

ADDENDUM NO. 01



PROJECT NAME: **Espada Road - IH 410 to Ashley Rd.**

BID DATE: **2:00 P.M. CST, on Tuesday, February 23, 2016**

PLACE: **Office of the City Clerk, City Hall, 100 Military Plaza, 2nd floor
San Antonio, Texas 78205**

This addendum should be included in and be considered part of the plans and specifications for the above named project. The contractor shall be required to sign an acknowledgement of the receipt of this addendum and submit with their bid.

TCI PROJECT NO: **40-00246/40-00419**

Plan Sheets, Sheet 4, 13, 14, 18, 82, 83, 87, 104, SAWS Water Sheets (attached to this Addendum) is revised as follows:

1. Form 010 – Change in contract calendar days to 425
2. Form 025 – Unit Pricing quantities and items changed as outline below
3. Form 060 - Change in contract calendar days to 425
4. Sheet 4: Added a section of notes to the General Notes which includes the following:

EXCESS SOIL DISPOSAL: Contractor shall provide a submittal regarding disposal sites to the City 45 days prior to commencement of hauling off any excavated and/or excess fill material. The conditions set forth herein are solely due to a desire by the City to manage and document the disposal of soils from this site, not due to any environmental concerns relative to the material being disposed of. Accordingly, in the soil disposal Contractor submittal:

Contractor shall certify and assure that the number of soil disposal sites does not exceed three (3) sites.

Contractor shall certify that no disposal areas are within the flood plain and known Superfund or environmental issue area, and provide OWNER evidence to that effect.

Contractor shall provide all affected landowner's written authorization to dispose of soil from this project site on his or her property.

Contractor shall include provisions in landowner agreements that the City reserves the right to conduct independent visual inspections and soil testing on listed properties prior to disposal of project excess soils to determine background levels of various elements as identified by the City. Said landowner agreements will provide an effective right of entry that will expire upon substantial completion of the project.

Contractor agrees to abide by the landowners written conditions in landowner agreements including those related to for placing, compacting, restoration, and erosion



control of the site(s), and that the landowner's will be requested to provide final written approval before prior to substantial completion, and that any costs the City incurs to address legitimate landowner concerns will be considered and may be deducted from the Contractor's final payment as determined by the City.

Accordingly, landowners shall provide certification to the Contractor and the Contractor shall include said certification in his submittal that excess soils shall not be hauled to residential properties. Every attempt will be made to dispose of excess soils at either Contractor agrees to comply with other regulatory agencies requirements for proper and legal implementation of the reuse plan prior to soils transport, as applicable. Contractor shall ensure an appropriate storm water pollution prevention plan is developed and implemented in accordance with Texas Pollutant Discharge Elimination System requirements, as applicable.

Contractor shall be responsible for tracking excess soil disposed of at approved designated areas. Contractor shall track loads and provide documentation, such as trip tickets or "bill of landing" for all transported soil to each approved site.

Contractor shall not begin hauling activities of excavated or excess soils to the designated disposal sites until City's Engineer or his/her designee provides written authorization.

In the event Contractor only provides one disposal location to City and an additional disposal location is needed, Contractor is required to notify City in writing of its new disposal location and provide written documentation to City's Engineer at minimum 72 hours in advance of utilizing the additional disposal location so City may review and approve the additional disposal location, prior to hauling activities.

5. Sheet 4: Added additional note to General Notes:
 - POWER TO THE FIELD OFFICE WILL BE SUPPLIED VIA A TEMPORARY SERVICE METER. IF POWER IS REQUIRED PRIOR TO THE COMPLETION OF THE TEMPORARY SERVICE METER APPLICATION PROCESS, THE CONTRACTOR SHALL SUPPLY A GENERATOR CAPABLE OF ADEQUATELY POWERING THE FIELD OFFICE.
6. Sheet 13: Added quantity for Portable Changeable Message Sign: 100 Days
7. Sheets 14, 82, & 83: Added quantities revision relating to Hauling of Misc Concrete adjacent to Oldcastle Precast Inc as well as removal of wording relating to hauling of concrete shall be considered subsidiary to Prep ROW:
 - Remove Miscellaneous Concrete: 27,332 SF
8. Sheets 14 & 87: Added quantities relating to Electrical Service removal and relocation, due to potential conflicts at 9143 Espada Road:
 - ELECTRICAL SERVICES (PER INSTALLATION): 1 EA
 - REMOVE ELECTRICAL SERVICES (PER REMOVAL): 1 EA
9. Sheet 18: Added quantities on Illumination Summary relating to ITSD conduit. Plans are currently under production.
 - CONDUIT (PVC)(SCHD 80)(4"): 8580 FT
 - 3-CELL MAXCELL INNERDUCT (FABRIC)(3"): 25,740 FT – *Subsidiary to Item 618.xx*
 - TRACER WIRE (METALLIC): 4,290 FT – *Subsidiary to Item 618.xx*
 - TRACER WARNING TAPE (METALLIC)(ORANGE): 4290 FT – *Subsidiary to Item 618.xx*
 - 48"X24"X30" H20 RATED HANDHOLE: 11 EA

10. Sheet WL-3: Revised Quantities: (Revised plans not included)

- Removed Item 833.0 Existing Meter and Meter Box Relocation
- Added Item 833.0: New Meter and New Meter Box Relocation: 41 EA

11. Misc callouts on Water Sheets in table below (Revised plans not included)

Item No.	Reference Sheet	Original Bid Document Language	Replace with
1	WL-3, Bid Code 833.0	Existing Meter and Meter Box relocation: Quantity:41	Existing Meter and Meter box relocation: Quantity:0
2	WL-3, Bid Code 833.0	Existing Meter and New Meter Box relocation: Quantity:0	New Meter and New Meter box relocation: Quantity:41
3	WL-4, Bid Code 833.0	Existing Meter and Meter Box relocation: Quantity:7	New Meter and New Meter box relocation: Quantity:7
4	WL-4	Callout "proposed long relay, Unmetered relay 3/4"service #130599, STA. 12+49.43"	Callout "proposed long relay with new meter and new meter box, Unmetered relay 3/4"service #130599, STA. 12+49.43"
5	WL-4	Callout "proposed short relay, 3/4"service #132966, STA. 15+53.33"	Callout "proposed short relay with new meter and new meter box, 3/4"service #132966, STA. 15+53.33"
6	WL-4	Callout "proposed long relay, 1"service #379488, STA. 15+24.40"	Callout "proposed long relay with new meter and new meter box, 1"service #379488, STA. 15+24.40"
7	WL-4	Callout "proposed long relay, 3/4"service #132638, STA. 16+74.07"	Callout "proposed long relay with new meter and new meter box, 3/4"service #132638, STA. 16+74.07"
8	WL-4	Callout "proposed long relay, 3/4"service #158262, STA. 17+18.09"	Callout "proposed long relay with new meter and new meter box, 3/4"service #158262, STA. 17+18.09"
9	WL-4	Callout "proposed long relay, 3/4"service, STA. 17+57.67"	Callout "proposed long relay with new meter and new meter box, 3/4"service, STA. 17+57.67"
10	WL-4	Callout "proposed long relay, 1"service #263392, STA. 14+11.24"	Callout "proposed long relay with new meter and new meter box, 3/4"service #263392, STA. 14+11.24"
11	WL-5, Bid Code 833.0	Existing Meter and Meter Box relocation: Quantity:1	New Meter and New Meter box relocation: Quantity:5



12	WL-5	Callout "proposed long relay, 3/4"service, STA. 20+01.43"	Callout "proposed long relay with new meter and new meter box, 3/4"service , STA. 20+01.43"
13	WL-5	Callout "proposed long relay, 3/4"service, STA. 18+10.56"	Callout "proposed long relay with new meter and new meter box, 3/4"service, STA. 18+10.56"
14	WL-5	Callout "proposed long relay, 3/4"service #141391, STA.19+29.34"	Callout "proposed long relay with new meter and new meter box, 3/4"service #141391, STA. STA.19+29.34"
15	WL-5	Callout "proposed long relay, 3/4"service#194990, STA.25+71.55"	Callout "proposed long relay with new meter and new meter box, 3/4"service #194990, STA. 25+71.55"
16	WL-5	Callout "proposed long relay, 3/4"service, STA. 25+67.53"	Callout "proposed long relay with new meter and new meter box, 3/4"service, STA. 25+67.53"
17	WL-6, Bid Code 833.0	Existing Meter and Meter Box relocation: Quantity:7	Existing Meter and New Meter box relocation: Quantity:7
18	WL-6	Callout "proposed long relay, 3/4"service #129528, STA.26+62.63"	Callout "proposed long relay with new meter and new meter box, 3/4"service #129528, STA.26+62.63"
19	WL-6	Callout "proposed long relay, 3/4"service #129135, STA. 28+45.57"	Callout "proposed long relay with new meter and new meter box, 3/4"service #129135, STA. 28+45.57"
20	WL-6	Callout "proposed long relay, 1"service #253822, STA. 28+91.01"	Callout "proposed long relay with new meter and new meter box, 1"service #253822, STA. 28+91.01"
21	WL-6	Callout "proposed long relay, 3/4"service #149312, STA. 29+88.35"	Callout "proposed long relay with new meter and new meter box, 3/4"service#149312, STA. 29+88.35"
22	WL-6	Callout "proposed long relay, 3/4"service, STA. 30+66.18"	Callout "proposed long relay with new meter and new meter box, 3/4"service, STA. 30+66.18"
23	WL-6	Callout "proposed long relay, 3/4"service #164044, STA. 31+32.50"	Callout "proposed long relay with new meter and new meter box, 3/4"service #164044, STA. 31+32.50"
24	WL-6	Callout "proposed long relay, 3/4"service #129288, STA. 32+28.73"	Callout "proposed long relay with new meter and new meter box, 3/4"service #129288, STA. 32+28.73"
25	WL-7, Bid Code 833.0	Existing Meter and Meter Box relocation: Quantity:8	New meter and meter box relocation: Quantity:7



26	WL-7	Callout "proposed long relay, 3/4"service #147122, STA. 34+34.22"	Callout "proposed long relay with new meter and new meter box, 3/4"service#147122, STA. 34+34.22"
27	WL-7	Callout "proposed long relay, 3/4"service #199698, STA. 36+54.78"	Callout "proposed long relay with new meter and new meter box, 3/4"service#199698, STA. 36+54.78"
28	WL-7	Callout "proposed long relay, 3/4"service #157299, STA. 37+37.37"	Callout "proposed long relay with new meter and new meter box, 3/4"service #157299, STA.37+37.37"
29	WL-7	Callout "proposed long relay, 3/4"service #195354, STA. 38+70.84"	Callout "proposed long relay with new meter and new meter box, 3/4"service #195354, STA. 38+70.84"
30	WL-7	Callout "proposed short relay, 3/4"service #131648, STA. 40+43.78"	Callout "proposed short relay with new meter and new meter box, 3/4"service#131648, STA. 40+43.78"
31	WL-7	Callout "proposed short relay, 3/4"service #128942, STA. 40+92.58"	Callout "proposed short relay with new meter and new meter box, 3/4"service #128942, STA. 40+92.58"
32	WL-7	Callout "proposed short relay, 1"service #129082, STA. 41+28.86"	Callout "proposed short relay with new meter and new meter box, 1"service #129082, STA. 41+28.86"
33	WL-8, Bid Code 833.0	Existing Meter and Meter Box relocation: Quantity:8	New Meter and New Meter box relocation: Quantity:8
34	WL-8	Callout "proposed short relay, 3/4"service #387489, STA. 42+10.67"	Callout "proposed short relay with new meter and new meter box, 3/4"service #387489, STA. 42+10.67"
35	WL-8	Callout "proposed short relay, 3/4"service #129141, STA. 42+78.19"	Callout "proposed short relay with new meter and new meter box, 3/4"service #129141, STA. 42+78.19"
36	WL-8	Callout "proposed short relay, 3/4"service #129143, STA. 44+00.89"	Callout "proposed short relay with new meter and new meter box, 3/4"service #129143, STA. 44+00.89"
37	WL-8	Callout "proposed short relay, 3/4"service #149142, STA. 44+56.72"	Callout "proposed short relay with new meter and new meter box, 3/4"service #149142, STA. 44+56.72"
38	WL-8	Callout "proposed long relay, 3/4"service #129024, STA. 45+27.17"	Callout "proposed long relay with new meter and new meter box, 3/4"service #129024, STA. 45+27.17"
39	WL-8	Callout "proposed short relay, 3/4"service, STA. 46+81.80"	Callout "proposed short relay with new meter and new meter box, 3/4"service, STA. 46+81.80"



40	WL-8	Callout "proposed long relay, 3/4"service #186940, STA. 43+69.64"	Callout "proposed long relay with new meter and new meter box, 3/4"service #186940, STA. 43+69.94"
41	WL-8	Callout "proposed short relay, 3/4"service #130830, STA. 49+02.09"	Callout "proposed short relay with new meter and new meter box, 3/4"service #130830, STA. 49+02.09"
42	WL-9, Bid Code 833.0	N/A	New Meter and New Meter box relocation: Quantity:1
43	WL-9	Callout "proposed short relay, 3/4"service #129099, STA. 49+53.54"	Callout "proposed short relay with new neter and meter box, 3/4"service #129099, STA. 49+53.54"

12. Sheet 104: Hydraulic Data Sheet revised to change name of Line A-3 (MH-A3 to DI-A1) to Line A and Line B1-3 (CI-B8 to MH-B16) to Line B1-8. No quantity changes were made.

13. Spec Package:

- Revised date on cover
- Revised table of contents
- Revised list of governing specifications to reflect new items
- Added CPS Electric "Section 500" and "1400"
- Added TxDOT Special Spec 6001-6001 Portable Changeable Message Sign
- Added City of San Antonio Structured Cabling Infrastructure Guidelines

QUESTIONS AND RESPONSES

Question 1:

During the pre bid meeting the question was raised about the haul off of stock piles from the Old Castle Facility where COSA has acquired right of way. While the new fencing is covered under a bid item it was stated that the removal would be incidental to prep right of way. After a site visit and a review of the material we are requesting that COSA quantify the haul off in a specific bid item or provide an allowance to perform the work. Without survey data of the piles or an account of the material that is piled we have no way to quantify the removal to provide an accurate estimate for the work. Additionally, since the new ROW fence is not in place there is nothing to prevent that pile from "growing" between the bid date and the Notice to Proceed. It will be a point of contention with the low bidder if the pile contains materials that are difficult to dispose of and are not visible at the moment.

Please consider quantifying the removal (so we can measure and document) or providing a line item allowance that can be used to pay for the labor, equipment, trucking and dump fees. This will allow all contractors to bid the item similarly instead of guessing.



Response:

Bid Item including approximation of material has been added to plans.

Question 2:

Could you please provide the inverts for the manholes in sanitary sewer section that we will be adjusting or reconstructing? We will need to know the total LF for lining of the manholes we touch.

Response:

MH ID	INVERT	EXISTING RIM ELEVATION	PROPOSED RIM ELEVATION	RECONSTRUCT/ADJUST
425840	539.2	550.63	551.91	RECONSTRUCT
425782	539.78	554.50	555.68	RECONSTRUCT
425747	540.15	556.01	557.08	RECONSTRUCT
425783	540.92	548.35	549.35	RECONSTRUCT
425814	540.43	546.16	547.10	RECONSTRUCT
425817	546.38	558.04	559.00	RECONSTRUCT
425818	547.02	561.08	561.30	RECONSTRUCT
425832	549.5	563.89	564.15	RECONSTRUCT
425760	540.74	545.52	555.55	RECONSTRUCT
425742	544.32	552.12	551.88	RECONSTRUCT
425805	529.1	553.00	552.97	RECONSTRUCT
425806	529.25	553.53	553.24	RECONSTRUCT
425807	529.89	548.82	548.86	RECONSTRUCT
425808	530.17	546.70	547.55	RECONSTRUCT
425809	530.73	544.02	545.33	RECONSTRUCT
425810	531.28	540.23	542.53	RECONSTRUCT

Bid Options are identified in the 002 Proposal form posted on the City's web site.

The plan holders list will be updated from time to time and either placed on the City's website or provided to those requesting it from



RECEIPT OF ADDENDUM NUMBER 01 IS HEREBY ACKNOWLEDGED FOR PLANS AND SPECIFICATIONS FOR CONSTRUCTION OF **Espada Road – IH 410 to Ashley Rd., TCI Project No 40-00246/40-00419**

FOR WHICH BIDS WILL BE OPENED ON **2:00 P.M. CST, on Tuesday, February 23, 2016.**

THIS ACKNOWLEDGEMENT MUST BE SIGNED AND RETURNED WITH THE BID PACKAGE.

Company Name: _____

Address: _____

City/State/Zip Code: _____

Date: _____

Signature: _____

Print Name/Title: _____

CITY OF SAN ANTONIO

Issued By: Transportation and Capital Improvements
ID NO.: 40-00246

Date Issued: January 25, 2016

(010) FORMAL INVITATION FOR BIDS (IFB) to CONTRACT
ESPADA ROAD – IH 410 TO ASHLEY ROAD #40-00246

Sealed bids, subject to the Terms and Conditions of this Invitation for Bids and other contract provisions, will be received at the Office of the City Clerk, City Hall, 100 Military Plaza, San Antonio, Tx 78205 until 2:00 P.M. CST on Tuesday, February 23, 2016 (solicitation deadline) and publicly read aloud in City Council Chambers, 114 W. Commerce, Municipal Plaza Building. Bids must be submitted in a sealed envelope and clearly marked with the bidder's name, Project Name and ID NO. The City is not responsible for submissions not clearly and appropriately marked. Late submissions will be rejected and returned to bidder. A Non-Mandatory Pre-bid meeting will be held at 114 W. Commerce, San Antonio, TX 78205, 9th floor conference room on February 4, 2016 at 10:00 A.M. Deadline for questions is Friday, February 12, 2016 at 4.00 P.M.

This invitation includes the following Contract Documents:

- 010 Invitation for Bids and Contract Signature Page
020 Bid Form
025 Unit Pricing Form
030 Qualification Questionnaire
040 Standard Instructions to Respondent
041 Certificate of Interested Parties (TEC Form 1295)
050.01 SBEDA Guidelines
060 Supplemental Conditions
075 Performance Bond
076 Payment Bond
081 General Conditions for Construction Contracts
095 SAWS Special Conditions
Subcontractor/Supplier Utilization Plan
Wage Decision

Plans, Specifications and Special Conditions may be purchased at a cost of \$150.00 per set (tax included) from the office of Pape-Dawson Engineers, 2000 NW Loop 410, San Antonio, TX 78213; Phone: (210) 375-9000. No refund will be made for plan sets that are returned. Changes to Plans, Specifications and Special Conditions will be included in an addendum and will be posted on the web at http://www.sanantonio.gov/purchasing/biddingcontract/opportunities.aspx along with this solicitation. Bidder understands and agrees that bidder is responsible for obtaining addenda and adhering to all requirements in addenda. City is not responsible for incorrect information obtained through other sources.

The following documents (fully completed and with original signatures) constitute the required information to be submitted as a part of the bid proposal:

- 010 Invitation for Bids and Contract Signature Page
020 Bid Form
025 Unit Pricing Form
030 Qualification Questionnaire
Bid Bond
Subcontractor/Supplier Utilization Plan
Signed Addenda Acknowledgement Forms
Proof of Form 1295 with Certification Number & Date Filed

This is a Qualified Low Bid Solicitation. It is understood and agreed that the work is to be substantially completed on or before 425 calendar days. This project includes hazardous environmental work. This project requires 2 project sign(s).

Small Business Economic Development Advocacy (SBEDA) Program Compliance – Respondents shall meet the subcontracting requirements as stated on Form 050.01 and on the Subcontractor/Supplier Utilization Plan posted with this solicitation on the City's website.

Wage Decision – Respondent shall meet the prevailing wage rate requirements established for this contract and shall reference the wage decision posted with this solicitation on the City's website.

The undersigned, by his/her signature, represents that he/she is authorized to bind the bidder to fully comply with Contract Documents for the amount(s) shown on the accompanying bid sheet(s). The work proposed to be done shall be accepted when fully completed and finished to the entire satisfaction of the City. The undersigned certifies all prices contained in this bid have been carefully checked and are submitted as correct and final. The bidder by submitting this bid and signing below, acknowledges that he/she has received & read the entire Bid and Contract document and agrees to be bound by the terms therein, has received all Addenda, and agrees to the terms, conditions, and requirements of the bidder's bid proposal and all documents listed in the tables above and the enabling Ordinance and associated documentation that form the entire Contract upon approval by the City Council.

Official Name of Company (legal): _____

Original Signature of Person Authorized to Sign Bid/Contract / Date Signer's Name: (Please Print or Type)

CITY OF SAN ANTONIO
025 UNIT PRICING FORM

PROJECT NAME: Espada Road (IH 410 to Ashley Road)
PROJECT NO. 40-00246

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO.	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
				The City only will accept bid pricing to the hundredths. Any pricing extended out to three decimal points will be truncated to two decimal points in the City's favor.					
BASE BID									
	100.1			MOBILIZATION (RDWY, DRN, ENV, TCP, ILLUM)	LS	1			
	100.2			INSURANCE & BOND	LS	1			
	101.1			PREPARING RIGHT OF WAY	LS	1			
	103.4			REMOVE MISCELLANEOUS CONCRETE	SF	27332			
	104.1			STREET EXCAVATION	CY	13416			
	106.1			BOX CULVERT EXCAVATION & BACKFILL (< 600 C.Y.)	CY	311			
	107.1			EMBANKMENT (FINAL)	CY	3331			
	108.1			LIME TREATED SUBGRADE (6")	SY	17759			
	108.2			LIME	TON	200.8			
	200.1			FLEXIBLE BASE (17")	SY	8680			
	202.1			PRIME COAT	GAL	868			
	203.1			TACK COAT	GAL	1802			
	204.1			ONE COURSE SURFACE TREATMENT	SY	7830			
	205.2			HOT MIX ASPHALTIC PAVEMENT, TYPE B (9")	SY	8424			
	205.2b			HOT MIX ASPHALTIC PAVEMENT, TYPE B (4")	SY	2573.6			
	205.2c			HOT MIX ASPHALTIC PAVEMENT, TYPE B (6")	SY	2562.5			
	205.3a			HOT MIX ASPHALTIC PAVEMENT, TYPE C (2") (SURF)	SY	18016.7			
	205.3b			HOT MIX ASPHALTIC PAVEMENT, TYPE C (2")	SY	7084.4			
	205.3c			HOT MIX ASPHALTIC PAVEMENT, TYPE C (3")	SY	11582			
	308.1			FND FOR RDWY ILL ASM (TY E) (24" DR SH)	FT	186			
	401.1a			REINFORCED CONCRETE PIPE (CLASS III)(24" DIA)	LF	368			
	401.1b			REINFORCED CONCRETE PIPE (CLASS III)(30" DIA)	LF	17			
	401.1c			REINFORCED CONCRETE PIPE (CLASS III)(36" DIA)	LF	1116			
	401.1d			REINFORCED CONCRETE PIPE (CLASS III)(48" DIA)	LF	187			
	401.4			SAFETY END TREATMENT (TYPE II) (DESIGN SIZE 2)	EA	26			
	404.2			CORRUGATED METAL PIPE (ARCHED) (DESIGN 2)	LF	419			
	406.1a			JACKING, BORING OR TUNNELING (48")	LF	187			
	406.2a			CARRIER PIPE FOR JACK, BORE OR TUNNEL (48")	LF	187			
	500.1			CONCRETE CURBING (> 1,000 L.F.)	LF	9856			
	501			MACHINE LAID CURB (5,000 L.F., X, 20,000 L.F.)	LF	3753			
	502.1			CONCRETE SIDEWALKS CONVENTIONALLY FORMED	SY	110.2			

CITY OF SAN ANTONIO
025 UNIT PRICING FORM

PROJECT NAME: Espada Road (IH 410 to Ashley Road)
PROJECT NO. 40-00246

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
	503.1			PORTLAND CEMENT CONCRETE DRIVEWAYS (100 S.Y. < X < 10,000 S.Y.)	SY	1348.9			
	503.4			ASPHALTIC CONCRETE DRIVEWAY (> 1000 S.Y.)	SY	727.1			
	505.1			CONCRETE RIPRAP (5" THICK)	SY	716			
	507.1			CHAIN LINK FENCE (4 FT HIGH)	LF	50			
	507.2			CHAIN LINK FENCE (6 FT HIGH)	LF	726			
	507.X			CHAIN LINK SLATS (6 FT HIGH)	SF	4356			
	509.1			METAL BEAM GUARD RAIL	LF	625			
	513.1			REMOVING AND RELOCATING MAIL BOXES	EA	34			
	515.1			TOPSOIL	CY	3111.7			
	520.1			HYDROMULCHING (RESIDENTIAL OR COMMERCIAL)	SY	17064			
	525.1			CONCRETE TRAFFIC BARRIER (PORTABLE)	LF	8140			
	530.1			BARRICADES, SIGNS AND TRAFFIC HANDLING	LS	1			
	531.21			R7-1 DBL NO PARKING ANY TIME (18"X24") (HIGH DENSITY)	EA	1			
	531.30			R1-1 STOP (30") (HIGH DENSITY)	EA	2			
	531.37			W1-1 TURN (30"X30") (HIGH DENSITY)	EA	1			
	531.40			W1-4 REVERSE CURVE (30"X30") (HIGH DENSITY)	EA	2			
	531.42			W1-6 LARGE ARROW (48"X24") (HIGH DENSITY)	EA	1			
	531.43			W1-7 LARGE ARROW (48"X24") (HIGH DENSITY)	EA	1			
	531.57			9 INCH STREET NAME BLOCK # (VARIES X9") (HIGH DENSITY)	EA	4			
	531.60			R2-1 SPEED LIMIT (24"X30") (HIGH DENSITY)	EA	2			
	531.68			R3-17 BIKE LANE (30"X24") (HIGH DENSITY)	EA	8			
	531.7			R3-17b ENDS (30"X12") (HIGH DENSITY)	EA	1			
	531.73			W11-1 BICYCLE WARNING (30"X30") (HIGH DENSITY)	EA	7			
	531.XX			W13-1P ADVISORY SPEED (24"x24") (HIGH DENSITY)	EA	9			
	531.XX			R5-1b BICYCLE WRONG WAY (12"X18") (HIGH DENSITY)	EA	1			
	531.XX			R8-3 NO PARKING (18"X18") (HIGH DENSITY)	EA	7			
	531.XX			R9-3cP RIDE WITH TRAFFIC (12"X12") (HIGH DENSITY)	EA	1			
	531.XX			W6-3 TWO-WAY TRAFFIC (36"X36") (HIGH DENSITY)	EA	1			
	531.XX			W16-1P SHARE THE ROAD (24"X30") (HIGH DENSITY)	EA	7			
	531.XX			W17-3 HUMP SYMBOL (30"X30") (HIGH DENSITY)	EA	6			
	531.XX			W17-3 HUMP AHEAD SYMBOL (30"X30") (HIGH DENSITY)	EA	6			
	531.XX			SIGN ESPADA AQUEDUCT MISSION ESPADA	EA	2			
	531.XX			NO DUMPING (HIGH DENSITY)	EA	2			
	535.10			4 INCH WIDE YELLOW LINE (<100,000 LF)	EA	9437			
	535.16			STRAIGHT WHITE ARROW BICYCLE FACILITY	EA	9			

CITY OF SAN ANTONIO
025 UNIT PRICING FORM

PROJECT NAME: Espada Road (IH 410 to Ashley Road)
PROJECT NO. 40-00246

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
	535.17			BICYCLE RIDER SYMBOL	EA	9			
	535.XX			SHARED LANE BICYCLE FACILITY SYMBOL	EA	14			
	535.XX			TYPE "A" SPEED HUMP TRIANGLE	EA	6			
	535.XX			TYPE "B" SPEED HUMP TRIANGLE	EA	12			
	535.20			4 INCH WIDE WHITE LINE (<30,000 LF)	LF	3593			
	535.40			8 INCH WIDE WHITE LINE	LF	5812			
	535.70			24 INCH WIDE WHITE LINE (<1,500)	LF	34			
	536.20			4 INCH WIDE WHITE LINE	LF	78			
	536.50			12 INCH WIDE WHITE LINE	LF	120			
	537.80			TRAFFIC BUTTON (TYPE II A-A)	EA	219			
	540.10			INLET GRAVEL FILTER BAGS	LF	375			
	540.1b			ROCK FILTER DAM (INSTALL/REMOVE) TY 2	LF	220			
	540.1c			ROCK FILTER DAM (INSTALL/REMOVE) TY 3	LF	95			
	540.6			CONSTRUCTION EXITS (INSTALL/REMOVE)	SY	1594			
	540.9			TEMPORARY SEDIMENT CONTROL FENCE	LF	3687			
	550.1			TRENCH EXCAVATION SAFETY PROTECTION	LF	1641			
	554.X			EROSION CONTROL MATTING	SY	1470			
	618.XX			CONDUIT (PVC) (SCHD 40) (2 1/2")	FT	4275			
	618.XX			CONDUIT (PVC)(SCHD 80)(4")	FT	8580			
	618.XX			STREETLIGHT RISER (PVC) (SCHD 80) (2 1/2")	LF	80			
	620.XX			ELEC CNDR (NO 2) BARE	FT	4410			
	620.XX			ELEC CNDR (NO 2) INSUL	FT	8860			
	624.XX			48"X24"X30" H20 RATED HANDHOLE	EA	11			
	XXX.XX			RDWY ILL ASSEM (SPL TY 4)	EA	31			
	XXX.XXXX			BACKFLOW PREVENTOR	EA	1			
	624.5			GROUND BOX TY A (122311) W/ APRON	EA	6			
	628.1			ELECTRICAL SERVICES (PER INSTALLATION)	EA	1			
	628.2			REMOVE ELECTRICAL SERVICES (PER REMOVAL)	EA	1			
	798.1			ASPHALTIC CONCRETE CUSHION SPEED HUMP TYPE 3	EA	3			
	801.1			LEVEL I PROTECTIVE FENCING	LF	2734			
	802.2			LEVEL II PRUNING	LS	1			
	329300.5			MONTERREY OAKS (4")	EA	57			
	168	6001		VEGETATIVE WATERING	MG	29			
	340	2011		D-GR HMA (METH) TY-B PG64-22	TON	874.9			
	340	2242		D-GR HMA (METH) TY-C PG64-22 (LEVEL-UP)	TON	21.64			

CITY OF SAN ANTONIO
025 UNIT PRICING FORM

PROJECT NAME: Espada Road (IH 410 to Ashley Road)
PROJECT NO. 40-00246

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
	354	2045		PLANE ASPH CONC PAV (2")	SY	27			
	432	2034		RIPRAP (CONC) (CL B) (MOW STRIP)	LF	956.43			
	450	6006		RAIL (TY T223)	LF	68.2			
	459	2010		GABION MATTRESSES (GALV) (9 IN)	SY	179			
	459	2012		GABION MATTRESSES (GALV) (18 IN)	SY	81			
	459	2014		GABINS (3' X 3')(GALV)	CY	50			
	462	2008		CONC BOX CULV (5 FT X 4 FT)	LF	141			
	462	2025		CONC BOX CULV (9 FT X 6 FT)	LF	129			
	465	2001		INLET (COMPL)(TY C)	EA	8			
	465	2007		INLET EXT (TY C)	EA	1			
	465	2092		MANH (COMPL)(TY 1)	EA	13			
	465	2143		INLET (COMPL)(TRAFFIC)(TY X-1)	EA	1			
	465	2144		INLET (COMPL)(TRAFFIC)(TY X-2)	EA	2			
	465	2145		INLET (COMPL)(TRAFFIC)(TY X-3)	EA	1			
	465	2194		MANH (COMPL)(TY 4)	EA	1			
	465	2193		MANH (COMPL)(TY 2)	EA	2			
	465	2479		MANH (COMPL)(TY 5)	EA	2			
	466	2038		WINGWALL (FW-S)(HW=8 FT)	EA	2			
	466	2086		HEADWALL (CH-FW-15)(DIA=48 IN)	EA	1			
	528	2001		COLORED TEXTURED CONC (4")	SY	771			
	529	2016		CONC CURB (TY F)	LF	298			
	540	2012		MTL BEAM GD FEN TRANS (TL2)	EA	4			
	540	2046		MTL BM GD FEN TRANS (NON-SYM)	EA	2			
	540	2044		DOWNSTREAM ANCHOR TERMINAL (DAT) SECTION	EA	4			
	542	2001		REMOVING METAL BEAM GUARD FENCE	LF	690			
	542	2002		REMOVING TERMINAL ANCHOR SECTION	EA	4			
	544	2001		GUARDRAIL END TREATMENT (INSTALL)	EA	4			
	550	2003		CHAIN LINK FENCE (REMOVE)	LF	807			
	662	2016		WK ZN PAV MRK NON-REMOV (W) 24" (SLD)	LF	20			
	662	2032		WK ZN PAV MRK NON-REMOV (Y) 4" (SLD)	LF	9990			
	662	2099		WK ZN PAV MRK REMOV (Y) 4" (SLD)	LF	470			
	772	2003		POST AND CABLE FENCE (NEW INSTALLATION)	LF	110			
	5515	2001		BRICK PAVERS	SY	828			
	6001	6001		PORTABLE CHANGEABLE MESSAGE SIGN	DAY	100			

Total Bid Amount:

CITY OF SAN ANTONIO
025 UNIT PRICING FORM

PROJECT NAME: Espada Road (IH 410 to Ashley Road)
PROJECT NO. 40-00246

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
				The City only will accept bid pricing to the hundredths. Any pricing extended out to three decimal points will be truncated to two decimal points in the City's favor.					
SAWS WATER JOB NO. 11-5073									
	100.00			MOBILIZATION	LS	1			
	101.00			PREPARING RIGHT OF WAY	LS	1			
	550.00			TRENCH EXCAVATION SAFETY PROTECTION	LF	4542			
	818.00			8" PVC WATERLINE (RESTRAINED)	LF	4113			
	818.00			12" PVC WATERLINE (RESTRAINED)	LF	246			
	824.00			3/4" LONG RELAY SERVICE	EA	19			
	824.00			3/4" LONG RELAY SERVICE (UNMETERED)	EA	15			
	824.00			3/4" SHORT RELAY SERVICE	EA	12			
	824.00			3/4" SHORT RELAY SERVICE (UNMETERED)	EA	5			
	824.00			1" LONG RELAY SERVICE	EA	3			
	824.00			1" SHORT RELAY SERVICE	EA	1			
	828.00			8" GATE VALVE	EA	7			
	828.00			12" GATE VALVE	EA	1			
	833.00			NEW METER AND METER BOX RELOCATION	EA	41			
	834.10			FIRE HYDRANT	EA	9			
	836.00			PIPE FITTINGS, ALL SIZES AND TYPES	TON	3.14			
	840.00			8" WATER TIE-INS	EA	3			
	840.00			12" WATER TIE-INS	EA	1			
	841.00			HYDROSTATIC TESTING	EA	1			
	844.00			2" STANDARD BLOW-OFF (TEMPORARY)	EA	2			
	856.20			12" CARRIER PIPE	LF	183			
	856.30			24" STEEL CASING PIPE (OPEN CUT)	LF	183			
	3000.00			REMOVAL, TRANSPORTATION AND DISPOSAL OF AC PIPE	LF	80			
	SP 1			2" PVC SLEEVE FOR SERVICES	LF	1164			

Total Bid Amount:

CITY OF SAN ANTONIO
025 UNIT PRICING FORM

PROJECT NAME: Espada Road (IH 410 to Ashley Road)
PROJECT NO. 40-00246

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
				The City only will accept bid pricing to the hundredths. Any pricing extended out to three decimal points will be truncated to two decimal points in the City's favor.					
SAWS SEWER JOB NO. 11-5573									
	100.00			MOBILIZATION	LS	1			
	101.00			PREPARING RIGHT OF WAY	LS	1			
	851.00			ADJUST EXISTING MANHOLE	EA	2			
	852.00			RECONSTRUCT EXISTING MANHOLE	EA	14			
	854.00			SAITARY SEWER CLEAN OUT	EA	33			
	854.00			SANITARY SEWER LATERAL	LF	830			
	864.00			BYPASS PUMPING	LS	1			
	866.00			SEWER MAIN TELEVISIONING INSPECTION	LF	2339			

Total Bid Amount:

CITY OF SAN ANTONIO
025 UNIT PRICING FORM

PROJECT NAME: Espada Road (IH 410 to Ashley Road)
PROJECT NO. 40-00246

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
				The City only will accept bid pricing to the hundredths. Any pricing extended out to three decimal points will be truncated to two decimal points in the City's favor.					
CPS ENERGY JOB NO. 1743595									

NOTE A: For each of the items below, the Contractor's work is to include: trenching, joining, testing, coating steel, connecting new pipe to existing pipe and all necessary fittings for tie-ins such as, stopper fittings and 3-way stopper tees, sand padding, backfilling and compacting to consistency of original soil, installing all necessary cathodic protection devices such as CPTLB's and anodes, replacing paving, curbs, and sidewalks removed or damaged during construction, and cleanup as may be necessary in each instance.

NOTE B: Trenching is considered to be the normal method of service installation and is required on all service adjustments. A gas service can be rerun by INSERTION, when the old service is PULLED from the riser to one foot inside the property line, ONLY at the discretion of the CPS Inspector.

NOTE C: Bid quantities shown are estimates by CPS Energy. Per foot prices shall be applied to the actual distance measured along the top of the trench or the actual length of the bore, as applicable.

NOTE D: Unit prices shall include insurance costs. CPS Energy's insurance requirements are specified in Echibit GAS-1

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
	1			Run 1" Gas Service stub Off New Main Long Side	EA	16			
	2			Install Gas Main or Casing (Distance As Measured Along the Top of Trench) 6" Plastic Pipe and Tracer Wire	LF	4260			
	3			Install Gas Main by directional drilling 6" Plactic Pipe and Tracer Wire	LF	100			
	4			Flexible Pavement Repair 2" HMAc Type D with 10" Asphalt Treated Base Type D or Flowable Fill	SY	95			
	5			Flowable Fill	CY	35			

Total Bid Amount:

CITY OF SAN ANTONIO
025 UNIT PRICING FORM

PROJECT NAME: Espada Road (IH 410 to Ashley Road)
PROJECT NO. 40-00246

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
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_____ certifies that the unit prices shown on this complete computer print-out for all of the bid items and the alternates contained in this proposal are the unit prices intended and that its bid will be tabulated using these unit prices and no other information from this print-out.

_____ Acknowledged and agrees that the total bid amount shown will be read as its total bid and further agrees that the official total bid amount will be determined by multiplying the unit bid prices shown in this print-out by the respective estimated quantities shown in the proposal and then totaling all of the extended amounts. _____ agrees to the terms, conditions, and requirements of the bidder's bid proposal.

Signed: _____ Date: _____

Title: _____

SUPPLEMENTAL CONDITIONS

1. **When submitting a bid in person, visitors to City Hall must allow time for security measures.** Visitors to City Hall will be required to enter through the east side of the building. The public will pass through a metal detector and x-ray machine located in the lobby. All packages, purses and carried items will be scanned during regular business hours of 7 a.m. to 7 p.m. After the public proceeds through the metal detector, they will sign in and receive a visitor's badge. For those that might require the use of a ramp, entry is available on the south side of the building (Dolorosa side). Security will meet the visitor in the basement with a hand scanner.
2. **Scope of the Work** - The Contractor shall furnish all the materials and perform all the Work called for in the Contract Documents and more specifically described in the Plans and Specification for the Project entitled.
3. The Contractor shall begin Work at the job site within seven (7) calendar days after the date of the Owner's written Authorization to Proceed issued by the Owner's Representative.
4. **Liquidated Damages for Delay in Substantial Completion & Final Completion:** Contractor shall pay Owner the sum indicated on the table below for each and every calendar day of unexcused delay in achieving Substantial Completion/Final Completion beyond the Scheduled Completion/Final Completion Dates. Any sums due and payable hereunder by Contractor shall be payable, not as a penalty, but as Liquidated Damages representing an estimate of delay damages likely to be sustained by Owner, estimated at the time of executing the Contract. Such Liquidated Damages shall apply regardless of whether Contractor has been terminated by Owner prior to Substantial Completion, so long as Contractor's actions or inactions contributed to the delay. Such Liquidated Damages shall be in addition to and not in preclusion of any recovery of actual damages resulting from other defects in Contractor's performance hereunder for matters other than delays in Substantial Completion/Final Completion. When Owner reasonably believes that Substantial Completion/Final Completion will be inexcusably delayed, Owner shall be entitled, but not required, to withhold from any amounts otherwise due to Contractor an amount then believed by Owner to be adequate to recover liquidated damages applicable to such delays. If and when Contractor overcomes the delay in achieving Substantial Completion/Final Completion, or any part thereof, for which Owner has withheld payment, Owner promptly shall release to Contractor those funds withheld but no longer applicable as Liquidated Damages.

