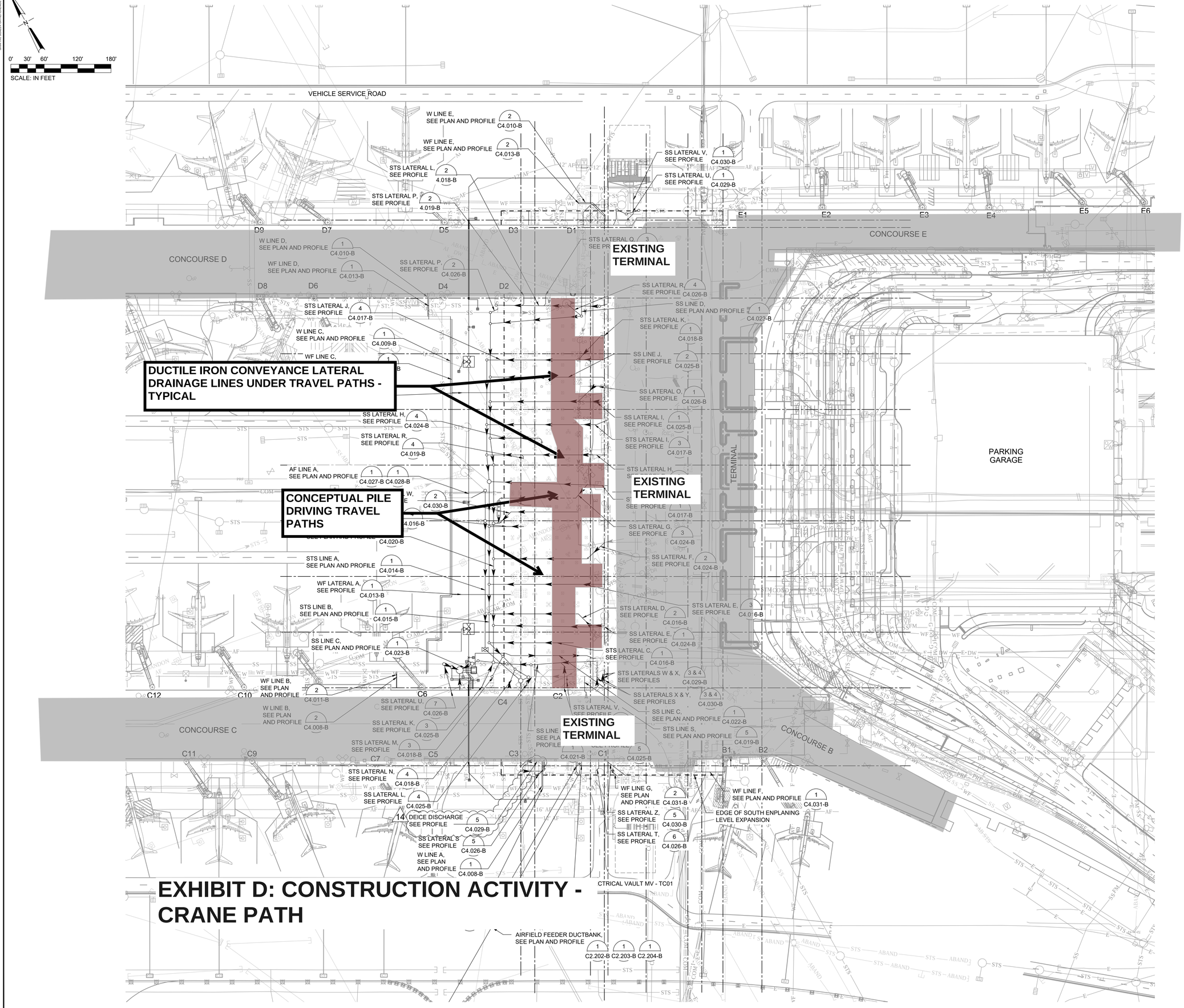
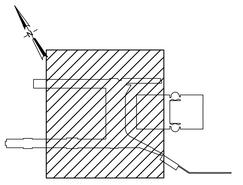


EXHIBIT D: CONSTRUCTION ACTIVITY - CRANE PATH



KEY PLAN
SCALE: N.T.S.

0' 30' 60' 120' 180'
SCALE: IN FEET

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1	3/02/20		Set ADDED by CC #15		

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2016D006 DESIGN NUMBER
102191 PROJECT NUMBER

REGISTERED PROFESSIONAL ENGINEER
95780PE
Digitally Signed
OREGON
MARCH 5, 2020
HANS N. CONRADT
EXPIRES: 12-31-21

DIGITALLY SIGNED
ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

DESIGNED BY	R. CARSON
DRAWN BY	N. HATCHER
CHECKED BY	H. CONRADT
DATE	MARCH 2020
SCALE	1" = 60'

PORTLAND INTERNATIONAL AIRPORT

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KERI GESNER PORT ENGINEER	CD	PDX 2020-509	65	C4.007-B

DRAWING SCALE IS REDUCED 50% WHEN SHEET SIZE IS 22" x 17".

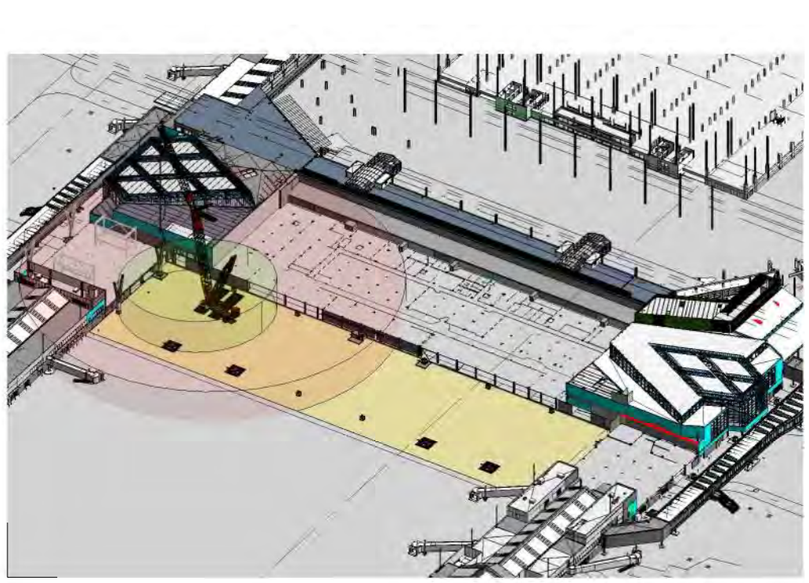
DEPLANING

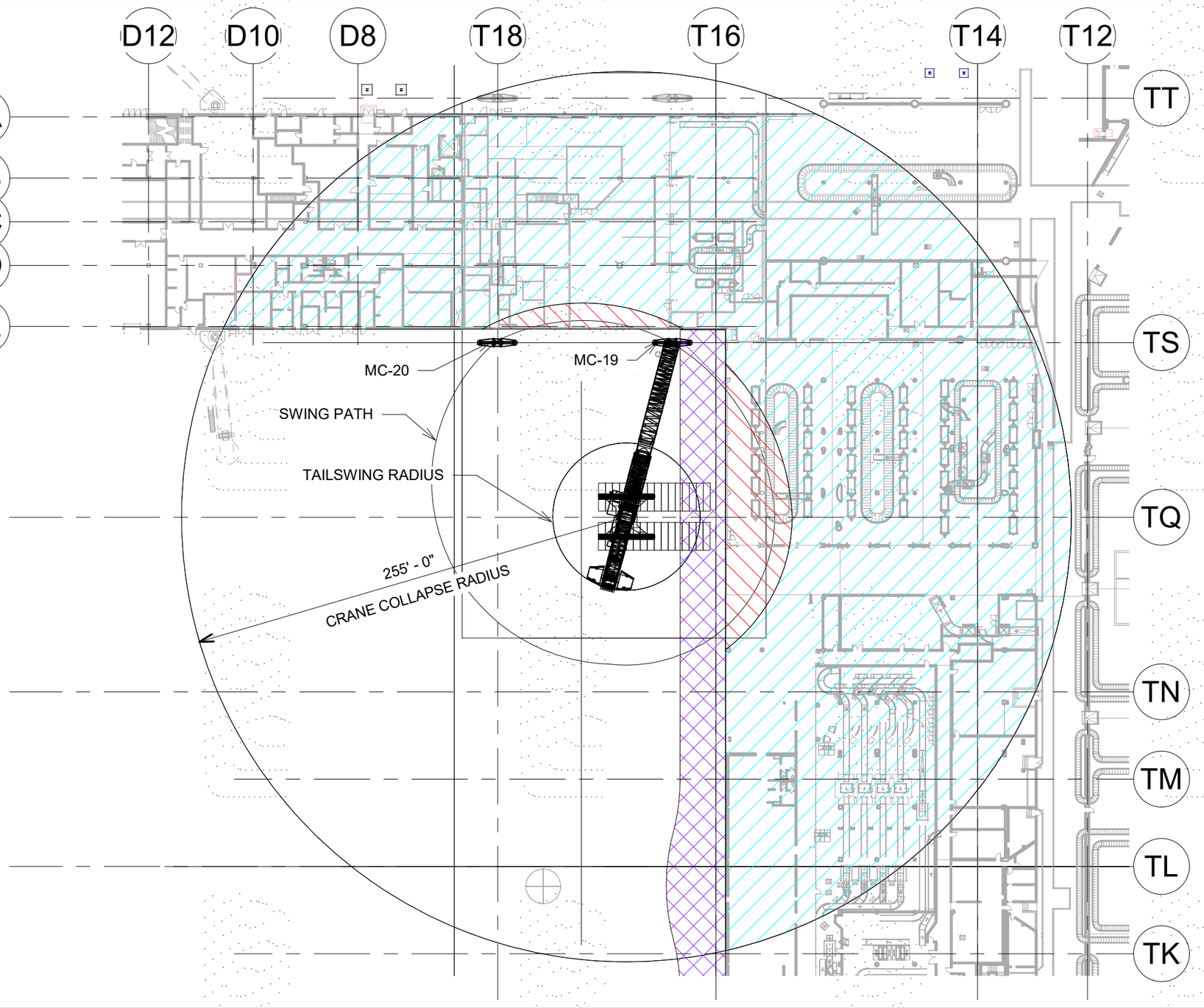
10' SAFETY MARGIN ADDED TO SWING PATH

CRANE SWING PATH AREA

CRANE COLLAPSE AREA

PREVIOUSLY DEMOLISHED/
UNOCCUPIED





HOFFMAN SKANSKA

PDX TCore Structural Erection

No.	Description	Date

Megacolumn Lifts 3&4

Project number	411-7046
Date	OCT 2020
Drawn by	Author
Checked by	Checker

MCL1.02

Scale 1/64" = 1'-0"

C:\Users\Philip.Simon\Documents\TCore Steel Erection Model_philip.simon@skanska.com.rvt

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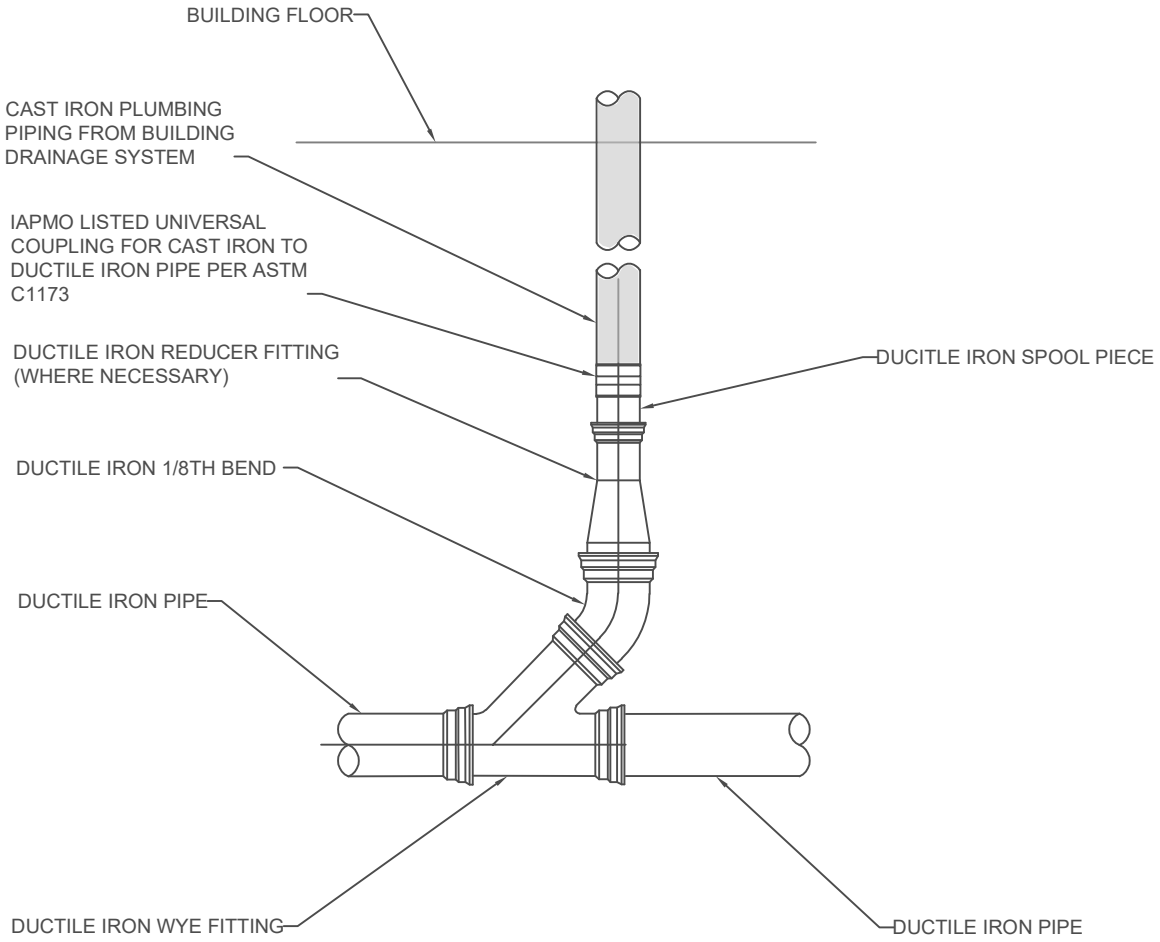
EXHIBIT E - TYPICAL PIPE CONNECTION DETAIL

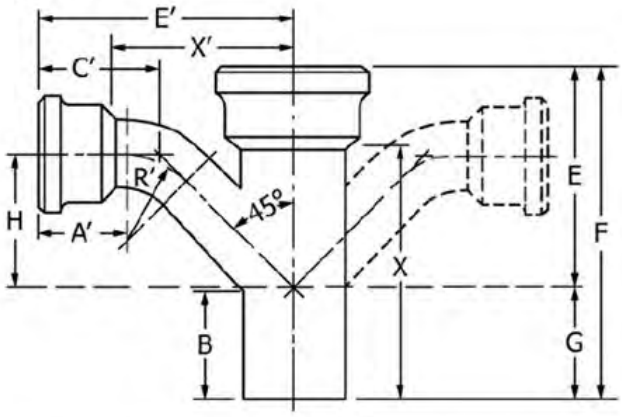


DUCTILE IRON WYE AND 1/8TH BEND FITTINGS IN DUCTILE IRON CONVEYANCE LATERAL

TABLE 14 Dimensions of Combination Y and One-Eighth Bend, Single and Double

NOTE 1—1 in. = 25.4 mm.