Liquidated Damages

Contractual Milestone	Contractual Milestone Description and Requirements	From	To	Liquidated Damages
1	Substantial Completion	NTP	425 calendar days	\$1150.00 per day
2	Final Completion	Substantial Completion	30 calendar days	\$900.00 per day

5. **The Contract Sum** - The Owner shall pay the Contractor for the proper performance of the Contract, subject to additions and deduction provided therein, the Contract sum is listed in the Purchase Order.
6. **Partial Payment** - Each month, the Owner shall make a progress payment as approved by the Owner's Representative in accordance with the General Conditions.
7. **Acceptance and Final Payment** - Final Payment shall be due on final Owner acceptance of the Project Work, provided the Contract has been completed by Contractor as provided in the General Conditions. Before issuance of the final payment, the Contractor shall submit an affidavit and reasonable additional supporting evidence if required, as satisfactory to the Director of Finance, City of San Antonio, that all labor payrolls, construction materials and supply bills, subcontractors, and other indebtedness connected with the Work have been paid in full, or that an outstanding debt is being disputed and that the corporate surety or its agent is processing the outstanding claim and is willing to defend and/or indemnify the City should the City make final Contract payment.
8. Contractor shall comply with Standard Specification 1000 in its invoicing.

THE FOLLOWING CHANGES ARE MADE TO THE CITY OF SAN ANTONIO'S GENERAL NOTES:

ADDITIONAL NOTES

1. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN ALL REQUIRED STORM WATER PERMITS, FEES, AND APPROVALS. NO CONSTRUCTION OR FABRICATION SHALL BEGIN UNTIL THE CONTRACTOR HAS RECEIVED AND THOROUGHLY REVIEWED ALL PERMITS REQUIRED FOR CONSTRUCTION IN DRAINAGE EASEMENTS, RIGHT OF WAYS, AND FLOODPLAINS.
2. THE CONTRACTOR SHALL NOTIFY STORM WATER ENGINEERING AT LEAST 24 HOURS PRIOR TO THE INSTALLATION OF ANY DRAINAGE FACILITY WITHIN A DRAINAGE EASEMENT OR STREET RIGHT-OF-WAY NOT INDICATED ON THE CONSTRUCTION PLANS.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING EXISTING DRAINAGE FACILITIES FROM DAMAGE. ANY DAMAGE TO EXISTING DRAINAGE SYSTEMS, WHETHER OR NOT SHOWN ON THE PLANS, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR AT HIS EXPENSE. THE CONTRACTOR SHALL NOTIFY STORM WATER ENGINEERING AT 210-207-8052 AS SOON AS CONFLICTS WITH UTILITIES ARE ENCOUNTERED OR ANY DRAINAGE SYSTEM IS DAMAGED DURING CONSTRUCTION
4. CONSTRUCTION SPOILS WILL NOT BE ALLOWED TO BE DEPOSITED ANYWHERE WITHIN A DRAINAGE EASEMENT, RIGHT-OF-WAY OR FLOODPLAIN WITHIN THE LIMITS OF THE PROJECT AND SHALL BE DISPOSED OFFSITE IN COMPLIANCE WITH CURRENT APPLICABLE REGULATIONS.
5. NO STRUCTURED, FENCES, WALLS, LANDSCAPING, OR OTHER OBSTRUCTIONS THAT IMPEDE DRAINAGE SHALL BE PLACED WITHIN THE LIMITS OF THE DRAINAGE EASEMENTS SHOWN ON THE CONSTRUCTION DOCUMENTS.
6. UPON COMPLETEION OF THE TRENCHING, THE AREA WILL BE BACKFILLED AND COMPACTED TO ITS ORIGINAL CONDITION. TRENCHES/BORE PITS TO BE OPEN AND UNATTENDED LONGER THAN 24 HOURS SHALL BE PROTECTED TO WITHSTAND ALL HYDRODYNAMIC AND HYDROSTATIC FORCES AND PREVENT DOWNSTREAM IMPACTS. TRENCHES/BORE PITS TO BE OPEN LONGER THAN 30 DAYS AFTER STARTING EXCAVATION SHALL BE BACKFILL WITH A SEMI-PERMANENT REPAIR BACKFILL.
7. IMPROVED SECTIONS OF EARTHEN CHANNELS AND/OR WATERWAYS WILL BE VEGETATED BY SEEDING OR SODDING. EIGHTY-FIVE PERCENT OF THE CHANNEL SURFACE AREA MUST HAVE ESTABLISHED VEGETATION BEFORE THE CITY OF SAN ANTONIO WILL ACCEPT THE CHANNEL FOR MAINTENANCE.
8. POWER TO THE FIELD OFFICE WILL BE SUPPLIED VIA A TEMPORARY SERVICE METER. IF POWER IS REQUIRED PRIOR TO THE COMPLETION OF THE TEMPORARY SERVICE METER APPLICATION PROCESS, THE CONTRACTOR SHALL SUPPLY A GENERATOR CAPABLE OF ADEQUATELY POWERING THE FIELD OFFICE.

9. EXCESS SOIL DISPOSAL: CONTRACTOR SHALL PROVIDE A SUBMITTAL REGARDING DISPOSAL SITES TO THE CITY 45 DAYS PRIOR TO COMMENCEMENT OF HAULING OFF ANY EXCAVATED AND/OR EXCESS FILL MATERIAL. THE CONDITIONS SET FORTH HEREIN ARE SOLELY DUE TO A DESIRE BY THE CITY TO MANAGE AND DOCUMENT THE DISPOSAL OF SOILS FROM THIS SITE, NOT DUE TO ANY ENVIRONMENTAL CONCERNS RELATIVE TO THE MATERIAL BEING DISPOSED OF. ACCORDINGLY, IN THE SOIL DISPOSAL CONTRACTOR SUBMITTAL:

CONTRACTOR SHALL CERTIFY AND ASSURE THAT THE NUMBER OF SOIL DISPOSAL SITES DOES NOT EXCEED THREE (3) SITES.

CONTRACTOR SHALL CERTIFY THAT NO DISPOSAL AREAS ARE WITHIN THE FLOOD PLAIN AND KNOWN SUPERFUND OR ENVIRONMENTAL ISSUE AREA, AND PROVIDE OWNER EVIDENCE TO THAT EFFECT.

CONTRACTOR SHALL PROVIDE ALL AFFECTED LANDOWNER'S WRITTEN AUTHORIZATION TO DISPOSE OF SOIL FROM THIS PROJECT SITE ON HIS OR HER PROPERTY

CONTRACTOR SHALL INCLUDE PROVISIONS IN LANDOWNER AGREEMENTS THAT THE CITY RESERVES THE RIGHT TO CONDUCT INDEPENDENT VISUAL INSPECTIONS AND SOIL TESTING ON LISTED PROPERTIES PRIOR TO DISPOSAL OF PROJECT EXCESS SOILS TO DETERMINE BACKGROUND LEVELS OF VARIOUS ELEMENTS AS IDENTIFIED BY THE CITY. SAID LANDOWNER AGREEMENTS WILL PROVIDE AN EFFECTIVE RIGHT OF ENTRY THAT WILL EXPIRE UPON SUBSTANTIAL COMPLETION OF THE PROJECT.

CONTRACTOR AGREES TO ABIDE BY THE LANDOWNERS WRITTEN CONDITIONS IN LANDOWNER AGREEMENTS INCLUDING THOSE RELATED TO FOR PLACING, COMPACTING, RESTORATION, AND EROSION CONTROL OF THE SITE(S), AND THAT THE LANDOWNER'S WILL BE REQUESTED TO PROVIDE FINAL WRITTEN APPROVAL BEFORE PRIOR TO SUBSTANTIAL COMPLETION, AND THAT ANY COSTS THE CITY INCURS TO ADDRESS LEGITIMATE LANDOWNER CONCERNS WILL BE CONSIDERED AND MAY BE DEDUCTED FROM THE CONTRACTOR'S FINAL PAYMENT AS DETERMINED BY THE CITY.

ACCORDINGLY, LANDOWNERS SHALL PROVIDE CERTIFICATION TO THE CONTRACTOR AND THE CONTRACTOR SHALL INCLUDE SAID CERTIFICATION IN HIS SUBMITTAL THAT EXCESS SOILS SHALL NOT BE HAULED TO RESIDENTIAL PROPERTIES. EVERY ATTEMPT WILL BE MADE TO DISPOSE OF EXCESS SOILS AT EITHER

CONTRACTOR AGREES TO COMPLY WITH OTHER REGULATORY AGENCIES REQUIREMENTS FOR PROPER AND LEGAL IMPLEMENTATION OF THE REUSE PLAN PRIOR TO SOILS TRANSPORT, AS APPLICABLE. CONTRACTOR SHALL ENSURE AN APPROPRIATE STORM WATER POLLUTION PREVENTION PLAN IS DEVELOPED AND IMPLEMENTED IN ACCORDANCE WITH TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM REQUIREMENTS, AS APPLICABLE.

CONTRACTOR SHALL BE RESPONSIBLE FOR TRACKING EXCESS SOIL DISPOSED OF AT APPROVED DESIGNATED AREAS. CONTRACTOR SHALL TRACK LOADS AND PROVIDE DOCUMENTATION, SUCH AS TRIP TICKETS OR "BILL OF LANDING" FOR ALL TRANSPORTED SOIL TO EACH APPROVED SITE.

CONTRACTOR SHALL NOT BEGIN HAULING ACTIVITIES OF EXCAVATED OR EXCESS SOILS TO THE DESIGNATED DISPOSAL SITES UNTIL CITY'S ENGINEER OR HIS/HER DESIGNEE PROVIDES WRITTEN AUTHORIZATION.

IN THE EVENT CONTRACTOR ONLY PROVIDES ONE DISPOSAL LOCATION TO CITY AND AN ADDITIONAL DISPOSAL LOCATION IS NEEDED, CONTRACTOR IS REQUIRED TO NOTIFY CITY IN WRITING OF ITS NEW DISPOSAL LOCATION AND PROVIDE WRITTEN DOCUMENTATION TO CITY'S ENGINEER AT MINIMUM 72 HOURS IN ADVANCE OF UTILIZING THE ADDITIONAL DISPOSAL LOCATION SO CITY MAY REVIEW AND APPROVE THE ADDITIONAL DISPOSAL LOCATION, PRIOR TO HAULING ACTIVITIES.

DESIGN



Luke Reed
LUKE REED, P.E.
2/17/2016
DATE

REVIEW AND APPROVAL



James A. Lutz
JAMES A. LUTZ, P.E.
2/17/2016
DATE

NO.	DESCRIPTION	DATE
ADD 1	ADDED NOTES 8 AND SOIL DISPOSAL	2/17/16



2000 NW LOOP 410 | SAN ANTONIO, TEXAS 78213 | PHONE: 210.375.9000
FAX: 210.375.9010
TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

GENERAL NOTES

SHEET 2 OF 2

95% SUBMITTAL	PROJECT NO.: 40-00246	DATE: 2/17/2016
DRWN. BY:	DSGN. BY:	CHKD. BY:

SHEET NO.: 4 OF 256

Plotted on: 2/17/2016

Design Filename: P:\79\47\00\Design\Civi\General\794700002.dgn

Plotted on: 2/17/2016

Design File name: P:\79\47\00\Design\Civil\Summaries\794700SUM*TCP.dgn

ITEM-DESC	6001-6001	525.1	0340-2011	0340-2242	0459-2010	0662-2016	0662-2032	0662-2099
SHEET	PORTABLE CHANGEABLE MESSAGE SIGN	Concrete Traffic Barrier (Portable)	D-GR HMA(METH) TY-B PG64-22	D-GR HMA(METH) TY-B PG64-22 (LVL-UP)	GABION MATTRESSES (GALV)(9 IN)	WK ZN PAV MRK NON-REMOV (W) 24" (SLD)	WK ZN PAV MRK NON-REMOV (Y) 4" (SLD)	WK ZN PAV MRK REMOV (Y) 4" (SLD)
	DAY	LF	TON	TON	SY	LF	LF	LF
23	100						478	
24						20	542	
26								
27		260	16.5					470
28		320	205.1				800	
29		440	156.1				800	
30		580	5.1		30		800	
31		380					800	
32		340	53.9	15.22			694	
33		325	236.8					
34								
36		200					468	
37		260					800	
38		355					800	
39		510					800	
40		260					800	
41		260					818	
42		320					590	
43		420		6.42				
44		320						
45		240	114.0					
46		280	87.4					
47		320						
48		385						
49		355						
50		320						
51		355						
52		335						
TOTALS	100	8140	874.9	21.64	30	20	9990	470

NO.	DESCRIPTION	DATE
ADD 1	ADD ITEM 6001-6001	2/17/16
 <p>PAPE-DAWSON ENGINEERS</p> <p>2000 NW LOOP 410 SAN ANTONIO, TEXAS 78213 PHONE: 210.375.9000 FAX: 210.375.9010</p> <p>TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470</p>		
<p>CITY OF SAN ANTONIO CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT</p> <p>ESPADA RD TCP SUMMARY</p>		
SHEET 1 OF 1		
95% SUBMITTAL	PROJECT NO.: 40-00246	DATE: 2/17/2016
DRWN. BY:	DSGN. BY:	CHKD. BY:
		SHEET NO.: 13 OF 256

Plotted on: 2/17/2016

ITEM-DESC	628.1	628.2	103.4	101.1	104.1	107.1	108.1	108.2	202.1	203.1	204.1	500.1
SHEET	Electrical Services	Remove Electrical Services	Remove Miscellaneous Concrete	Preparing Right of Way	Street Excavation	Embankment (Final)	LIME TREATED SUBGRADE (6")	Lime	Prime Coat	Tack Coat	ONE COURSE SURFACE TREATMENT	CONCRETE CURBING (C 1,000 L.F.)
	EA	EA	SF	LS	CY	CY	SY	TON	GAL	GAL	SY	LF
77				1	218	441	518	5.9	47	60	421	308
78					610	550	1850	20.9	170	198	1547	1498
79					1221	54	1422	16.1	129	164	1156	1600
80					2187	94	1417	16.0	126	164	1131	1600
81					2194	799	1288	14.6	51	164	456	1566
82					1649	33	1422	16.1	129	164	1156	1600
83			27332		1611	21	1571	17.8	144	176	1302	1528
84					1114	144	1599	18.1	14	141	129	156
85					814	121	1556	17.6		133		
86					784	88	1556	17.6		133		
87	1	1			378	175	1569	17.7		134		
88					579	65	1359	15.4		119		
89					57	746	633	7.2	58	50	533	
TOTALS	1	1	27332	1	13416	3331	17759	200.8	868	1802	7830	9856

ITEM-DESC	501.0	502.1	505.1	507.1	507.2	509.1	513.1	515.1	520.1	798.1	0354-2045	0432-2034
SHEET	MACHINE LAID CURB (5,000 L.F. X 20,000 L.F.)	Concrete Sidewalks Conventionally Formed	CONCRETE RIPRAP (5" THICK)	Chain Link Wire Fence (4 ft. high)	Chain Link Wire Fence (6 ft. high)	Metal Beam Guard Rail	Removing and Relocating Mail Boxes	Topsoil	Hydr mulching (Residential or Commercial)	ASPH CONC CUSHION SPEED HUMP TY 3	PLANE ASPH CONC PAV (2")	RIPRAP (CONC) (CL B) (MOW STRIP)
	LF	SY	SY	LF	LF	LF	EA	CY	SY	EA	SY	LF
77						303		507.0	2602.0			305.0
78				50		47	4	316.8	2106.0			150.4
79							4	214.3	1286.0	1		
80							2	433.8	2602.9	1		40.5
81						75	1	478.6	1478.0	1		197.5
82					365		5	273.3	1526.0			
83					361		3	201.5	1209.1		27	
84	718						2	246.0	1476.0			
85	800						7	157.4	944.7			
86	800						4	96.8	581.0			
87	800						2	89.7	538.0			
88	635	110.2						96.3	577.8			
89			137.0			200			137.0			263.0
TOTALS	3753	110.2	137.0	50	726	625	34	3111.7	17064.4	3	27	956.4

ITEM-DESC	0528-2001	0529-2014	0529-2016	0540-2012	0540-2044	0540-2046	0542-2001	0542-2002	0544-2001	0550-2003	0772-2003	200.1a
SHEET	COLORED TEXTURED CONC (4")	CONC CURB (TY C)	CONC CURB (TY F)	MTL BEAM GD FEN TRANS (TL2)	DOWNSTREAM ANCHOR TERMINAL (DAT) SECTION	MTL BM GD FEN TRANS (NON - SYM)	REMOVING METAL BEAM GUARD FENCE	REMOVING TERMINAL ANCHOR SECTION	GUARDRAIL END TREATMENT (INSTALL)	CHAIN LINK FENCE (REMOVE)	POST AND CABLE FENCE (NEW INSTALLATION)	FLEXIBLE BASE (17")
	SY	LF	LF	EA	EA	EA	LF	EA	EA	LF	LF	SY
77				2			304					469.3
78					1		231	2	1			1698.6
79												1288.9
80							62.5	1	1			1261.2
81				2	2	2	92.5	1	1			508.8
82										427		1288.9
83										380		1437.7
84	158											143.4
85	178											
86	178											
87	178		272									
88	79		26								110	
89					1				1			583.3
TOTALS	771		298	4	4	2	690	4	4	807	110	8680.1

ITEM-DESC	205.2a	205.2b	205.2c	205.3a	205.3b	205.3c	507.X	5515-2001	554.X
SHEET	HOT MIX ASPHALTIC PAVEMENT, TYPE B (9")	HOT MIX ASPHALTIC PAVEMENT, TYPE B (4")	HOT MIX ASPHALTIC PAVEMENT, TYPE B (6")	HOT MIX ASPHALTIC PAVEMENT, TYPE C (2") (SURF)	HOT MIX ASPHALTIC PAVEMENT, TYPE C (2")	HOT MIX ASPHALTIC PAVEMENT, TYPE C (3")	CHAIN LINK FENCE SLATS (6 FT)	BRICK PAVERS	Erosion Control Matting (Type TRM)
	SY	SY	SY	SY	SY	SY	SF	SY	SY
77		142.7	111.3	598.4		598.4		26	
78		401.0	399.0	1978.6		1978.6		125	
79		400.0	400.0	1644.4		1644.4		134	
80	25.8	400.3	399.7	1644.4		1644.4		134	
81	726.3	394.0	406.0	1644.4		1644.4		134	1382
82		395.7	404.4	1644.4		1644.4	2190	134	88
83		399.0	401.0	1756.6		1756.6	2166	128	
84	1632.1	40.9	41.1	1408.4	1357.3	170.8		13	
85	1555.6			1333.3	1466.7				
86	1555.6			1333.3	1466.7				
87	1568.6			1340.0	1504.3				
88	1359.9			1190.2	1289.4				
89				500.0		500			
TOTALS	8423.9	2573.6	2562.5	18016.7	7084.4	11582	4356	828	1470

Design File Name: P:\79\47\00\Design\Civil\Summary\794700SUMRDWY.dgn

NO.	DESCRIPTION	DATE
ADD 1	ADDED ITEMS 628.1, 628.2, 103.4	2/17/16

PAPE-DAWSON ENGINEERS

2000 NW LOOP 410 | SAN ANTONIO, TEXAS 78213 | PHONE: 210.375.9000
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TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

ESPADA RD
ROADWAY SUMMARY

SHEET 1 OF 1

95% SUBMITTAL	PROJECT NO.: 40-00246	DATE: 2/17/2016
DRWN. BY:	DSGN. BY:	CHKD. BY:

SHEET NO.: 14 OF 256

SUMMARY OF ILLUMINATION AND INTERCONNECT QUANTITIES

SHEET NO.	LIMITS			#								#			
				308.1	618.XX	618.XX	**	**	**	618.XX*	620.XX	620.XX	624.5	624.XX***	XXX.XX
				FND FOR RDWY ILL ASM (TY E) (24" DR SH)	CONDUIT (PVC) (SCHD 40) (2 1/2")	CONDUIT (PVC) (SCHD 80) (4")	3-CELL MAXCELL INNERDUCT (FABRIC) (3")	TRACER WIRE (METALLIC)	TRACER WARNING TAPE (METALLIC) (ORANGE)	STREETLIGHT RISER (PVC) (SCHD 80) (2 1/2")	ELEC CNDR (NO 2) BARE	ELEC CNDR (NO 2) INSUL	GROUND BOX TY A (122311) W/APRON	48"X 24"X 30" H2O RATED HANDHOLE	RDWY ILL ASSEM (SPL TY 4)
				FT	FT	FT	FT	FT	FT	LF	FT	FT	EA	EA	EA
1 OF 6	BEGIN	TO	14+00	24	410	860	2580	430	430	40	415	870	2	1	4
2 OF 6	14+00	TO	22+00	30	890	1620	4860	810	810	0	920	1840	0	2	5
3 OF 6	22+00	TO	30+00	36	860	1640	4920	820	820	0	900	1800	2	1	6
4 OF 6	30+00	TO	38+00	36	675	1640	4920	820	820	40	685	1370	2	2	6
5 OF 6	38+00	TO	46+00	30	860	1640	4920	820	820	0	890	1780	0	2	5
6 OF 6	46+00	TO	END	30	580	1180	3540	590	590	0	600	1200	0	3	5
PROJECT TOTALS =				186	4275	8580	25740	4290	4290	80	4410	8860	6	11	31

* FURNISH ONLY. CPS ENERGY TO INSTALL RISER. SEE ILLUMINATION LAYOUTS FOR MORE INFORMATION.

** SUBSIDIARY TO ITEM 618.XX, CONDUIT (PVC) (SCHD 80) (4"). (NSPI - FOR CONTRACTOR'S INFORMATION ONLY)

*** ALL ACCESSORIES SUCH AS RACKING, GROUNDING AND BONDING, LADDERS AND ANCILLARY EQUIPMENT TO BE SUBSIDIARY TO ITEM 624.XX, 48"X 24"X 30" H2O RATED HANDHOLE. (NSPI - FOR CONTRACTOR'S INFORMATION ONLY)

QUANTITIES FOR INTERCONNECT

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2/15/2016



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FAX: 210.375.9010

TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470



AIA ENGINEERS, LTD.
CONSULTANTS

8023 VANTAGE DR, STE 420, SAN ANTONIO, TX 78230
PHONE: (210) 694-5464 TBPE # 2801

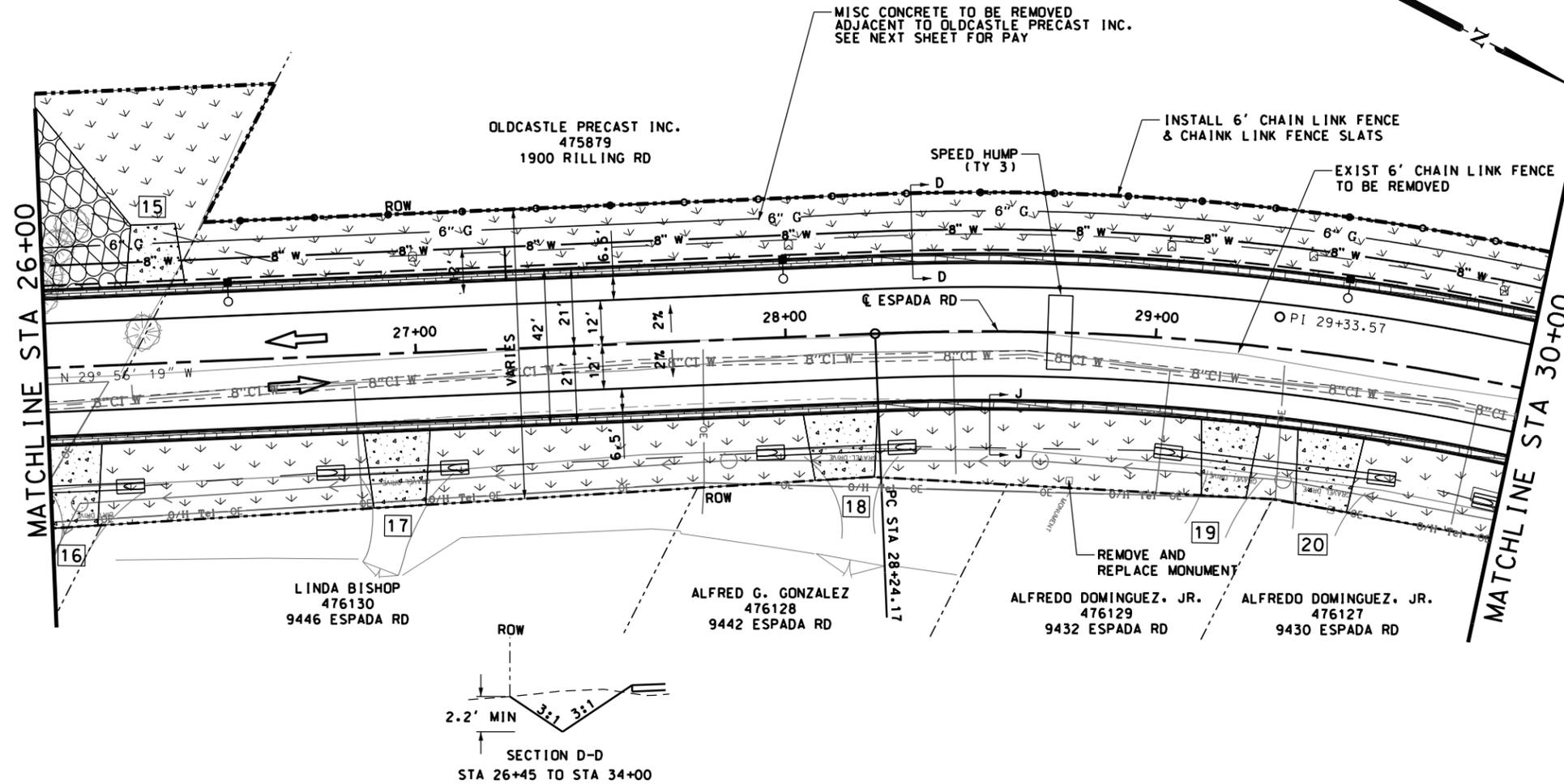
CITY OF SAN ANTONIO
TRANSPORTATION & CAPITAL IMPROVEMENTS

ESPADA RD
ILLUMINATION AND INTERCONNECT QUANTITIES

100% SUBMITTAL	PROJECT NO.: 40-00246	DATE: 2/15/2016
DRWN. BY: CG	DSGN. BY: JO	CHKD. BY: TC
SHEET NO.: 18 OF 256		

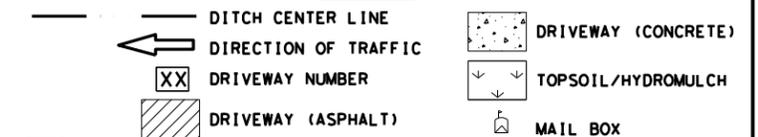
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Plotted on: 2/17/2016



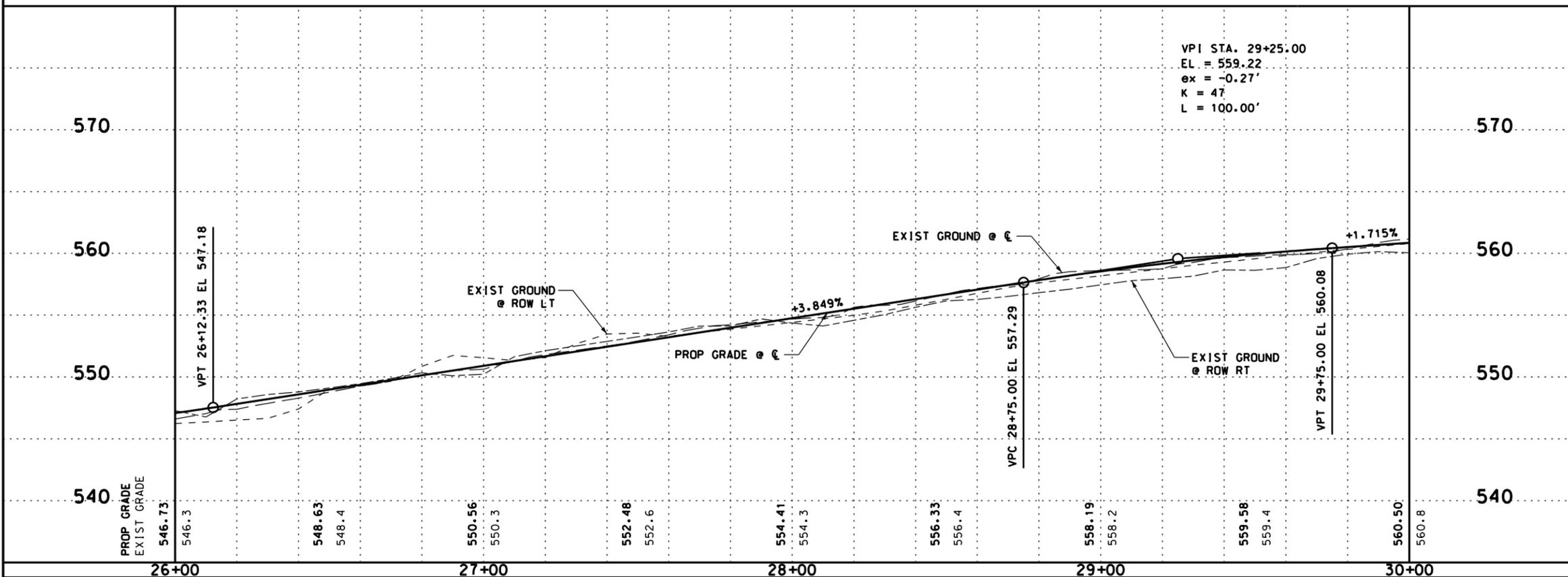
ITEM	DESCRIPTION	UNIT	QTY
104.1	Street Excavation	CY	1649
107.1	Embankment (Final)	CY	33
108.1	LIME TREATED SUBGRADE (6")	SY	1422
108.2	Lime	TON	16.1
200.1a	FLEXIBLE BASE (17")	SY	1288.9
202.1	Prime Coat	GAL	129
203.1	Tack Coat	GAL	164
204.1	ONE COURSE SURFACE TREATMENT	SY	1156
205.2b	HOT MIX ASPHALTIC PAVEMENT, TYPE B (4")	SY	395.7
205.2c	HOT MIX ASPHALTIC PAVEMENT, TYPE B (6")	SY	404.4
205.3a	HOT MIX ASPHALTIC PAVEMENT, TYPE C (2") (SURF)	SY	1644.4
205.3c	HOT MIX ASPHALTIC PAVEMENT, TYPE C (3")	SY	1644.4
500.1	CONCRETE CURBING (> 1,000 L.F.)	LF	1600
507.2	Chain Link Wire Fence (6 ft. high)	LF	365
507.X	CHAIN LINK FENCE SLATS (6 FT)	SF	2190
513.1	Removing and Relocating Mail Boxes	EA	5
515.1	Topsoil	CY	273.3
520.1	Hydromulching (Residential or Commercial)	SY	1526.0
0550-2003	CHAIN LINK FENCE (REMOVE)	LF	427
554.X	Erosion Control Matting (Type TRM)	SY	88
5515-2001	BRICK PAVERS	SY	134

LEGEND



- NOTES:**
1. DIMENSIONS AND CALL OUTS ARE FROM CENTERLINE OR FACE OF CURB, UNLESS OTHERWISE INDICATED.
 2. REFER TO MISC. ROADWAY DETAILS FOR ADDITIONAL INFO.
 3. EXISTING FEATURES ARE SHOWN SCREENED BACK, I.E. FADED.
 4. SHORING OF EXIST POLES SUBSIDIARY TO EXCAVATION ITEMS.
 5. REFER TO DRIVEWAY DETAIL AND TABLE SHEETS FOR ADDITIONAL DRIVEWAY INFO.
 6. REFER TO STORM DRAIN PLAN & PROFILE SHEETS FOR STORM SEWER INFO.
 7. REFER TO ROADWAY STRIPING AND SIGNING SHEETS FOR ADDITIONAL INFO.
 8. SALVAGE AND REPLACE EXISTING MONUMENTS. SUBSIDIARY TO PREP ROW.
 9. THE EXISTENCE AND LOCATION OF ALL UNDERGROUND UTILITIES AND DRAINAGE STRUCTURES INDICATED IN THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE. CONTRACTOR SHALL VERIFY ACTUAL LOCATION PRIOR TO CONSTRUCTION.

Design File Name: P:\79\47\00\Design\Civil\Roadway\794700RDWY06.dgn



DESIGN

LUKE REED, P.E. 101242 2/17/2016 DATE

REVIEW AND APPROVAL

JAMES A. LUIZ, P.E. 84722 2/17/2016 DATE

SCALE: PLAN 1" = 40' PROFILE 1" = 10'

NO.	DESCRIPTION	DATE
ADD 1	REVISED CONC REMOVAL NOTE	2/17/16

PAPE-DAWSON ENGINEERS

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CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

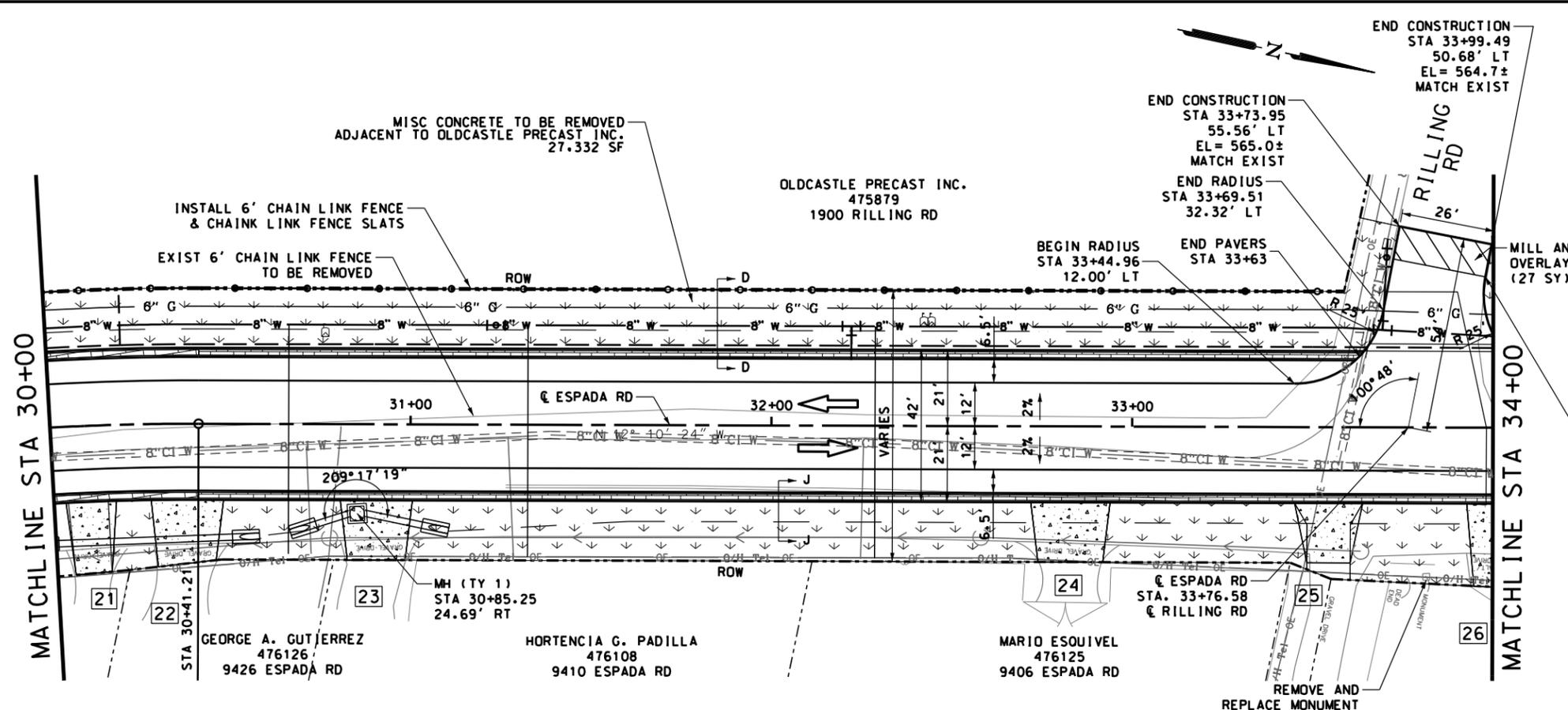
ESPADA RD
PLAN & PROFILE SHEET
STA 26+00 TO STA 30+00

SHEET 6 OF 13

95% SUBMITTAL PROJECT NO.: 40-00246 DATE: 2/17/2016

DRWN. BY: DSGN. BY: CHKD. BY: SHEET NO.: 82 OF 256

Plotted on: 2/17/2016



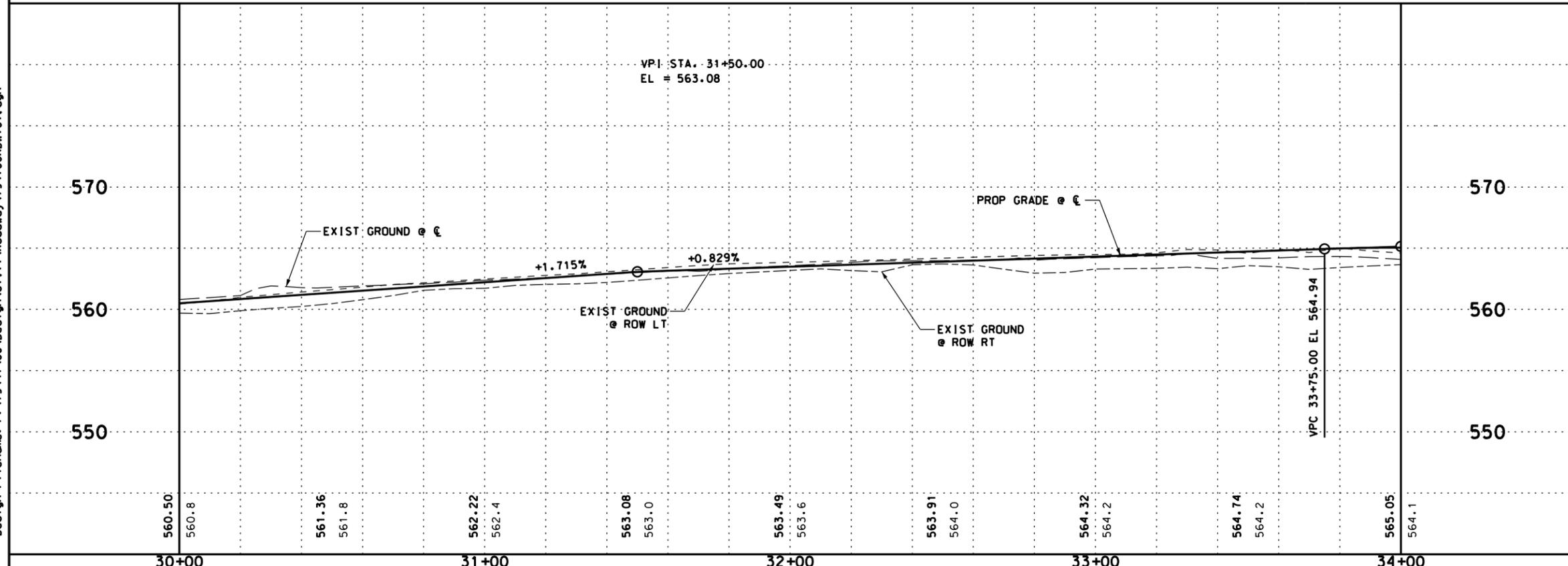
ITEM	DESCRIPTION	UNIT	QTY
104.1	Street Excavation	CY	1611
107.1	Embankment (Final)	CY	21
108.1	LIME TREATED SUBGRADE (6")	SY	1571
108.2	Lime	TON	17.8
200.1a	FLEXIBLE BASE (17")	SY	1437.7
202.1	Prime Coat	GAL	144
203.1	Tack Coat	GAL	176
204.1	ONE COURSE SURFACE TREATMENT	SY	1302
205.2b	HOT MIX ASPHALTIC PAVEMENT, TYPE B (4")	SY	399.0
205.2c	HOT MIX ASPHALTIC PAVEMENT, TYPE B (6")	SY	401.0
205.3a	HOT MIX ASPHALTIC PAVEMENT, TYPE C (2") (SURF)	SY	1756.6
205.3c	HOT MIX ASPHALTIC PAVEMENT, TYPE C (3")	SY	1756.6
0354-2045	PLANE ASPH CONC PAV (2")	SY	27
500.1	CONCRETE CURBING (> 1,000 L.F.)	LF	1528
507.2	Chain Link Wire Fence (6 ft. high)	LF	361
507.X	CHAIN LINK FENCE SLATS (6 FT)	SF	2166
513.1	Removing and Relocating Mail Boxes	EA	3
515.1	Topsoil	CY	201.5
520.1	Hydromulching (Residential or Commercial)	SY	1209.1
0550-2003	CHAIN LINK FENCE (REMOVE)	LF	380
5515-2001	BRICK PAVERS	SY	128
103.4	Remove Miscellaneous Concrete	SF	27332

END RADIUS
STA 33+97.77
41.68' LT

LEGEND

- DITCH CENTER LINE
- DIRECTION OF TRAFFIC
- DRIVEWAY NUMBER
- DRIVEWAY (CONCRETE)
- DRIVEWAY (ASPHALT)
- TOPSOIL/HYDROMULCH
- MAIL BOX

- NOTES:**
- DIMENSIONS AND CALL OUTS ARE FROM CENTERLINE OR FACE OF CURB, UNLESS OTHERWISE INDICATED.
 - REFER TO MISC. ROADWAY DETAILS FOR ADDITIONAL INFO.
 - EXISTING FEATURES ARE SHOWN SCREENED BACK, I.E. FADED.
 - SHORING OF EXIST POLES SUBSIDIARY TO EXCAVATION ITEMS.
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 - REFER TO STORM DRAIN PLAN & PROFILE SHEETS FOR STORM SEWER INFO.
 - REFER TO ROADWAY STRIPING AND SIGNING SHEETS FOR ADDITIONAL INFO.
 - SALVAGE AND REPLACE EXISTING MONUMENTS, SUBSIDIARY TO PREP ROW.
 - THE EXISTENCE AND LOCATION OF ALL UNDERGROUND UTILITIES AND DRAINAGE STRUCTURES INDICATED IN THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE. CONTRACTOR SHALL VERIFY ACTUAL LOCATION PRIOR TO CONSTRUCTION.