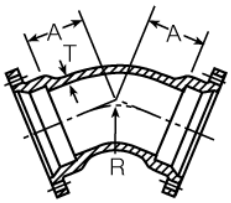
NOTE 2—Dimensions *X* and *X'* are laying lengths.



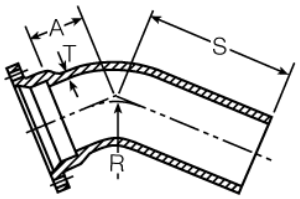
Size, in., Availability[A]	Dimensions in in.[B]										
	A'	*B* (min)	*C'*	*E*	*E'*	*F*	*G*	*H*	*R'*	*X*	*X'*
Single:											
2°O	2¾ [70]	3½ [89]	4 [102]	6½ [165]	7⅜ [187]	10½ [267]	4 [102]	3⅜ [86]	3 [76]	8 [203]	4⅞ [124]
3°O	3¼ [83]	4 [102]	4 1/16 [119]	8¼ [210]	9¾ [248]	13¼ [337]	5 [127]	5 1/16 [129]	3½ [89]	10½ [267]	7 [178]
4°O	3½ [89]	4 [102]	5 3/16 [132]	9¾ [248]	12 [305]	15 [381]	5¼ [133]	6 13/16 [173]	4 [102]	12 [305]	9 [229]
5°O	3½ [89]	4 [102]	5⅜ [137]	11 [279]	14 [356]	16½ [419]	5½ [140]	8⅝ [219]	4½ [114]	13½ [343]	11 [279]
6°O	3½ [89]	4 [102]	5 9/16 [141]	12¼ [311]	15⅞ [403]	18 [457]	5¾ [146]	10 5/16 [262]	5 [127]	15 [381]	12⅞ [327]
8°O	4⅛ [105]	5½ [140]	6⅝ [168]	15 5/16 [389]	20½ [521]	23 [584]	7 1/16 [195]	13⅞ [352]	6 [152]	19½ [495]	17 [432]
3 by 2°O	3 [76]	4 [102]	4¼ [108]	7 9/16 [192]	8¼ [209]	11¾ [299]	4 3/16 [106]	4 [102]	3 [76]	9 [229]	5¾ [146]
4 by 2°O	3 [76]	4 [102]	4¼ [108]	8 5/16 [211]	8¾ [222]	12 [305]	3 1/16 [94]	4½ [114]	3 [76]	9 [229]	6¼ [159]
4 by 3°O	3¼ [83]	4 [102]	4 1/16 [119]	9 [229]	10¼ [260]	13½ [343]	4½ [114]	5 9/16 [141]	3½ [89]	10½ [267]	7½ [191]
5 by 2°O	3 [76]	4 [102]	4¼ [108]	8⅝ [219]	9¼ [235]	12 [305]	3⅜ [86]	5 [127]	3 [76]	9 [229]	6¾ [171]
5 by 3°O	3¼ [83]	4 [102]	4 1/16 [119]	9½ [241]	10¾ [273]	13½ [343]	4 [102]	6 1/16 [154]	3½ [89]	10½ [267]	8 [203]
5 by 4°O	3½ [89]	4 [102]	5 3/16 [132]	10¼ [260]	12½ [318]	15 [381]	4¼ [108]	7 5/16 [185]	4 [102]	12 [305]	9½ [241]
6 by 2°O	3 [76]	4 [102]	4¼ [108]	9 5/16 [237]	9¾ [248]	12 [305]	2 1/16 [68]	5½ [140]	3 [76]	9 [229]	7¼ [184]
6 by 3°O	3¼ [83]	4 [102]	4 1/16 [119]	10 [257]	11¼ [286]	13½ [343]	3⅛ [79]	6 9/16 [167]	3½ [89]	10½ [267]	8½ [216]
6 by 4°O	3½ [89]	4 [102]	5 3/16 [132]	10¾ [237]	13 [330]	15 [381]	4¼ [108]	7 13/16 [198]	4 [102]	12 [305]	10 [254]
6 by 5°O	3½ [89]	4 [102]	5⅜ [137]	11 7/16 [291]	14½ [368]	16½ [419]	5 1/16 [129]	9⅛ [232]	4½ [114]	13½ [343]	11½ [292]
8 by 2°O	3 [76]	5½ [140]	4¼ [108]	10⅞ [276]	10¾ [273]	14 [356]	3⅛ [79]	6½ [165]	3 [76]	10½ [267]	8¼ [210]
8 by °O	3½ [89]	5½ [140]	5 3/16 [132]	12¼ [311]	14 [356]	17 [432]	4¾ [121]	8 13/16 [224]	4 [102]	13½ [343]	11 [279]
8 by 5°O	3½ [89]	5½ [140]	5⅜ [137]	13 [330]	15½ [394]	18½ [470]	5½ [140]	10⅛ [257]	4½ [114]	15 [381]	12½ [318]
8 by 6°O	3½ [89]	5½ [140]	5 9/16 [141]	13 11/16 [348]	16⅞ [429]	20 [508]	6 5/16 [160]	11 5/16 [287]	5 [127]	16½ [419]	13⅞ [352]
Double:											

EXHIBIT E - DUCTILE IRON 1/8TH BEND FITTINGS

45° BENDS (1/8TH)



MJ and MJ

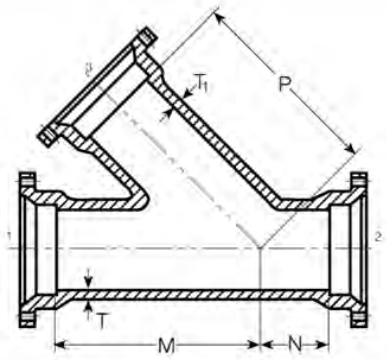


MJ and PE

AWWA C110

Size (in.)	Pressure Rating (psi)	Dimensions in Inches				Weight in Pounds	
		T	A	S	R	MJ & MJ	MJ & PE
4	350	0.52	4.0	12.0	4.81	50	45
6	350	0.55	5.0	13.0	7.25	75	70
8	350	0.60	5.5	13.5	8.44	110	105
10	350	0.68	6.5	14.5	10.88	155	155
12	350	0.75	7.5	15.5	13.25	215	215
14	350	0.66	7.5	15.5	12.06	270	255
16	350	0.70	8.0	16.0	13.25	340	320

EXHIBIT E - DUCTILE IRON WYE FITTINGS

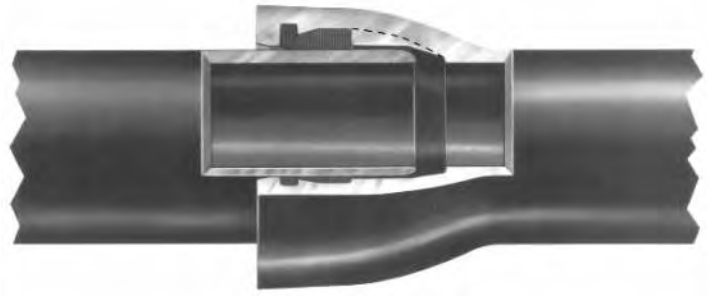


All MJ Wye

Size (in.)		Pressure Rating[1] (psi)	Dimensions in Inches					Weight in Pounds
Run	Branch		T (nom.)	T 1 (nom.)	M	N	P	All MJ
4	4	250	0.34	0.34	9.5	2.5	9.5	45
6	6	250	0.37	0.37	13	3	13	93
8	8	250	0.39	0.39	16	3.5	16	136
10	10	250	0.41	0.41	19	3.5	19	199
12	12	250	0.43	0.43	22.5	4.5	22.5	272

AMERICAN Fastite® Joint Pipe

For Water, Sewage or Other Liquids



AMERICAN Fastite Joint Pipe in sizes 4"-64" for water, sewage or other liquids has the proven long-life and high-strength qualities inherent in pipe produced centrifugally in accordance with AWWA C151. In addition, this significant AMERICAN development, a dependable, single gasket, push-on type joint meeting the requirements of AWWA C111, affords the customer lower joint cost and time-saving advantages in installation. It provides exceptional strength and flexibility and has been widely accepted by engineers, contractors and utility officials since the 1950s. For added flexibility during construction, and for possible elimination of bends, a liberal 5° allowable deflection is standard in all sizes through 30", offering 21" offset in a 20' length of pipe. Liberal deflection can also be provided in larger diameter pipe with standard and Special Fastite Deflection Bells.

The patented AMERICAN Fastite Joint embodies many advanced design features and is rated for a water working pressure of 350 psi. For specific conditions, ductile iron piping with this joint has been approved for much higher pressure conditions. The socket, which is scientifically designed with two gasket recesses and a dividing buttress, is manufactured to close tolerances so that the gasket is self-centered, securely confined, and firmly compressed for a permanent, tight, trouble-free joint. The Fastite joint seal, bubble-tight under vacuum and external pressure, becomes even tighter with the application of internal pressure due to a specially designed wedging surface in the socket.

Fastite Joint Assembly

The bell opening is slightly tapered to provide easy entry of the pipe end; the flared socket design permits liberal joint deflection. The plain end of the pipe is tapered or rounded to facilitate entry into the bell and self-centering in the gasket. On pipe cut in the field, the plain end can be easily beveled and smoothed by the use of a portable grinding wheel or other suitable apparatus. Methods of cutting ductile iron pipe are described in Section 3.

A stripe is painted on the plain end of AMERICAN Fastite Joint Pipe to provide a visual means of checking the joint alignment and to assure proper insertion. See page 2-10 for detailed assembly instructions.

Fastite Gasket

The Fastite Joint sealing component—a molded synthetic rubber ring gasket of two hardnesses, shaped to fit the configuration of the gasket socket—is manufactured per all requirements of ANSI/AWWA C111/A21.11 and under AMERICAN's own rigid specifications, assuring closely controlled dimensional and hardness properties. The smaller end of the gasket is of harder rubber, approximately 85 durometer hardness, which provides a strong shoulder for self-centering on the gasket buttress, a permanent seal against cold flow, and protection from deterioration. The larger end of the gasket is of softer rubber, approximately 65 durometer hardness, providing ease of assembly and positive sealing. The design assures effective sealing at low or high pressures and in straight or deflected joint alignment. It also eliminates any concerns of infiltration or root intrusion, and assures positive sealing against negative pressure, thus preventing gasket "pullout" should a vacuum be created in the line.

A taper on the inside of the gasket allows the entering pipe to locate and center on the hard section and reduces friction loads during

subsequent assembly. The snug fit and the hard section of the gasket, in conjunction with the design of the buttress, act to restrain the gasket against dislodgment during assembly. Additional internal pressure results in increased tightness of the seal when pipe is either in straight alignment or deflected.

Gaskets made of SBR (Styrene Butadiene Rubber) are standard. For information on gaskets made of special types of rubber, for applications involving air or liquid temperatures in excess of 150°F, or for chemical, hydrocarbon or other special service applications, and for installations in contaminated soils where permeation through gaskets might be a concern, consult AMERICAN for recommendations. See Table 2-1.

Fastite Lubricant

AMERICAN Fastite Joint Lubricant is a non-toxic water soluble material imparting neither taste nor odor to the conveyed water and is ANSI/NSF 61 approved. The lubricant is suitable for use in hot or cold weather and will adhere to wet or dry pipe. AMERICAN Fastite Joint Pipe can be assembled when submerged, though for such installation, special AMERICAN underwater joint lubricant is recommended. See Table No. 2-5 for appropriate lubricant quantities.

Fastite Joint Materials

Standard joint materials include Fastite plain rubber gaskets and a sufficient supply of Fastite joint lubricant. Fastite pipes are most often readily joined with available excavating equipment; however, assembly tools can be supplied by AMERICAN on a loan basis with a nominal deposit which is refundable upon return of tools in good condition.

Fittings

AMERICAN Fastite or Flex-Ring fittings and AMERICAN Mechanical Joint Fittings are used with Fastite Joint pipe. See Sections 4 and 5.

Coating and Lining

AMERICAN Fastite Joint Pipe can be furnished asphaltic coated, cement lined, or with special coating or lining where required. See Section 11.

Fastite Gaskets

Table No. 2-1

Common Name or Trade Name*	Chemical Name	Maximum Service Temperature**		Common Uses
		Water & Sewer	Air	
Plain Rubber	Styrene Butadiene Copolymer(SBR)	150°F	150°F	Fresh Water, Salt Water, Sanitary Sewage
Plain Rubber (conductive)	Styrene Butadiene Copolymer(SBR)	150°F	150°F	Electrical continuity for thawing of Service Water and Sewage
EPDM	Ethylene Propylene Diene Monomer	212°F	200°F	Water, Sewage, Ketones, Dilute Acids and Alkalies, Vegetable Oil, Alcohols, Air
Neoprene	Polychloroprene(CR)	200°F	180°F	Fresh Water, Sewage
Nitrile Buna-N	Acrylonitrile Butadiene(NBR)	150°F	150°F	Non-Aromatic Hydrocarbons, Petroleum Oil, Hydraulic Fluids, Fuel Oil, Fats, Oil, Grease†
Fluoroelastomer Fluorel Viton®***	FKM	212°F	300°F	Aromatic Hydrocarbons, Gasoline, Refined Petroleum Products, most Chemicals and Solvents, High Temp., Air (Least permeable of all available Fastite gasket rubbers)

*AMERICAN reserves the right to furnish any Trade or Brand rubber for the chemical formulation specified.
Temperature is in reference to conveyed fluid. **Lubricating oil in air can adversely affect SBR and EPDM performance. SBR, Nitrile and Neoprene are not recommended for hot air exposure in wastewater treatment systems.
***Viton® is a registered trademark of DuPont Dow Elastomers.
Refer to Section 11 for temperature and service capabilities of pipe linings.
Refer higher temperatures or other special requirements to AMERICAN for recommendations regarding suitable gasket material.
†This gasket rubber is chemically resistant in the non-potable water uses shown but is not as resistant to permeation in potable water applications as FKM.
All Fastite gaskets made from the materials in the above table are suitable for use with water containing normal concentrations of chloramine. Where increased resistance to chloramine is desired, neoprene or fluoroelastomer materials should be considered.