DESIGN

LUKE REED, P.E. 101242
DATE: 2/17/2016

REVIEW AND APPROVAL

JAMES A. LUTZ, P.E. 84722
DATE: 2/17/2016

SCALE: PLAN 1" = 40' PROFILE 1" = 10'

NO.	DESCRIPTION	DATE
ADD 1	ADDED REMOV MISC CONC PAY ITEM	2/17/16

PAPE-DAWSON ENGINEERS

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TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

ESPADA RD
PLAN & PROFILE SHEET
STA 30+00 TO STA 34+00

SHEET 7 OF 13

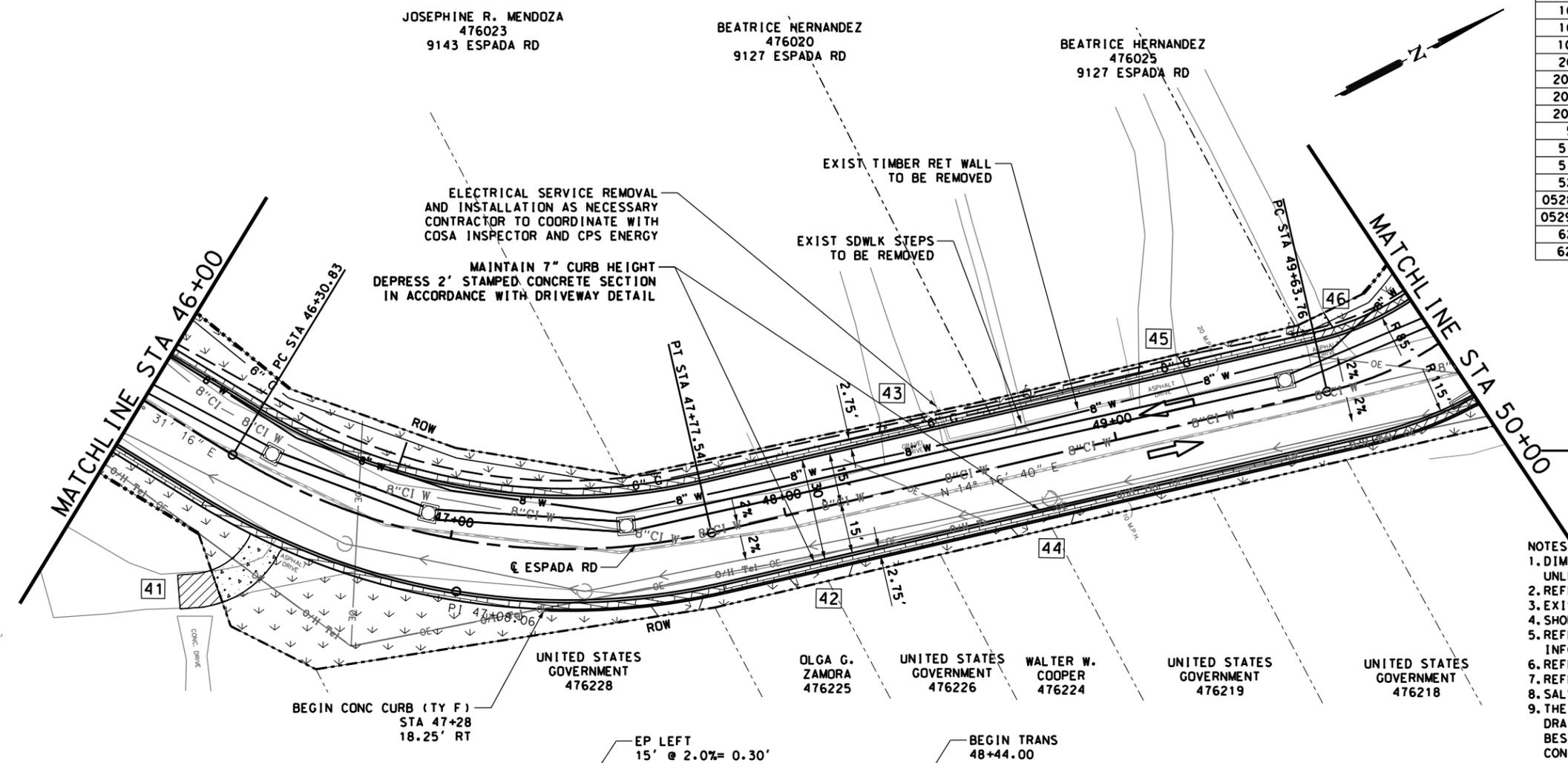
95% SUBMITTAL PROJECT NO.: 40-00246 DATE: 2/17/2016
DRWN. BY: DSGN. BY: CHKD. BY: SHEET NO.: 83 OF 256

Design File name: P:\79\47\00\Design\Civil\Roadway\794700RDWY07.dgn

Plotted on: 2/17/2016

Design File Name: P:\79\47\00\Design\Civil\Roadway\794700RDW11.dgn

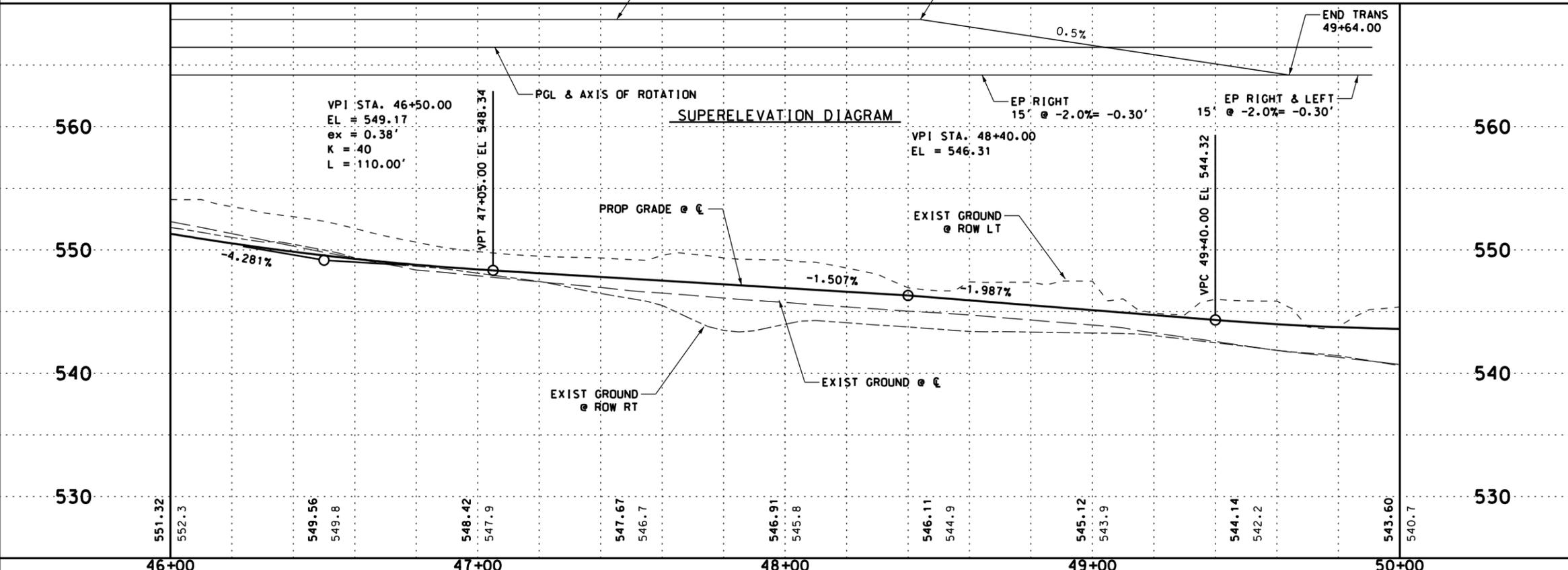
ITEM	DESCRIPTION	UNIT	QTY
104.1	Street Excavation	CY	378
107.1	Embankment (Final)	CY	175
108.1	LIME TREATED SUBGRADE (6")	SY	1569
108.2	Lime	TON	17.7
203.1	Tack Coat	GAL	134
205.2a	HOT MIX ASPHALTIC PAVEMENT, TYPE B (9")	SY	1568.6
205.3a	HOT MIX ASPHALTIC PAVEMENT, TYPE C (2") (SURF)	SY	1340.0
205.3b	HOT MIX ASPHALTIC PAVEMENT, TYPE C (2")	SY	1504.3
501	MACHINE LAID CURB (5,000 L.F., X, 20,000 L.F.)	LF	800
513.1	Removing and Relocating Mail Boxes	EA	2
515.1	Topsoil	CY	89.7
520.1	Hydr mulching (Residential or Commercial)	SY	538.0
0528-2001	COLORED TEXTURED CONC (4")	SY	177.8
0529-2016	CONC CURB (TY F)	LF	272
628.1	Electrical Services	EA	1
628.2	Remove Electrical Services	EA	1



LEGEND

- DITCH CENTER LINE
- DIRECTION OF TRAFFIC
- DRIVEWAY NUMBER
- DRIVEWAY (ASPHALT)
- DRIVEWAY (CONCRETE)
- TOPSOIL/HYDROMULCH
- MAIL BOX

- NOTES:**
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DESIGN

LUKE REED, P.E. 101242 2/17/2016

REVIEW AND APPROVAL

JAMES A. LUTZ, P.E. 84722 2/17/2016

SCALE: PLAN 1" = 40' PROFILE 1" = 10'

NO.	DESCRIPTION	DATE
ADD 1	ADD ELEC SERVICE PAY ITEMS	2/17/16

PAPE-DAWSON ENGINEERS

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CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

ESPADA RD
PLAN & PROFILE SHEET
STA 46+00 TO STA 50+00

SHEET 11 OF 13

95% SUBMITTAL PROJECT NO.: 40-00246 DATE: 2/17/2016

DRWN. BY: DSGN. BY: CHKD. BY: SHEET NO.: 87 OF 256

Plotted on: 2/17/2016

Design File Name: P:\79\47\00\Design\Civi\Drainage\794700DRN\CALCO1.dgn

CURB INLET COMPUTATIONS														
INLET				DRAINAGE AREA	Q _s FROM AREA	CARRY OVER FLOW	TOTAL Q _s	LONGITUDINAL ROAD SLOPE	DEPTH OF FLOW	ALLOWABLE PONDED WIDTH	PONDED WIDTH	LENGTH INLET	BY PASS FLOW	REMARKS
NO	TYPE	CONTROL	STATION											
CI-B4	(TY C)	15.00 'RT	G	42+26.83	B-4	15.2	0.25	15.4	---	0.56	0.00	27.73	10.0	*SUMP
CI-B5	(TY C)	15.00 'LT	G	50+08.72	B-5	5.0		5.0	---	0.26	0.00	13.16	10.0	*SUMP
CI-B6	(1-TY C) (1-10' EXT)	18.39 'RT	G	50+08.72	B-6	8.8		8.8	---	0.28	0.00	13.88	20.0	*SUMP
CI-B7	(TY C)	15.00 'RT	G	39+57.80	B-7	0.9		0.9	0.0267	0.12	0.00	6.00	10.0	
CI-B8	(TY C)	15.00 'LT	G	38+57.00	B-8	1.5		1.5	0.0478	0.13	0.00	6.63	10.0	0.25 C.O. TO B-4
CI-B9	(TY C)	15.00 'RT	G	36+95.00	B-9	1.0		1.0	0.0074	0.16	7.00	8.02	10.0	
CI-B10	(TY C)	15.00 'RT	G	43+52.00	B-10	1.6		1.6	0.0078	0.19	0.00	9.54	10.0	
CI-B11	(TY C)	15.00 'RT	G	44+11.00	B-11	1.2		1.2	0.0078	0.17	0.00	8.58	10.0	

DROP/TRAFFIC INLET COMPUTATIONS														
INLET				DRAINAGE AREA	Q _s	INLET HEAD	REQ'D AREA	INLET AREA	INLET TYPE	CARRY OVER	BY PASS FLOW			
NO	TYPE	CONTROL	STATION									NO	CFS	FT
DI-A1	(TY X-3)	41.27 'RT	G	23+30.48	A-1	*249.8	4.33	42.75	44.69	TI X3				
DI-B1	(TY X-2)	23.50 'RT	G	39+57.80	B-1	12.8	0.44	6.91	29.85	TI X2				
DI-B2	(TY X-1)	22.50 'RT	G	39+57.80	B-2	0.6	0.08	0.78	15.00	TI X1				
DI-B3	(TY X-2)	21.00 'RT	G	37+25.00	B-3	20.7	0.60	9.51	29.85	TI X2				

*Q FOR DI-A1 IS Q₁₀₀ AS CALCULATED ON PROPOSED CULVERT A HDS, WHICH IS THE Q ENTERING EXISTING 60" RCP DURING Q₁₀₀ STORM EVENT.

STORM DRAIN COMPUTATIONS												
LINE NO	FROM	TO	LENGTH (FT)	TC (MIN)	I _{ss} (in/hr)	Q _s (CFS)	DESIGN					
							STR SIZE	SLOPE %	CAP (CFS)	VEL (FT/SEC)	FREQ (YR)	
LINE A	DI-A1	MH-A1	65.90	50.00	N/A	249.8	5' x 4' SBC	0.40	206.1	12.5	25	
LINE A	MH-A1	OUT A	32.33	50.00	N/A	249.8	5' x 4' SBC	0.40	206.1	12.5	25	
LINE A	MH-A3	DI-A1	42.95	50.00	---	0.0	5' x 4' SBC	0.40	206.1	0.0	25	
LINE B1	MH-B13	MH-B14	26.26	28.04	5.18	1.0	24" RCP	0.50	18.6	0.5	25	
LINE B1	MH-B14	MH-B16	127.67	28.36	5.15	21.3	24" RCP	1.50	32.3	10.2	25	
LINE B1	MH-B16	MH-B1	95.80	28.61	5.13	21.8	24" RCP	1.50	32.3	10.1	25	
LINE B1	MH-B1	MH-B7	264.95	29.54	5.04	33.8	36" RCP	0.75	62.1	8.5	25	
LINE B1	MH-B7	MH-B6	121.17	29.86	5.01	46.2	36" RCP	0.75	62.1	9.1	25	
LINE B1	MH-B6	MH-B15	55.00	30.01	5.00	46.9	36" RCP	0.75	62.1	9.0	25	
LINE B1	MH-B15	MH-B2	66.55	30.19	5.00	47.5	36" RCP	0.75	62.1	9.1	25	
LINE B1	MH-B2	MH-B8	59.66	30.34	5.00	47.5	36" RCP	0.75	62.1	9.1	25	
LINE B1	MH-B8	MH-B9	95.19	30.59	5.00	47.5	36" RCP	0.75	62.1	9.1	25	
LINE B1	MH-B9	MH-B11	45.28	30.71	5.00	47.5	36" RCP	0.75	62.1	9.0	25	
LINE B1	MH-B11	MH-B3	54.51	30.86	5.00	47.5	36" RCP	0.75	62.1	9.0	25	
LINE B1	MH-B3	MH-B12	195.01	31.35	5.00	47.5	36" RCP	1.00	71.7	10.2	25	
LINE B1	MH-B12	MH-B5	49.09	31.48	4.86	47.5	36" RCP	1.00	71.7	6.7	25	
LINE B1	MH-B5	MH-B10	46.05	31.59	4.86	54.7	36" RCP	0.75	67.3	9.8	25	
LINE B1	MH-B10	MH-B4	60.16	31.73	4.86	54.7	36" RCP	0.75	67.3	9.8	25	
LINE B1	MH-B4	OUTFALL	186.63	32.45	---	54.7	48" RCP	0.50	118.4	4.4	25	
LINE B1-1	CI-B9	MH-B13	16.13	11.09	8.45	1.0	24" RCP	0.50	18.6	0.6	25	
LINE B1-2	DI-B3	MH-B14	13.00	28.04	5.18	20.7	24" RCP	1.00	26.4	6.6	25	
LINE B1-3	DI-B2	CI-B7	5.46	10.62	8.25	0.6	24" RCP	1.50	32.3	0.2	25	
LINE B1-3	DI-B1	MH-B1	13.75	28.61	5.13	12.8	24" RCP	1.00	26.4	7.1	25	
LINE B1-3	CI-B7	MH-B1	15.62	28.61	5.13	1.5	24" RCP	1.50	29.8	0.5	25	
LINE B1-4	CI-B4	MH-B7	16.12	29.54	5.04	15.4	30" RCP	0.50	33.8	3.1	25	
LINE B1-5	CI-B6	MH-B5	19.54	31.48	4.86	8.8	24" RCP	1.00	24.3	2.8	25	
LINE B1-5	CI-B5	MH-B5	4.13	31.48	4.86	5.0	24" RCP	1.00	24.3	1.6	25	
LINE B1-6	CI-B10	MH-B6	16.12	29.86	5.01	1.6	24" RCP	2.50	41.7	5.7	25	
LINE B1-7	CI-B11	MH-B15	16.12	30.01	5.00	1.2	24" RCP	2.75	43.7	0.7	25	
LINE B1-8	CI-B8	MH-B16	3.63	28.36	5.15	1.3	24" RCP	0.50	18.6	0.5	25	

DESIGN



Luke Reed
LUKE REED, P.E.
DATE: 2/17/2016

REVIEW AND APPROVAL



James A. Lutz
JAMES A. LUTZ, P.E.
DATE: 2/17/2016

NO.	DESCRIPTION	DATE
ADD 1	REVISED NAMES OF LINES A, A-3, B1-3, B1-8	2/17/16
 PAPE-DAWSON ENGINEERS 2000 NW LOOP 410 SAN ANTONIO, TEXAS 78213 PHONE: 210.375.9000 FAX: 210.375.9010 TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470		
CITY OF SAN ANTONIO CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT ESPADA RD HYDRAULIC DATA SHEET		
SHEET 1 OF 1		
95% SUBMITTAL	PROJECT NO.: 40-00246	DATE: 2/17/2016
DRWN. BY:	DSGN. BY:	CHKD. BY:
		SHEET NO.: 104 OF 256

**ESPADA ROAD
(IH-410 TO ASHLEY ROAD)
PROJECT**

**City of San Antonio
Transportation & Capital Improvements
Department**

February 2016

**Espada Road (IH-410 to Ashley Road) Project
February 2016**

**CITY OF SAN ANTONIO
TRANSPORTATION & CAPITAL IMPROVEMENTS DEPARTMENT**

Table of Contents

TECHNICAL SPECIFICATIONS

Governing Specifications for Public Works Construction

Special Provisions to the Governing Specifications

SAWS Bid Documents

CPS Energy Requirements and Specifications for Construction of Natural Gas Distribution Facilities

Geotechnical Engineering Study

CPS Section 500 – Overhead Service (Service-Drop under 600 Volts)

CPS Section 1400 – Service to Customer-Owned Meter Pole

City of San Antonio Structured Cabling Infrastructure Guidelines

Project: Espada Road – IH 410 to Ashley Rd
 Highway: Espada Road
 County: Bexar

**CITY OF SAN ANTONIO
 GOVERNING SPECIFICATIONS AND PROVISIONS**

ALL SPECIFICATIONS, SPECIAL SPECIFICATIONS, AND SPECIAL PROVISIONS APPLICABLE TO THIS PROJECT ARE IDENTIFIED AS FOLLOWS:

STANDARD SPECIFICATIONS:

- CITY OF SAN ANTONIO - STANDARD SPECIFICATIONS FOR CONSTRUCTION (JUNE 2008)
- TEXAS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS (JUNE 1, 2004)

CITY OF SAN ANTONIO STANDARD SPECIFICATIONS FOR CONSTRUCTION

100	Mobilization
101	Preparing Right-Of-Way
103	Remove Concrete
104	Street Excavation
106	Box Culvert Excavation and Backfilling
107	Embankment
108	Lime Treated Subgrade
200	Flexible Base
202	Prime Coat
203	Tack Coat
204	Surface Treatments
205	Hot Mix Asphaltic Concrete Pavement
308	Drilled Shafts and Under-Reamed Foundations
401	Reinforced Concrete Pipe
404	Corrugated Metal Pipe
406	Jacking, Boring, or Tunneling Pipe
500	Concrete Curb, Gutter, And Concrete Curb And Gutter
501	Machine Laid Curb
502	Concrete Sidewalks
503	Asphaltic Concrete, Portland Cement Concrete, And Gravel Driveways
505	Concrete Riprap
507	Chain Link Fence
509	Metal Beam Guard Rail
513	Removing And Relocating Mailboxes
515	Topsoil
520	Hydromulching
530	Barricades, Signs, and Traffic Handling
531	Signs
535	Hot Applied Thermoplastic Pavement Markings
540	Temporary Erosion, Sedimentation and Water Pollution Prevention and Control
550	Trench Excavation Safety Protection
554	Erosion Control Matting
618	Conduit
620	Electrical Conductors
624	Ground Boxes
628	Electrical Services
798	Asphalt Concrete Cushion Speed Hump Type 3

Project: Espada Road – IH 410 to Ashley Rd
 Highway: Espada Road
 County: Bexar

628	Electrical Services
818	PVC Pipe Installation
824	Service Supply Lines (Water)
828	Gate Valves
833	Meter And Box Installation
834	Fire Hydrants
836	Grey Iron and Ductile-Iron Fittings
840	Water Tie-ins
841	Hydrostatic Testing Operations
844	Blowoff Assemblies
851	Adjust Existing Manhole
845	Sanitary Sewer Laterals
855	Reconstruct Existing Manholes
856	Jacking, Boring or Tunneling Pipe
864	Bypass Pumping
866	Sewer Main Televising Inspection
3000	Removal, Transportation And Disposal of AC Pipe
XXX.X	Special Sign
XXX.X	Roadway Illumination Assembly (SPL TY 4)

TEXAS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS

0340	Dense-Graded Hot Mix Asphalt
0354	Planing and Texturing Pavement
0432	Riprap (420) (421) (427) (440)
0459	Gabions and Gabion Mattresses
0462	Concrete Box Culverts and Storm Drains (400) (424) (464) (476)
0465	Manholes and Inlets (400) (420) (421) (440) (471)
0466	Headwalls and Wingwalls (400) (420) (421) (440) (430) (464)
0512	Portable Concrete Traffic Barrier
0528	Colored Textured Concrete and Landscape Pavers (132) (247) (420) (421) (440)
0529	Concrete Curb, Gutter, and Combined Curb and Gutter (360) (420) (421) (440)
0540	Metal Beam Guard Fence
0542	Removing Metal Beam Guard Fence
0544	Guardrail End Treatments
0662	Workzone Pavement Markings (666) (668) (672) (677)
0772	Post And Cable Fence
5515	Brick Pavers

SPECIAL SPECIFICATION

SPL1	Backflow Preventer
6001-6001	Portable Changeable Message Sign

SAN ANTONIO WATER SYSTEM 2014 SPECIFICATIONS

101	Mobilization
550	Preparation Of Right-of-Way
818	Trench Excavation Projection

Project: Espada Road – IH 410 to Ashley Rd
Highway: Espada Road
County: Bexar

824	PVC Pipe Installation
828	Water Service Supply Line
833	Gate Valves
834	Meter and Meter Box Installation
836	Fire Hydrants
840	Grey-Iron and Ductile-Iron Fittings
841	Water Tie-Ins
844	Hydrostatic Testing
856	Blow-Off Assemblies
3000	Jacking, Boring or Tunneling Pipe
SP 1	Handling Asbestos Cement Pipe

THE ABOVE-LISTED SPECIFICATION ITEMS ARE THOSE UNDER WHICH PAYMENT IS TO BE MADE. THESE, TOGETHER WITH SUCH OTHER PERTINENT ITEMS, IF ANY, AND INCLUDING THE SPECIAL PROVISIONS LISTED BELOW, CONSTITUTE THE COMPLETE SPECIFICATIONS FOR THIS PROJECT.

SPECIAL PROVISIONS:

SPECIAL PROVISIONS WILL GOVERN AND TAKE PRECEDENCE OVER THE SPECIFICATIONS ENUMERATED HEREON WHEREVER IN CONFLICT THEREWITH.

502+ Barricades, Signs and Traffic Handling

*Denotes Texas Department of Transportation bid item – this section only

+Denotes City of San Antonio bid item – this section only

**CPS ENERGY
REQUIREMENTS AND SPECIFICATIONS
FOR CONSTRUCTION OF
NATURAL GAS DISTRIBUTION FACILITIES
ON THE
ESPADA RD 6PA GAS MAIN**

Special Specification 6001

Portable Changeable Message Sign



1. DESCRIPTION

Furnish, operate, and maintain portable trailer mounted changeable message sign (PCMS) units.

2. MATERIALS

Furnish new or used material in accordance with the requirements of this Item and the details shown on the plans. Provide a self-contained PCMS unit with the following:

- Sign controller
- Changeable Message Sign
- Trailer
- Power source

Paint the exterior surfaces of the power supply housing, supports, trailer, and sign with Federal Orange No. 22246 or Federal Yellow No. 13538 of Federal Standard 595C, except paint the sign face assembly flat black.

2.1. **Sign Controller.** Provide a controller with permanent storage of a minimum of 75 pre-programmed messages. Provide an external input device for random programming and storage of a minimum of 75 additional messages. Provide a controller capable of displaying up to 3 messages sequentially. Provide a controller with adjustable display rates. Enclose sign controller equipment in a lockable enclosure.

2.2. **Changeable Message Sign.** Provide a sign capable of being elevated to at least 7 ft. above the roadway surface from the bottom of the sign. Provide a sign capable of being rotated 360° and secured against movement in any position.

Provide a sign with 3 separate lines of text and 8 characters per line minimum. Provide a minimum 18 in. character height. Provide a 5 × 7 character pixel matrix. Provide a message legibility distance of 600 ft. for nighttime conditions and 800 ft. for normal daylight conditions. Provide for manual and automatic dimming light sources.

The following are descriptions for 3 screen types of PCMS:

- **Character Modular Matrix.** This screen type comprises of character blocks.
- **Continuous Line Matrix.** This screen type uses proportionally spaced fonts for each line of text.
- **Full Matrix.** This screen type uses proportionally spaced fonts, varies the height of characters, and displays simple graphics on the entire sign.

2.3. **Trailer.** Provide a 2 wheel trailer with square top fenders, 4 leveling jacks, and trailer lights. Do not exceed an overall trailer width of 96 in. Shock mount the electronics and sign assembly.

2.4. **Power Source.** Provide a diesel generator, solar powered power source, or both. Provide a backup power source as necessary.

2.5. **Cellular Telephone.** When shown on the plans, provide a cellular telephone connection to communicate with the PCMS unit remotely.

3. CONSTRUCTION

Place or relocate PCMS units as shown on the plans or as directed. The plans will show the number of PCMS units needed, for how many days, and for which construction phases.

Maintain the PCMS units in good working condition. Repair damaged or malfunctioning PCMS units as soon as possible. PCMS units will remain the property of the Contractor.

4. MEASUREMENT

This Item will be measured by each PCMS or by the day used. All PCMS units must be set up on a work area and operational before a calendar day can be considered measurable. When measurement by the day is specified, a day will be measured for each PCMS set up and operational on the worksite.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Portable Changeable Message Sign." This price is full compensation for PCMS units; set up; relocating; removing; replacement parts; batteries (when required); fuel, oil, and oil filters (when required); cellular telephone charges (when required); software; and equipment, materials, tools, labor, and incidentals.

SECTION 500

OVERHEAD SERVICE

(SERVICE-DROPS UNDER 600 VOLTS)

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2
3
4
5
6
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8
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14
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SECTION 500 - OVERHEAD SERVICES (SERVICE-DROPS UNDER 600 VOLTS)

501 General:

An overhead service consists of overhead secondary voltage service conductors from a CPS Energy distribution pole to a Customer-owned building or structure, or meter pole. CPS Energy metering equipment will be installed at this location.

501.1 Aesthetic Design Areas:

In areas where overhead service-drops are prohibited for aesthetic reasons, CPS Energy will supply with overhead to underground service laterals or from padmount transformers.

501.2 Overhead-to-Underground Conversion Areas:

Overhead services are not available in areas that have been converted from overhead primary distribution to underground primary distribution. Only underground services will be allowed in these areas.

501.3 Underground Distribution Areas:

Overhead services are not available in underground distribution areas such as the South Texas Medical Center, Hemisfair Park and other underground commercial developments. Only underground services will be allowed in these areas.

501.4 Downtown Network System:

Overhead services are not available in the area served by the Downtown Network System, which is generally in the San Antonio Central Business District. Only underground services will be allowed from the Downtown Network System. Customer may contact the CPS Energy Customer Service Representative for the geographical boundaries of the Downtown Network System and to review service options from the Downtown Network System (Refer to Section 1100).

502 Vertical Clearances:

Service-drop conductors including drip loops shall comply with minimum clearance requirements of the NEC and NESC and with the specific provisions herein for services not exceeding 600 volts, nominal (Refer to Figure 500.1).

502.1 Above Roofs:

Where service-drop conductors have to be installed above a building or structure's roof, the service-drop conductors shall be provided with the minimum vertical clearances shown in Figure 500.1. The vertical clearance above the roof shall be maintained for a distance of not less than 5 feet in all directions from the edge of the roof.

Note: Customer shall coordinate with the CPS Energy Customer Service Representative where temporary or permanent structures are to be constructed or placed under existing CPS Energy service-drop conductors. Customer will be responsible for costs associated with clearance poles if minimum requirements of Figure 500.1 are not maintained.

502.2 Above Final Grade:

Service-drop conductors and drip loops, where not in excess of 600 volts nominal, shall be installed in accordance with the minimum vertical clearances from final grade, or any other platform or standing surface, as shown in Figure 500.1.

SECTION 500 - OVERHEAD SERVICES (SERVICE-DROPS UNDER 600 VOLTS)

Note: Customer shall install service head 12 inches above the minimum height clearances required in Figure 500.1 to allow for proper connection of service-drop conductors and forming of drip loop by CPS Energy.

502.3 Above Swimming Pools and Similar:

Swimming pools, hot tubs, spas or any other recreational body of water shall not be placed under existing service-drop conductors, nor shall service-drop conductors be installed above these types of installations without meeting the minimum vertical and horizontal clearances outlined by CPS Energy in Figure 500.8.

503 Clearances on Buildings from Final Span of Service-Drop Conductors:

Where permanent attachment of service-drop conductors to building is necessary for connection to Customer's service-entrance conductors, the final span of service-drop conductors shall be installed to meet the following requirements over or along the installation to which the conductors are attached.

503.1 Windows, Doors, Porches, Balconies, etc.:

Service-drop conductors and drip loops shall have a horizontal clearance of not less than 5 feet from doors, porches, balconies, ladders, stairs, fire escapes, windows that are designed to be opened, or other similar locations.

503.2 Platforms, Projections and Similar Surfaces:

The vertical clearance of final spans of service-drop conductors and drip loops above or within 5 feet measured horizontally from platforms, projections, or surfaces from which they might be reached shall be maintained in accordance with Article 502.3 and Figure 500.1.

503.3 Building Openings:

Service-drop conductors or drip loops shall not be installed beneath openings through which materials may be moved, such as openings in farm and commercial buildings, and shall not be installed where they obstruct entrance to these building openings.

504 Length:

The maximum length of unsupported service-drop conductors is determined by CPS Energy based on the wire size, weight, sag and tension on the anchor points. Service-drop conductors greater than 1/0 AWG may require the use of one or more clearance poles for support. Demand load may limit service-drop conductor length due to voltage-drop limitations specified by CPS Energy (Refer to Section 300).

505 Point of Attachment:

The point of attachment of service-drop conductors to a building or other structure shall provide the minimum clearances as specified in Articles 502 and 503 and as shown in Figure 500.1. In no case shall this point of attachment be more than 30 feet nor less than 12 feet above finished grade unless otherwise approved by CPS Energy.

Attachments to building walls shall be made such that the horizontal angle between the service-drop conductors and the building wall shall be a minimum of 45 degrees. The point of attachment for the service-drop conductors shall be so located as to be accessible from a ladder placed firmly on the ground and against the building.

SECTION 500 - OVERHEAD SERVICES (SERVICE-DROPS UNDER 600 VOLTS)

505.1 Location:

The point of attachment for the service-drop conductors shall be located on the building, service mast, or other structure at the nearest practical point to CPS Energy's supply pole.

Exception: Clearance poles may be used to extend service-drop conductor distances where approved and deemed necessary by the CPS Energy Customer Service Representative.

505.2 Means of Attachment:

There are various types of hardware used to anchor the service-drop conductors to the building or other structure depending on the type, size and weight of the conductors. Typical anchoring options and related information are outlined in (1) through (4) below:

- (1) On service-drops such as for residences and small commercial occupancies, a clamp-on type eyebolt for service masts, or a screw-type eyebolt for wood structures may be used. CPS Energy installs the anchor during the service-drop installation. Customer shall furnish the anchors if the CPS Energy standard type anchor cannot be used.
- (2) On larger service-drops, Customer must furnish and install 5/8-inch galvanized all-thread machine bolts for installation in the building or structure during construction, especially for buildings of concrete, masonry, or brick construction. The machine bolts with galvanized washer and nut must be installed by the Customer and protrude 2 inches outside the building wall. CPS Energy will install a clevis and insulator on these bolts when the service-drop is installed.
- (3) Anchorage must be designed to withstand 750 pounds of load-tension induced from the weight of the service-drop conductors. Open (moused) service-drops will require an anchor for each conductor. Cabled (bundled) service-drops will require only one anchor. Customer must consult with the CPS Energy Customer Service Representative to determine the type of service-drop required (Refer to Figures 500.6 and 500.7).
- (4) Where a building is not tall enough to provide anchorage to meet the required clearances, the service raceway may be extended vertically from the metering or service equipment and serve the dual purpose of enclosing the service-entrance conductors and supporting the service-drop conductors. CPS Energy will furnish and install a raceway clamp with eyebolt to support the service-drop conductors. Service raceways so installed shall meet the requirements for service masts outlined in Article 507 and shown in Figures 500.3 through 500.5.

506 Service Raceway:

The service raceway(s) containing the service-entrance conductors shall be installed in a manner that will ensure proper clearances for the service-drop conductors and drip loop in accordance with this Section.

506.1 Location:

Service raceways shall be installed on the outside of the building or structure and be continuous except for couplings. Couplings or fittings shall

SECTION 500 - OVERHEAD SERVICES (SERVICE-DROPS UNDER 600 VOLTS)

be listed and provide no access to unmetered conductors (Refer to Definition of "Listed").

506.2 Approved Types:

Service raceways enclosing service-entrance conductors shall be galvanized rigid metal conduit (RMC), intermediate metal conduit (IMC) or electrical metallic tubing (EMT) type raceways.

Exception 1: EMT is not permitted where used as a service mast.

Exception 2: Bussed risers are permitted where service-entrance conductors exceed three conductors per phase (Refer to Article 509.5).

506.3 Size:

The size of service raceways shall be as specified by the NEC and other applicable codes but in no case be less than 1 ¼-inch.

Exception No. 1: Service raceways used as service masts shall be 2 inches, minimum, RMC or IMC.

Exception No. 2: Where CPS Energy supplies hubs on meter sockets, the size of the service raceway shall be the same size as the hub.

Note: Service raceways on the load-side of meter sockets or other metering enclosures shall be the same size or smaller than the line-side conduits.

506.4 Number of Conduits:

Service raceways on meter sockets shall consist of one conduit. For other than meter sockets, they may consist of two or more conduits. Each conduit shall have the same physical characteristics and contain one each of the ungrounded (phase) and neutral conductors. Where three conductors per phase are insufficient, a bussed service head must be used (Refer to Article 509.5).

Exception: Two conduits may be used on Customer furnished and CPS Energy approved Code 31 meter socket. Customer should coordinate with CPS Energy Representative on these installations.

507 Service Masts:

Where service-drop conductor clearances as specified in Article 502 and 503 and shown in Figure 500.1 cannot be obtained by standard anchorage, then a service mast must be used. This type of installation consists of extending the service raceway, through the eaves if necessary, and anchoring the service-drop conductors on the service mast (Refer to Figure 500.3).

507.1 Adequate Strength:

The service mast must withstand the strain imposed on it by the service-drop conductors. Conduit used for service masts shall be 2 inches (minimum) and shall be rigid metal conduit (RMC) or intermediate metal conduit (IMC), with no coupling between the roof line and service head. The service mast, or any other service raceway, shall not be used to support other equipment.

507.2 Rise Above Roof:

Where a service mast rises above a roof or roof parapet, it shall extend beyond that point a minimum of 36 inches and maximum of 60 inches measured to

SECTION 500 - OVERHEAD SERVICES (SERVICE-DROPS UNDER 600 VOLTS)

the top of the conduit. The service mast must be designed to withstand 750 pounds of load-tension induced from the service-drop conductors.

507.3 Roof Penetrations:

The point where a service mast emerges through a roof shall be weatherproof and utilize approved flashing plates and associated hardware including sealing materials. Roof flashing plate shall be installed in accordance with manufacturer's instructions and as shown in Figure 500.3.

507.4 Support of Service Mast:

Where service raceways are used for the support of service-drop conductors, they shall be supported in accordance with the respective figure indicated below:

- (1) Service mast for overhead residential single-phase services shall be supported in accordance with Figure 500.3.
- (2) Service masts for overhead commercial three-phase services without overhead CT's shall be supported in accordance with Figure 500.4.
- (3) Service masts for overhead commercial three-phase services with overhead CT's shall be supported in accordance with Figures 500.5, 500.6 and 500.7.

508 Service Head:

The service head shall be an approved raintight-type properly sized to accommodate the service raceway and service-entrance conductors. It should be positioned within 12 to 24 inches from the anchorage point of the service-drop conductors to allow the bottom of the drip loop to comply with minimum clearances specified in Articles 502 and 503 and shown in Figure 500.1.

509 Service-Entrance Conductors:

The service-entrance conductors shall be furnished and installed by Customer for connection to CPS Energy's service-drop conductors. Conductors shall be installed to meet minimum requirements of the NEC and other applicable codes and the provisions outlined herein.

509.1 Size:

Service-entrance conductors shall have sufficient ampacity to carry the load as determined by the NEC and other applicable codes, and in no case, be smaller than No. 8 AWG copper or No. 6 AWG aluminum. Service-entrance conductor sizes shall not exceed those specified by CPS Energy for meter sockets or other CPS Energy metering equipment (Refer to Section 1800).

509.2 Conductor Insulation:

Service-entrance conductors including grounded conductors entering or on the exterior of buildings or other structures shall be insulated. Conductor insulation must be a type approved by the NEC and other applicable codes for the use intended.

509.3 Connectors, Terminals and Taps:

The service-drop conductors shall be connected by CPS Energy to the service-entrance conductors by means of compression or mechanical connectors furnished

SECTION 500 - OVERHEAD SERVICES (SERVICE-DROPS UNDER 600 VOLTS)

by CPS Energy. CPS Energy will not permit connectors, terminals or taps to be connected to the service-entrance conductors ahead of metering equipment.

Exception 1: *Where Customer installs a bussed service head in accordance with Article 509.5, the Customer shall furnish and install approved connectors for connection to CPS Energy service-drop conductors.*

Exception 2: *Where connectors are used to join the service-drop conductors and service-entrance conductors.*

Exception 3: *Where connections within metering equipment are used to close the meter loop.*

Exception 4: *Where taps are used within auxiliary gutters or junction boxes required by CPS Energy to energize metering equipment from service lateral or service-entrance conductors.*

509.4 Paralleled Conductors:

Aluminum, copper-clad aluminum, or copper conductors for each phase, neutral, or grounded circuit shall be permitted to be connected in parallel (electrically joined at both ends to form a single conductor) only in sizes 1/0 AWG and larger where installed in accordance with (1) through (5) below:

- (1) Be the same length.
- (2) Have the same conductor material.
- (3) Be the same size in circular-mil area.
- (4) Have the same insulation type.
- (5) Be terminated in the same manner.

509.5 Maximum Number of Conductors:

CPS Energy will connect service-drop conductors directly to service-entrance conductors where paralleled service-entrance conductors per phase at the service head do not exceed three conductors.

- (1) Where three paralleled service-entrance conductors per phase are used, each cable shall not exceed 500 KCM aluminum or 500 KCM copper.
- (2) Where two paralleled service-entrance conductors per phase are used, each cable shall not exceed 750 KCM aluminum or 500 KCM copper.

Note: *Where more than three paralleled service-entrance conductors per phase are used, a bussed service head approved by CPS Energy shall be furnished and installed by Customer.*

509.6 Exposed Conductors for Connections:

CPS Energy requires 24 inches minimum of free wire ends extending from the service head (except bussed type) for making connections to the service-drop conductors.

SECTION 500 - OVERHEAD SERVICES (SERVICE-DROPS UNDER 600 VOLTS)

On the line- and load-side of metering equipment, Customer must provide sufficient wire ends for forming wire and making necessary connections to close meter loops. Where window-type CT's are installed in enclosures, CPS Energy will work with Customer in pulling their conductors through the CT's thereby avoiding connections. Ample conductor slack shall be provided for training and forming conductors (Refer to Section 1800 and Figure 1800.13).

509.7 Means of Identifying Grounded Conductors:

Customer shall clearly and permanently identify the grounded (neutral) conductor(s) before CPS Energy installs and connects the service-drop conductors.

(A) Sizes No. 8 AWG or Smaller:

An insulated grounded conductor of No. 8 AWG or smaller shall be identified by a continuous white or gray outer finish along its entire length on other than green insulation along its entire length.

(B) Sizes Larger than No. 8 AWG:

An insulated grounded conductor larger than No.8 AWG shall be identified either by a continuous white or gray outer finish or on other than green insulation along its entire length, or at the time of installation by a distinctive white marking at its terminations. Such white marking shall remain readily visible after termination of conductors at service.

509.8 Means of Identifying Ungrounded Conductors:

Ungrounded conductors shall be distinctively marked as shown below to identify phasing and voltage but shall not have insulation colors of white, natural gray or green. For proper identification and safe operation of CPS Energy metering equipment, the conductors shall be distinctively marked at their terminations as follows unless otherwise specified by CPS Energy:

Color of Ungrounded Conductor

<u>Type of Service</u>	<u>Phase A</u>	<u>Phase B</u>	<u>Phase C</u>
208Y/120-volt	black	red	blue
480Y/277-volt	purple	brown	yellow
240Δ/120-volt	blue	black	orange (hi-leg) (See Exception)

Exception: On all Customer service equipment, the hi-leg conductor shall be connected as the center leg (Refer to Section 1800 and Figure 1800.7).

Note: Where conductors are marked as shown above, CPS Energy will connect service for A-B-C phase rotation (clockwise indication on a phase sequence indicator). This color code applies to all three-phase services, overhead or underground. Permanent plaque and/or labeling to indicate this termination within metering equipment enclosures will be required.

SECTION 500 - OVERHEAD SERVICES (SERVICE-DROPS UNDER 600 VOLTS)

509.9 Minimum Number of Conductors Required Based on Type of Service Supplied:

The minimum number of service-entrance conductors shall be as specified below depending on the type of service (single-phase or three-phase) supplied by CPS Energy.

- (1) Single-phase power and lighting requires three conductors: two-ungrounded, one-grounded.
- (2) Three-phase power and lighting requires four conductors: three-ungrounded, one-grounded.

509.10 Line and Load Conductors:

Conductors other than service-entrance conductors shall not be in service raceways. Customer load conductors shall not be permitted in any service raceway, junction box or auxiliary gutter installed ahead of CPS Energy metering equipment.

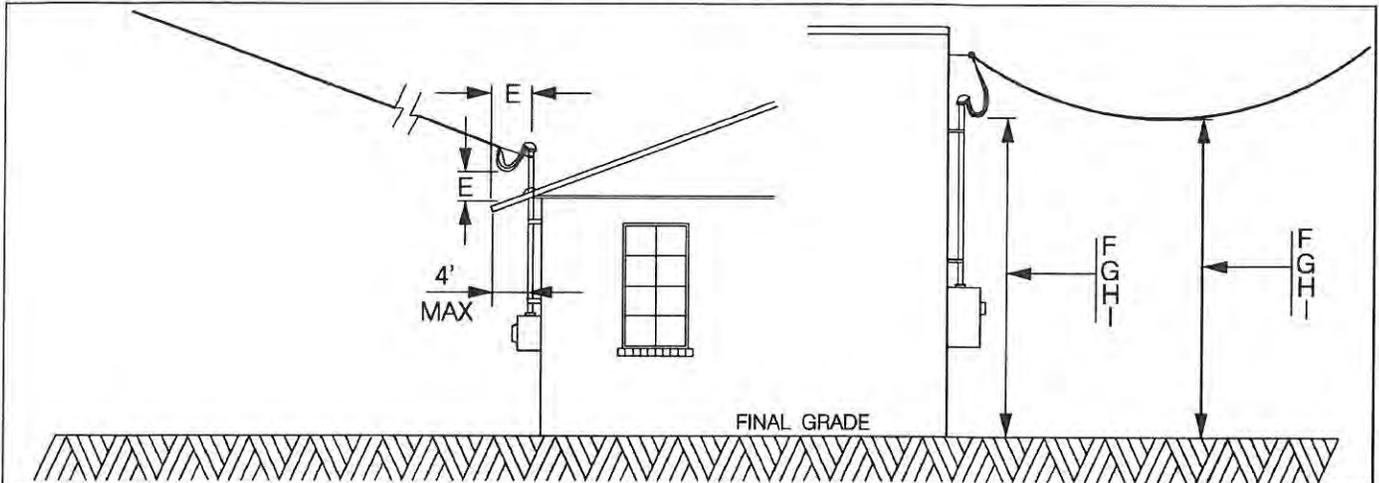
510 Metering:

All metering equipment shall be installed on the exterior of building or structure at a location approved by the CPS Energy Customer Service Representative and in accordance with Section 1800. Customer shall provide CPS Energy an approved space on the building wall or structure for metering equipment.

Note 1: Where space is not available on building wall, Customer shall provide a suitable metering equipment rack separate from building (Refer to Definition of "Metering Equipment Rack" and Figure 1800.18).

Note 2: For Customer connected loads requiring instrument transformer-rated metering equipment, CPS Energy may install instrument transformers at building wall or on service mast where applicable. CPS Energy will furnish transformer mounting bracket (s) (TMB) for installation by Customer (Refer to Figure 500.5, 500.6 and 500.7).

FIGURE 500.1
SERVICE-DROP CLEARANCES, 600 VOLTS OR LESS

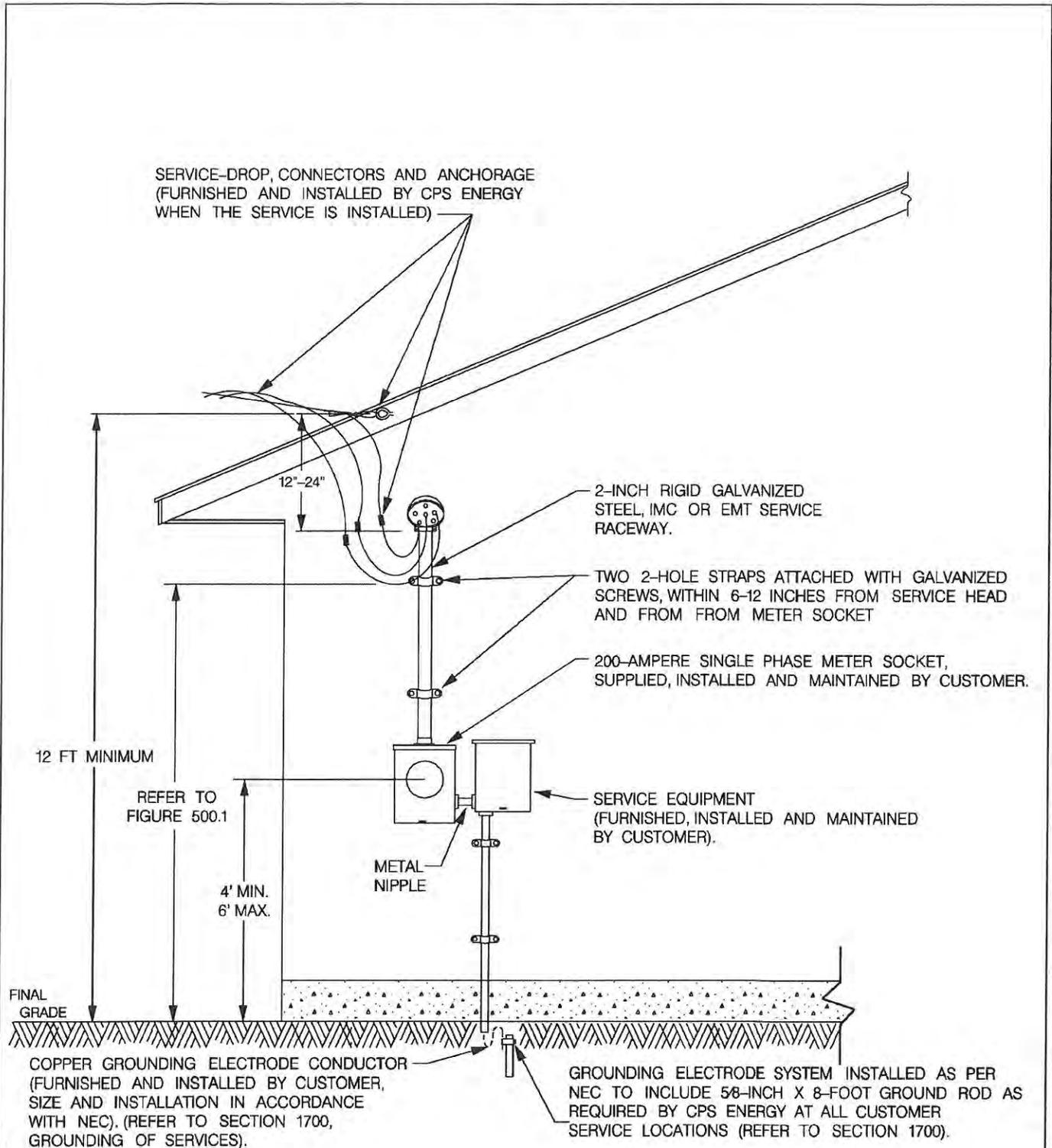


		120/240 VOLTS	208Y/120 VOLTS	240/120 VOLTS	480Y/277 VOLTS
VERTICAL CLEARANCES ABOVE ROOF					
A	ALL POINTS OF ROOF ABOVE WHICH CONDUCTORS PASS ⁽³⁾	8 FT	8 FT	8 FT	8 FT
B	ROOFS SUBJECT TO PEDESTRIAN TRAFFIC ⁽³⁾	10 FT	10 FT	10 FT	10 FT
C	ROOFS SUBJECT TO VEHICULAR TRAFFIC ⁽³⁾	18 FT	18 FT	18 FT	18 FT
D	ROOFS WITHOUT READY ACCESS TO PEDESTRIANS AND HAVING A PITCH OF 4 INCHES PER FOOT OR GREATER ⁽²⁾⁽³⁾	5 FT	5 FT	5 FT	5 FT
E	ROOFS WITHOUT READY ACCESS TO PEDESTRIANS AND SERVICE-DROP CONDUCTORS WITH MAXIMUM HORIZONTAL DISTANCE OF 6 FT FROM AN APPROVED RACEWAY OR SUPPORT LOCATED NOT MORE THAN 4 FT FROM THE EDGE OF THE ROOF. ⁽¹⁾⁽²⁾⁽³⁾	1 FT 6 IN	1 FT 6 IN	1 FT 6 IN	1 FT 6 IN
VERTICAL CLEARANCES ABOVE GROUND , ROADS, ETC.					
F	SPACES AND WAYS SUBJECT TO PEDESTRIANS OR RESTRICTED TRAFFIC ONLY; INCLUDES POINT OF ATTACHMENTS, IF APPLICABLE. ⁽³⁾⁽⁴⁾⁽⁵⁾	12 FT	12 FT	12 FT	12 FT
G	DRIVEWAYS, PARKING LOTS , AND ALLEYS; INCLUDES POINT OF ATTACHMENTS, IF APPLICABLE ⁽³⁾⁽⁶⁾	18 FT	18 FT	18 FT	18 FT
H	ROADS, STREETS, AND OTHER AREAS SUBJECT TO TRUCK ⁽³⁾ TRAFFIC; INCLUDES POINT OF ATTACHMENT, IF APPLICABLE	22 FT	22 FT	22 FT	22 FT
I	OVER TRACKS RAILS OF RAILROADS	24 FT	24 FT	24 FT	24 FT
	OTHER	REFER TO NESC	REFER TO NESC	REFER TO NESC	REFER TO NESC

NOTES

- REMAINDER OF HORIZONTAL DISTANCE TO BE MAINTAINED AT 3 FT AND ONLY APPLICABLE IF ON ROOFS WITHOUT READY ACCESS.
- ROOF, BALCONY, PORCH, OR ATTACHED DECK IS CONSIDERED READILY ACCESSIBLE TO PEDESTRIANS IF IT CAN BE CASUALLY ACCESSED THROUGH A DOORWAY, WINDOW, RAMP, STAIRWAY, OR PERMANENTLY MOUNTED LADDER BY A PERSON, ON FOOT, WHO NEITHER EXERTS EXTRAORDINARY PHYSICAL EFFORT NOR EMPLOYS TOOLS OR DEVICES TO GAIN ENTRY. A PERMANENTLY MOUNTED LADDER IS NOT CONSIDERED A MEANS OF ACCESS IF ITS BOTTOM RUNG IS 8 FT OR MORE ABOVE THE GROUND OR OTHER PERMANENTLY INSTALLED ACCESSIBLE SURFACE.
- MEASUREMENTS APPLY TO DRIP LOOP CONDUCTORS AS WELL AS SERVICE-DROP CONDUCTORS.
- SPACES AND WALKWAYS SUBJECT TO PEDESTRIANS OR RESTRICTED TRAFFIC ONLY ARE THOSE AREAS WHERE RIDERS ON HORSES OR OTHER LARGE ANIMALS, VEHICLES, OR OTHER MOBILE UNITS EXCEEDING A TOTAL HEIGHT OF 8 FT, ARE PROHIBITED BY REGULATION OR PERMANENT TERRAIN CONFIGURATIONS, OR ARE OTHERWISE NOT NORMALLY ENCOUNTERED NOR REASONABLY ANTICIPATED.
- WHERE THE HEIGHT OF A RESIDENTIAL BUILDING DOES NOT PERMIT ITS SERVICE-DROP(S) TO MEET THESE VALUES, THE CLEARANCES MAY BE REDUCED AS FOLLOWS: 150 VOLTS OR LESS TO GROUND - 10 FT FOR BOTH SERVICE-DROP AND DRIP LOOP.
- WHERE THE HEIGHT OF A RESIDENTIAL BUILDING DOES NOT PERMIT ITS SERVICE-DROP(S) TO MEET THESE VALUES, THE CLEARANCES OVER RESIDENTIAL DRIVEWAYS ONLY MAY BE REDUCED AS FOLLOWS: 150 VOLTS OR LESS TO GROUND - 12 FT FOR SERVICE DROP AND FOR 10 FT DRIP LOOP.
- CLEARANCES IN FRONT AND ABOUT METERING AND SERVICE EQUIPMENT SHALL BE IN ACCORDANCE WITH THE NEC AND SECTION 1800 (REFER TO FIGURE 1800.19).
- CUSTOMER SHALL INSTALL TOP OF SERVICE HEAD 12 INCHES ABOVE THE MINIMUM HEIGHT CLEARANCES SHOWN HERE TO ALLOW FOR PROPER CONNECTION OF SERVICE-DROP CONDUCTORS AND FORMING OF DRIP LOOP BY CPS ENERGY.

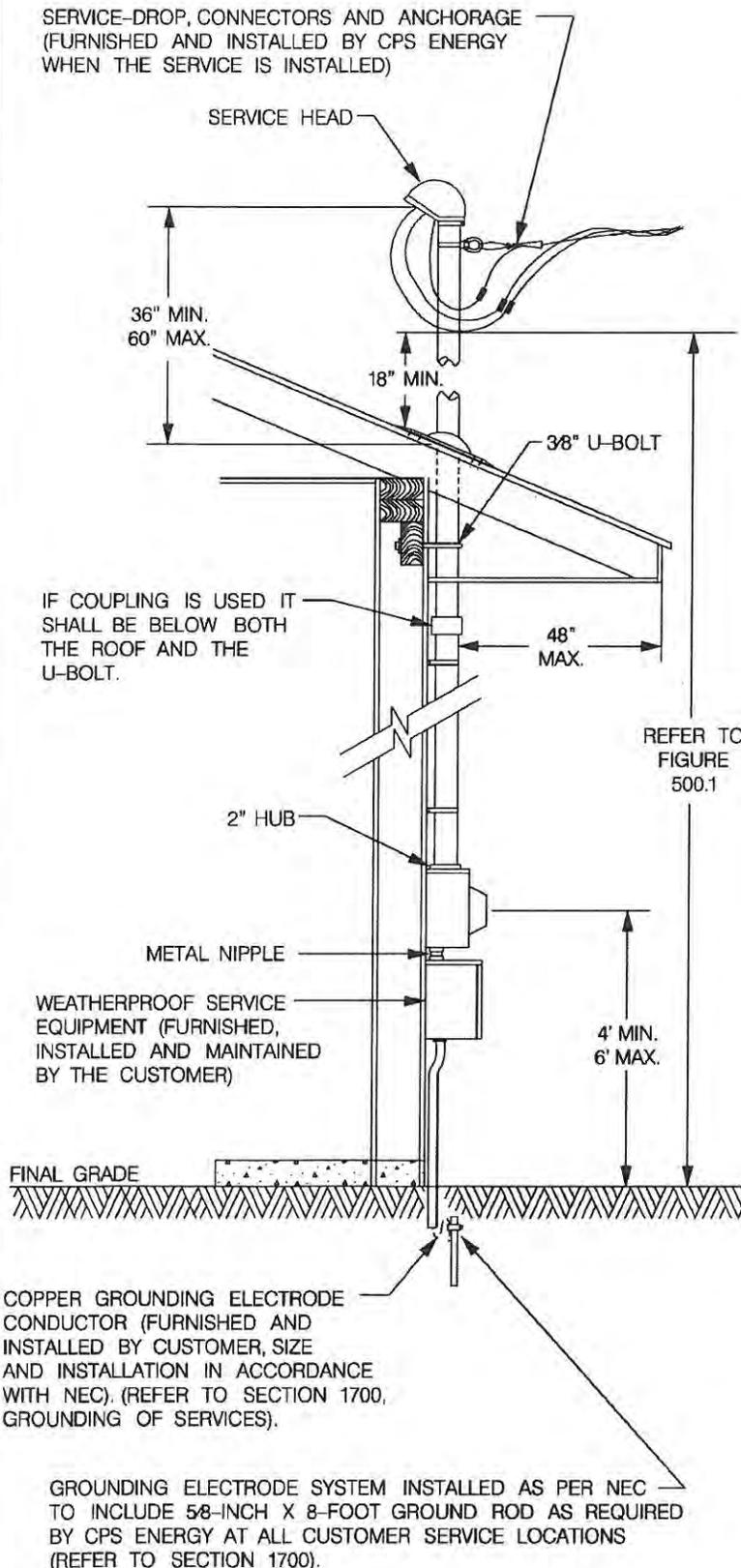
FIGURE 500.2
OVERHEAD RESIDENTIAL SERVICE, ONE METER



NOTES:

1. SERVICE OUTLET SHALL BE FURNISHED AND INSTALLED BY CUSTOMER. SERVICE-ENTRANCE CONDUCTORS TO EXTEND A MINIMUM OF 24 INCHES OUTSIDE THE SERVICE HEAD FOR CONNECTION TO SERVICE-DROP.
2. METERING EQUIPMENT SHALL BE LOCATED TOTALLY OUTSIDE OF BUILDING OR STRUCTURE AT CPS ENERGY APPROVED SERVICE-DROP LOCATION.
3. CLEARANCES IN FRONT AND ABOUT METERING AND SERVICE EQUIPMENT SHALL BE IN ACCORDANCE WITH THE NEC AND SECTION 1800 (REFER TO FIGURE 1800.19).
4. CUSTOMER SHALL INSTALL TOP OF SERVICE HEAD 12 INCHES ABOVE THE MINIMUM HEIGHT CLEARANCES SHOWN HERE TO ALLOW FOR PROPER CONNECTION OF SERVICE-DROP CONDUCTORS AND FORMING OF DRIP LOOP BY CPS ENERGY.

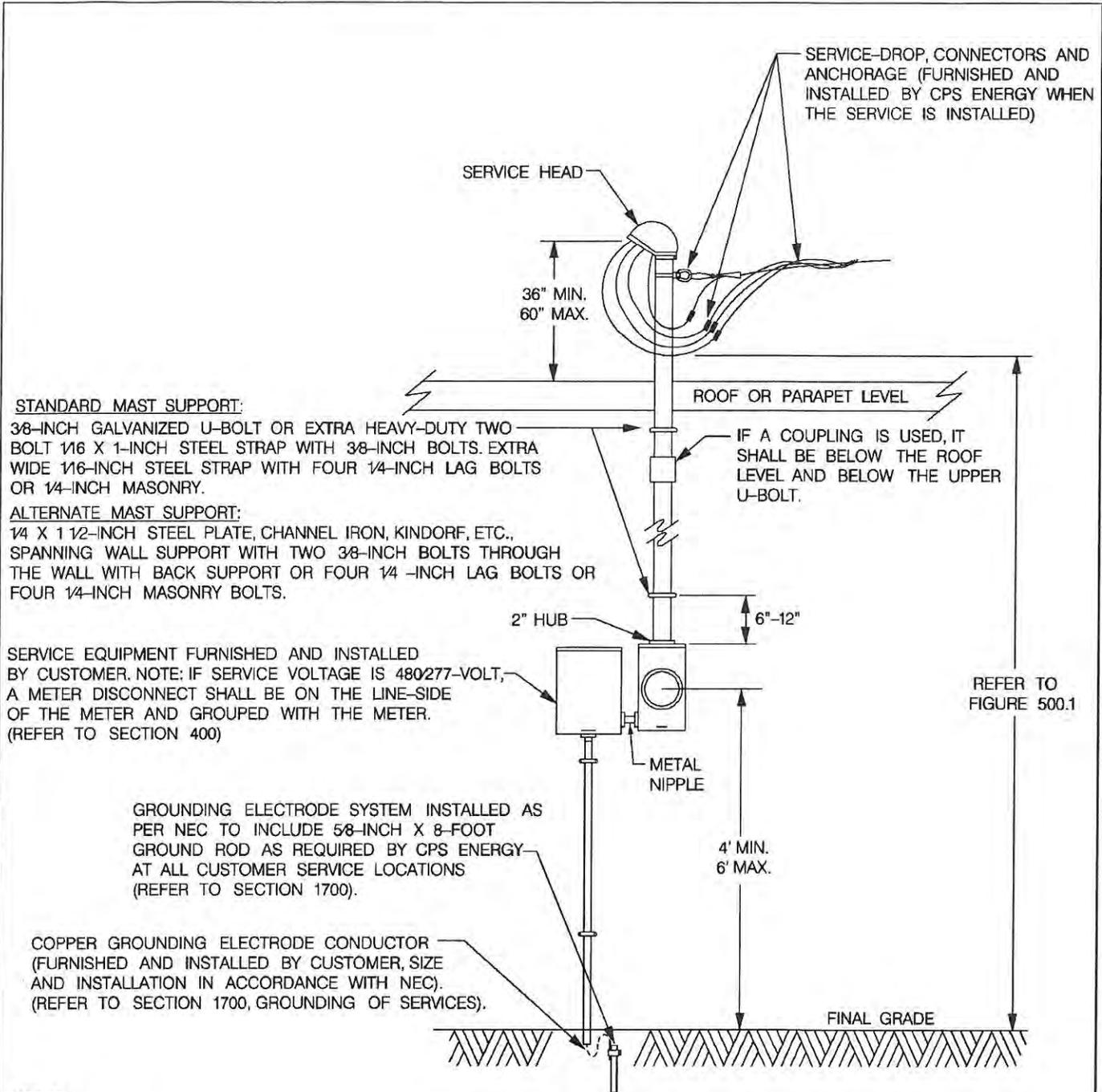
FIGURE 500.3
OVERHEAD RESIDENTIAL SERVICE, ONE METER WITH A SERVICE MAST



NOTES:

1. SERVICE OUTLET SHALL BE FURNISHED AND INSTALLED BY THE CUSTOMER. TWENTY-FOUR INCHES OF WIRE ENDS MUST BE EXTENDING OUT OF SERVICE HEAD.
2. SERVICE MAST SHALL BE SUPPLIED WITH APPROVED WEATHERPROOF ROOF FLASHING AND BE SUPPORTED BY ONE OF THE FOLLOWING:
 - (A) 3/8-INCH GALVANIZED U-BOLT ATTACHED TO WALL FRAMING MEMBER BELOW ROOF EAVE OR TO ROOF OR CEILING RAFTER.
 - (B) BY ELECTRIC CHANNEL MATERIAL SUCH AS KINDORF THAT IS SECURED TO TWO OR MORE WOODEN STUDS WITH LAG BOLTS.
3. ROOF SLOPE SHALL NOT BE LESS THAN 4 INCHES IN 12 INCHES AND NOT BE READILY ACCESSIBLE TO PEDESTRIAN TRAFFIC FOR THE DRIP LOOP CLEARANCES SHOWN ON THIS FIGURE (REFER TO FIGURE 500.1 FOR SPECIFIC INFORMATION)
4. SERVICE MAST SHALL ALSO BE SUPPORTED BY 2 STANDARD HEAVY-DUTY 2-HOLE PIPE STRAPS OR EQUIVALENT. SERVICE MAST SHALL BE 2-INCH RIGID METAL CONDUIT (RMC) OR INTERMEDIATE METAL CONDUIT (IMC).
5. 200-AMPERE SINGLE PHASE METER SOCKET, SUPPLIED, INSTALLED AND MAINTAINED BY CUSTOMER.
6. THE SERVICE MAST SHOWN HERE IS TYPICAL AND UTILIZED WHERE ADDITIONAL CLEARANCE IS REQUIRED BETWEEN THE SERVICE-DROP AND FINAL GRADE. WHERE THE SERVICE MAST MUST EXTEND ABOVE A ROOF OR ROOF PARAPET, IT SHALL EXTEND ABOVE THAT POINT A MINIMUM OF 36 INCHES AND MAXIMUM OF 60 INCHES MEASURED TO THE TOP OF THE CONDUIT. CONDUIT SHALL BE OF 2 INCHES MINIMUM, RIGID METAL CONDUIT (RMC) OR INTERMEDIATE METAL CONDUIT (IMC) ANCHORAGE AND MAST MUST BE DESIGNED TO WITHSTAND 750 POUNDS OF LOAD-TENSION INDUCED FROM THE WEIGHT OF THE SERVICE-DROP CONDUCTORS.
7. METERING EQUIPMENT SHALL BE LOCATED TOTALLY OUTSIDE AT CPS ENERGY APPROVED SERVICE-DROP LOCATION.
8. CLEARANCES IN FRONT AND ABOUT METERING AND SERVICE EQUIPMENT SHALL BE IN ACCORDANCE WITH THE NEC AND SECTION 1800 (REFER TO FIGURE 1800.19).
9. CUSTOMER SHALL INSTALL TOP OF SERVICE HEAD 12 INCHES ABOVE THE MINIMUM HEIGHT CLEARANCES SHOWN HERE TO ALLOW FOR PROPER CONNECTION OF SERVICE-DROP CONDUCTORS AND FORMING OF DRIP LOOP BY CPS ENERGY.

FIGURE 500.4
OVERHEAD SERVICE, THREE-PHASE METER WITH A SERVICE MAST



STANDARD MAST SUPPORT:

3/8-INCH GALVANIZED U-BOLT OR EXTRA HEAVY-DUTY TWO BOLT 1/6 X 1-INCH STEEL STRAP WITH 3/8-INCH BOLTS. EXTRA WIDE 1/6-INCH STEEL STRAP WITH FOUR 1/4-INCH LAG BOLTS OR 1/4-INCH MASONRY.

ALTERNATE MAST SUPPORT:

1/4 X 1 1/2-INCH STEEL PLATE, CHANNEL IRON, KINDORF, ETC., SPANNING WALL SUPPORT WITH TWO 3/8-INCH BOLTS THROUGH THE WALL WITH BACK SUPPORT OR FOUR 1/4 -INCH LAG BOLTS OR FOUR 1/4-INCH MASONRY BOLTS.

SERVICE EQUIPMENT FURNISHED AND INSTALLED BY CUSTOMER. NOTE: IF SERVICE VOLTAGE IS 480/277-VOLT, A METER DISCONNECT SHALL BE ON THE LINE-SIDE OF THE METER AND GROUPED WITH THE METER. (REFER TO SECTION 400)

GROUNDING ELECTRODE SYSTEM INSTALLED AS PER NEC TO INCLUDE 5/8-INCH X 8-FOOT GROUND ROD AS REQUIRED BY CPS ENERGY AT ALL CUSTOMER SERVICE LOCATIONS (REFER TO SECTION 1700).

COPPER GROUNDING ELECTRODE CONDUCTOR (FURNISHED AND INSTALLED BY CUSTOMER, SIZE AND INSTALLATION IN ACCORDANCE WITH NEC). (REFER TO SECTION 1700, GROUNDING OF SERVICES).

NOTES:

1. THE SERVICE MAST SHOWN HERE IS USUALLY INSTALLED WHERE ADDITIONAL CLEARANCE IS REQUIRED BETWEEN THE SERVICE-DROP AND FINISHED GRADE. THE SERVICE MAST SHALL BE OF 2 INCHES MINIMUM, RIGID METAL CONDUIT (RMC) OR INTERMEDIATE METAL CONDUIT (IMC). IF IT MUST EXTEND ABOVE A ROOF OR ROOF PARAPET, IT SHALL EXTEND ABOVE THAT POINT A MINIMUM OF 36 INCHES AND A MAXIMUM OF 60 INCHES (5 FT) MEASURED TO THE TOP OF THE CONDUIT.
2. ANCHORAGE AND MAST MUST BE DESIGNED TO WITHSTAND 750 POUNDS OF LOAD-TENSION INDUCED FROM THE WEIGHT OF THE SERVICE-DROP CONDUCTORS.
3. CLEARANCES IN FRONT AND ABOUT METERING AND SERVICE EQUIPMENT SHALL BE IN ACCORDANCE WITH THE NEC AND SECTION 1800 (REFER TO FIGURE 1800.19).
4. CUSTOMER SHALL INSTALL TOP OF SERVICE HEAD 12 INCHES ABOVE THE MINIMUM HEIGHT CLEARANCES SHOWN HERE TO ALLOW FOR PROPER CONNECTION OF SERVICE-DROP CONDUCTORS AND FORMING OF DRIP LOOP BY CPS ENERGY.

FIGURE 500.5
OVERHEAD SERVICE, WEATHERPROOF CT'S ON A SERVICE MAST

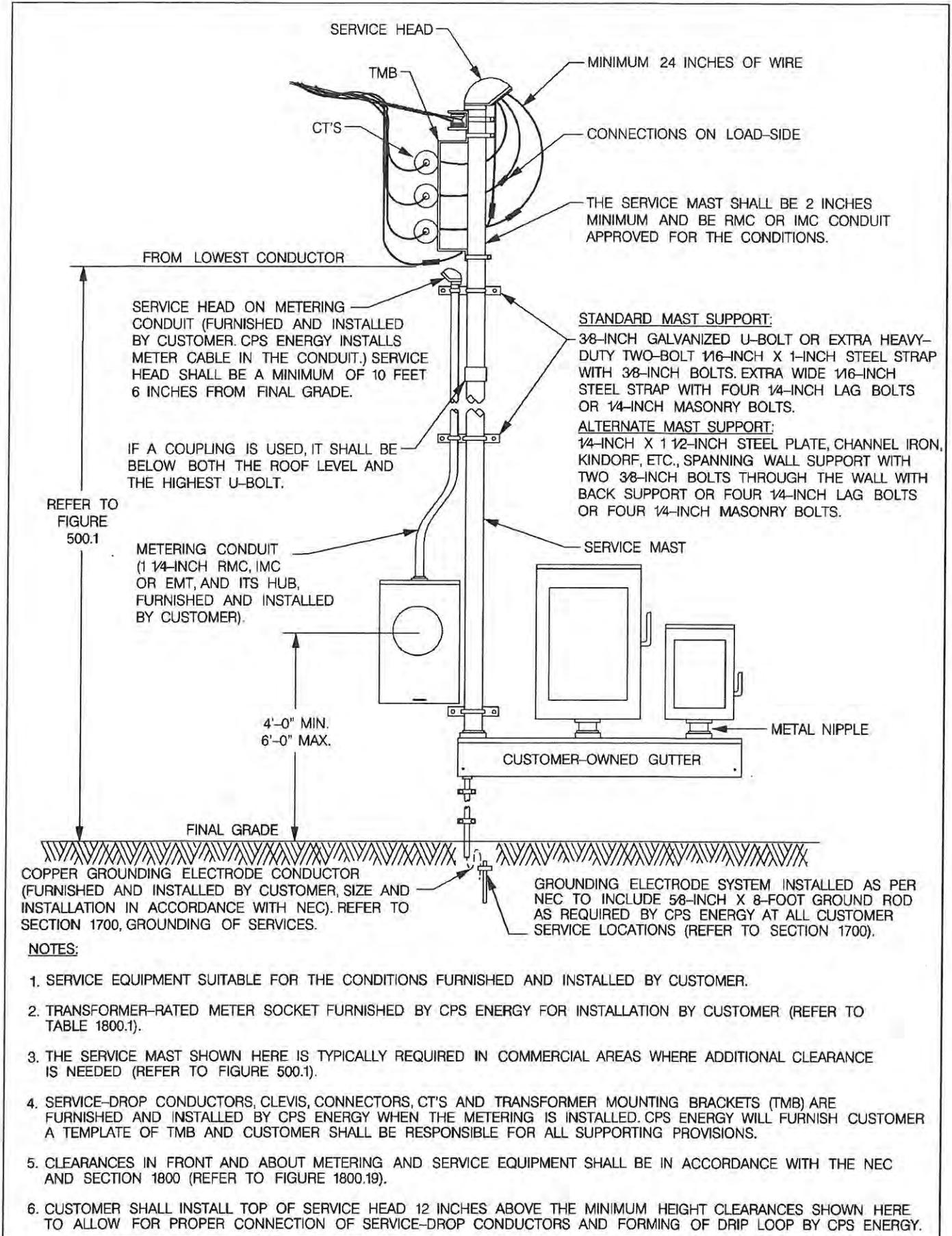
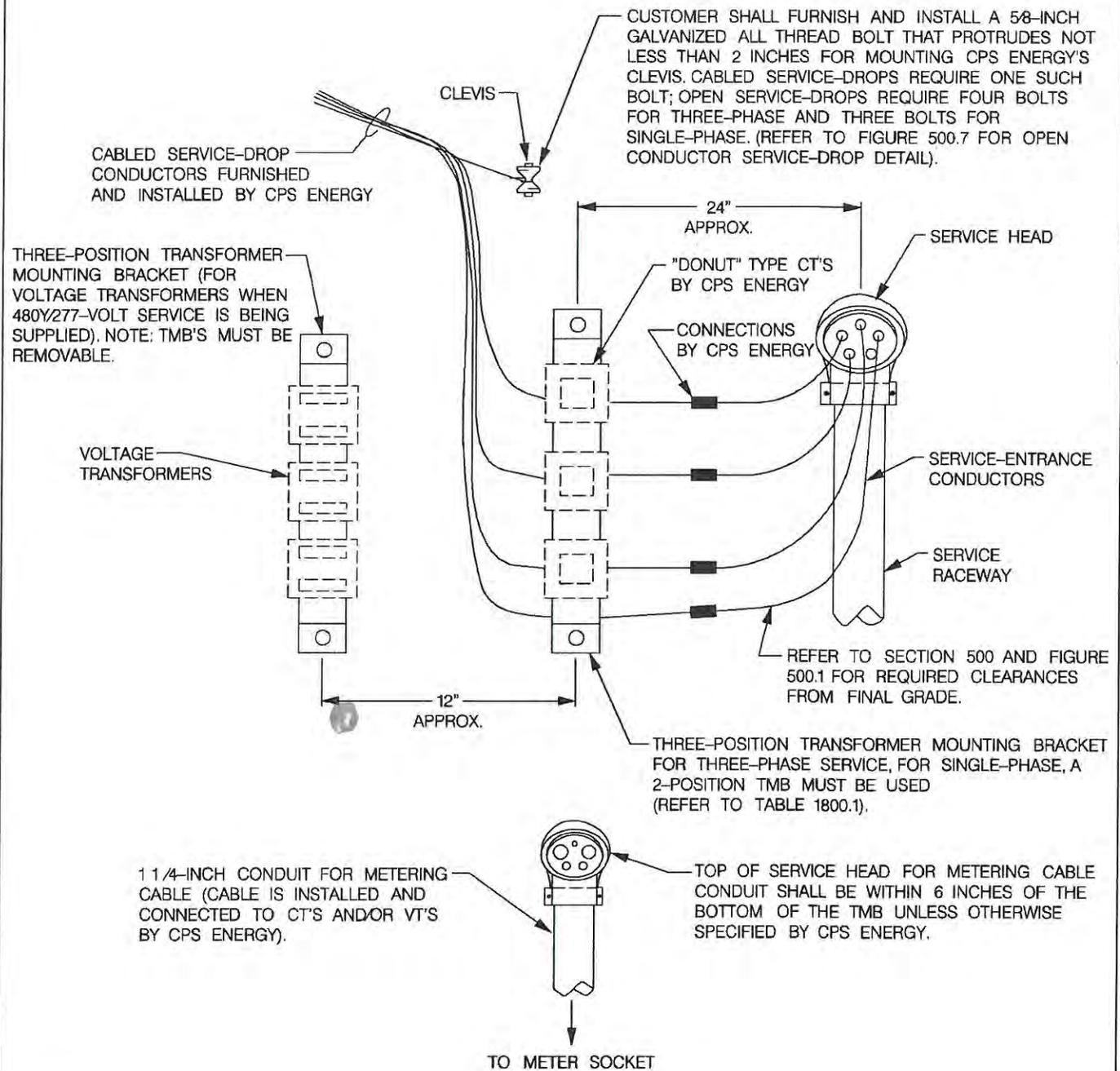


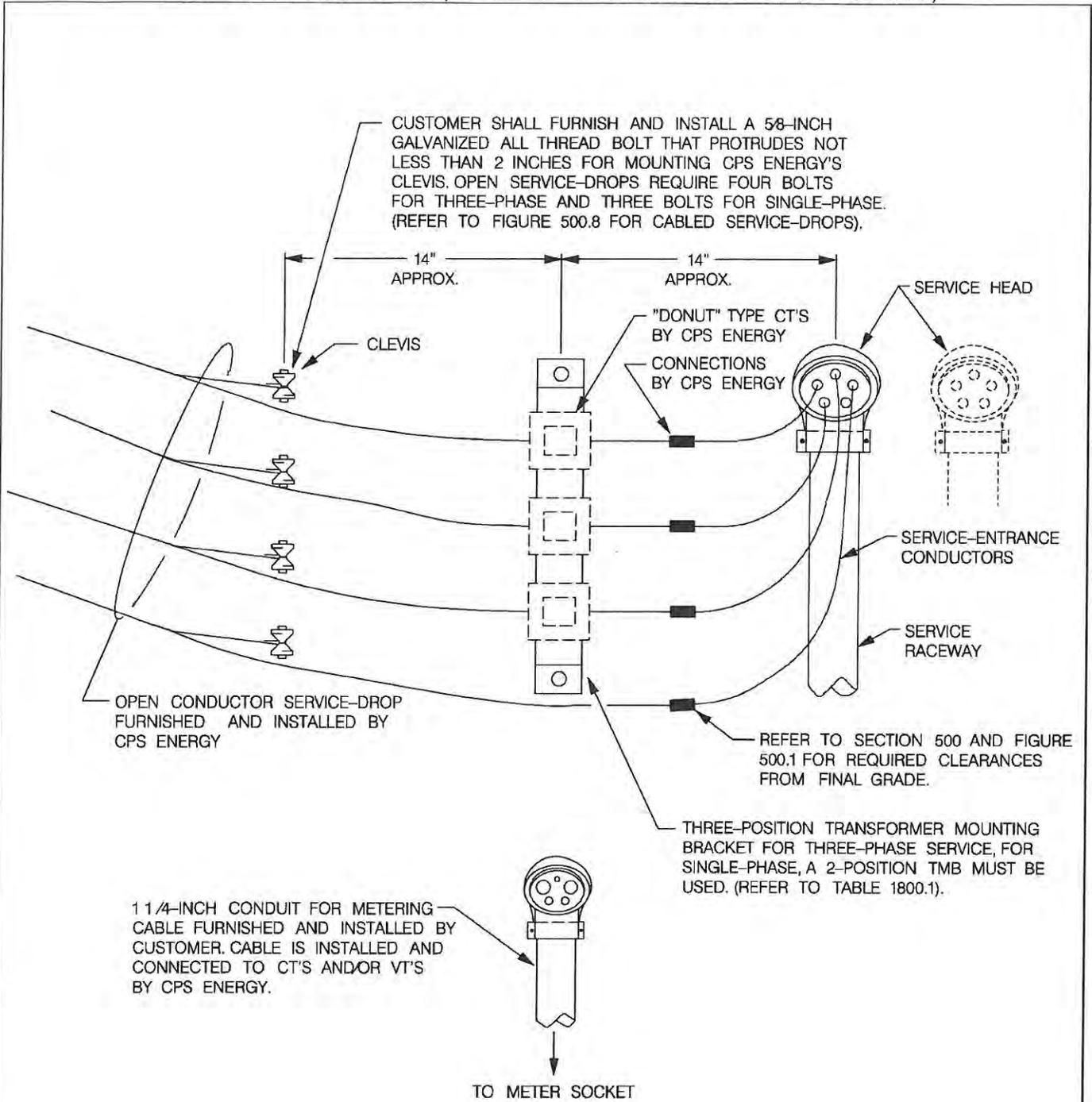
FIGURE 500.6
TYPICAL WALL-MOUNTED WEATHERPROOF TYPE CURRENT AND/OR
VOLTAGE TRANSFORMER INSTALLATION (CABLED SERVICE-DROP)



NOTES:

1. WHERE ONLY ONE CUSTOMER IS TO BE SERVED FROM A SERVICE-DROP AND THE CONNECTED LOAD REQUIRES THE USE OF CT'S AND/OR VT'S IN ACCORDANCE WITH SECTION 1800, CPS ENERGY WILL FURNISH THE TRANSFORMER MOUNTING BRACKETS FOR INSTALLATION BY CUSTOMER. CUSTOMER INSTALLS THE TRANSFORMER MOUNTING BRACKETS AS A TEMPLATE FOR CPS ENERGY. CPS ENERGY WILL INSTALL THE CT'S AND/OR VT'S AND CONNECT THEM TO THE METER THIS IS DONE WHEN THE SERVICE-DROP IS INSTALLED.
2. THE ABOVE DRAWING IS FOR A TYPICAL CT/VT, SERVICE-DROP INSTALLATION WHERE A CABLED SET OF SERVICE-DROP CONDUCTORS IS USED. WHERE CUSTOMER INSTALLS PARALLELED SERVICE-ENTRANCE CONDUCTORS, OR WHERE CPS ENERGY INSTALLS OPEN SERVICE-DROP CONDUCTORS, OTHER CONFIGURATIONS FOR THE ANCHORAGE AND TRANSFORMER-MOUNTING BRACKETS WILL BE REQUIRED (REFER TO FIGURE 500.7).
3. CUSTOMER FURNISHES AND INSTALLS THE 1 1/4-INCH METERING CONDUIT AND SERVICE HEAD. CUSTOMER IS ADVISED TO CLOSELY COORDINATE THIS TYPE OF INSTALLATION WITH CPS ENERGY'S CUSTOMER SERVICE REPRESENTATIVE.