AMERICAN Fastite® Joint for Ductile Iron Pipe

ANSI/AWWA C111/A21.11 Standard Dimensions

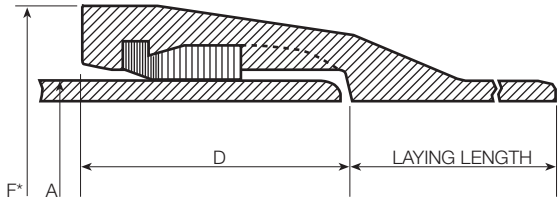


Table No. 2-2

Size in.	Nominal Laying Length ft.	Dimensions in Inches		
		A Outside Diameter	D Depth of Socket	F* Bell O.D.
4	18	4.80	3.31	6.40
6	20	6.90	3.38	8.60
8	20	9.05	3.75	11.16
10	20	11.10	3.75	13.25
12	20	13.20	3.75	15.22
14	20	15.30	5.23	17.73
16	20	17.40	5.23	19.86
18	20	19.50	5.50	22.16
20	20	21.60	5.50	24.28
24	20	25.80	5.50	28.50
30	20	32.00	6.50	34.95
36	20	38.30	6.50	41.37
42	20	44.50	7.50	48.27
48	20	50.80	8.00	54.71
54	20	57.56	8.50	61.65
60	20	61.61	8.75	65.80
64	20	65.67	9.00	70.04

*Dimensions subject to change at our option. Check AMERICAN if exact dimensions required.
See Section 3 for additional information on ductile iron pipe.
See Sections 4 and 7 for information on Fastite fittings.

AMERICAN Fastite® Joint Pipe
Allowable Joint Deflection

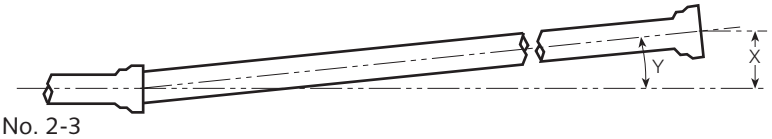


Table No. 2-3

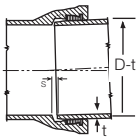
Size in.	Nominal Laying Length ft.	Maximum Recommended Deflection†					
		Standard Bell			Special Deflection Bell		
		X Offset per Nominal Length in.	Y Deflection Angle	Radius of Curve* ft.	X Offset per Nominal Length in.	Y Deflection Angle	Radius of Curve* ft.
4	18	19	5°	206	-	-	-
6	20	21	5°	230	-	-	-
8	20	21	5°	230	-	-	-
10	20	21	5°	230	-	-	-
12	20	21	5°	230	-	-	-
14	20	21	5°	230	-	-	-
16	20	21	5°	230	-	-	-
18	20	21	5°	230	-	-	-
20	20	21	5°	230	-	-	-
24	20	21	5°	230	-	-	-
30	20	21	5°	230	-	-	-
36	20	17	4°	285	21	5°	230
42	20	12	3°	380	21	5°	230
48	20	12	3°	380	17	4°	285
54	20	12	3°	380	17	4°	285
60	20	12	3°	380	17	4°	285
64	20	12	3°	380	17	4°	285

*Approximate radius of curve produced by a succession of nominal lengths of pipe fully deflected.
†Special Deflection Bells must be specifically ordered and will be marked with white bell face for easy identification.
For easiest assembly, the joints should be assembled with the pipe in reasonably straight alignment. After joint assembly, the pipe may be deflected up to the maximum shown above. Offset distances are based on 20' lengths.

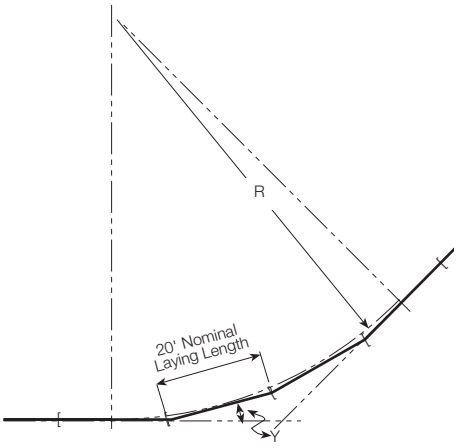
Maximum Allowable Separation

Table No. 2-4

Size in.	S Separation in.
4	3/8
6	9/16
8	3/4
10	15/16
12	1 1/8
14	1 5/16
16	1 1/2
18	1 5/8
20	1 7/8
24	2 1/4
30	2 3/4
36	2 5/8
42	2 1/4
48	2 1/2
54	2 7/8
60	3 1/8
64	3 3/8



Maximum Allowable Separation, "S", in Standard Bell pipe is approximately equal to the median pipe diameter in inches times the sine of the deflection angle. This is provided for information only and should not be used to determine precise joint deflection.



R = Radius of Curve (ft.)

Y = Deflection Angle (degrees)

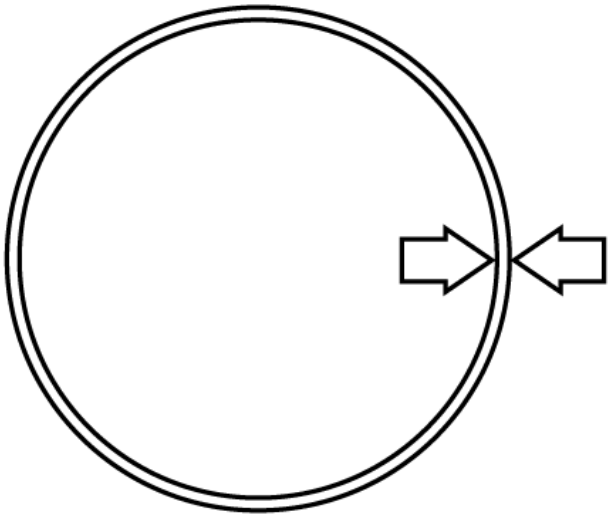
$$\text{Radius of Curve} = \frac{\text{Nominal Laying Length}}{2 \times \text{Tangent } (Y \div 2)}$$

AMERICAN
THE RIGHT WAY

SEAI

Home Products Ductile Iron Pipe and Fittings Unrestrained Joint Pipe Fastite Joint Pipe

Fastite Joint Pipe



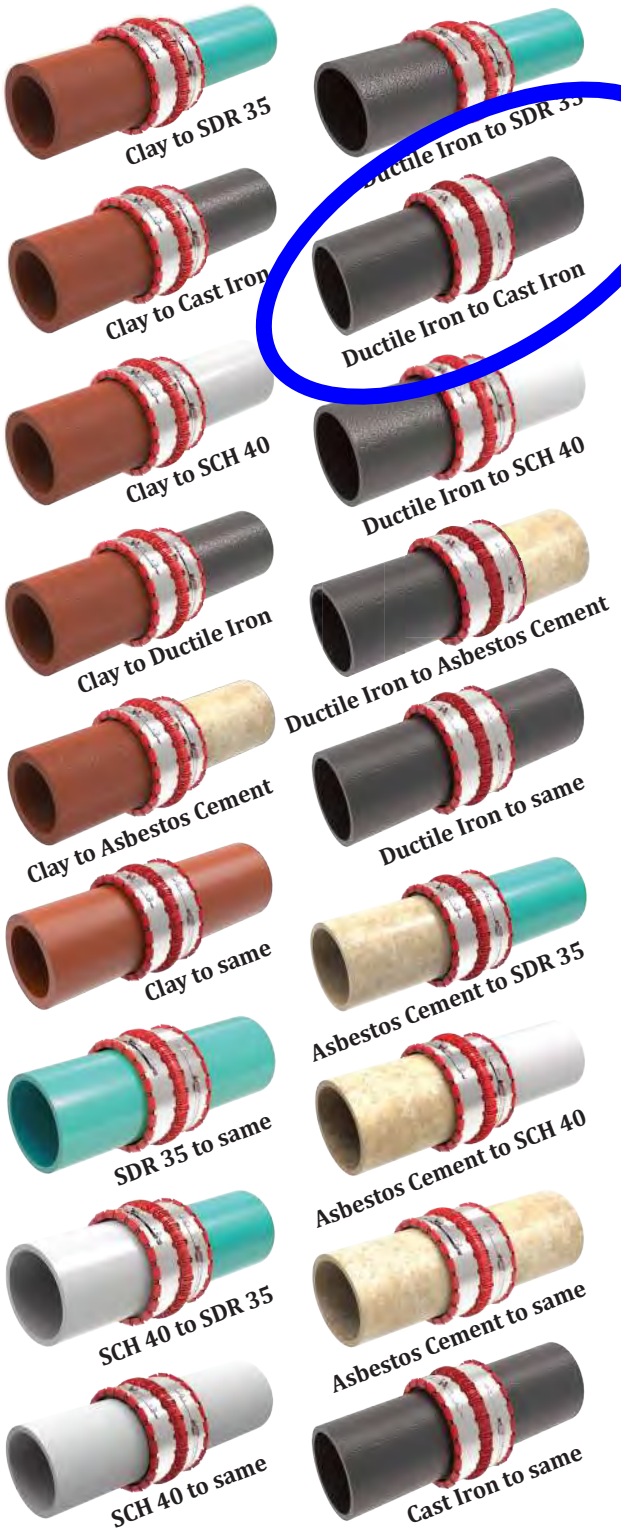
These are special thickness classes as shown in AWWA C150 and C151. AMERICAN can furnish any thickness in between these special thicknesses if deemed desirable for major projects.