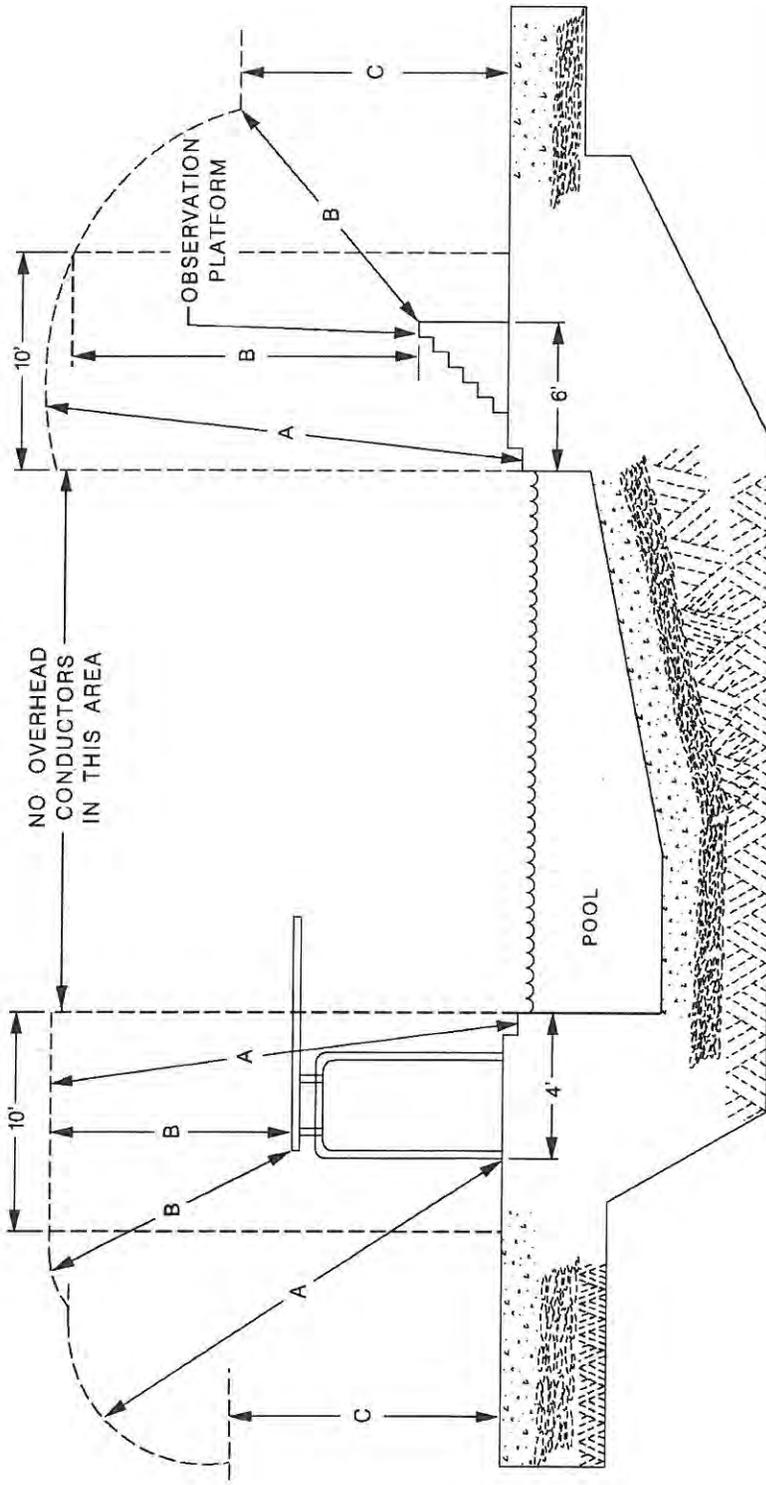
FIGURE 500.7
 TYPICAL WALL-MOUNTED WEATHERPROOF TYPE CURRENT
 TRANSFORMER INSTALLATION (PARALLELED OR OPEN CONDUCTOR SERVICE-DROP)



NOTES:

1. WHERE ONLY ONE CUSTOMER IS TO BE SERVED FROM A SERVICE-DROP AND THE CONNECTED LOAD REQUIRES THE USE OF CT'S AND/OR VT'S IN ACCORDANCE WITH SECTION 1800, CPS ENERGY WILL FURNISH THE TRANSFORMER MOUNTING BRACKETS FOR INSTALLATION BY CUSTOMER. CUSTOMER INSTALLS THE TRANSFORMER MOUNTING BRACKETS AS A TEMPLATE FOR CPS ENERGY. CPS ENERGY WILL LATER INSTALL THE CT'S AND/OR VT'S AND CONNECT THEM TO THE METER WHEN THE SERVICE-DROP IS INSTALLED.
2. THE ABOVE DRAWING IS FOR A TYPICAL CT/VT, SERVICE-DROP INSTALLATION WHERE CPS ENERGY INSTALLS OPEN SERVICE-DROP CONDUCTORS OR CUSTOMER INSTALLS PARALLEL SERVICE-ENTRANCE CONDUCTORS. WHERE A CABLED SET OF SERVICE-DROP CONDUCTORS IS INSTALLED, OTHER CONFIGURATIONS FOR THE ANCHORAGE AND TRANSFORMER-MOUNTING BRACKETS WILL BE REQUIRED, (REFER TO FIGURE 500.6).
3. CUSTOMER FURNISHES AND INSTALLS THE 1 1/4-INCH METERING CONDUIT AND SERVICE HEAD. CUSTOMER IS ADVISED TO CLOSELY COORDINATE THIS TYPE OF INSTALLATION WITH CPS ENERGY'S CUSTOMER SERVICE REPRESENTATIVE.

FIGURE 500.8
OVERHEAD CONDUCTOR CLEARANCES (SWIMMING POOL)



A. CLEARANCE IN ANY DIRECTION FROM THE WATER LEVEL, EDGE OF POOL, BASE OF DIVING PLATFORM OR ANCHORED RAFT	CABLED SERVICE, 0 TO 750 VOLTS SUPPORTED BY GROUNDED BARE MESSENGER	ALL OTHER CONDUCTORS WITH VOLTAGE TO GROUND 750 VOLTS TO 22 KV (TO INCLUDE SYSTEM NEUTRAL)
B. CLEARANCE IN ANY DIRECTION TO THE DIVING PLATFORM OR TOWER	22.5 FEET	25 FEET
C. VERTICAL CLEARANCES OVER ADJACENT LAND	14.5 FEET	17 FEET
CLEARANCES AS REQUIRED BY FIGURE 500.1 AND NESC RULE 232		

EXCEPTION 1: THIS RULE DOES NOT APPLY TO A POOL FULLY ENCLOSED BY A SOLID OR SCREENED PERMANENT STRUCTURE.
 EXCEPTION 2: THIS RULE DOES NOT APPLY TO EFFECTIVELY GROUNDED SURGE-PROTECTION WIRES, NEUTRAL CONDUCTORS MEETING RULE 230E1, GUYS AND MESSENGERS, SUPPLY CABLES MEETING RULE 230C1, AND SUPPLY CABLES OF 0 TO 750 V MEETING RULES 230C2 OR 230C3 WHEN THESE FACILITIES ARE 10-FEET OR MORE HORIZONTALLY FROM THE EDGE OF THE POOL, DIVING PLATFORM, OR DIVING TOWER.
 A CPS ENERGY CUSTOMER SERVICE REPRESENTATIVE WILL BE MADE AVAILABLE TO ASSIST CUSTOMERS WITH DETAILED INFORMATION CONCERNING SWIMMING POOL INSTALLATION.



SECTION 1400 - SERVICE TO CUSTOMER-OWNED METER POLE

1401 General:

Where Customer requests electric service and is not allowed to, or chooses not to have their meter loop installed on their building or structure, they may install a meter pole in accordance with the provisions herein on their premises.

Note: CPS Energy will not provide or install transformers or primary voltage conductors on a Customer-owned meter pole.

1401.1 Services Requiring Meter Pole:

A meter pole (if overhead service is taken) is a requirement for receiving service to a manufactured home, temporary or portable building, and/or other structures deemed by CPS Energy not to be suitable for direct supply by CPS Energy-owned and maintained service-drops.

1401.2 Customer-Owned and Maintained:

Where a Customer meter pole is utilized, it shall be owned and maintained by Customer in a safe condition as determined by CPS Energy (Refer to Figures 1400.1 and 1400.2 for typical installations).

Note: Customer load conductors may leave the meter pole either underground or overhead.

1401.3 Location of Meter Pole:

The meter pole shall be located on Customer's premises in a readily accessible area. Installation of meter poles under CPS Energy primary distribution lines or in a CPS Energy electric easement is prohibited. Customer shall coordinate with the CPS Energy Customer Service Representative.

1401.4 Approved Types of Poles:

The meter pole structure shall be a chemically treated wood pole, steel I-beam, pipe or equivalent. A wood pole shall not be less than 5 inches in diameter at the top and it shall be tall enough to satisfy the clearances of service-drops and drip loops as specified in Section 500 and shown in Figure 500.1.

Steel I-beam, pipe, or equivalent may be used by Customer where specifications and design are first approved by CPS Energy. A pipe shall be a minimum of 4 inches in diameter while I-beam must be a minimum 4 inches by 4 inches. The meter pole shall provide adequate anchorage to the service conductors and all equipment it supports.

Note: In situations where CPS Energy provides underground supply, a meter pedestal approved by CPS Energy's Electric Service and Metering Standards Section may be installed (Refer to Definition of "Meter Pedestal" and Figure 1500.1).

1402 Installation of Meter Pole:

Customer may install their own chemically treated meter pole, but its type and installation must meet CPS Energy standards and in no case be less than 6 feet deep into the ground. Upon Customer request, CPS Energy will install a chemically treated wood pole for Customer at their expense.

SECTION 1400 - SERVICE TO CUSTOMER-OWNED METER POLE

(A) Steel I-Beam or Pipe Type:

Steel I-beam or pipe must be installed by Customer and it shall be set in concrete to a minimum depth of 48 inches. Steel I-beams or pipe, shall provide adequate contact points for service conductors as required and acceptable by the CPS Energy Customer Service Representative. A 5/8-inch hole for anchorage shall be pre-drilled 2 feet above the service head.

(B) Damaged/Deteriorated Poles:

Rotted wood poles, deteriorated steel poles or I-beams, or poorly set meter poles, that are deemed unsafe by CPS Energy shall be repaired or replaced by Customer. Failure to remedy the unsafe situation may be cause for disconnection of service.

1403 Service Equipment:

Customer's service equipment shall be installed in accordance with NEC and other applicable codes including Sections 400 and 1800 of these Standards. Customer service equipment shall be located on the meter pole as shown in Figure 1400.1 and 1400.2.

(A) Service-Drop:

The service-drop shall satisfy the clearances specified in Section 500 and shown in Figure 500.1 and shall be attached on meter pole at no more than 12 inches from the service head of Customer's service raceway.

(B) Customer Load Conductors:

Where Customer elects to leave meter pole with overhead load conductors, the point of attachment for Customer's overhead load wires shall be 36 inches, minimum, below the service head. Customer will be responsible for providing all load-side clearances for secondary conductors as required by the NEC and other applicable codes.

Note 1: At no time will Customer be allowed to rely on a CPS Energy primary fuse disconnect to protect service-entrance conductors on a meter pole or other services.

Note 2: Customer's grounding electrode shall be located at the service equipment and be installed as per NEC and Section 1700.

1404 Metering Equipment:

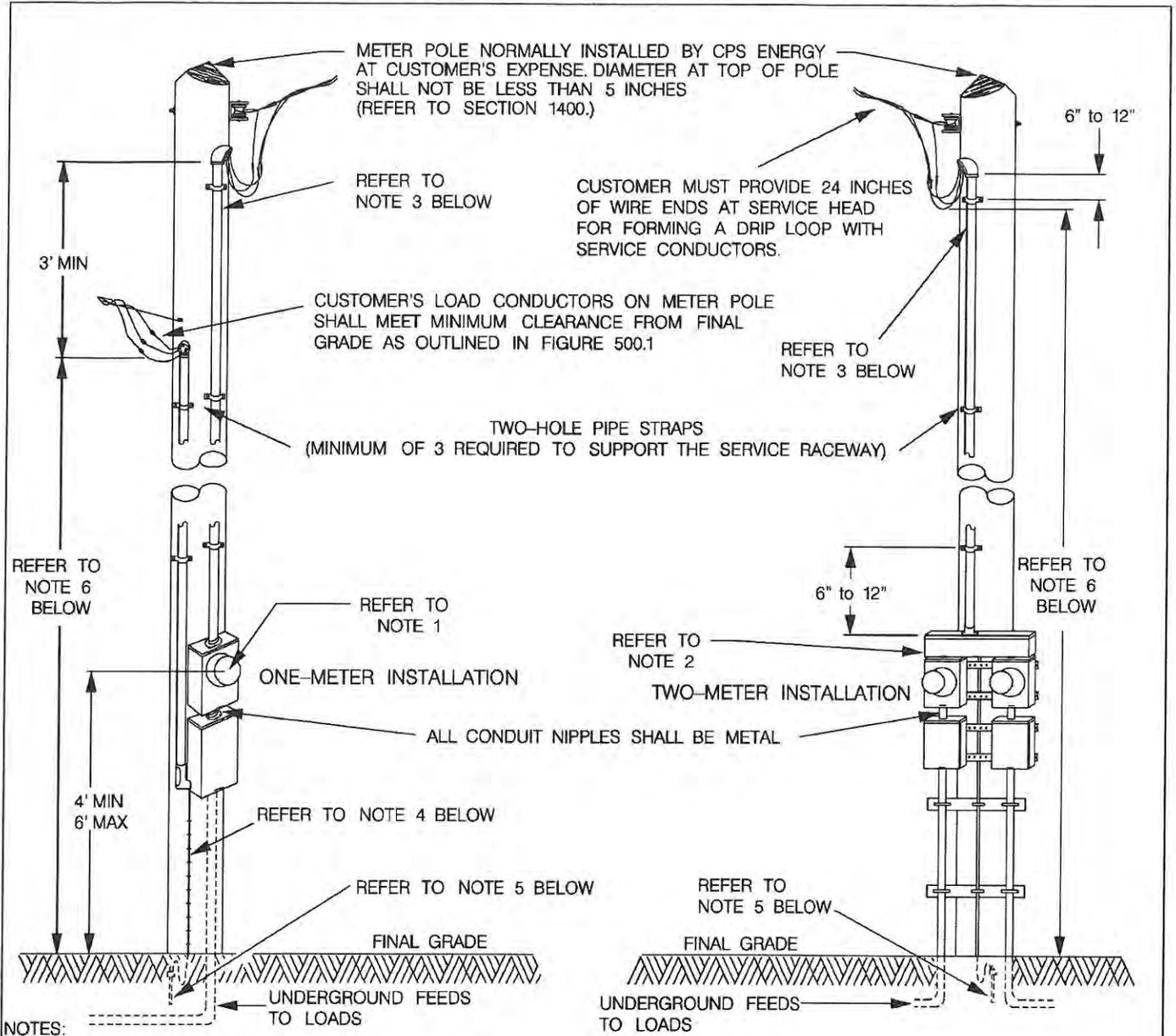
Metering enclosures shall be positioned so that the meter will face toward streets. Metering instrument transformer enclosures, including transockets, shall not be mounted on meter pole.

Where approved for use by CPS Energy, meter racks may be installed to support equipment that does not properly fit on pole. Customer shall furnish and install rack in accordance with CPS Energy specifications (Refer to Figure 1400.2).

1405 Other Equipment Not Permitted on Meter Pole:

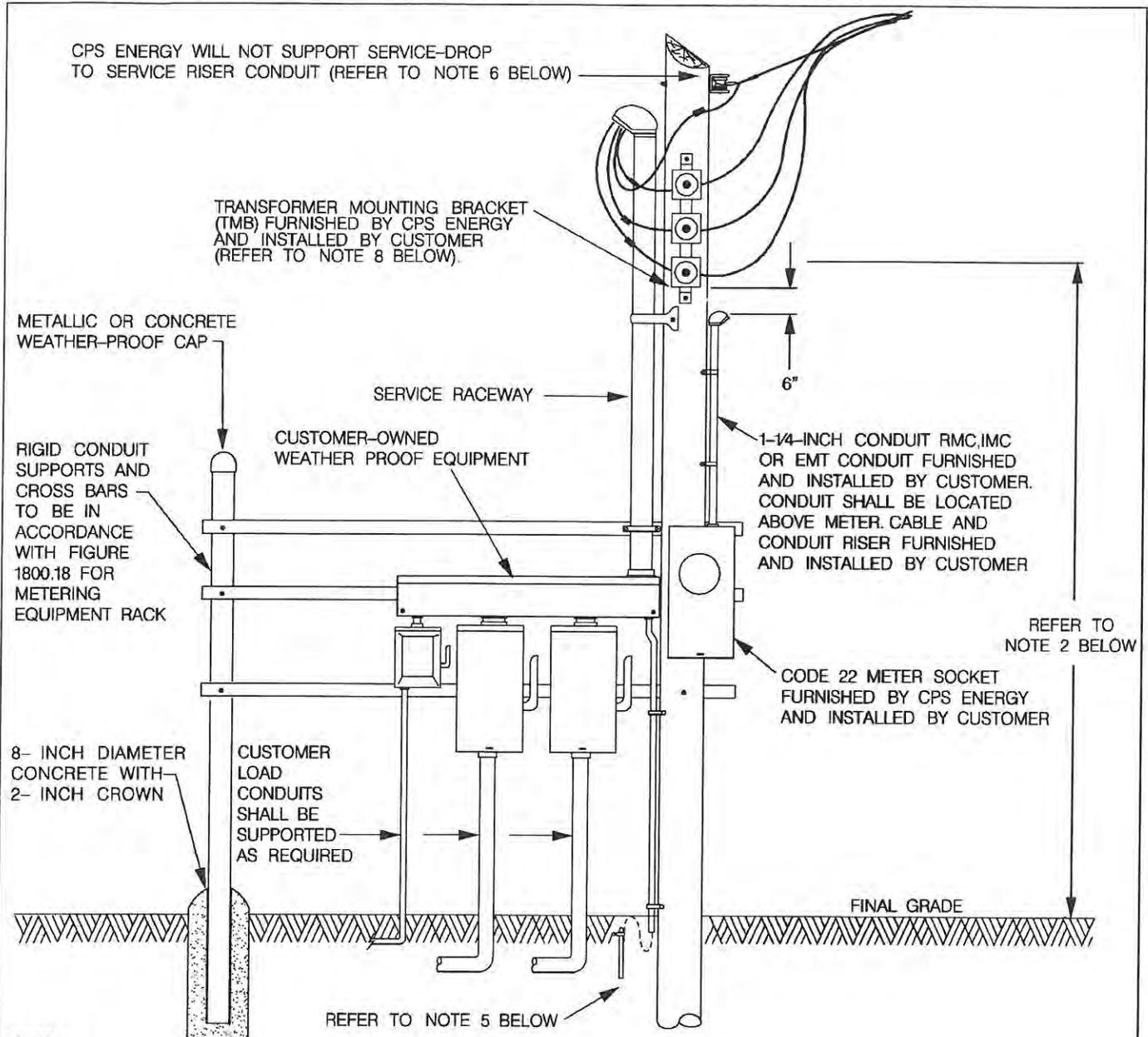
Devices other than service and load conductors, metering equipment, and service equipment shall not be placed on the meter pole. Security lights may be installed on Customer's meter pole where first approved by the CPS Energy Customer Service Representative and after proper clearance (36 inches) to the service-drop conductors and drip loop is maintained.

FIGURE 1400.1
OVERHEAD SERVICE, SELF-CONTAINED METER(S) ON CUSTOMER-OWNED METER POLE



1. CPS ENERGY APPROVED SINGLE-PHASE SELF-CONTAINED METER SOCKET WITH BOLT-ON HUB FURNISHED AND INSTALLED BY CUSTOMER REFER TO FIGURE 1800.1. METER SOCKET, ETC, MUST BE MOUNTED DIRECTLY TO POLE OR TO METAL BRACES; WOODEN BACKERS ARE NOT PERMITTED. METERS MUST BE MOUNTED SO THAT THEY WILL FACE THE STREET.
2. METER GUTTER WITH WEATHERPROOF CONDUIT HUB FURNISHED AND INSTALLED BY CUSTOMER. CUSTOMER MAKES ALL CONNECTIONS IN GUTTER.
3. SERVICE RACEWAY SHALL BE GALVANIZED RMC, IMC, OR EMT FOR USE WITH A 125-AMPERE METER SOCKET (AT LEFT), IT SHALL BE 1 1/4-INCH MINIMUM. WHERE SERVING A METER GUTTER (AT RIGHT), ITS SIZE SHALL BE AS PERMITTED BY NEC AND THESE STANDARDS.
4. COPPER GROUNDING ELECTRODE CONDUCTOR (FURNISHED AND INSTALLED BY CUSTOMER, SIZE AND INSTALLATION IN ACCORDANCE WITH NEC. CONDUCTORS SMALLER THAN NO. 6 MUST BE ENCLOSED IN CONDUIT OR CABLE ARMOR.)
5. GROUNDING ELECTRODE SYSTEM INSTALLED AS PER NEC TO INCLUDE 5/8-INCH X 8-FOOT GROUND ROD AS REQUIRED BY CPS ENERGY AT ALL CUSTOMER SERVICE LOCATIONS (REFER TO SECTION 1700)
6. REFER TO SECTION 500 AND FIGURE 500.1 FOR REQUIRED CLEARANCES FROM FINAL GRADE.

FIGURE 1400.2
OVERHEAD SERVICE, WEATHERPROOF CT'S ON CUSTOMER-OWNED METER POLE



NOTES:

1. THIS TYPE OF INSTALLATION MAY BE USED WHERE CUSTOMER PREFERS TO HAVE THE SERVICE AND METER INSTALLATION LOCATED REMOTE FROM THE BUILDING AND HAVE UNDERGROUND LOAD CONDUCTORS. IT MAY ALSO BE USED WHERE THERE IS NO BUILDING OR STRUCTURE ON WHICH TO MOUNT THE EQUIPMENT. IT IS PREFERABLE THAT CPS ENERGY INSTALL THE METER POLE. METER POLES WOULD BE INSTALLED AT CUSTOMER'S EXPENSE AND BE OWNED AND MAINTAINED BY CUSTOMER REGARDLESS OF WHO INSTALLS THEM.
2. REFER TO ARTICLE 500 AND FIGURE 500.1 FOR REQUIRED CONDUCTOR CLEARANCES TO FINAL GRADE.
3. METERING CONDUIT, SERVICE HEAD AND HUB FURNISHED AND INSTALLED BY CUSTOMER. CONDUIT MAY BE RMC, IMC OR EMT, CPS ENERGY INSTALLS METERING CABLE IN THE CONDUIT.
4. ENCLOSURE FOR INSTRUMENT TRANSFORMER-RATED METER FURNISHED BY CPS ENERGY FOR INSTALLATION BY CUSTOMER. REFER TO FIGURE 1800.10 FOR USE OF THIS ENCLOSURE. NOTE: TOP OF ENCLOSURE MUST BE WITHIN 6 FEET TO 6 FEET 6 INCHES ABOVE FINAL GRADE.
5. GROUNDING ELECTRODE SYSTEM INSTALLED AS PER NEC TO INCLUDE 5/8-INCH X 8-FOOT GROUND ROD AS REQUIRED BY CPS ENERGY AT ALL CUSTOMER SERVICE LOCATIONS (REFER TO SECTION 1700)
6. CPS ENERGY WILL FURNISH AND INSTALL ANCHORS FOR SERVICE-DROP, (IF CLEVISSES ARE REQUIRED, CUSTOMER MUST FURNISH AND INSTALL APPROVED BOLTS FOR THEIR SUPPORT). (REFER TO SECTION 500).
7. SERVICE CABLE CONNECTIONS (BY CPS ENERGY) WILL BE MADE ON THE LOAD-SIDE OF CURRENT TRANSFORMERS. CUSTOMER MUST PROVIDE 24 INCHES OF WIRE ENDS EXTENDING OUT OF SERVICE HEAD FOR MAKING CONNECTIONS AND FORMING A DRIP LOOP.
8. TRANSFORMER MOUNTING BRACKET (TMB) WILL BE FURNISHED BY CPS ENERGY AND INSTALLED BY CUSTOMER, CPS ENERGY INSTALLS CT'S AND/OR CT'S ON THE TMB(S) WHEN THE SERVICE-DROP IS INSTALLED

City of San Antonio



Structured Cabling Infrastructure Guideline For Facility Construction or Renovations Version 1.0

TABLE OF CONTENTS

PART 1 - DOCUMENT PURPOSE	5
PART 2 - DOCUMENT HISTORY	5
PART 3 - INDUSTRY STANDARDS	6
PART 4 - CONTRACTOR QUALIFICATIONS	7
PART 5 - WARRANTY ON PARTS AND LABOR.	7
PART 6 - NOMENCLATURE	7
PART 7 - CITY INFRASTRUCTURE STANDARDS	7
7.01 Telecommunications Spaces	7
A. Main Distribution Frame (MDF)	8
1. Description.....	8
2. Architectural Requirements	8
3. HVAC Requirements.....	10
4. Lighting Requirements	10
5. Power Requirements.....	10
6. Equipment Cabinets / Racks and Cable Management Requirements	11
B. Intermediate Distribution Frame (IDF)	12
1. Description.....	12
2. Architectural Requirements	12
3. HVAC Requirements.....	14
4. Lighting Requirements	14
5. Power Requirements.....	15
6. Equipment Cabinets / Racks and Cable Management Requirements	16
7.02 Entrance Pathways and Conduits	16
A. Design Principles	16
B. Service Provider Conduits.....	17
C. Campus Serving Conduits	17

- D. Building Entrance for Large Campus 18
- 7.03 Cable Management In Telecommunications Spaces..... 18
 - A. Equipment Cabinets / Equipment Racks 18
 - B. Overhead Cable Management 18
- 7.04 Cable Support in Pathways..... 19
 - A. Main Cable Pathway 19
 - B. Sleeves and Penetrations 19
 - C. Workstation Rough-ins and local power (Typ.).....20
- 7.05 Backbone Cabling.....21
 - A. Service Provider Demarc21
 - B. Inter-building Backbone Cabling (Campus).....22
 - 1. Permanent Structures22
 - a. Copper22
 - b. Fiber22
 - C. Intra-building Backbone Cabling22
 - 1. Copper22
 - 2. Fiber23
- 7.06 Horizontal Cabling23
 - A. Workstation Cable23
 - B. Workstation Configurations23
 - 1. Office Workstation.....23
 - 2. Ceiling-Mounted Projector Outlet24
 - 3. Audio/Visual Control System (Control Panel)24
 - 4. Wireless Access Point Outlet24
 - 5. IP Camera Outlet25
 - C. Patch Cables25
- 7.07 Grounding.....27
- 7.08 Labeling.....27

7.09 Testing.....29

7.10 As-Built Documentation29

PART 8 - SUMMARY OF STANDARDS29

8.01 Summary29

PART 9 - EXHIBITS.....30

EXHIBIT 1 - ACCEPTABLE MANUFACTURERS / PRODUCTS31

EXHIBIT 2 – TYPICAL DETAILS40

PART 1 - DOCUMENT PURPOSE

- 1.01 The City of San Antonio Structured Cabling Infrastructure Standard is a guideline for structured cabling infrastructure and the associated spaces to be applied by the design team for new or renovated facilities. Information herein is applicable to the Technology Consultant, Architect, MEP, and contractors, and shall be taken into account for each project by all team members.
- A. The standards set forth parameters for the technical system in addition to the site and building requirements to facilitate a properly-installed standards-compliant structured cable system, organized as follows;
1. Telecommunications Spaces; Architectural, HVAC, Power, Entrance Pathways and Conduits
 2. System Requirements; Cable Management in Telecommunications Spaces, Cable Support in Pathways, Backbone Cabling, Horizontal Cabling, Grounding, Labeling, Testing, and As-Built Documentation.
 3. Telecommunications Diagrams
- 1.02 The standard addresses infrastructure for typical buildings and is not intended for the design of data centers or specialty facilities, of which should be considered on a case-by-case basis.
- 1.03 Designers shall not deviate from this standard without explicit written approval from the City of San Antonio Information Technology Services Department.
- 1.04 Any deviations shall immediately be brought to the attention of the owner's representative in writing for resolution.
- 1.05 Where specific product brands are mentioned, an equivalent will be considered following an official submission of product literature and written acceptance by the City of San Antonio Information Technology Services Department.
- 1.06 Where means, methods, and best practices are mentioned, contractor shall follow the manufacturers' and owner's requirements, industry standards, or code, whichever is most stringent.
- 1.07 Basic contractor qualifications are set forth, but may be made more stringent as applicable to each project based upon size and scope.
- 1.08 A Division 27 specification and T-Series drawings for the Structured Cabling System shall be commissioned and issued by the Architect during the design phases for each facility or project.

PART 2 - DOCUMENT HISTORY

- 2.01 This document supersedes all previous standards which have been fully reevaluated and described herein by the City of San Antonio Information Technology Services Department.

- 2.02 The contents of the standards were derived by the assembly and input from the City of San Antonio Information Technology Services Department.

PART 3 - INDUSTRY STANDARDS

- 3.01 The following industry standards shall be adhered to unless specifically directed otherwise by the City of San Antonio Information technology Services Department. The list is not all-inclusive and does not alleviate compliance with the latest applicable standards, codes, and best practices:
- A. TIA-568-C.0 Generic Telecommunications Cabling for Customer Premises
 - B. TIA-568-C.1 Commercial Building Telecommunication Cabling Standards – Part 1 General Requirements (2008)
 - C. TIA-568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standard (2009)
 - D. TIA-568-C.3 Optical Fiber Cabling Components Standard (2009)
 - E. TIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces - (October 2004)
 - F. TIA-598-C Optical Fiber Cable Color Coding - (January 2005)
 - G. TIA/EIA-606-B Administration Standard for Commercial Telecommunications Infrastructure - (May 2012)
 - H. ANSI J-STD-607-B Commercial Building Grounding and Bonding Requirements for Telecommunications - (October 2011)
 - I. TIA-758-A Customer-Owned Outside Plant Telecommunications Infrastructure Standard - (August 2004)
 - J. TIA-526-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant – OFSTP-7 - (February 2002)
 - K. TIA-526-14-A Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant – OFSTP-14 - (August 1998)
 - L. AIA
 - M. Local Building Code
 - N. NEC
 - O. ISO
 - P. ANSI
 - Q. FCC
 - R. UL

- S. OSHA
- T. NFPA
- U. NEMA

PART 4 - CONTRACTOR QUALIFICATIONS

- 4.01 Contractor and staff shall be a current authorized Panduit Certified Installers and certified by Panduit to provide and furnish a 20-year performance warranty for structured cabling and connectivity components.
- 4.02 Contractor and staff shall possess relevant past-experience and references for a minimum of (5) projects of similar size and scope to that of the City of San Antonio.
- 4.03 Contractor's Project Manager shall be a RCDD in good standing and shall provide Certificate.
- 4.04 Contractor shall have a local office within a 75-mile radius of the project site
- 4.05 Sub-contractors to the primary structured cabling contractor shall meet the same requirements for the primary structured cabling contractor as identified above.

PART 5 - WARRANTY ON PARTS AND LABOR.

- 5.01 The contractor shall furnish a 20-year performance warranty from Panduit for the structured cabling and connectivity components.
- 5.02 All labor and workmanship shall carry a minimum warranty period of (1) year from the date of final system acceptance.
- 5.03 Defects in material or workmanship appearing within this period of time, shall be promptly repaired without cost to the City of San Antonio.

PART 6 - NOMENCLATURE

- 6.01 Main Distribution Frame (MDF) – An environmentally controlled centralized architectural space for housing telecommunications equipment that usually serves as the demarcation point for service providers, and houses the backbone terminations for cross-connection and distribution to Intermediate Distribution Frames.
- 6.02 Intermediate Distribution Frames (IDF) – An environmentally controlled architectural space for housing telecommunications equipment and backbone terminations for cross-connection and distribution to the MDF and end-user workstations.

PART 7 - CITY INFRASTRUCTURE STANDARDS

- 7.01 Telecommunications Spaces

A. Main Distribution Frame (MDF)

1. Description

- a. The MDF is a telecommunications space that serves a building or multi-building facility or campus. There is only (1) on each campus.
- b. The MDF houses the entrance conduits, terminations, and cross connections for all incoming inter-building backbone cabling from the IDFs in other buildings on the campus and the intra-building backbone cabling from the IDFs in the building in which it resides, and cross-connects to user workstations.
- c. Wall and floor space shall be reserved for service provider demarcation equipment and incoming infrastructure terminations.
- d. Campus distribution network equipment, servers, and other centralized telecommunications related equipment will reside in the MDF.
- e. The MDF may share space with other systems such as security panels, paging systems, and CATV cabling. Space allocation for other systems shall be coordinated with the applicable disciplines after approval from the City of San Antonio Information Technology Service Department. All coordination shall be completed prior to installation.
- f. Fire alarm panels and building control panels shall not be located inside the MDF. Space allocation for these systems needs to occur outside of the MDF.
- g. The MDF shall not be used for storage, serve as a mechanical or electrical distribution space, nor shall it have within its space main electrical feeds, electrical switch gear, transformers, and water or sprinkler main lines.
- h. The layout of cabinets, equipment racks, wall fields, and cable management shall be as indicated on the attached diagrams.

2. Architectural Requirements

- a. The MDF shall be a minimum of 150 square feet with minimum clear lineal walls of at least 10 feet by 15 feet. The size of the MDF shall be coordinated with and approved by the City of San Antonio Information Technology Services Department during the design.
- b. All walls inside the MDF shall go to deck. When walls are drywall they shall be double layered drywall on both sides to help reduce the risk of unauthorized entry.

- c. The MDF Room shall be centrally located.
- d. The floor finish shall be sealed bare concrete or VCT.
- e. The MDF shall not contain windows.
- f. The MDF shall not be located adjacent to or below restrooms or other water-based facilities, or sources of EMI and mechanical vibration.
- g. All walls shall be covered with 4-feet x 8-feet x ¾-inch AC Grade Void Free Fire Retardant Plywood, aligned vertically starting at 12 inches above the finished floor. The plywood shall be installed with the “A” grade side exposed and the “C” grade side against the building or structure. The plywood shall be painted with two coats of fire retardant paint and one stamp from each sheet shall be masked during the painting and uncovered after the paint has dried so the fire rated plywood stamps are visible for inspection.
- h. The minimum ceiling height shall be 9-feet above finished floor with the following preferences of finishes.
 - 1) No ceiling is the preferred finish
 - 2) Hard ceiling is acceptable if leaving open to structure is not possible.
 - 3) The last alternative is a lift-out ceiling. If a lift-out ceiling tile is required this shall be coordinated and approved by the City of San Antonio Information Technology Services Department during the design process. If this option is approved it is recommended the ceiling height inside the MDF room be higher than the ceiling height in the corridor outside the MDF so the cables entering into the MDF do not have to pass through the lift-out ceiling inside the MDF room.
- i. Entry to the space shall be through a minimum 36-inch by 80-inch clear door opening that swings outward. Door shall be solid core or steel and shall not have any windows. The door shall securely lock and access shall only be by City of San Antonio Information Technology Services Department-approved personnel. The door shall open to an interior hallway or space, it is not recommended the door open to the exterior of the building.
- j. The MDF door shall be equipped with a minimum of a City of San Antonio Information Technology Services Department approved cipher lock. When an access control security system is available, the entrance to the MDF shall be equipped with a card reader and electrified door hardware.
- k. Fire suppression for the MDF shall be determined by the specific code requirements for the fire protection scheme of the overall building. If a fire suppression system is designed, it shall be

designed to avoid running distribution over the MDF equipment cabinets, racks and equipment.

3. HVAC Requirements

- a. The MDF shall be serviced by a dedicated unit that is part of the building's main system and be equipped with a Split DX system through the wall above the door which cools only when the building HVAC is inadequate or not running. The unit shall maintain a constant 24/7 cooled environment between 68° and 77° F with relative humidity of 40% - 55%.
- b. Changes in temperature and humidity shall be kept to around 1 percent.
- c. The minimum HVAC load shall be designed to displace 12KW of power, or 3.5 Tons, and shall be coordinated with the City of San Antonio Information Technology Services Department during the design and designed to load if the known load is greater at the time of design.
- d. It is recommended the MDF maintain the stated temperature and humidity in the event of building power outages or primary HVAC system failure.
- e. Air delivery shall be aligned in the front of the equipment rows and returns at the rear of the equipment rows when possible.
- f. HVAC sensors and controls shall be located in the MDF at 5-ft AFF.
- g. A hard-wired wall mounted thermostat shall be located inside the MDF Room.
- h. HVAC systems shall be alarmed for power loss, high and low temperature, high and low humidity, smoke detection, compression failures and water flooding.
- i. A simplex data drop shall be installed within 12 inches of the unit so it can be incorporated into the Building Automation System (BAS).

4. Lighting Requirements

- a. Florescent light fixtures shall be at least 24 inches above the top of the highest cabinet, rack or cable runway (approximately 84 inches), 36 inches is recommended.
- b. Lighting shall be a minimum of 50 foot candles at 2 feet above the floor in the entire space.
- c. The MDF shall be equipped with emergency lighting to keep the space lit during power outages.

5. Power Requirements

- a. All electrical service outlets shall be labeled with the associated panel and circuit information.
 - b. Power shall be in two categories: dedicated and convenience.
 - c. Dedicated
 - 1) The MDF shall be equipped with a minimum of (2) dedicated 208 VAC 20 amp electrical circuits terminated in separate J-boxes and (1) dedicated 120 VAC 20 Amp circuit mounted above each equipment cabinet or rack.
 - a) The (2) 208 VAC J-boxes shall be mounted to a uni-strut above the equipment cabinets or racks and shall be provided with a 7-foot "SO Type" cord with a female NEMA L6-20R receptacle on the end.
 - b) The (1) 120 VAC J-box shall be mounted to a uni-strut above the equipment cabinets or racks and shall be provided with a 7-foot "SO Type" cord with a female NEMA 5-20R receptacle on the end.
 - c) The originating electrical panel shall be properly sized for the loads calculated and shall be located in the nearest Electrical Room.
 - 2) Additional power circuits to be allocated to security, paging CATV, and service provider equipment shall be considered and coordinated at the time of building design.
 - 3) Power distribution to the cabinets shall be achieved by installing rack mounted PDUs.
 - d. Convenience
 - 1) The MDF shall be equipped with 120 volt 20 Amp duplex NEMA 5-20R receptacles, with maximum (3) receptacles on each circuit. The originating electrical panel shall be equipped with a 20 Amp breaker per circuit.
 - 2) A duplex receptacle shall be spaced at least 1 foot from an adjacent wall and every 6 feet thereafter. A minimum of (1) duplex receptacle shall be placed in each wall and be flush mounted to the finished wall surface at 18 inches above finished floor.
6. Equipment Cabinets / Racks and Cable Management Requirements
- a. The MDF shall be equipped with a minimum (2) equipment cabinets or equipment racks. Coordination with and approval by City of San

Antonio Information Technology Services Department during the design is required to determine with equipment cabinets or equipment racks shall be utilized.

- b. The MDF shall be equipped with cable runway encircling the room at 84-86 inches above the finished floor, and crossing the room above the equipment cabinets or racks (1) time.
 - 1) Cable runway shall not be secured to the top of the equipment cabinets.
 - 2) A vertical section of cable runway shall be attached to the wall board to manage backbone and service provider cables as they transition from the entrance conduits to the overhead cable runway.

B. Intermediate Distribution Frame (IDF)

1. Description

- a. An IDF is a telecommunications space that resides in each building that requires more than a single telecommunications space from which to terminate horizontal workstation cables. There may be multiple IDFs in each building as required to maintain horizontal cable distances of 295 feet for the permanent link.
- b. An IDF houses the terminations and cross connections for the intra or inter-building cabling from the MDF and the horizontal user workstation cabling in the area of the building that it serves.
- c. Building workstation access network equipment will reside in the IDF.
- d. The IDF may share space with other systems such as security panels and paging systems. Space allocation for other systems shall be coordinated with the applicable disciplines.
- e. Fire alarm panels and building control panels shall not be located inside the IDF. Space allocation for these systems needs to occur outside of the IDF.
- f. The IDF shall not be used for storage, serve as a mechanical or electrical distribution space, nor shall it have within its space main electrical feeds, electrical switch gear, transformers, water or main sprinkler lines.
- g. The layout of cabinets, equipment racks, wall fields, and cable management shall be as indicated on the attached diagrams.

2. Architectural Requirements

- a. The IDF shall be a minimum of 100 square feet with minimum clear lineal wall lengths of at least 10 feet by 10 feet.

- b. All walls shall go to deck. When walls are drywall they shall be double layered drywall on both sides to help reduce the risk of unauthorized entry.
- c. The floor finish shall be sealed bare concrete or VCT.
- d. The IDF shall not contain windows.
- e. IDFs shall be arranged in a stacked formation in multi-story buildings, and not be located next to or below restrooms or other water-based facilities, or sources of EMI and mechanical vibration.
- f. All walls shall be covered with 4-feet x 8-feet x ¾-inch AC Grade Void Free Fire Retardant Plywood, aligned vertically starting at 12 inches above the finished floor. The plywood shall be installed with the “A” grade side exposed and the “C” grade side against the building or structure. The plywood shall be painted with two coats of fire retardant paint and one stamp from each sheet shall be masked during the painting and uncovered after the paint has dried so the fire rated plywood stamps are visible for inspection.
- g. The minimum ceiling height shall be 9-feet above finished floor with the following preferences of finishes.
 - 1) No ceiling is the preferred finish
 - 2) Hard ceiling is acceptable if leaving open to structure is not possible.
 - 3) The last alternative is a lift-out ceiling. If a lift-out ceiling tile is required this shall be coordinated and approved by the City of San Antonio Information Technology Services Department during the design process. If this option is approved it is recommended the ceiling height inside the MDF room be higher than the ceiling height in the corridor outside the MDF so the cables entering into the MDF do not have to pass through the lift-out ceiling inside the MDF room.
- h. Entry to the space shall be through a minimum 36-inch by 80-inch clear door opening that swings outward. Door shall be solid core or steel and shall not have any windows. The door shall securely lock and access shall only be by City of San Antonio Information Technology Services Department-approved personnel. The door shall open to an interior hallway or space, it is not recommended the door open to the exterior of the building.
- i. The IDF door shall be equipped with a minimum of a City of San Antonio Information Technology Services Department approved cipher lock. When an access control security system is available, the entrance to the IDF shall be equipped with a card reader and electrified door hardware.

- j. Fire suppression for the IDF shall be determined by the specific code requirements for the fire protection scheme of the overall building. If a fire suppression system is designed, it shall be designed to avoid running distribution over the IDF equipment cabinets, racks and equipment.

3. HVAC Requirements

- a. The IDF shall be serviced by a dedicated unit that is part of the building's main system and be equipped with Split DX system through the wall above the door which cools only when the building HVAC is inadequate or not running. The unit shall maintain a constant 24/7 cooled environment between 68° and 77° F with relative humidity of 40% - 55%.
- b. Changes in temperature and humidity shall be kept to around 1 percent.
- c. The minimum HVAC load shall be designed to displace 4KW of power, or 1 Ton, and shall be coordinate with the City of San Antonio Information technology Services Department and designed to load if the load is greater and known at the time of design.
- d. It is recommended that the IDF maintain the stated temperature and humidity in the event of building power outages or primary HVAC system failure.
- e. Air delivery shall be aligned in the front of the equipment rows and returns at the rear of the equipment rows.
- f. HVAC sensors and controls shall be located in the IDF at 5-ft AFF.
- g. A hard-wired wall mounted thermostat shall be located inside the IDF Room.
- h. HVAC systems shall be alarmed for power loss, high and low temperature, high and low humidity, smoke detection, compression failures and water flooding.
- i. A simplex data drop shall be installed within 12 inches of the unit so it can be incorporated into the Building Automation System (BAS).

4. Lighting Requirements

- a. Florescent light fixtures shall be at least 24 inches above the top of the highest cabinet, rack or cable runway, 36 inches is recommended.

- b. Lighting shall be a minimum of 50 foot candles at 2 feet above the floor in the entire space.
 - c. The IDF shall be equipped with emergency lighting to keep the space lit during power outages.
5. Power Requirements
- a. All electrical service outlets shall be labeled with the associated panel and circuit information.
 - b. Power for the IDF shall be in two categories: dedicated and convenience.
 - c. Dedicated
 - 1) The IDF shall be equipped with a minimum of (2) dedicated 208 VAC 20 amp electrical circuits terminated in separate J-boxes and (1) dedicated 120 VAC 20 Amp circuit mounted above each equipment cabinet or rack.
 - a) The (2) 208 VAC J-boxes shall be mounted to a uni-strut above the equipment cabinets or racks and shall be provided with a 7-foot "SO Type" cord with a female NEMA L6-20 R receptacle on the end.
 - b) The (1) 120 VAC J-box shall be mounted to a uni-strut above the equipment cabinets or racks and shall be provided with a 7-foot "SO Type" cord with a female NEMA 5-20 R receptacle on the end.
 - c) The originating electrical panel shall be properly sized for the loads calculated and shall be located in the nearest Electrical Room.
 - 2) Additional power circuits to be allocated to security, paging, and service provider equipment shall be considered and coordinated at the time of building design.
 - 3) Power distribution to the cabinets shall be achieved by installing rack mounted PDUs.
 - d. Convenience
 - 1) The IDF shall be equipped with 20 Amp duplex NEMA 5-20R receptacles, with maximum (3) receptacles on each circuit. The originating electrical panel shall be equipped with a 20 Amp breaker per circuit.
 - 2) A duplex receptacle shall be spaced at least 1 foot from an adjacent wall and every 6 feet thereafter. A minimum of (1)

duplex receptacle shall be placed in each wall and be flush mounted to the finished wall surface at 18 inches above finished

6. Equipment Cabinets / Racks and Cable Management Requirements

- a. The IDF shall be equipped with a minimum (2) equipment cabinets or equipment racks. Coordination with and approval by City of San Antonio Information Technology Services Department during the design is required to determine with equipment cabinets or equipment racks shall be utilized.
- b. The IDF shall be equipped with cable runway encircling the room at 84-86 inches above the finished floor, and crossing the room above the equipment cabinets or racks (1) time.
 - 1) Cable runway shall not attach to the top of the equipment cabinets.
 - 2) A vertical section of cable runway shall be attached to the wall board to manage backbone and service provider cables as they transition from the entrance conduits to the overhead cable runway.

7.02 Entrance Pathways and Conduits

A. Design Principles

- 1. Pathways and conduits are described herein with regard to capacity, function, and basic design principles and shall be designed by the MEP in accordance with NEC and EIA/TIA-758, Customer-Owned Outside Plant Telecommunications Cabling.
- 2. Telecommunications Conduit Systems shall:
 - a. Be Schedule 80 when placed under ground.
 - b. Contain a minimum of (3) 3-inch 3-Cell Maxcell fabric innerducts inside each conduit. Coordination with and approval by the City of San Antonio Information Services Technology Department is required to determine the exact quantity and size of the Maxcell innerducts inside each conduit.
 - c. Contain no more than the equivalent of (2) 90 degree bends between pull boxes.
 - d. Maintain a minimum bend radius of 10 times the diameter of the conduit.
 - e. Not exceed 40 percent fill ratio.
 - f. Be placed at a minimum depth of 36-inches from the top of the conduit to the finished grade with 3-inches of compacted sand above and below the buried conduit and an orange metallic tracer warning

tape stenciled "TELECOMMUNICATIONS" 12-inches below grade throughout the entire pathway.

- g. Be interrupted by an adequately sized manhole or pull box at least every 600 feet for sections containing up to (1) 90 degree of bend, and at least every 350 feet for sections with the equivalent of (2) 90 degree bends.
 - 1) Manholes and pull boxes shall be of adequate depth for conduits to enter from the side of the pull box and not be required to sweep up into the bottom of box.
 - 2) Manholes shall have a minimum size of 12 feet long 6 feet wide and 7 feet high.
 - 3) Pull boxes shall be a minimum of 24 inches wide, 48 inches long and 30 inches tall.
 - 4) All accessories such as racking, grounding and bonding, ladders and ancillary equipment shall be provided
 - 5) All covers shall be stenciled with "**COSA COMMUNICATIONS**".
 - 6) Manholes and pull boxes shall be designed to ensure proper construction types and load ratings (i.e., traffic bearing) are observed and utilized based on the location of the pull boxes.
- h. Stub up into the MDF and/or IDF at 4-inches above the finished floor, no more than 2-inches from the finished wall and installed parallel to the finished wall.
- i. Contain a marked pulling tape with 1800 lbs tension strength, be fitted with bushings, and sealed appropriately at both ends.

B. Service Provider Conduits

- 1. Minimum of (4) 4-inch conduits shall route underground from the MDF to the edge of the property Right of Way and terminate as required by the service provider(s). Additional conduits shall be added as required.
- 2. Manholes and pull boxes shall be utilized as required for an ANSI, TIA and BICSI compliant conduit distribution system. The conduit, pull boxes/manholes sizing and construction shall be coordinated with the City of San Antonio Information Technology Service Department and the applicable service provider on a project by project basis.
- 3. Where the service provider termination location is unidentified at the time of design, the conduits shall route from the MDF to an adequately-sized pull box or manhole at least 30 feet from the building edge.

C. Campus Serving Conduits

1. Minimum of (2) 4-inch conduits shall route underground from the MDF to the IDF on the first floor of each additional building on the campus. Additional conduits shall be added as required if fill capacity exceeds 40 percent.
2. Manholes and pull boxes shall be utilized as required for an ANSI, TIA and BICSI compliant conduit distribution system. The conduit, pull boxes/manholes sizing and construction shall be coordinated with the City of San Antonio Information Technology Service Department and the applicable service provider on a project by project basis.
3. Where only the first building of a campus is being designed, (2) 4-inch conduits for each additional future building shall route from the MDF to an adequately-sized manhole or pull box at least 30 feet from the building edge.

D. Building Entrance for Large Campus

1. For large campuses, the MEP and Structural Engineer shall consider a conduit entrance vault as part of the MDF sub floor.

7.03 Cable Management In Telecommunications Spaces

A. Equipment Cabinets / Equipment Racks

1. Coordination with and approval by City of San Antonio Information Technology Services Department during the design is required to determine with equipment cabinets or equipment racks shall be utilized.
2. Cabinets and racks shall be black aluminum Standard Equipment Cabinets and Racks with EIA 19-inch rails, 84-inch (45 RMU) overall height and rack mount unit markings engraved on the rails.
3. All cabinets and racks shall be equipped with horizontal and vertical cable management as indicated in Exhibit 1.
4. Racks shall be bolted to the concrete floor and to the overhead cable runway utilizing manufacturer-recommended hardware and methods.

B. Overhead Cable Management

1. Overhead Cable Management shall be a Universal Cable Runway made of 3/8" x 1-1/2" x .065" wall rectangular steel tubing with cross members welded at 12-inch intervals.
 - a. MDFs shall be provided with a minimum of 18-inch wide Universal Cable Runway.
 - b. IDFs shall be provided with a minimum of 12-inch wide Universal Cable Runway.

- c. Universal Cable Runway shall encircle the MDF or IDF room at 84-86 inches above the finished floor, and crossing the room above the equipment cabinets or racks (1) time.
- d. The appropriate Radius Drop shall be installed over the racks or cabinets to provide the proper support for the cabling leaving the Runway and entering the rack/cabinet.
- e. Universal Cable Runway shall be installed utilizing appropriate hardware to support, join, or attach sections to structures, and shall be supported at a minimum of 5 foot intervals.
- f. A vertical section of cable runway shall be attached to the wall board to manage backbone and service provider cables as they transition from the entrance conduits to the overhead cable runway.
- g. Universal Cable Runway shall not attach to the full sized equipment cabinets.

7.04 Cable Support in Pathways

A. Main Cable Pathway

- 1. Main cable pathway shall be wire-basket cable tray with the cables exiting the cable tray supported utilizing j-hooks installed a minimum of every 4-5 feet on center. J-hooks shall be installed utilizing appropriate hardware to support, join and attach j-hooks to structures.
- 2. Cable tray and J-hook sizing and quantity shall be scaled to the application not to exceed 40 percent fill ratio.
- 3. A separate j-hook shall be provided for each media type:
 - a. Backbone Fiber
 - b. Backbone Copper
 - c. Horizontal Data
 - d. Horizontal Wireless
 - e. Horizontal Audio/Visual
 - f. Horizontal Security

B. Sleeves and Penetrations

- 1. Sleeves and penetrations are described herein with regard to capacity, function, and basic design principles and shall be designed in accordance with NEC and EIA/TIA-569-B, Commercial Building Standard for Telecommunications Pathways and Spaces.
- 2. All sleeves shall be equipped with nylon bushings.

3. All sleeves and penetrations shall be properly fire-stopped to meet local code and to return the wall, floor or structure, back to its original rating.
4. Scale the quantity of sleeves to maintain a 40 percent fill ratio in each sleeve.
5. Above MDF and IDFs install minimum of (4) 4-inch EMT sleeves through the partition wall between the MDF and/or IDF overhead space and the main cabling pathway.
6. Between directly aligned vertically stacked MDF and IDFs install minimum of (3) 4" EMT sleeves through the floor of the upper IDF.
7. Between skewed MDF and IDFs on adjacent floors, install minimum of (3) 4" EMT sleeves through the floor of the upper IDF into the accessible ceiling space below and utilize main cabling pathway to route cabling into the IDF or MDF on the lower floor.

C. Workstation Rough-ins and local power (Typ.)

1. At each flush wall-mounted workstation location, install a 4 11/16 inch by 4 11/16 inch by 2-1/8 inch double-gang back box with double-gang mud ring at 18 inches above the finished floor and at appropriate height for wall mounted phones and above-counter and millwork locations.
 - a. Install a minimum of (1) 1-inch conduit from the double-gang box to above accessible ceiling in the room where double-gang box is located. If ceiling is not accessible, install conduit to nearest accessible ceiling.
 - b. Conduit shall not exceed the 40 percent fill ratio.
 - c. Terminate the conduit above accessible ceiling and install nylon bushing and pull string.
 - 1) Conduit shall be installed in accordance with EIA/TIA-569-B, contain no more than the equivalent of (2) 90 degree bends and /or 98.4 feet between pull boxes, and maintain a bend radius of 6 times the diameter of the conduit.
2. At locations where the workstation outlets cannot be installed flush in the wall, a Panduit Surface Mounted Raceway that is appropriately sized and designed to meet the specific requirements shall be provided.
 - a. When power is provided in the surface mounted raceway a dual-channel surface mounted raceway shall be provided to separate the power from the structured cabling.
 - b. The use of surface mounted raceway shall only be considered when no option is available to install the workstation outlets flush in the wall and shall be approved by the City of San Antonio Information

Technology Service Department during the design or prior to installation.

3. At floor-mounted workstation locations, install a floor box or poke-thru specifically designed for the application and environment adequately sized to accommodate the quantity of installed horizontal data cables.
 - a. Install a minimum of a (1) 1-inch conduit for every (6) cables from the floor box to above accessible ceiling.
 - b. Conduit shall not exceed the 40 percent fill ratio.
4. For modular furniture workstations, a rough-in pathway shall be considered and designed according to the furniture type, quantity of cables, and location as required for each furniture system.
 - a. The use of power poles shall be considered only on a case-by-case basis.
5. For ceiling-mounted outlets above accessible ceiling such as Wireless Access Points or IP Cameras, no rough-in is required. The data cable will terminate into a surface-mount box secured to the structure above the accessible ceiling.
6. The electrical engineer shall design at a minimum (1) quad NEMA 5-15R receptacle within 12" of each workstation outlet location.

7.05 Backbone Cabling

A. Service Provider Demarc

1. The service provider demarc shall be located inside the MDF when feasible.
 - a. For all new construction, the service provider demarc shall be located inside the MDF. The service provider demarc location and requirements shall be coordinated with City of San Antonio Information Technology Services Department.
 - b. For renovation projects where the service provider demarc is not currently located inside the MDF but is required to be relocated because of the renovation, the service provider demarc shall be relocated to the MDF. The service provider demarc location and requirements shall be coordinated with City of San Antonio Information Technology Services Department.
 - c. For renovation projects where the service provider demarc is not currently located inside the MDF and is not required to be relocated because of the renovation, the service provider demarc shall be extended to the MDF via copper and/or fiber as required. The service provider demarc location and requirements shall be

coordinated with City of San Antonio Information Technology Services Department.

B. Inter-building Backbone Cabling (Campus)

1. Permanent Structures

a. Copper

- 1) Inter-building Backbone Copper Cabling shall be Category 3 25-pair 24 AWG flooded UTP home run from the MDF to primary IDF in each of the buildings on the campus. Provide a 10-foot service loop at both ends of each cable stored on the wall above or below the cable runway. Provide a 20-foot service loop in each manhole or pull box. Cables shall be secured with Hook-and-loop tie-wraps in the MDF or IDF.
- 2) Inter-building Backbone Copper Cabling shall terminate on UL-listed Category 3 25-pair 110 IDC in/out lightning protection panels equipped with UL-listed Category 3 5-pin solid state quick-acting protector modules. The secondary side of the panel shall be connected to a Category 3 24-Port RJ-45 rack mounted patch panel.

b. Fiber

- 1) Inter-building Backbone Fiber Optic Cabling shall be armored indoor/outdoor 48-Strand single mode home run from the MDF to the primary IDF in each of the buildings on the campus and dressed with fan-out kits as required. Provide a 10-foot service loop at both ends of each cable stored on the wall above or below the cable runway. Provide a 20-foot service loop in each manhole or pull box. Cables shall be secured with Hook-and-loop tie-wraps in the MDF or IDF.
- 2) All fiber optic terminations shall be fusion spliced to factory provided "pig-tail" LC terminated cables.

C. Intra-building Backbone Cabling

1. Copper

- a. Intra-building Backbone Copper Cabling shall be Category 3 25-pair plenum rated 24 AWG UTP home run from the MDF to each of the IDFs in the building. Provide a 10-foot service loop at both ends of each cable stored on the wall above or below the cable runway. Cables shall be secured with Hook-and-loop tie-wraps in the MDF or IDF.
- b. Intra-building Backbone Copper Cabling shall terminate on a Category 3 24-Port RJ-45 rack mounted patch panel.

2. Fiber

- a. Intra-building Backbone Fiber Optic Cabling shall be armored plenum rated 24-Strand single mode from the MDF to each of the IDFs in the building. Provide a 10-foot service loop at both ends of each cable stored on the wall above or below the cable runway. Cables shall be secured with Hook-and-loop tie-wraps in the MDF or IDF and in the cable runway.
- b. All fiber optic terminations shall be fusion spliced to factory provided "pig-tail" LC terminated cables.

7.06 Horizontal Cabling

A. Workstation Cable

1. Horizontal Data Cabling shall be Category 6 UTP, minimum factory sweep tested to 350 MHz, plenum rated, installed from the patch panel in the MDF or IDF to the workstation location not to exceed 295 feet for the permanent link. Provide a 10' service loop in the MDF or IDF, and 1-foot of slack at the conduit stub-up above the outlet. Cable bundles shall be secured with Hook-and-loop tie-wraps.
2. At the workstation, each Category 6 cable shall be terminated in a Category 6 modular jack insert and snapped into a single or double-gang, faceplate. Jack colors are designated in Exhibit 1. Faceplates shall be equipped with designation windows for labeling and blank inserts in unused ports.
3. Wall phone workstations shall be equipped with a studded wall phone faceplate capable of accepting a modular jack insert.
4. All faceplate colors shall be coordinated with the Architect or owner at the time of installation.
5. In the MDF or IDF, each Category 6 cable shall be terminated on the back of Category 6 rack mounted patch panels which are mounted in the equipment cabinets.
6. Category 6 cable shall be terminated with the T568B sequence.

B. Workstation Configurations

1. Office Workstation
 - a. Install (2) yellow Category 6 cables for data into a 6-port double-gang flush faceplate. The yellow cables shall be terminated with ivory category 6 modular jacks and placed in the first and second position in the faceplate.
 - 1) Furnish a minimum of (1) 2-port workstation on each of (2) walls in each office of approximately 100 sq. ft. Offices that are

smaller or larger shall be designed with consideration given to the size of the office and number of personnel planned for the office.

- 2) Modular furniture clusters shall be designed to accommodate the user requirements at the time of construction.

2. Ceiling-Mounted Projector Outlet

- a. Install (1) Purple (or Violet) Category 6 cable with 20-foot slack loop at each ceiling mounted projector location, terminated with a purple category 6 modular jack placed in a surface mounted box and secured to the building structure when mounted above the accessible ceiling.
 - 1) When a Ceiling Mounted Projector outlet is installed above the accessible ceiling, a purple adhesive dot shall be attached to the ceiling grid directly below the outlet location for future identification of the outlet location.
 - 2) When an accessible ceiling is not available, the designer shall coordinate with the audio/visual consultant to termination requirements.
 - 3) The designer shall coordinate with the audio/visual consultant to determine quantities and locations of projectors.

3. Audio/Visual Control System (Control Panel)

- a. Install (1) Purple (or Violet) Category 6 cable at each control panel location, terminated with a purple category 6 modular jack placed in a surface mounted box and secured to the building structure when mounted above the accessible ceiling.
 - 1) When an Audio/Visual Control System Panel outlet is installed above the accessible ceiling, a purple adhesive dot shall be attached to the ceiling grid directly below the outlet location for future identification of the outlet location.
 - 2) When an accessible ceiling is not available, the designer shall coordinate with the audio/visual consultant to termination requirements.
 - 3) The designer shall coordinate with the audio/visual consultant to determine quantities and locations of projectors.

4. Wireless Access Point Outlet

- a. Install (1) white Category 6 cable with 20-foot slack loop at each wireless access point location, terminated with a white Category 6 modular jack placed in a surface mounted box and secured to the building structure when mounted above the accessible ceiling.

- 1) When a Wireless Access Point outlet is installed above the accessible ceiling, a white adhesive dot shall be attached to the ceiling grid directly below the outlet location for future identification of the outlet location.
- 2) When an accessible ceiling is not available, the outlet for the wireless access point shall be terminated in a 2-port single gang flush mounted faceplate located 6-inches below ceiling not to exceed 12-feet above finished floor.
- 3) The designer shall coordinate with the City of San Antonio Information Technology Services Department to determine quantities and locations of wireless access points.

5. IP Camera Outlet

- a. Install (1) red Category 6 cable with 20-foot slack loop at each IP camera location, terminated on red category 6 modular jack placed in a surface mounted box and secured to the building structure when mounted above the ceiling.
 - 1) When an IP Camera workstation is installed above the accessible ceiling, a red adhesive dot shall be attached to the ceiling grid directly below the outlet location for future identification of the outlet location.
 - 2) When an accessible ceiling is not available, the outlet for the IP camera shall be terminated in a 2-port single gang flush mounted faceplate located 6-inches below the ceiling not to exceed 12-feet above finished floor.
 - 3) The designer shall coordinate with the City of San Antonio Information technology Services Department to determine quantities and locations of IP Cameras.

C. Patch Cables

1. MDF

a. Fiber Patch Cables – Duplex

- 1) In the MDF furnish to the City of San Antonio Information technology Services Department at the time of substantial completion (1) fiber optic patch cable plus 25 percent spare for each terminated strand.
- 2) Coordinate with City of San Antonio Information technology Services Department for patch cable types, connectors, lengths and colors.

b. Copper Patch Cables

- 1) In the MDF, furnish to the City of San Antonio Information Technology Services Department at the time of final substantial completion (1) 28 AWG Category 6 modular non-booted patch cable plus 25 percent spare for each terminated cable.
- 2) Coordinate with City of San Antonio Information Technology Services Department for lengths of patch cables.
 - a) Category 6 patch cables for each end user workstation outlet terminated shall be black.
 - b) Category 6 patch cable for each audio/visual outlet terminated shall be purple.
 - c) Category 6 patch cable for each wireless access outlet terminated shall be white.
 - d) Category 6 patch cable for each IP camera outlet terminated shall be red.

2. IDF

a. Fiber Patch Cables – Duplex

- 1) In each IDF furnish to the City of San Antonio Information Technology Services Department owner at the time of substantial completion (1) fiber optic patch cable plus 25 percent for each terminated strand.
- 2) Coordinate with City of San Antonio Information technology Services Department for patch cable types, connectors, lengths and colors.

b. Copper Patch Cables

- 1) In each IDF, furnish to the owner at the time of substantial completion (1) 28 AWG Category 6 modular non-booted patch cable plus 25 percent for each terminated cable.
- 2) Coordinate with City of San Antonio Information Technology Services Department for lengths of patch cables.
 - a) Category 6 patch cables for each end user workstation outlet terminated shall be black.
 - b) Category 6 patch cables for the active equipment side of each end user workstation outlet terminated shall be yellow.
 - c) Category 6 patch cable for each audio/visual outlet terminated shall be purple.
 - d) Category 6 patch cable for each wireless access outlet terminated shall be white.

- e) Category 6 patch cable for each IP camera outlet terminated shall be red.

7.07 Grounding

- A. Grounding shall be designed and installed in accordance with ANSI-J-STD-607-B.
 - 1. Install (1) Telecommunications Main Grounding Busbar (TMGB) in the MDF and (1) Telecommunications Grounding Busbar (TGB) in each IDF.
 - a. The TMGB and TGB shall be labeled.
 - 2. Install a Telecommunications Bonding Backbone (TBB), #3/0 AWG stranded green insulated copper conductor in a star topology between the TMGB and each TGB in each building. When IDFs are stacked a single TBB can be daisy-chained between TGBs back to the TMGB.
 - 3. Install an Equipment Bonding Conductor (EBC), #6 AWG green insulated conductor from the TMGB or TGB as applicable to each cable runway system, equipment rack, cabinet, lightning protector, or multi-pair cable with a metallic element.
 - a. Install a #3/0 AWG stranded green insulated copper conductor from the TMGB to the main building electrical service ground in each building.
 - b. In a metal frame (structural steel) building, where the steel framework is readily accessible within or external to the room; each TGB and TMGB shall be bonded to the vertical steel metal frame using a minimum #6 AWG conductor. The connection to building steel does not eliminate the requirement for the TBB or BC to the service ground.
 - 4. Install a Grounding Equalizer Conductor, #3/0 AWG stranded green insulated copper conductor to interconnect multiple TBBs on the top floor and every 3rd floor when required by ANSI J-STD-607-B.
 - 5. When exceeding 13 feet the conductors shall be sized at 2 kcmil per linear foot of conductor length up to a maximum of 3/0 AWG.

7.08 Labeling

- 1. Coordination with and approval by the City of San Antonio Information Technology Services Department is required on the specific site labeling schema.
- 2. All labels shall be typed (not handwritten)
- 3. Verify room numbers and confirm the final room numbering scheme prior to generating labels.

4. Horizontal Cables shall be labeled within 12 inches from the termination point inside the MDF/IDF.
5. Horizontal Cables shall be labeled within 6 inches from the termination point at the workstation end.
6. Backbone Fiber and Copper Cables shall be labeled within 12 inches of the visible end of the jacket.
7. Fiber Innerduct shall be labeled within 12 inches of the point of entry of the fiber optic enclosure.
8. Cables shall be labeled identically at both ends.
9. MDFs and IDFs Room shall be labeled (signage) with the permanent room designations that match the final building signage for cable labeling.
10. Equipment cabinets or racks in each MDF or IDF shall be labeled in sequential numeric order. Labels shall be centered on the top front of the equipment rack.
11. Fiber optic backbone cable labels shall contain the cable origin room number, the cable destination room number, fiber strand numbers, and type (i.e. MDFA150-IDFC126-48SM001-048).
12. Fiber optic enclosures shall be labeled alpha-numeric starting with the 1st fiber optic enclosure in the top of the 1st equipment rack. A label for each terminated strand shall be securely placed inside each fiber optic enclosure.
13. Fiber optic couplers panels in fiber enclosures shall be labeled at each end by strand denoting MDF and/or IDF the cable comes from, and strand number to and from respectively (i.e. IDFC126-48SM001-048).
14. Copper backbone cables labels shall contain the cable origin room number, the cable destination room number, and cable pairs (i.e. MDFA150-IDFC126/001-025).
15. Horizontal cables shall be labeled identically at each end with the destination end and origin room number, patch panel number, and port number. (i.e. IDFC126-C115-B5).
16. Patch panels in each closet shall be uniquely alphabetically labeled sequentially starting with the first Patch Panel in the top of the first equipment rack (i.e. A, B, C, D, E, etc.). Each MDF or IDF starts with A and shall not repeat a letter.
17. 110-type blocks shall contain the origin room number, destination room number, and pair numbers, under each pair termination. (i.e. MDFA150-IDFC126-PR 1-50). 110-type block labels shall be printed on product-specific label strips and placed into label holders.

18. Workstation Faceplates shall be labeled denoting origin MDF/IDF Room Number, patch panel, and port number (i.e. IDFC126-B5).

7.09 Testing

- A. All test results shall be submitted to the owner along with all other final documentation. Test results shall be submitted in both PDF format and the Native Tester format along with the software needed to read the Native Tester Format.
- B. Terminated fiber optic strands shall be tested bi-directionally end to end be and certified in accordance with applicable industry standards and manufacturer certifications requirements with an OTDR field and Light Meter tester that is within their calibration period.
- C. Terminated backbone copper cable links shall be tested in accordance with applicable industry standards and manufacturer certification requirements for attenuation, continuity, and pin-mapping with approved field tester(s) that are within their calibration period.
- D. Terminated Category 6 UTP cable links shall be tested in accordance with applicable industry standards and manufacturer certification requirements for Category 6 compliance with approved field tester(s) that are within their calibration period.

7.10 As-Built Documentation

- A. Produce drawings depicting the condition of the Structured Cabling System as installed produced in AutoCAD 2010 or higher and provided in hardcopy, electronically in .DWG and .PDF format. Include the exact dimensions and locations of MDF and IDF layouts, wall elevations, equipment cabinet elevations, cable runways, cable tray, sleeves, backbone and horizontal cable pathways, workstation locations, and numbering and labeling scheme.
- B. A half-size hard copy of the as-built drawings for the applicable region served by the MDF and/or IDFs shall be provided in MDF and each IDF for reference.
- C. Produce cable records for the Structured Cabling System as installed to include a list of all horizontal and backbone cables produced in an Excel format and provided in hardcopy and electronic format indicating cable number, unique cable label, cable type, origin and destination, length, termination method, and pass/fail result.
- D. Produce (3) hard copies of all test results for each cable, to include technician's name and date stamp, a list of tested cables, and the individual results for each cable tested. Test results shall be furnished on CD ROM to include native file format and .PDF format.

PART 8 - SUMMARY OF STANDARDS

8.01 Summary

- A. All aspects of this City of San Antonio Structured Cabling Infrastructure Standards shall be applied to the design process for new, leased and renovated facilities.
- B. A Division 27 specification and T-Series drawings for the Structured cabling System shall be commissioned and issued by the Architect during the design phases for each facility or project. Drawings and specifications shall be sealed with a current RCDD stamp.

PART 9 - EXHIBITS

EXHIBIT 1 - ACCEPTABLE MANUFACTURERS / PRODUCTS

- A. The following list of manufacturers / products is provided for reference only and is not all inclusive. All manufacturers / products shall be verified by the designer for each project and confirmed with The City of San Antonio Information Technology Services Department prior to issuing any construction documents.
- B. Where specific manufacturers / products are mentioned, an equivalent will be considered following an official submission of product literature and written acceptance by the City of San Antonio Information Technology Services Department.
- C. Fiber Optic Backbone Cable
 - 1. Indoor
 - a. 9/125 μ m Single-Mode Plenum Rated Armored
 - 1) Panduit
 - 2) Chromatic
 - 3) Commscope
 - 4) Corning
 - 5) Systimax
 - 2. Outdoor Underground
 - a. 9/125 μ m Indoor/Outdoor Single-Mode Armored
 - 1) Panduit
 - 2) Chromatic
 - 3) Commscope
 - 4) Corning
 - 5) Systimax
 - 3. Outdoor Aerial
 - a. 9/125 μ m Indoor/Outdoor Single-Mode Armored
 - 1) Panduit
 - 2) Chromatic
 - 3) Commscope
 - 4) Corning

- 5) Systimax
- 4. Fiber Optic Fabric Innerduct
 - a. Indoor Plenum Rated
 - 1) MaxCell
 - b. Outdoor
 - 1) MaxCell
- D. Copper Backbone Cable
 - 1. Indoor
 - a. Category 3 24 AWG Unshielded Twisted Pair (UTP) Plenum (White Sheath)
 - 1) General
 - 2) Mohawk
 - 3) Superior
 - 4) Systimax
 - 2. Outdoor Underground
 - a. Category 3 24 AWG Unshielded Twisted Pair (UTP) Flooded (PE-89)
 - 1) General
 - 2) Mohawk
 - 3) Superior
 - 4) Systimax
 - 3. Outdoor Aerial
 - a. 24 AWG Unshielded Twisted Pair (UTP) Self-Supported
 - 1) General
 - 2) Mohawk
 - 3) Superior
 - 4) Systimax
- E. Horizontal Cable
 - 1. Category 6 UTP Plenum (Minimum 350 MHz)

- a. Network Access (Yellow Sheath)
 - 1) General
 - 2) Panduit
 - b. Wireless Access Points (White Sheath)
 - 1) General
 - 2) Panduit
 - c. AV Access (Purple Sheath)
 - 1) General
 - 2) Panduit
 - d. IP Security (Red Sheath)
 - 1) General
 - 2) Panduit
- F. Fiber Optic Cable Termination
- 1. Fiber Enclosure
 - a. Panduit Opticom Rack Mount Fiber Enclosure – Part No. FRMEXX
 - 2. 9µm Single-Mode Fiber Coupler Panel
 - a. 9µm Panduit Opticom LC Fiber Adapter Panel – Part No. FAP6WBUDLCZ
 - 3. Fiber Blank Panel
 - a. Panduit Opticom Blank Fiber Adapter Panel – Part No. FAPB
 - 4. 9µm Single-Mode LC Pigtails
 - a. Panduit Opti-Core OS1/OS2 Single-Mode Fiber Optic Pigtails (LC to Pigtail) – Part No. F9B10-NM1Y
 - 5. Loose Tube Fiber Fan-Out Kit
 - a. Panduit
- G. Copper Cable Termination
- 1. Building Entrance Terminals
 - a. Primary Copper Protectors
 - 1) Circa 50-Pair 110 Style Lightning Protection Block

- 2) Solid State Digital Series Surge Protection Modules
- 2. Backbone Cable Termination Panels
 - a. Rack Mounted Voice Patch Panels
 - 1) Panduit Voice Patch Panel – Part No. VP24382TV25Y
- 3. Category 6 Horizontal Rack Mounted Patch Panels
 - a. Category 6 48-Port Patch Panels – Panduit Mini-Com Flush Mount Modular Patch Panels - Part No. CPP48FMWBLY
- 4. Category 6 Modular Jacks
 - a. Network Access
 - 1) Equipment Room/Telecommunications Room End (Black)
 - a) Panduit Mini-com TX6 Plus UTP Jack Modules Part No. CJ688TGBL
 - 2) Field End (Ivory)
 - a) Panduit Mini-Com TX6 Plus UTP Jack Modules Part No. CJ688TGEI
 - b. Wireless Access Points
 - 1) Equipment Room/Telecommunications Room End (White)
 - a) Panduit Mini-Com TX6 Plus UTP Jack Modules Part No. CJ688TGWH
 - 2) Field End (White)
 - a) Panduit Mini-Com TX6 Plus UTP Jack Modules Part No. CJ688TGWH
 - c. AV Access (Violet)
 - 1) Equipment Room/Telecommunications Room End (Violet)
 - a) Panduit Mini-Com TX6 Plus UTP Jack Modules Part No. CJ688TGVL
 - 2) Field End (Violet)
 - a) Panduit Mini-Com TX6 Plus UTP Jack Modules Part No. CJ688TGVL
 - d. IP Security

- 1) Equipment Room/Telecommunications Room End (Red)
 - a) Panduit Mini-Com TX6 Plus UTP Jack Modules Part No. CJ688TGRD
- 2) Field End (Red)
 - a) Panduit Mini-Com TX6 Plus UTP Jack Modules Part No. CJ688TGRD
- 5. Telecommunications Faceplates with Designation Window
 - a. 2-Port Single Gang Flush (Stainless Steel)
 - 1) Panduit Mini-Com Stainless Steel Faceplates with Labels Part No. CFPL2SY
 - b. 4-Port Single Gang Flush (Stainless Steel)
 - 1) Panduit Mini-Com Stainless Steel Faceplates with Labels Part No. CFPL4SY
 - c. 4-Port Double Gang Flush (Stainless Steel)
 - 1) Panduit Mini-Com Stainless Steel Faceplates with Labels Part No. CFPL6S-2GY
- 6. Wall Phone Faceplate (Stainless Steel)
 - a. Panduit Phone Wall Plate Module Part No. KWP6PY
- 7. 2-Port Surface Mount Box (White)
 - a. Panduit Mini-Com Surface Mount Box Part No. CBXJ2HW-A
- 8. Blank Insert (White)
 - a. Panduit Mini-Com Blank Module – Part No. CMBWH-X
- H. Equipment Racks, Cabinets, Wire Management, and Accessories
 - 1. Two-Post Rack - 19" x 84" Open Frame (Black)
 - a. Panduit Part No. CMR19x84NU
 - 2. Four-Post Open Frame Rack – 23.3" x 84" x 30.2" (Black)
 - a. Panduit Part No. CMR4P84
 - 3. Equipment Cabinet (Black)
 - a. Chatsworth F-Series TeraFrame Gen 3 Cabinet Part No. FF2J-113B-C22A

- b. Chatsworth CUBE-iT Wall-Mounted Cabinet 48" H X 24" W X 30" D Black Part No. 11996-748
 - c. Chatsworth Thin-Line II Wall-Mounted Cabinet 36" H X 26" W X 12" D 6U Part No. 13050-723
 - 4. Vertical Wire Managers (Black)
 - a. Patch Runner Double Sided Vertical Cable Management System Panduit - Part No. PRV6
 - b. Patch Runner Vertical Cable Management Door Panduit - Part No. PRD6
 - c. Chatsworth F-Series TeraFrame Gen 3 Finger Cable Manager – Part No. 39112-C14
 - 5. Horizontal Wire Managers (Black)
 - a. Net Manager Double Sided High Capacity Horizontal Cable Mangers Panduit - Part No. NCMH2
- I. Cable Runway (Ladder Type)
 - 1. 12" Universal Cable Runway
 - a. Chatsworth - Part No. 10250-712
 - 2. 12" Cable Runway Radius Drop, Cross Member
 - a. Chatsworth - Part No. 12100-712
 - 3. 12" Cable Runway Radius Drop, Stringer
 - a. Chatsworth - Part No. 12101-712
 - 4. 18" Universal Cable Runway
 - a. Chatsworth - Part No. 10250-718
 - 5. 18" Cable Runway Radius Drop, Cross Member
 - a. Chatsworth - Part No. 12100-718
 - 6. 18" Cable Runway Radius Drop, Stringer
 - a. Chatsworth - Part No. 12101-718
 - 7. Cable Runway Butt-Splice Kit
 - a. Chatsworth - Part No. 11301-701
 - 8. Cable Runway Junction-Splice Kit

- a. Chatsworth - Part No. 11302-701
- 9. Cable Runway Butt-Swivel Splice Kit
 - a. Chatsworth - Part No. 10487-701