Special classes are most appropriately used for some threaded, grooved, or ball and socket pipes or for extraordinary design conditions, and they are generally less available than standard pressure class pipe.

For pressure rating and maximum depth of cover capabilities of special thickness classes, check with AMERICAN. These capabilities can be estimated by comparing metal thickness and capabilities of those of pressure classes, or calculated by using the design formulas shown in AWWA C150.

Nominal Wall Thicknesses for Special Thickness Classes ANSI/AWWA C150/A21.50 ANSI/AWWA C151/A21.51

Size (in.)	Outside Diameter (in.)	Special Thickness Classes – Wall Thickness (in.)[1]						
		50	51	52	53	54	55	56
4	4.80	-	0.26	0.29	0.32	0.35	0.38	0.41
6	6.90	0.25	0.28	0.31	0.34	0.37	0.40	0.43
8	9.05	0.27	0.30	0.33	0.36	0.39	0.42	0.45
10	11.10	0.29	0.32	0.35	0.38	0.41	0.44	0.47
12	13.20	0.31	0.34	0.37	0.40	0.43	0.46	0.49
14	15.30	0.33	0.36	0.39	0.42	0.45	0.48	0.51
16	17.40	0.34	0.37	0.40	0.43	0.46	0.49	0.52
18	19.50	0.35	0.38	0.41	0.44	0.47	0.50	0.53
20	21.60	0.36	0.39	0.42	0.45	0.48	0.51	0.54
24	25.80	0.38	0.41	0.44	0.47	0.50	0.53	0.56
30	32.00	0.39	0.43	0.47	0.51	0.55	0.59	0.63
36	38.30	0.43	0.48	0.53	0.58	0.63	0.68	0.73
42	44.50	0.47	0.53	0.59	0.65	0.71	0.77	0.83
48	50.80	0.51	0.58	0.65	0.72	0.79	0.86	0.93
54	57.56	0.57	0.65	0.73	0.81	0.89	0.97	1.05



MAXADAPTOR®
ONE&DONE™

ONE **coupling per nominal diameter joins:**

Clay Cast Iron Plastic
Ductile Iron Asbestos Cement

For non-pressure, gravity flow sewer applications only.

SIZE	PART DESCRIPTION	O.D. RANGE
4"	MAX 4	4.13" - 5.56"
4"+	MAX 4 Oversize	4.21" - 5.90"
5"	MAX 5	5.30" - 6.50"
6"	MAX 6	6.27" - 7.75"
6"+	MAX 6 Oversize	6.27" - 8.10"
7"	MAX 7	7.20" - 8.80"
8"	MAX 8	8.40" - 10.15"
9"	MAX 9	9.63" - 11.13"
10"	MAX 10	10.50" - 12.68"
12"	MAX 12	12.50" - 15.00"
13"	MAX 13	13.00" - 15.75"
16"	MAX 16	16.34" - 19.10"

U.S. Patent Nos. US 8,651,532 B2 & US 8,635,747 B2

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20 ADVANTAGES at a GLANCE

No more trips to a job site with the wrong coupling.

Low inventory storage costs as only a few sizes are needed to meet all applications.

Increased efficiency equals labor cost savings.

Greatly exceeds hydrostatic testing requirements of ASTM C1173.

Robust design ensures the coupling won't fall apart on the job site.

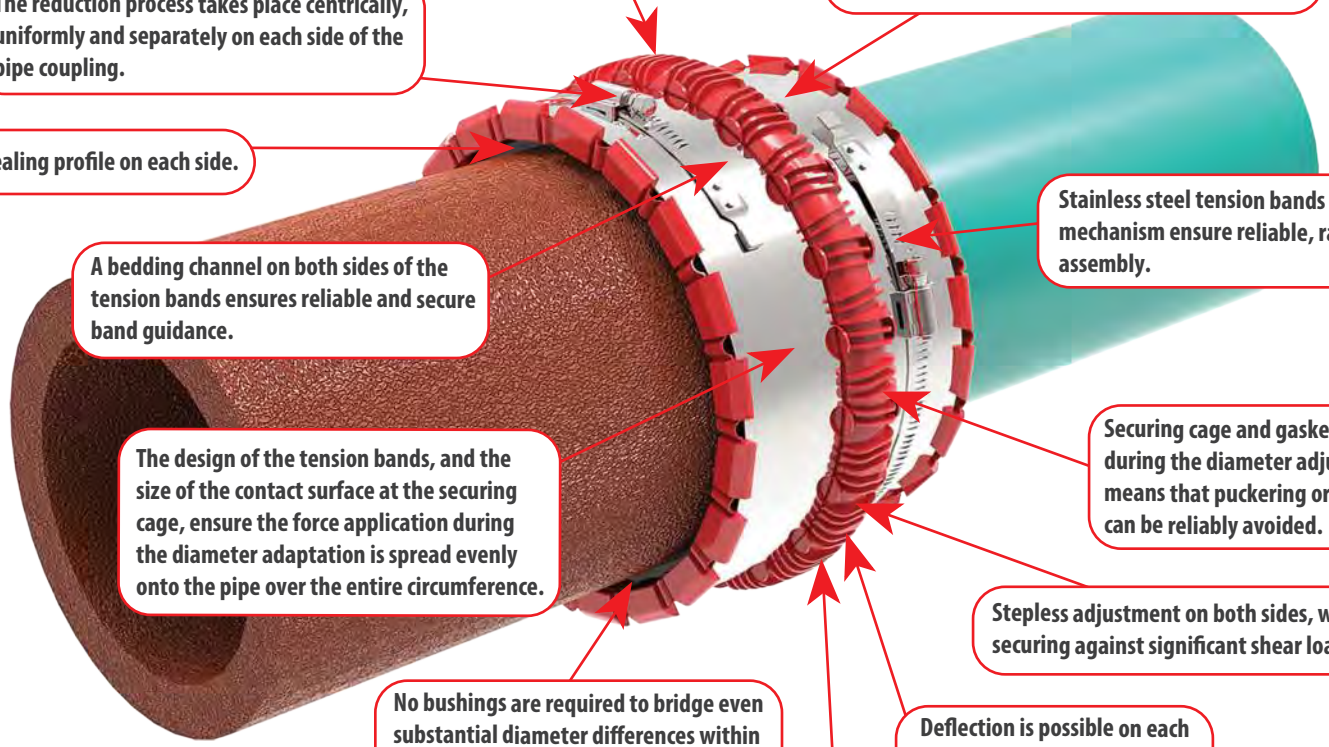
Large-surface cylindrical contact and sealing area.