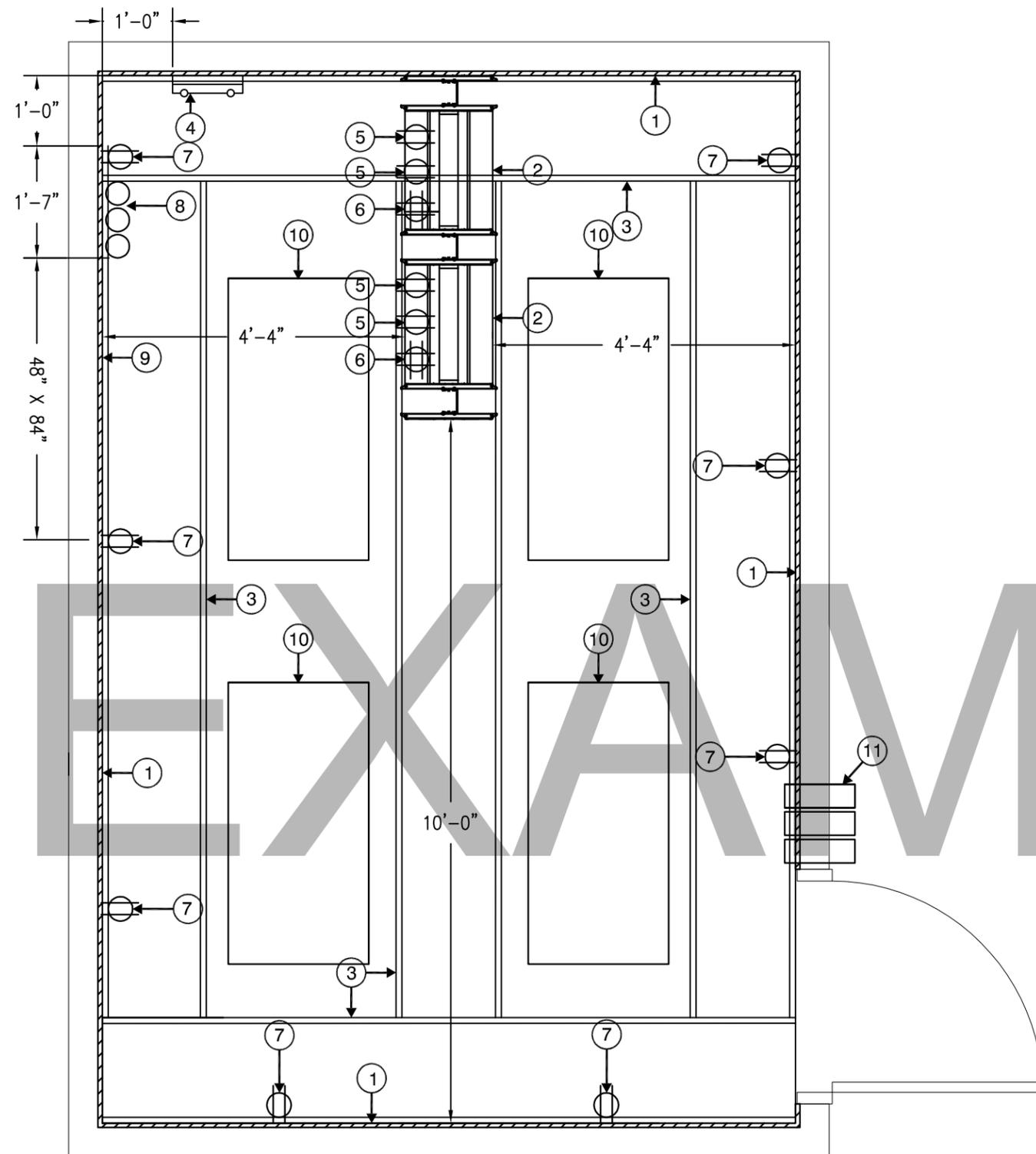
- 10. Rack-to-Runway Mounting Kit
 - a. Chatsworth - Part No. 10595-712
- 11. Cable Runway Elevation Kit for Racks
 - a. Chatsworth - Part No. 10506-706
- 12. Cable Runway Elevation Kit for Cabinets
 - a. Chatsworth - Part No. 10506-716
- 13. 12" Triangular Support Bracket, Aluminum
 - a. Chatsworth - Part No. 11312-712
- 14. 12" Wall Angle Support Kit, Cable Runway
 - a. Chatsworth - Part No. 11421-712
- 15. 18" Triangular Support Bracket, Aluminum
 - a. Chatsworth - Part No. 11312-718
- 16. 18" Wall Angle Support Kit, Cable Runway
 - a. Chatsworth - Part No. 11421-718
- 17. 90 Degree Runway-Splice Kit
 - a. Chatsworth - Part No. 11314-701
- 18. 45 Degree Runway-Splice Kit
 - a. Chatsworth - Part No. 11313-712
- 19. Foot Kit, Cable Runway
 - a. Chatsworth - Part No. 11309-001
- 20. Vertical Wall Brackets (pair)
 - a. Chatsworth - Part No. 10608-701
- 21. Threaded Ceiling Kit, Cable Runway
 - a. Chatsworth - Part No. 11310-001

- 22. Threaded Rod Cover
 - a. Chatsworth - Part No. 11085-001
- 23. Protective End Caps for Cable Runway
 - a. Chatsworth - Part No. 10642-001
- 24. End Closing Kit, Cable Runway
 - a. Chatsworth - Part No. 11700-712
- J. Pathway Cable Support
 - 1. Panduit J-Mod Cable Support System
 - 2. Erico – CADDY CAT LINKS J-Hook Series
 - 3. Panduit Plenum Rated Hook & Loop (Black)
- K. Grounding and Bonding
 - 1. Grounding Bus Bar, 20”
 - a. Chatsworth - Part No. 40153-020
 - 2. Grounding Bus Bar, 12”
 - a. Chatsworth - Part No. 13622-012
 - 3. Cable Runway Ground Strap Kit
 - a. Chatsworth - Part No. 40164-001
 - 4. One Mounting Hole Ground Terminal Block
 - a. Chatsworth - Part No. 08009-001
 - 5. Horizontal Rack Ground Bar for Wall Mount Cabinet
 - a. Chatsworth - Part No. 10610-019
 - 6. #6 AWG Solid Green Insulation Ground Wire
 - a. Superior Essex - Part No. 12-018-04
 - 7. #3/0 Stranded Green Insulation Ground Wire
 - 8. Cable Sheath Bonding Clamp
- L. Labeling
 - 1. Permanent Labels for Fiber Optic Cables

- a. Brady
 - b. Panduit Self Laminating Labels
 - 2. Permanent Labels for Innerduct
 - a. Panduit Dome-Top Ty Marker
 - 3. Permanent Labels for Copper Cables
 - a. Panduit Self-Laminating Labels
 - 4. Permanent Labels for Backbone Fiber Optic Cables
 - a. Panduit Dome-Top Ty Marker
 - 5. Permanent Labels for Patch Panels
 - a. Panduit Component Label
 - 6. Permanent Labels for Faceplates
 - a. Panduit Component Label
- M. Fire Stop
 - 1. STI Spec Seal Part No.
 - 2. 3M Products Part No.
- N. Plywood
 - 1. 8' H x 4' W x 3/4" Sheets of BC grade fire-rated plywood
- O. Fire Retardant Paint (White)
- P. Fiber Patch Cables
 - 1. Panduit
 - 2. Corning
- Q. Copper Patch Cables
 - 1. Panduit

EXHIBIT 2 – TYPICAL DETAILS

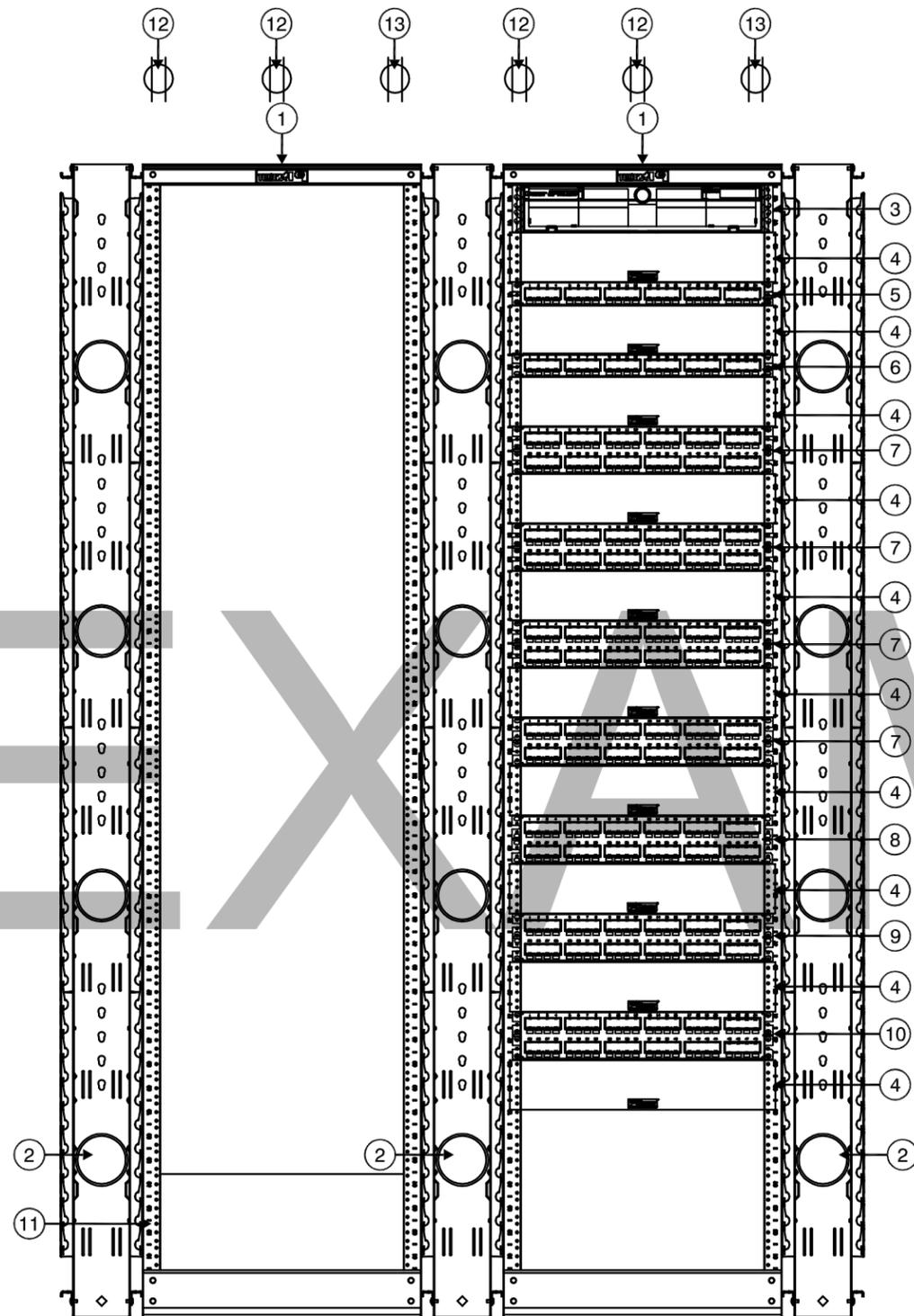
End of Guideline



TYPICAL MDF ROOM LAYOUT WITH RACKS KEYED NOTES

- ① 4 - FEET X 8 - FEET X 3/4 - INCH AC GRADE VOID FREE FIRE RATED PLYWOOD INSTALLED VERTICALLY STARTING AT 12 - INCHES ABOVE FINISHED FLOOR ON ALL PERIMETER WALLS. THE PLYWOOD SHALL BE INSTALLED WITH THE "A" GRADE SIDE EXPOSED AND THE "C" GRADE SIDE AGAINST THE BUILDING WALL OR STRUCTURE. THE PLYWOOD SHALL BE PAINTED WITH TWO COATS OF FIRE RETARDANT PAINT AND ONE STAMP FROM EACH SHEET SHALL BE MASKED DURING THE PAINTING AND UNCOVERED AFTER THE PAINT HAS DRIED SO THE FIRE RATED PLYWOOD STAMPS ARE VISIBLE FOR INSPECTION. (BY DIV. 27)
- ② 19 - INCH X 84 - INCH EQUIPMENT RACK WITH VERTICAL CABLE MANAGERS. (BY DIV. 27)
- ③ 18 - INCH LADDER RACK MOUNTED AT 84 - INCHES ABOVE FINISHED FLOOR. (BY DIV. 27)
- ④ GROUND BUS BAR MOUNTED AT 78 - INCHES ABOVE FINISHED FLOOR. (BY DIV. 27)
- ⑤ DEDICATED 208 VAC 20 AMP CIRCUIT IN J-BOX MOUNTED TO UNISTRUT ABOVE THE LADDER RACK AND PROVIDED WITH A 7 - FT SO TYPE CORD WITH FEMALE NEMA L6 - 20R RECEPTACLE ON THE END. (BY DIV. 26)
- ⑥ DEDICATED 120 VAC 20 AMP CIRCUIT IN J-BOX MOUNTED TO UNISTRUT ABOVE THE LADDER RACK AND PROVIDED WITH A 7 - FT SO TYPE CORD WITH FEMALE NEMA 5 - 20R RECEPTACLE ON THE END. (BY DIV. 26)
- ⑦ 20 AMP CIRCUIT WITH QUAD RECEPTACLE NEMA 5-20R FLUSH MOUNTED TO THE FINISHED WALL SURFACE AT 18 - INCHES ABOVE FINISHED FLOOR. OUTLETS SHALL BE SPACED NO FARTHER APART THAN 6 - FEET. MAXIMUM OF (6) PER CIRCUIT. (BY DIV. 26)
- ⑧ (3) 4 - INCH CONDUITS TERMINATED 4 - INCHES ABOVE FINISHED FLOOR AND NO FARTHER THAN 2 INCHES FROM THE WALL FOR SERVICE PROVIDER. CONTRACTOR SHALL PROVIDE PULL STRING AND NYLON BUSHINGS AND CAPS ON END OF CONDUIT. (BY DIV. 26)
- ⑨ 48 - INCHES WIDE X 84 - INCHES HIGH RESERVED FOR SERVICE PROVIDER TERMINATION. (BY DIV. 27)
- ⑩ TYPICAL LIGHTING ORIENTATION, ENSURE THERE IS 50 FOOT CANDLES AT 2 - FEET ABOVE FINISHED FLOOR. (BY DIV. 26)
- ⑪ (3) 4 - INCH EMT CONDUIT SLEEVES ABOVE ACCESSIBLE CEILING WITH NYLON BUSHINGS ON EACH END AND SECURED TO WALL. CONDUIT SLEEVES SHALL BE SEALED ON THE EXTERIOR AND INTERIOR TO RETURN THE WALL BACK TO THE ORIGINAL RATING. IF WALL IS NOT RATED CONDUIT SHALL BE SEALED ON THE EXTERIOR AND INTERIOR TO REDUCE NOISE TRAVELING THROUGH THE PENETRATION. CONDUIT SLEEVES SHALL BE USED FOR LOW VOLTAGE DATA VOICE VIDEO AND SECURITY ONLY. (BY DIV. 26)

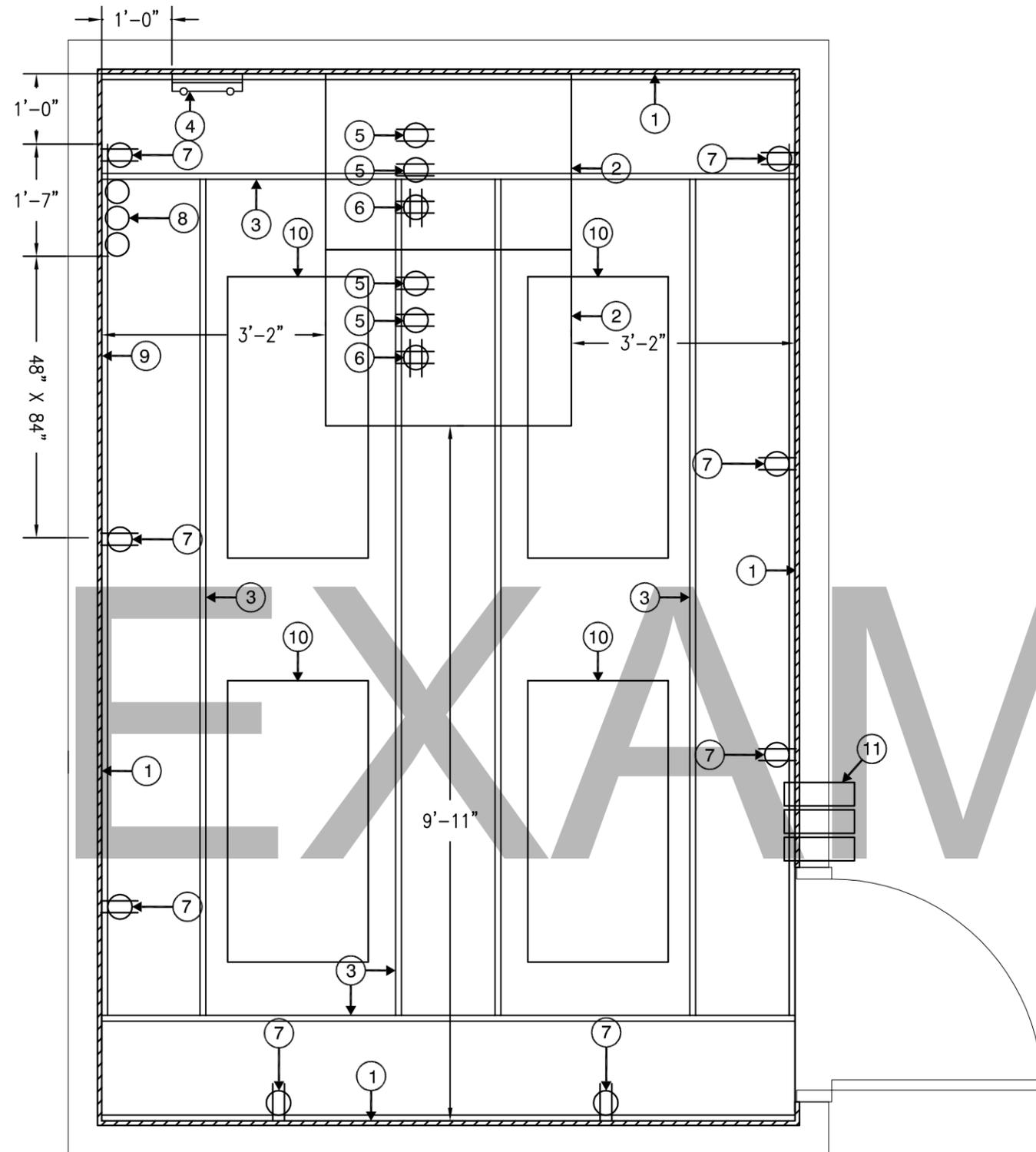
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Typical MDF Room Layout With Racks
SCALE: 1/2"=1'-0"



TYPICAL MDF ROOM RACK ELEVATION KEYED NOTES

- ① 19 - INCH X 84 - INCH EQUIPMENT RACK. (BY DIV. 27)
- ② DOUBLE - SIDED VERTICAL CABLE MANAGER. (BY DIV. 27)
- ③ RACK MOUNTED 48 - PORT FIBER OPTIC ENCLOSURE FOR SINGLE MODE FIBER OPTIC CABLE. (BY DIV. 27)
- ④ DOUBLE-SIDED HORIZONTAL CABLE MANAGER. (BY DIV. 27)
- ⑤ RACK MOUNTED 24 - PORT VOICE PATCH PANEL FOR INCOMING TELCO SERVICE. (BY DIV. 27)
- ⑥ RACK MOUNTED 24 - PORT VOICE PATCH PANEL. (BY DIV. 27)
- ⑦ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR DATA. (BY DIV. 27)
- ⑧ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR WIRELESS ACCESS POINTS. (BY DIV. 27)
- ⑨ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR AUDIO VISUAL SYSTEMS. (BY DIV. 27)
- ⑩ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR IP SECURITY. (BY DIV. 27)
- ⑪ (4) RACK MOUNTED UNITS OF SPACE FOR OWNER PROVIDED / OWNER INSTALLED UPS. (BY DIV. 27)
- ⑫ DEDICATED 208 VAC 20 AMP CIRCUIT IN J-BOX MOUNTED TO UNISTRUT ABOVE THE LADDER RACK AND PROVIDED WITH A 7 - FT SO TYPE CORD WITH FEMALE NEMA L6 - 20R RECEPTACLE ON THE END. (BY DIV. 26)
- ⑬ DEDICATED 120 VAC 20 AMP CIRCUIT IN J-BOX MOUNTED TO UNISTRUT ABOVE THE LADDER RACK AND PROVIDED WITH A 7 - FT SO TYPE CORD WITH FEMALE NEMA 5 - 20R RECEPTACLE ON THE END. (BY DIV. 26)

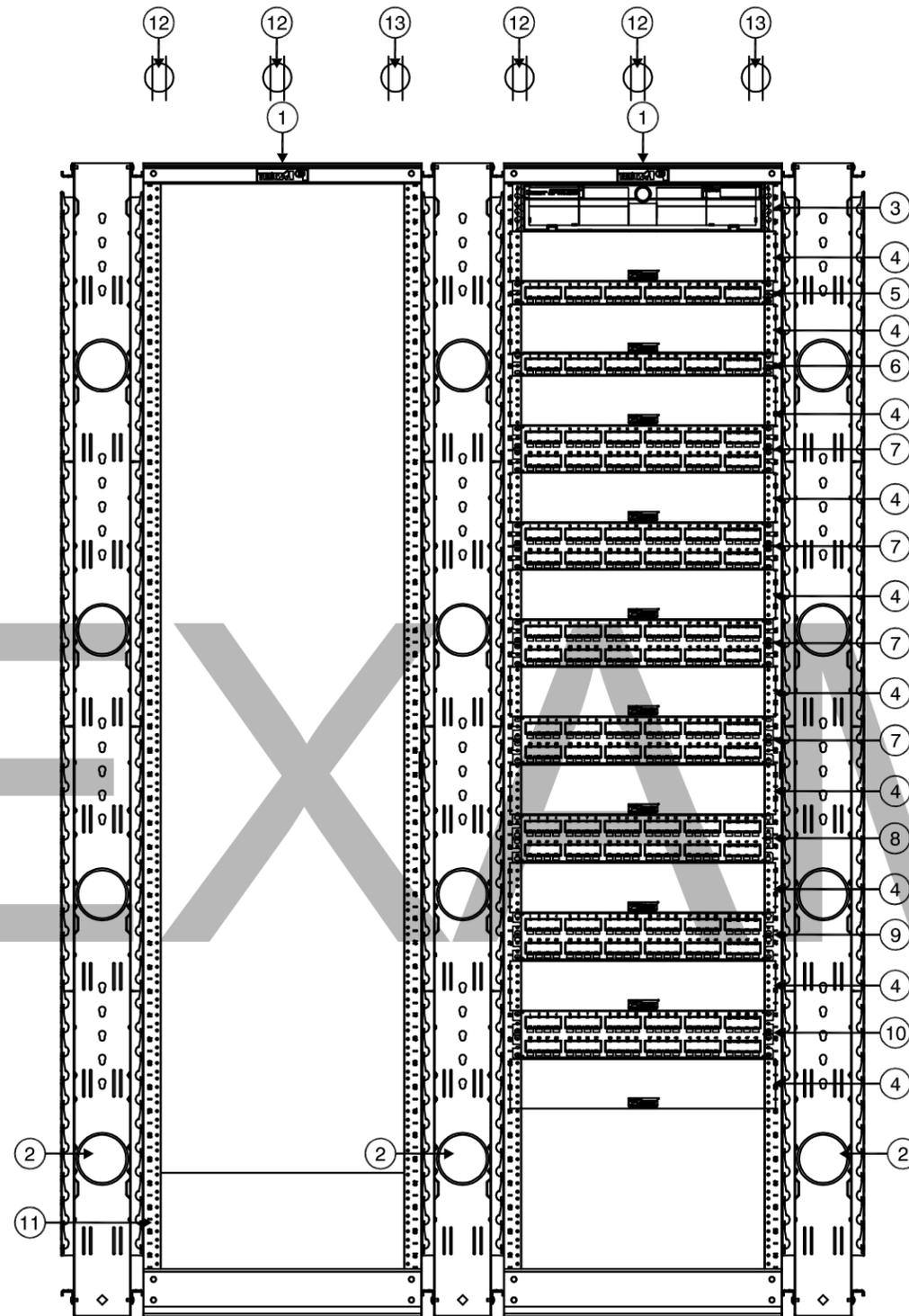
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Typical MDF Rack Elevation
SCALE: 1"=1'-0"



TYPICAL MDF ROOM LAYOUT WITH CABINETS KEYED NOTES

- ① 4 - FEET X 8 - FEET X 3/4 - INCH AC GRADE VOID FREE FIRE RATED PLYWOOD INSTALLED VERTICALLY STARTING AT 12 - INCHES ABOVE FINISHED FLOOR ON ALL PERIMETER WALLS. THE PLYWOOD SHALL BE INSTALLED WITH THE "A" GRADE SIDE EXPOSED AND THE "C" GRADE SIDE AGAINST THE BUILDING WALL OR STRUCTURE. THE PLYWOOD SHALL BE PAINTED WITH TWO COATS OF FIRE RETARDANT PAINT AND ONE STAMP FROM EACH SHEET SHALL BE MASKED DURING THE PAINTING AND UNCOVERED AFTER THE PAINT HAS DRIED SO THE FIRE RATED PLYWOOD STAMPS ARE VISIBLE FOR INSPECTION. (BY DIV. 27)
- ② 27.6 - INCH X 84.6 - INCH TERAFRAME CABINET WITH VERTICAL CABLE MANAGERS. (BY DIV. 27)
- ③ 12 - INCH LADDER RACK MOUNTED AT 84 - INCHES ABOVE FINISHED FLOOR. (BY DIV. 27)
- ④ GROUND BUS BAR MOUNTED AT 78 - INCHES ABOVE FINISHED FLOOR. (BY DIV. 27)
- ⑤ DEDICATED 208 VAC 20 AMP CIRCUIT IN J-BOX MOUNTED TO UNISTRUT ABOVE THE LADDER RACK AND PROVIDED WITH A 7 - FT SO TYPE CORD WITH FEMALE NEMA L6 - 20R RECEPTACLE ON THE END. (BY DIV. 26)
- ⑥ DEDICATED 120 VAC 20 AMP CIRCUIT IN J-BOX MOUNTED TO UNISTRUT ABOVE THE LADDER RACK AND PROVIDED WITH A 7 - FT SO TYPE CORD WITH FEMALE NEMA 5 - 20R RECEPTACLE ON THE END. (BY DIV. 26)
- ⑦ 20 AMP CIRCUIT WITH QUAD RECEPTACLE NEMA 5-20R FLUSH MOUNTED TO THE FINISHED WALL SURFACE AT 18 - INCHES ABOVE FINISHED FLOOR. OUTLETS SHALL BE SPACED NO FARTHER APART THAN 6 - FEET. MAXIMUM OF (6) PER CIRCUIT. (BY DIV. 26)
- ⑧ (3) 4 - INCH CONDUITS TERMINATED 4 - INCHES ABOVE FINISHED FLOOR AND NO FARTHER THAN 2 INCHES FROM THE WALL FOR SERVICE PROVIDER. CONTRACTOR SHALL PROVIDE PULL STRING AND NYLON BUSHINGS AND CAPS ON END OF CONDUIT. (BY DIV. 26)
- ⑨ 48 - INCHES WIDE X 84 - INCHES HIGH RESERVED FOR SERVICE PROVIDER TERMINATION. (BY DIV. 27)
- ⑩ TYPICAL LIGHTING ORIENTATION, ENSURE THERE IS 50 FOOT CANDLES AT 2 - FEET ABOVE FINISHED FLOOR. (BY DIV. 26)
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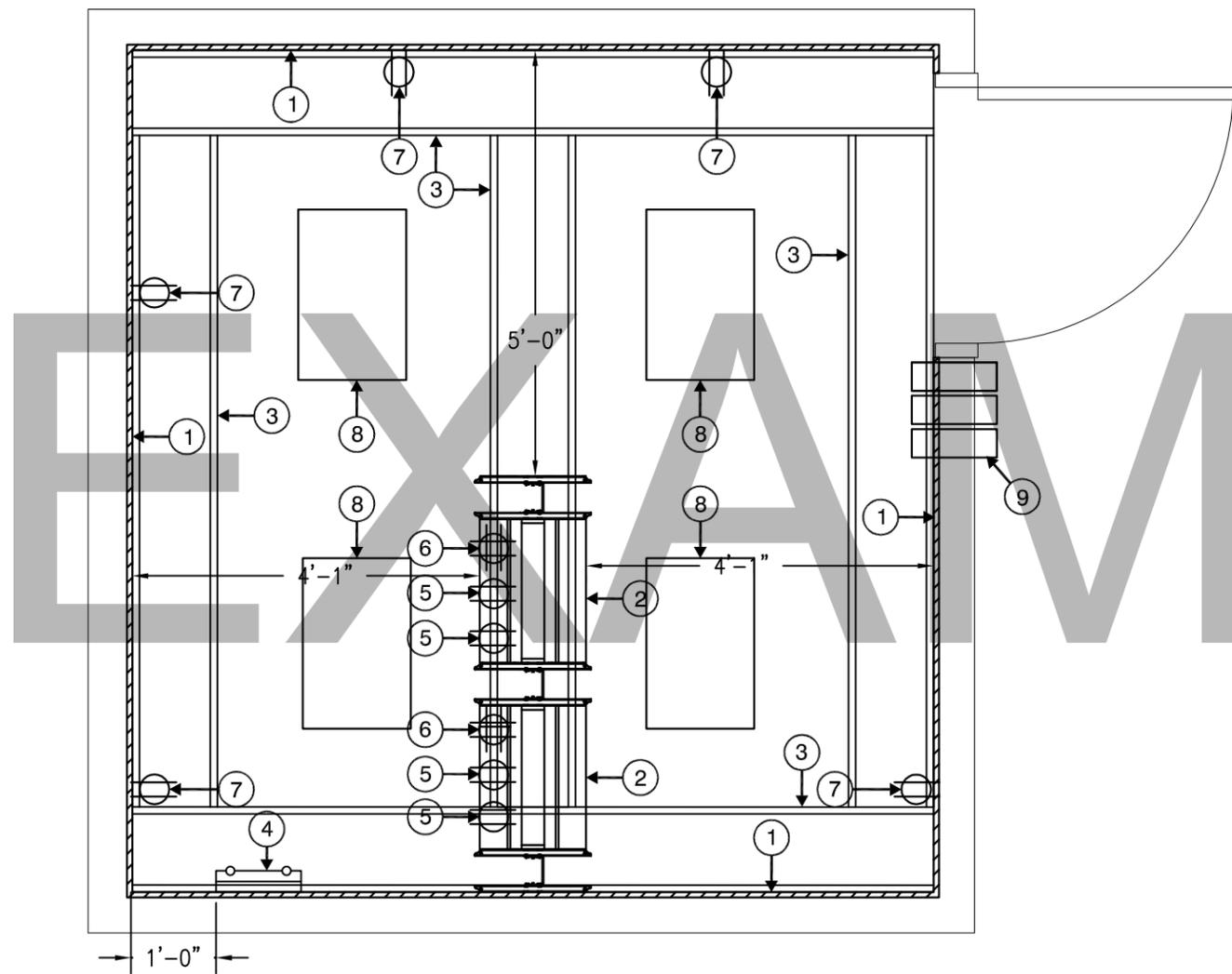
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Typical MDF Room Layout With Cabinets
SCALE: 1/2"=1'-0"



TYPICAL MDF ROOM CABINET ELEVATION KEYED NOTES

- ① 27.6 - INCH X 84.6 - INCH TERAFRAME CABINET. (BY DIV. 27)
- ② TERAFRAME DOUBLE - SIDED VERTICAL FINGER CABLE MANAGER. (BY DIV. 27)
- ③ RACK MOUNTED 48 - PORT FIBER OPTIC ENCLOSURE FOR SINGLE MODE FIBER OPTIC CABLE. (BY DIV. 27)
- ④ DOUBLE-SIDED HORIZONTAL CABLE MANAGER. (BY DIV. 27)
- ⑤ RACK MOUNTED 24 - PORT VOICE PATCH PANEL FOR INCOMING TELCO SERVICE. (BY DIV. 27)
- ⑥ RACK MOUNTED 24 - PORT VOICE PATCH PANEL. (BY DIV. 27)
- ⑦ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR DATA. (BY DIV. 27)
- ⑧ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR WIRELESS ACCESS POINTS. (BY DIV. 27)
- ⑨ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR AUDIO VISUAL SYSTEMS. (BY DIV. 27)
- ⑩ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR IP SECURITY. (BY DIV. 27)
- ⑪ (4) RACK MOUNTED UNITS OF SPACE FOR OWNER PROVIDED / OWNER INSTALLED UPS. (BY DIV. 27)
- ⑫ DEDICATED 208 VAC 20 AMP CIRCUIT IN J-BOX MOUNTED TO UNISTRUT ABOVE THE LADDER RACK AND PROVIDED WITH A 7 - FT SO TYPE CORD WITH FEMALE NEMA L6 - 20R RECEPTACLE ON THE END. (BY DIV. 26)
- ⑬ DEDICATED 120 VAC 20 AMP CIRCUIT IN J-BOX MOUNTED TO UNISTRUT ABOVE THE LADDER RACK AND PROVIDED WITH A 7 - FT SO TYPE CORD WITH FEMALE NEMA 5 - 20R RECEPTACLE ON THE END. (BY DIV. 26)

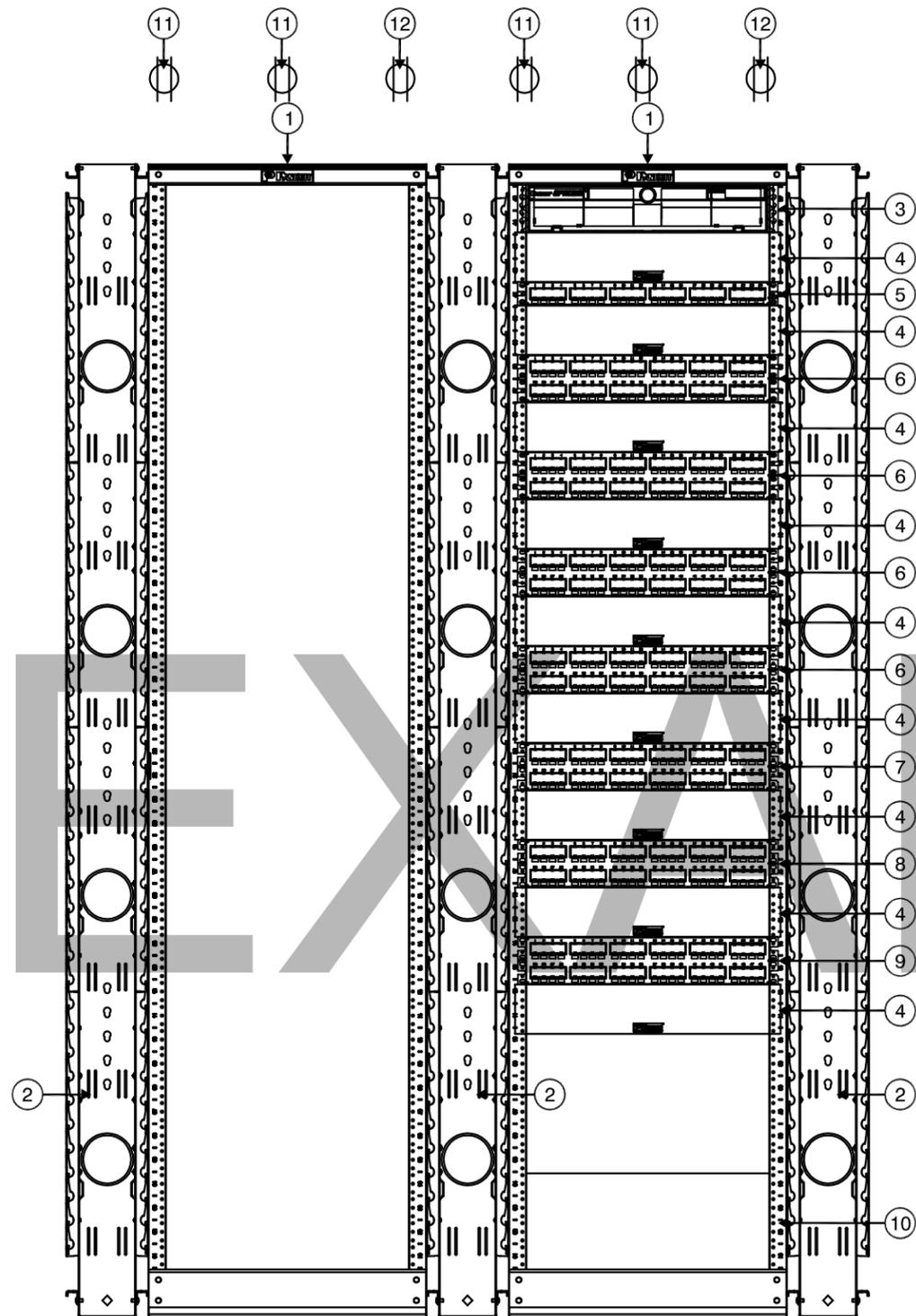
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Typical MDF Cabinet Elevation
SCALE: 1"=1'-0"



TYPICAL IDF ROOM LAYOUT WITH RACKS KEYED NOTES

- ① 4 - FEET X 8 - FEET X 3/4 - INCH AC GRADE VOID FREE FIRE RATED PLYWOOD INSTALLED VERTICALLY STARTING AT 12 - INCHES ABOVE FINISHED FLOOR ON ALL PERIMETER WALLS. THE PLYWOOD SHALL BE INSTALLED WITH THE "A" GRADE SIDE EXPOSED AND THE "C" GRADE SIDE AGAINST THE BUILDING WALL OR STRUCTURE. THE PLYWOOD SHALL BE PAINTED WITH TWO COATS OF FIRE RETARDANT PAINT AND ONE STAMP FROM EACH SHEET SHALL BE MASKED DURING THE PAINTING AND UNCOVERED AFTER THE PAINT HAS DRIED SO THE FIRE RATED PLYWOOD STAMPS ARE VISIBLE FOR INSPECTION. (BY DIV. 27)
- ② 19 - INCH X 84 - INCH EQUIPMENT RACK WITH VERTICAL CABLE MANAGERS. (BY DIV. 27)
- ③ 12 - INCH LADDER RACK MOUNTED AT 84 - INCHES ABOVE FINISHED FLOOR. (BY DIV. 27)
- ④ GROUND BUS BAR MOUNTED AT 78 - INCHES ABOVE FINISHED FLOOR. (BY DIV. 27)
- ⑤ DEDICATED 208 VAC 20 AMP CIRCUIT IN J-BOX MOUNTED TO UNISTRUT ABOVE THE LADDER RACK AND PROVIDED WITH A 7 - FT SO TYPE CORD WITH FEMALE NEMA L6 - 20R RECEPTACLE ON THE END. (BY DIV. 26)
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- ⑧ TYPICAL LIGHTING ORIENTATION, ENSURE THERE IS 50 FOOT CANDLES AT 2 - FEET ABOVE FINISHED FLOOR. (BY DIV. 26)
- ⑨ (3) 4 - INCH EMT CONDUIT SLEEVES ABOVE ACCESSIBLE CEILING WITH NYLON BUSHINGS ON EACH END AND SECURED TO WALL. CONDUIT SLEEVES SHALL BE SEALED ON THE EXTERIOR AND INTERIOR TO RETURN THE WALL BACK TO THE ORIGINAL RATING. IF WALL IS NOT RATED CONDUIT SHALL BE SEALED ON THE EXTERIOR AND INTERIOR TO REDUCE NOISE TRAVELING THROUGH THE PENETRATION. CONDUIT SLEEVES SHALL BE USED FOR LOW VOLTAGE DATA VOICE VIDEO AND SECURITY ONLY. (BY DIV. 26)

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Typical IDF Room Layout With Racks
SCALE: 1/2"=1'-0"