The reduction process takes place centrically, uniformly and separately on each side of the pipe coupling.

Multiple double sealing profile on each side.

Stainless steel tension bands with click-lock mechanism ensure reliable, rapid and uniform assembly.

A bedding channel on both sides of the tension bands ensures reliable and secure band guidance.



High impact polyamide (nylon) securing cage.

Corrosion resistant AISI 304 series stainless steel components.

The design of the tension bands, and the size of the contact surface at the securing cage, ensure the force application during the diameter adaptation is spread evenly onto the pipe over the entire circumference.

Securing cage and gasket retain a neutral position during the diameter adjustment process, which means that puckering or deformation of the rubber can be reliably avoided.

Stepless adjustment on both sides, with permanent securing against significant shear loads and deflection.

No bushings are required to bridge even substantial diameter differences within the same nominal diameter.

Deflection is possible on each side, up to 3°.

Nominal I.D.'s match-up perfectly, whether same or different pipe materials.

Injection molded EPDM rubber gasket.

Intrusion is limited by a central protruding rubber lip.

MAXADAPTOR®

MAXADAPTOR®
ONE&DONE™

Gripper Gasket LLC
1660 Leeson Lane
Corona, CA 92879
(951) 479-4999 • Fax (951) 479-4997
maxadaptor.com

MEETS:
ASTM C 1173
UPC 4224

MAXADAPTOR® Couplings - Submittal

Performance Sewer Repair Coupling

PROJECT _____

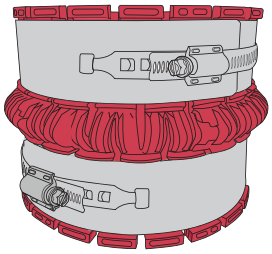
ENGINEER _____

CONTRACTOR _____

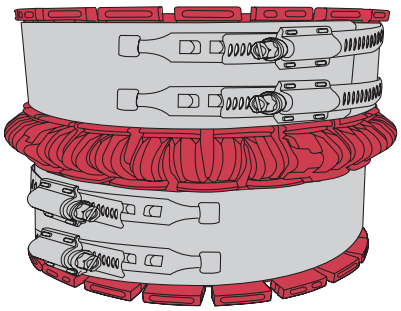
MATERIALS

Shear Band	Series 304 ASTM stainless steel
Screw Housing	Series 304 ASTM stainless steel
Screw Saddle	Series 304 ASTM stainless steel
Screw	Series 305 ASTM stainless steel
Securing Cage	High impact polyamide (nylon)
Gasket	EPDM rubber

The Only Universal Sewer Repair Coupling — ONE SIZE FITS ALL

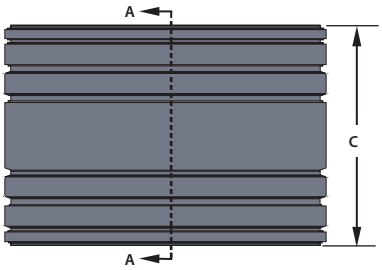


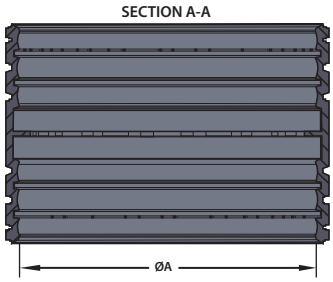
SIZES 4" THROUGH 8" & 10" - 2 CLAMPS



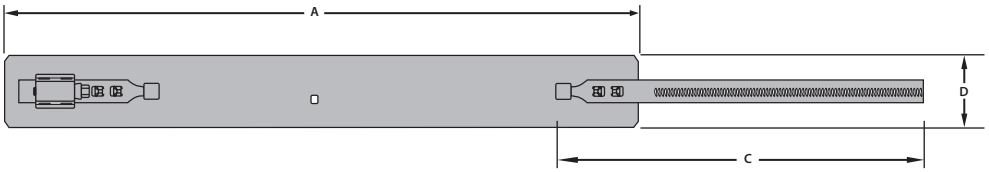
SIZES 9" & 12" THROUGH 16" - 4 CLAMPS

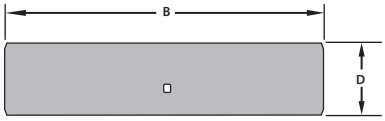
SEALING GASKET DETAILS



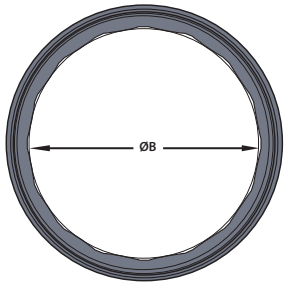


CLAMP ASSEMBLY DETAILS

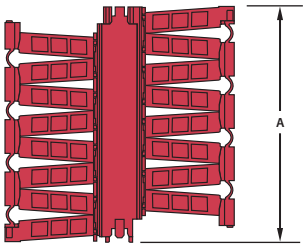


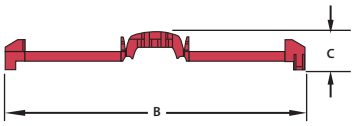


Band Thickness - .0315"



SECURING CAGE DETAILS





U.S. Patent Nos. US 8,651,532 B2 & US 8,635,747 B2

MAXADATOR REFERENCE	SIZE	CLAMP ASSEMBLY				SECURING CAGE			SEALING GASKET		
		A	B	C	D	A	B	C	ØA	ØB	C
MAX 4	4"	16.732"	8.465"	9.843"	1.929"	5.250"	5.900"	0.910"	5.285"	4.420"	5.345"
MAX 5	5"	20.276"	10.236"	9.843"	1.929"	5.250"	5.900"	0.910"	6.417"	5.720"	5.345"
MAX 6	6"	22.835"	11.614"	9.843"	1.929"	6.400"	6.200"	0.790"	7.575"	6.895"	5.935"
MAX 6 Oversize	6"+	25.750"	11.125"	11.496"	1.929"	5.250"	5.750"	0.910"	7.941"	7.250"	5.750"
MAX 7	7"	26.000"	13.250"	9.843"	2.323"	5.250"	5.750"	0.910"	8.628"	8.500"	6.375"
MAX 8	8"	29.528"	14.961"	11.496"	2.323"	8.000"	6.750"	0.690"	10.115"	9.358"	6.892"
MAX 9	9"	33.438"	19.719"	18.000"	2.725"	9.750"	8.250"	1.000"	11.230"	N/A	7.625"
MAX 10	10"	36.417"	18.504"	11.496"	2.323"	8.000"	6.750"	0.690"	12.625"	11.470"	6.788"
MAX 12	12"	45.520"	21.654"	18.110"	2.717"	9.500"	8.190"	0.910"	15.148"	N/A	7.660"
MAX 13	13"	41.250"	21.625"	21.500"	2.725"	9.750"	8.250"	1.000"	15.580"	N/A	7.625"
MAX 16	16"	55.500"	27.563"	18.100"	2.725"	9.750"	8.250"	1.000"	18.980"	N/A	7.625"

TEST	GASKET PHYSICAL TESTS (ASTM C1173)	ASTM C1173
Tensile Strength	1000 PSI minimum	D412
Elongation	200% minimum	D412
Durometer (Shore A)	50 minimum 75 maximum	D2240
Heat Aging	75% of original tensile strength 65% of original elongation All determined after oven aging at 70˚C for 70 hours	D573
Ozone Cracking	No visible cracking at 2X magnification of the gasket after 24 hours exposure in 0.5 PPHM ozone concentrations at 40˚C. Testing and inspection to be on gasket which is loop-mounted to give approximately 20% elongation of outer surface.	D1149
Water Absorption	20% maximum by weight after 7 days at 70˚F	D471
Chemical Resistance	No weight loss 48 hours at 74˚F	D543

MAXADAPTOR® Couplings are designed for the repair of most types and sizes of gravity flow, non-pressure sewer/drainage pipes. One coupling per nominal diameter joins clay, ductile iron, asbestos cement, cast iron and plastic. Coupling consists of corrosion resistant AISI 304 series stainless steel components, and a high impact polyamide (nylon) securing cage, over an injection molded EPDM rubber gasket. Couplings are available in sizes 4" through 16".

Leak-Proof Seal - AISI 304 series stainless steel components and high impact polyamide (nylon) securing cage provide sufficient band load to ensure a water-tight, leak-proof seal that is resistant to both infiltration and exfiltration.

Corrosion Resistant - AISI 304 series stainless steel components provide highly effective corrosion resistance in a variety of environments; such as marine applications, poorly aerated or moist soils, contaminated ground conditions (particularly industrial fill sites) and where the ground water contains chloride, sulfates or bicarbonates.

Withstands Tension and Compression - EPDM rubbers permit a substantial degree of distortion without change in basic physical resistance, unlike other manufacturers' thermoplastic gasket materials. Molded rubber gasket is strong, durable and resilient to ultraviolet rays, ozone, fungus growth, natural erosive properties of soil and normal sewer gases. More pliable and easier to install in cold weather applications than an elastomeric PVC gasket.

Internal "Pipe Stop" - For proper pipe positioning and noise/vibration reduction.

Joint Movement Restraint - Coupling provides for superior load bearing control between the coupling and pipe surface. The coupling's rugged construction provides excellent sealing properties, and the stainless steel band plus securing cage offers excellent resistance to shear forces and helps with alignment, while maintaining flexibility.

Pre-Set Calibration - Designed to be installed with a cordless drill to 80 in/lbs. minimum torque to accommodate the AISI 305 series stainless steel $^{5}/_{16}$" hex head screw.

MAXADAPTOR®

ONE&DONE™

PIPE MATERIAL	4"	5"	6"	8"	10"	12"	14"	15"	16"	18"
Clay										
Mission Clay	5.37	6.65	7.68	9.90	12.43	14.46		18.30		22.30
Building Products Clay	5.20		7.75	9.80	12.40	14.40		18.25		22.25
Eastern Standard Clay	5.23	6.31	7.44	9.84	11.99	14.36		18.20		21.93
Gladding/McBean Clay	5.36		7.82	9.99	12.47	14.52		18.03		21.47
Pacific Clay	5.36		7.93	9.93	12.88	15.30		18.60		22.40
Metal										
No Hub Cast Iron	4.38	5.30	6.30	8.38	10.56	12.50		15.83		
Service Weight Cast Iron	4.30	5.30	6.30	8.38	10.50	12.50		15.88		
Extra Heavy Cast Iron	4.50	5.50	6.50	8.62	10.75	12.75		15.88		
Ductile Iron	4.80		6.90	9.05	11.10	13.20	15.30		17.40	19.50
Steel	4.50	5.56	6.62	8.62	10.75	12.75	14.00		16.00	18.00
Copper	4.13	5.13	6.13	8.13	10.13					
Stainless Steel	4.00	5.00	6.00	8.00	10.00					
Duriron®	4.75		6.69	9.00	11.25	13.25		16.75		
Plastic										
Schedule 40 Plastic	4.50	5.56	6.62	8.62	10.75	12.75	14.00		16.00	18.00
Thinwall Plastic PVC (ASTM 3033) - SDR 26	4.21		6.27	8.16	10.20	12.24				
Thinwall Plastic PVC (ASTM 3034) - SDR 35	4.21		6.27	8.40	10.50	12.50		15.30		18.70
Thinwall Plastic ABS (ASTM 2751)	4.21	5.30	6.27	8.40	10.50	12.50				
Miscellaneous										
Armco Truss				9.40	11.80	14.10				
Bituminous Fiber/ Orangeberg	Min. 4.64	Min. 5.82	Min. 6.92	Min. 9.14	Min. 11.24	Min. 13.44				
Asbestos Cement Class 1500 - Transite	4.81	5.90	6.92	9.02	11.12	13.22	15.30	16.34	17.38	
Concrete	Min. 5.50	Min. 6.50	Min. 7.50	Min. 10.00	Min. 12.45	Min. 14.50		Min. 19.60		Min. 22.50

U.S. Patent Nos. US 8,651,532 B2 & US 8,635,747 B2

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EXHIBIT F - PIPE COUPLING OPTION

MISSION STANDARD
"Calder Style" Sewer Couplings & Bushings

MISSION STANDARD

"Calder Style" Sewer Couplings & Bushings

(0404616) (0404624) (Bushing)

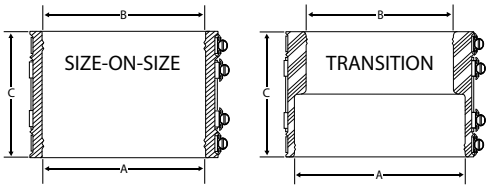
3" to 12"

RECOMMENDED TOOLS
SEEKONK Pre-Set Torque Wrench: 60 in/lbs; 5/16" hex head

Flexible sewer couplings designed to join **Clay, Plastic or Cast Iron to any other pipe** materials. *Utilized primarily in the Western United States.*

COMPONENTS

Clamps: Surgical Grade 316 Stainless Steel, Nut & Bolt (2)
or 300 Series Stainless Steel, Worm Drive (2)
Shield: 300 Series Stainless Steel with 300 Series Stainless Steel, Worm Drive Clamps (2)
Gasket: Molded, One-Piece Elastomeric Sealing Gasket



FOR: Asbestos Cement (**AC**) | Cast Iron (**CI**) | Clay (**CL**) | Concrete (**CONC**) | Ductile Iron (**DI**) | Schedule 40 Plastic (**PL**) | Thinwall Plastic (**TWP**) | Steel (**ST**) | Extra Heavy Cast Iron (**XHCI**) | Cast Iron Transition (**CIT**) | Iron Pipe Size (**IPS**)

EASY

MISSIONMADE™ products are **easy to install and reuse.**

LEAKPROOF

Increased band tension secures pipe ends, for a **watertight, root-proof seal, impervious to infiltration and exfiltration.**

RESILIENT

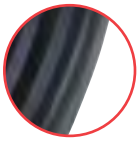
Synthetic rubbers permit considerable distortion **withstanding tension and compression.** More pliable, **easier to install in cold weather** applications than elastomeric PVC gaskets.

RIGID

Thick, stainless steel shield controls load bearing between coupling and pipe surface, opposing **shear forces** while maintaining **pipe alignment**.

(0403444)

SECURE



Sealing "O" Rings under each clamp prevent pipe end slippage for a **reinforced joint seal.**

ADAPTABLE

Independent clamp tightening **adapts to different outside pipe diameters.**

DURABLE

Extra thick rubber gasket resists ultraviolet rays, ozone, fungus growth, natural soil erosive properties, and normal sewer gases. **Can be used with or without bushings.**

ANTICORROSIVE

Stainless steel components resist corrosion in marine applications, poorly aerated/moist soils, contaminated grounds conditions, *(e.g. industrial fill sites)* and chloride, sulfates or bicarbonates in ground water.

SPECIFICATIONS

Natural and synthetic rubbers conform to **ASTM C425** and **ASTM C1173**	300 Series Stainless Steel conforms to **ASTM A240/A240M**	**IAPMO FILE 4224 & 0317** listed