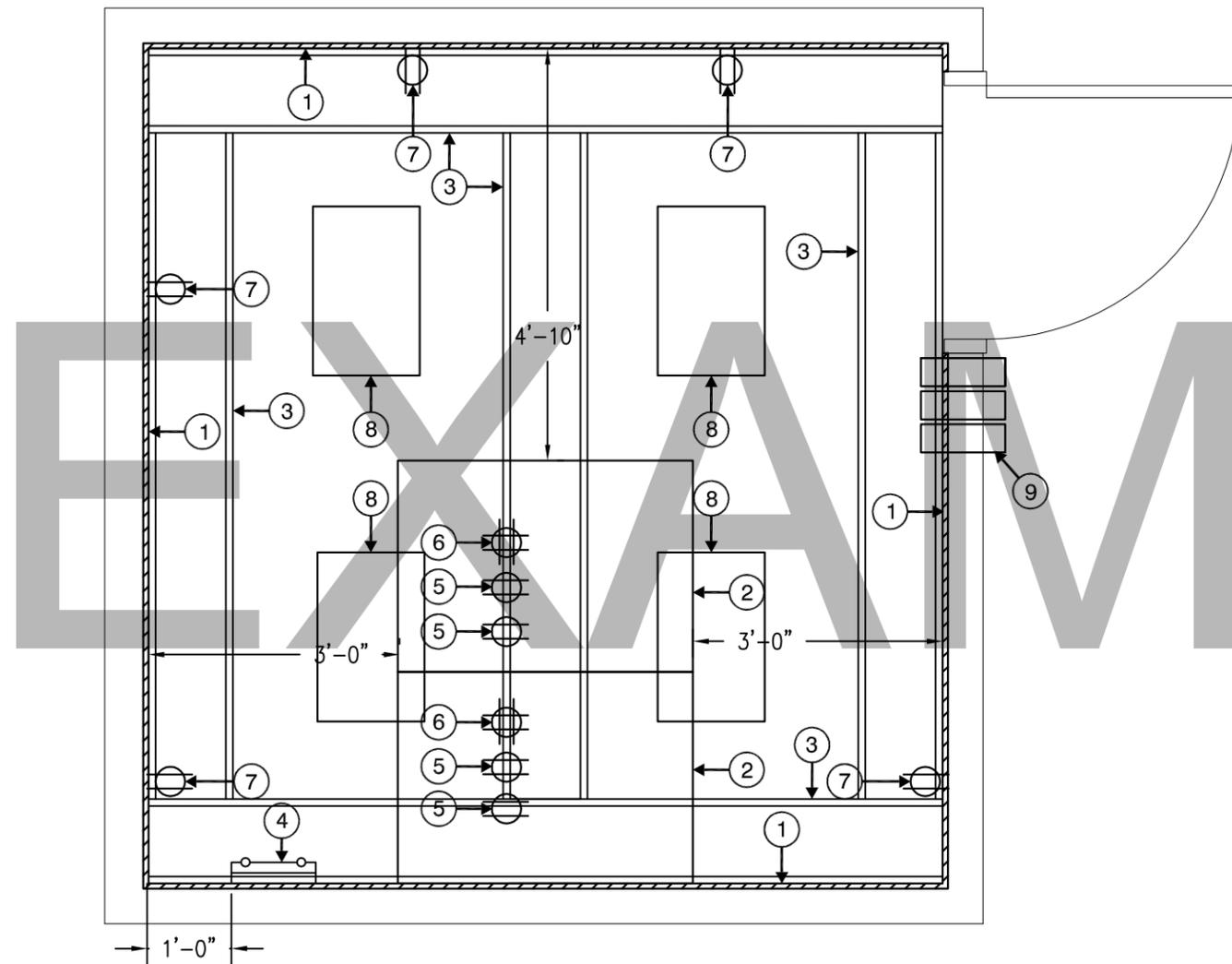


TYPICAL IDF ROOM RACK ELEVATION KEYED NOTES

- ① 19 - INCH X 84 - INCH EQUIPMENT RACK. (BY DIV. 27)
- ② DOUBLE - SIDED VERTICAL CABLE MANAGER. (BY DIV. 27)
- ③ RACK MOUNTED 48 - PORT FIBER OPTIC ENCLOSURE FOR SINGLE MODE FIBER OPTIC CABLE. (BY DIV. 27)
- ④ DOUBLE-SIDED HORIZONTAL CABLE MANAGER. (BY DIV. 27)
- ⑤ RACK MOUNTED 24 - PORT VOICE PATCH PANEL. (BY DIV. 27)
- ⑥ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR DATA. (BY DIV. 27)
- ⑦ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR WIRELESS ACCESS POINTS. (BY DIV. 27)
- ⑧ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR AUDIO VISUAL SYSTEMS. (BY DIV. 27)
- ⑨ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR IP SECURITY. (BY DIV. 27)
- ⑩ (4) RACK MOUNTED UNITS OF SPACE FOR OWNER PROVIDED / OWNER INSTALLED UPS. (BY DIV. 27)
- ⑪ DEDICATED 208 VAC 20 AMP CIRCUIT IN J-BOX MOUNTED TO UNISTRUT ABOVE THE LADDER RACK AND PROVIDED WITH A 7 - FT SO TYPE CORD WITH FEMALE NEMA L6 - 20R RECEPTACLE ON THE END. (BY DIV. 26)
- ⑫ DEDICATED 120 VAC 20 AMP CIRCUIT IN J-BOX MOUNTED TO UNISTRUT ABOVE THE LADDER RACK AND PROVIDED WITH A 7 - FT SO TYPE CORD WITH FEMALE NEMA 5 - 20R RECEPTACLE ON THE END. (BY DIV. 26)

① Typical IDF Rack Elevation

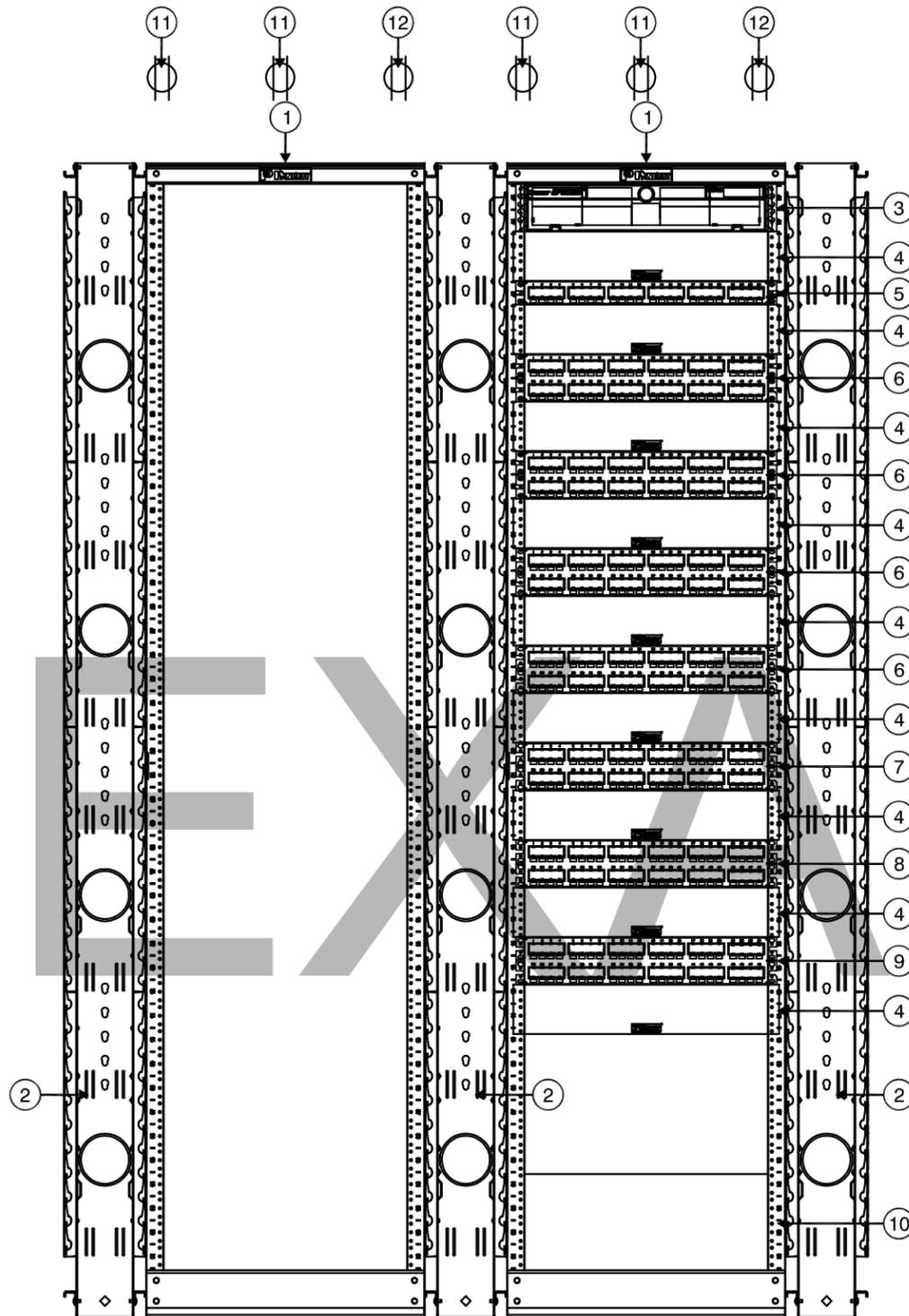
SCALE: 1"=1'-0"



TYPICAL IDF ROOM LAYOUT WITH CABINETS KEYED NOTES

- ① 4 - FEET X 8 - FEET X 3/4 - INCH AC GRADE VOID FREE FIRE RATED PLYWOOD INSTALLED VERTICALLY STARTING AT 12 - INCHES ABOVE FINISHED FLOOR ON ALL PERIMETER WALLS. THE PLYWOOD SHALL BE INSTALLED WITH THE "A" GRADE SIDE EXPOSED AND THE "C" GRADE SIDE AGAINST THE BUILDING WALL OR STRUCTURE. THE PLYWOOD SHALL BE PAINTED WITH TWO COATS OF FIRE RETARDANT PAINT AND ONE STAMP FROM EACH SHEET SHALL BE MASKED DURING THE PAINTING AND UNCOVERED AFTER THE PAINT HAS DRIED SO THE FIRE RATED PLYWOOD STAMPS ARE VISIBLE FOR INSPECTION. (BY DIV. 27)
- ② 27.6 - INCH X 84.6 - INCH TERAFRAME CABINET WITH VERTICAL CABLE MANAGERS. (BY DIV. 27)
- ③ 12 - INCH LADDER RACK MOUNTED AT 84 - INCHES ABOVE FINISHED FLOOR. (BY DIV. 27)
- ④ GROUND BUS BAR MOUNTED AT 78 - INCHES ABOVE FINISHED FLOOR. (BY DIV. 27)
- ⑤ DEDICATED 208 VAC 20 AMP CIRCUIT IN J-BOX MOUNTED TO UNISTRUT ABOVE THE LADDER RACK AND PROVIDED WITH A 7 - FT SO TYPE CORD WITH FEMALE NEMA L6 - 20R RECEPTACLE ON THE END. (BY DIV. 26)
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- ⑦ 20 AMP CIRCUIT WITH QUAD RECEPTACLE NEMA 5-20R FLUSH MOUNTED TO THE FINISHED WALL SURFACE AT 18 - INCHES ABOVE FINISHED FLOOR. OUTLETS SHALL BE SPACED NO FARTHER APART THAN 6 - FEET. MAXIMUM OF (6) PER CIRCUIT. (BY DIV. 26)
- ⑧ TYPICAL LIGHTING ORIENTATION, ENSURE THERE IS 50 FOOT CANDLES AT 2 - FEET ABOVE FINISHED FLOOR. (BY DIV. 26)
- ⑨ (3) 4 - INCH EMT CONDUIT SLEEVES ABOVE ACCESSIBLE CEILING WITH NYLON BUSHINGS ON EACH END AND SECURED TO WALL. CONDUIT SLEEVES SHALL BE SEALED ON THE EXTERIOR AND INTERIOR TO RETURN THE WALL BACK TO THE ORIGINAL RATING. IF WALL IS NOT RATED CONDUIT SHALL BE SEALED ON THE EXTERIOR AND INTERIOR TO REDUCE NOISE TRAVELING THROUGH THE PENETRATION. CONDUIT SLEEVES SHALL BE USED FOR LOW VOLTAGE DATA VOICE VIDEO AND SECURITY ONLY. (BY DIV. 26)

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Typical IDF Room Layout With Cabinets
SCALE: 1/2"=1'-0"



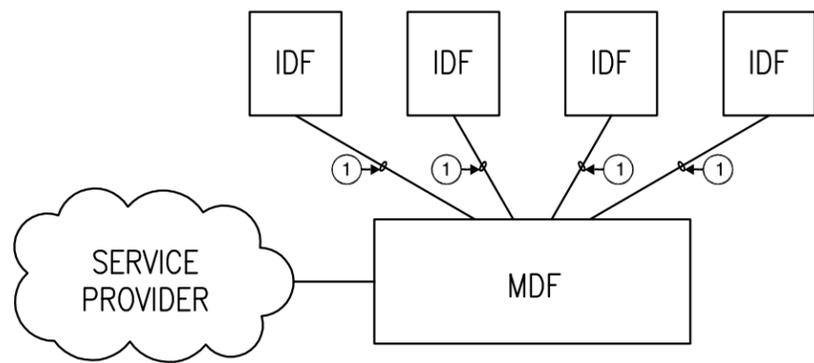
TYPICAL IDF ROOM CABINET ELEVATION KEYED NOTES

- ① 27.6 - INCH X 84.6 - INCH TERAFRAME CABINET. (BY DIV. 27)
- ② TERAFRAME DOUBLE - SIDED VERTICAL FINGER CABLE MANAGER. (BY DIV. 27)
- ③ RACK MOUNTED 48 - PORT FIBER OPTIC ENCLOSURE FOR SINGLE MODE FIBER OPTIC CABLE. (BY DIV. 27)
- ④ DOUBLE-SIDED HORIZONTAL CABLE MANAGER. (BY DIV. 27)
- ⑤ RACK MOUNTED 24 - PORT VOICE PATCH PANEL. (BY DIV. 27)
- ⑥ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR DATA. (BY DIV. 27)
- ⑦ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR WIRELESS ACCESS POINTS. (BY DIV. 27)
- ⑧ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR AUDIO VISUAL SYSTEMS. (BY DIV. 27)
- ⑨ RACK MOUNTED 48 - PORT CATEGORY 6 PATCH PANEL FOR IP SECURITY. (BY DIV. 27)
- ⑩ (4) RACK MOUNTED UNITS OF SPACE FOR OWNER PROVIDED / OWNER INSTALLED UPS. (BY DIV. 27)
- ⑪ DEDICATED 208 VAC 20 AMP CIRCUIT IN J-BOX MOUNTED TO UNISTRUT ABOVE THE LADDER RACK AND PROVIDED WITH A 7 - FT SO TYPE CORD WITH FEMALE NEMA L6 - 20R RECEPTACLE ON THE END. (BY DIV. 26)
- ⑫ DEDICATED 120 VAC 20 AMP CIRCUIT IN J-BOX MOUNTED TO UNISTRUT ABOVE THE LADDER RACK AND PROVIDED WITH A 7 - FT SO TYPE CORD WITH FEMALE NEMA 5 - 20R RECEPTACLE ON THE END. (BY DIV. 26)

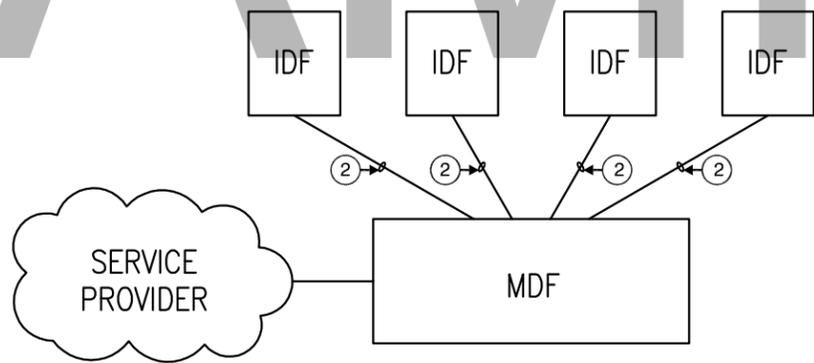
① Typical IDF Cabinet Elevation

SCALE: 1"=1'-0"

- ① CATEGORY 3 25-PAIR PLENUM
- ② ARMORED SINGLE MODE 24-STRAND PLENUM



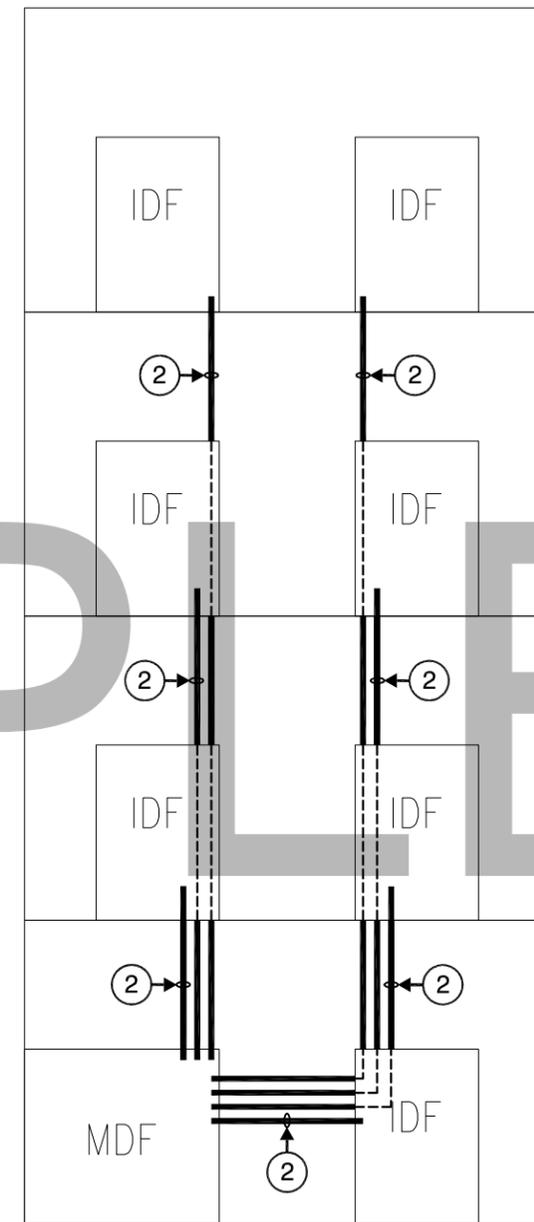
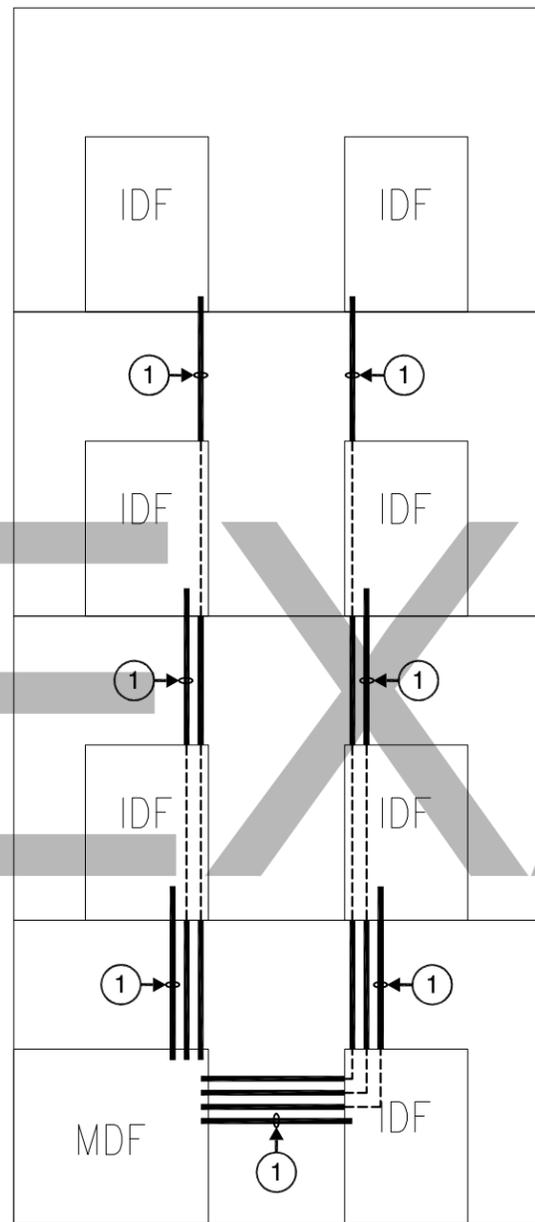
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Single Stand-Alone Building Copper Topology Diagram
SCALE: N.T.S.



①
xx
Single Stand-Alone Building Fiber Topology Diagram
SCALE: N.T.S.

EXAMPLE

- ① CATEGORY 3 25-PAIR PLENUM
- ② ARMORED SINGLE MODE 24-STRAND PLENUM

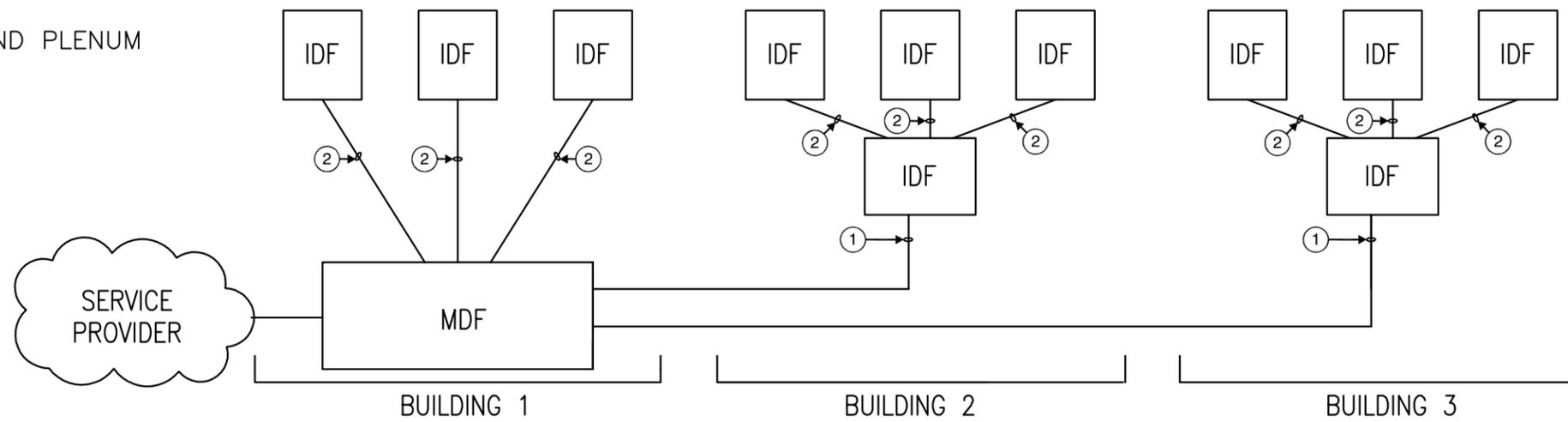


EXAMPLE

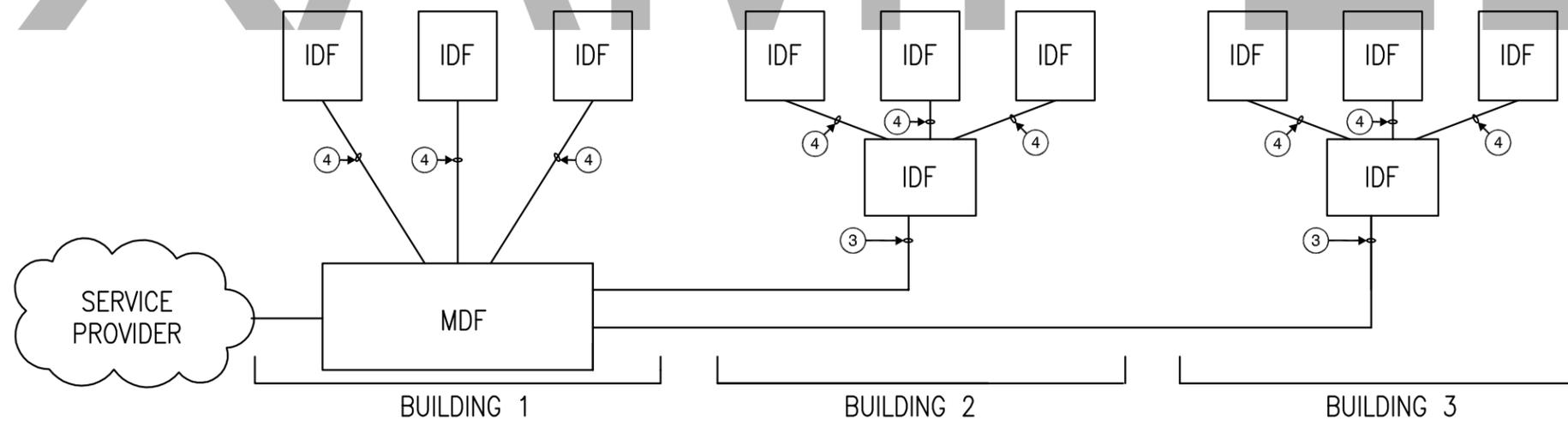
① Single Stand-Alone Building Copper Riser Diagram
 SCALE: N.T.S.

② Single Stand-Alone Building Fiber Riser Diagram
 SCALE: N.T.S.

- ① CATEGORY 3 25-PAIR OSP
- ② CATEGORY 3 25-PAIR PLENUM
- ③ ARMORED SINGLE MODE 48-STRAND INDOOR/OUTDOOR
- ④ ARMORED SINGLE MODE 24-STRAND PLENUM



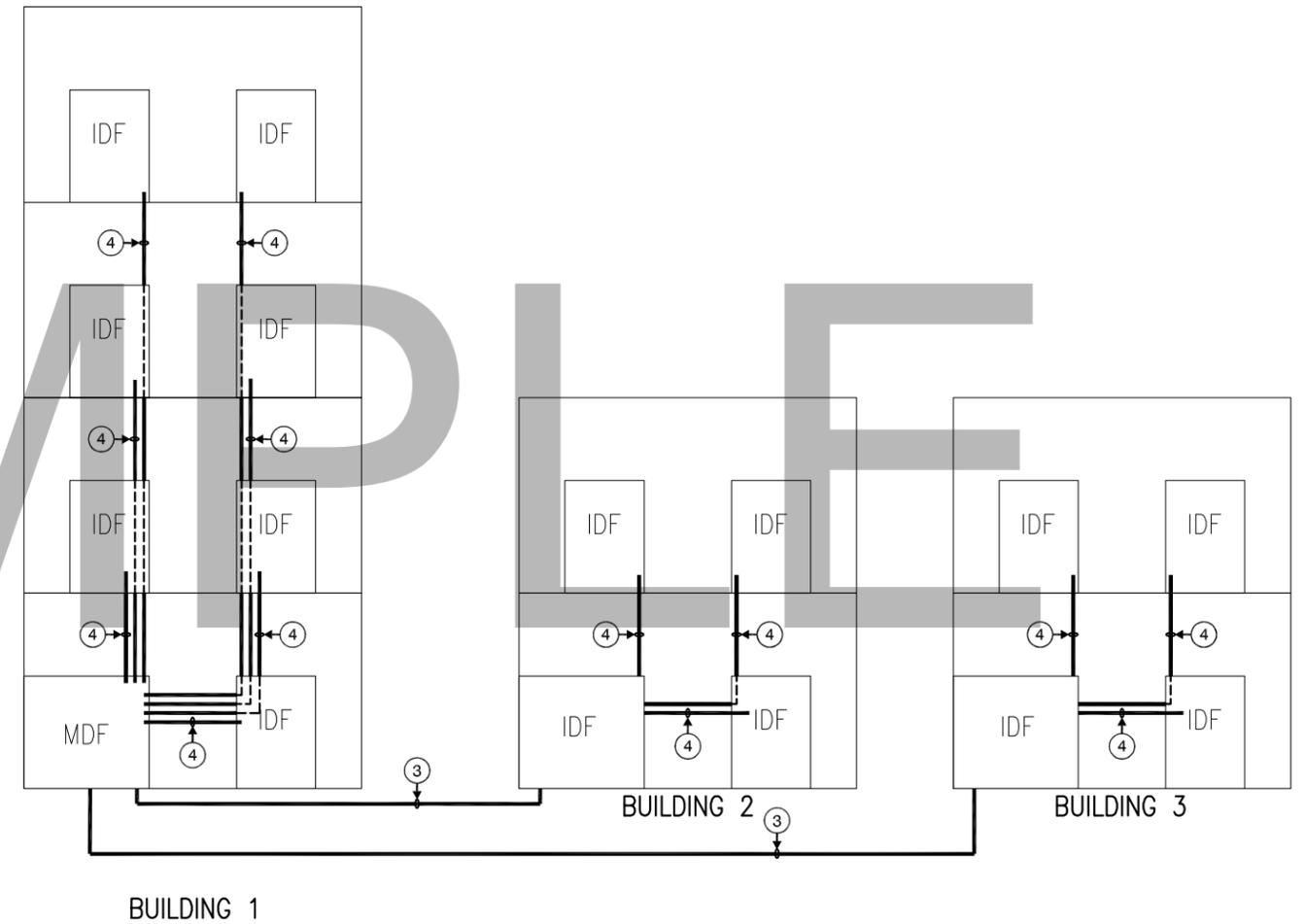
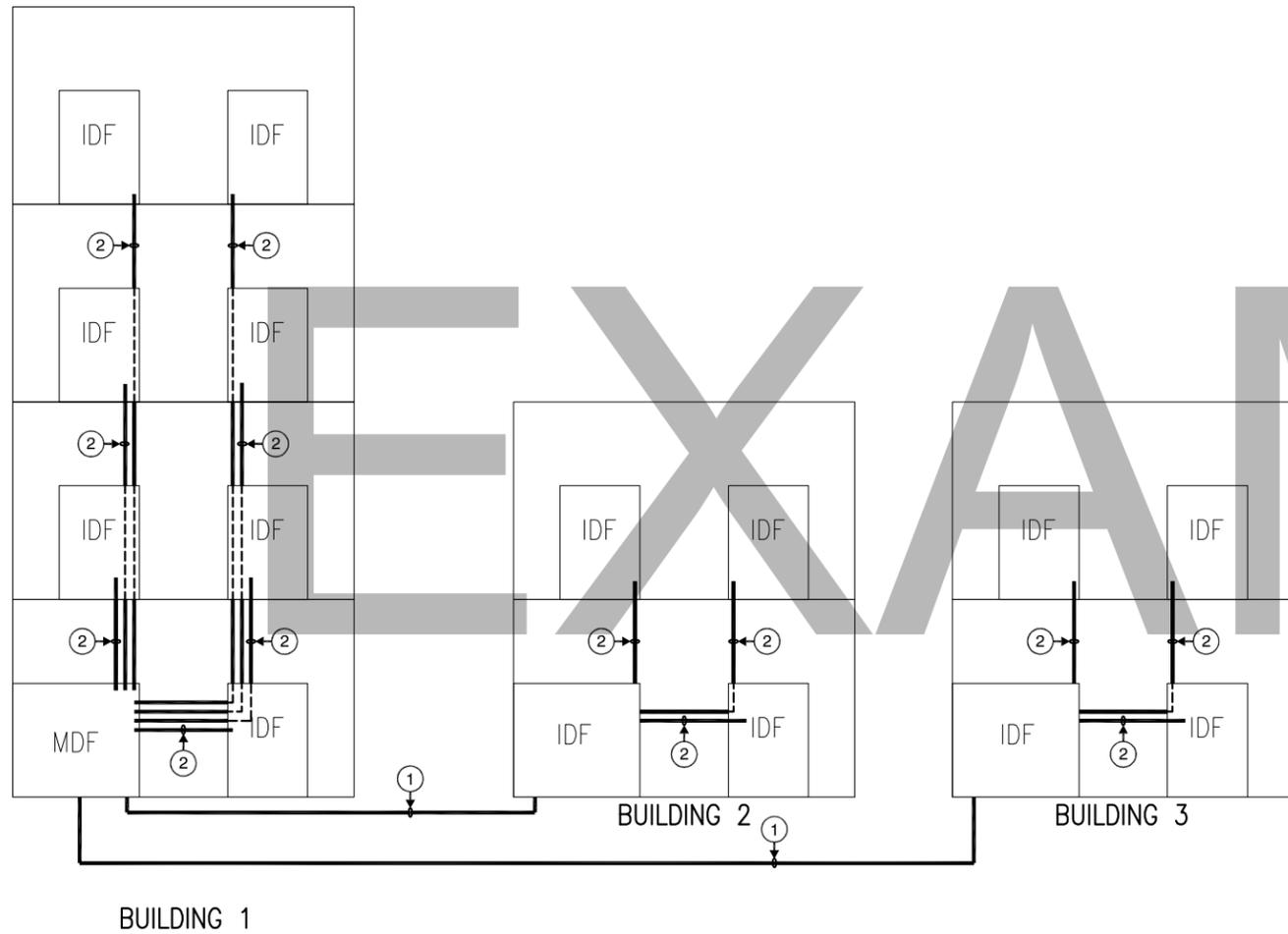
①
xx
Campus Copper Topology Diagram
SCALE: N.T.S.



②
xx
Campus Fiber Topology Diagram
SCALE: N.T.S.

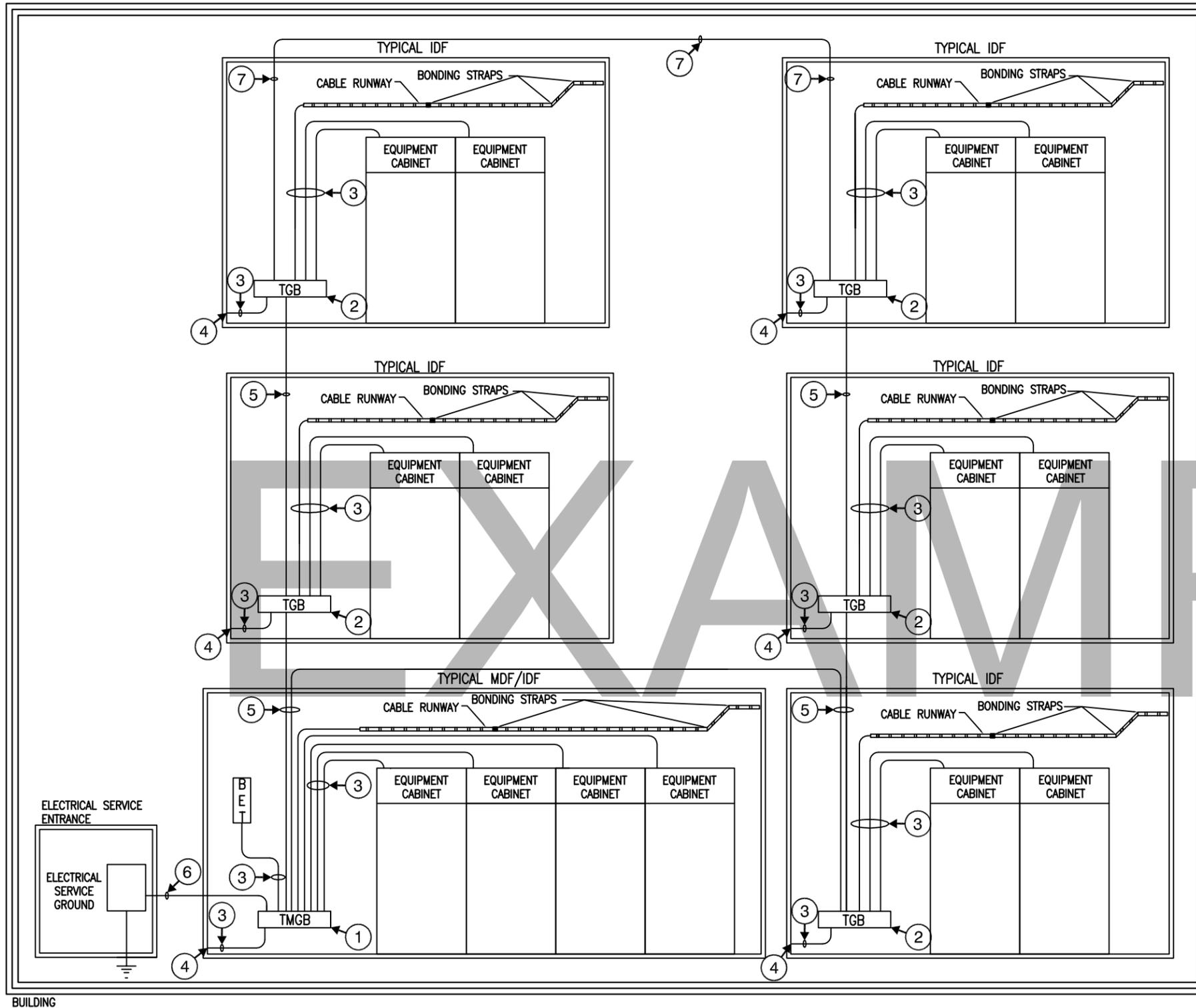
EXAMPLE

- ① CATEGORY 3 25-PAIR OSP
- ② CATEGORY 3 25-PAIR PLENUM
- ③ ARMORED SINGLE MODE 48-STRAND INDOOR/OUTDOOR
- ④ ARMORED SINGLE MODE 24-STRAND PLENUM



① Campus Copper Riser Diagram
 xx SCALE: N.T.S.

② Campus Fiber Riser Diagram
 xx SCALE: N.T.S.

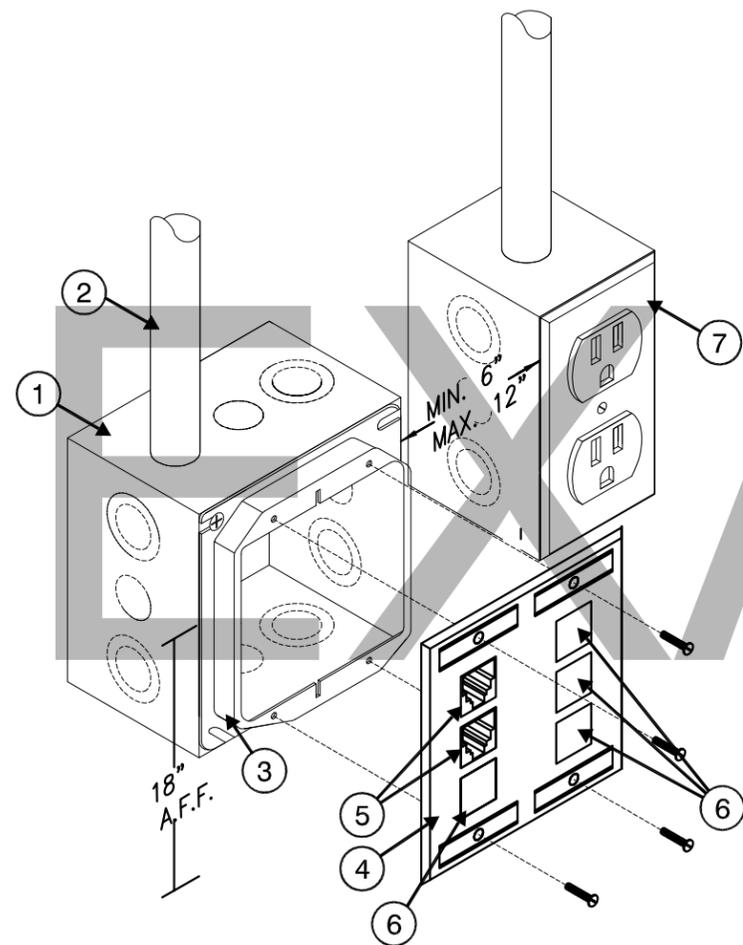


- ① TELECOMMUNICATIONS MAIN GROUNDING BUS BAR (TMGB)
- ② TELECOMMUNICATIONS GROUNDING BUS BAR (TGB)
- ③ TELECOMMUNICATIONS BONDING CONDUCTOR (TBC)
- ④ CONNECT TO GROUNDED BUILDING STEEL WHEN EXPOSED IN ROOM.
- ⑤ TELECOMMUNICATIONS BONDING BACKBONE (TBB)
- ⑥ TELECOMMUNICATIONS BONDING CONDUCTOR (TBC) BY ELECTRICAL CONTRACTOR
- ⑦ GROUNDING EQUALIZER CONDUCTOR (GEC)

TBB/GE linear length m (ft)	TBB/GE size (AWG)
less than 4 (13)	6
4 – 6 (14 – 20)	4
6 – 8 (21 – 26)	3
8 – 10 (27 – 33)	2
10 – 13 (34 – 41)	1
13 – 16 (42 – 52)	1/0
16 – 20 (53 – 66)	2/0
20 – 26 (67 – 84)	3/0
26 – 32 (85 – 105)	4/0
32 – 38 (106 – 125)	250 kcmil
38 – 46 (126 – 150)	300 kcmil
46 – 53 (151 – 175)	350 kcmil
53 – 76 (176 – 250)	500 kcmil
76 – 91 (251 – 300)	600 kcmil
Greater than 91 (301)	750 kcmil

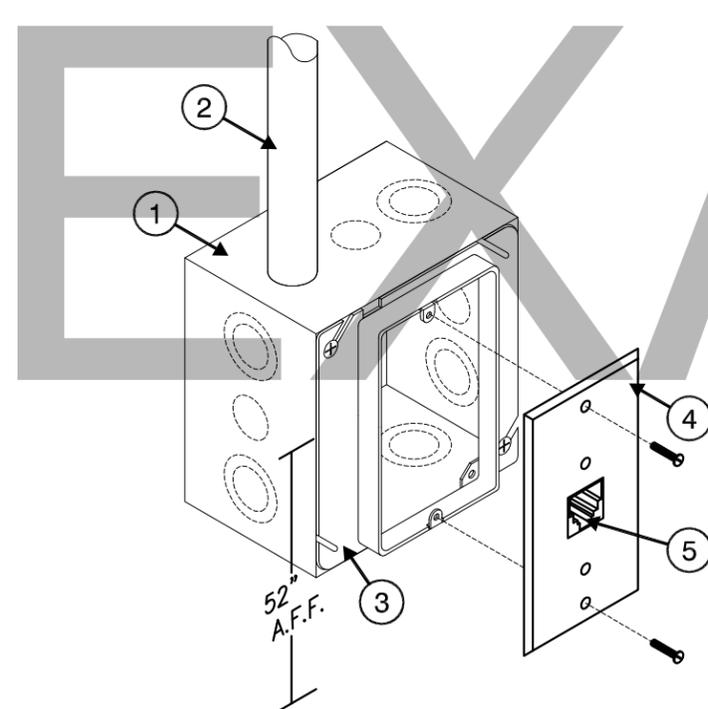
1 Typical Grounding Diagram

xx SCALE: N.T.S.



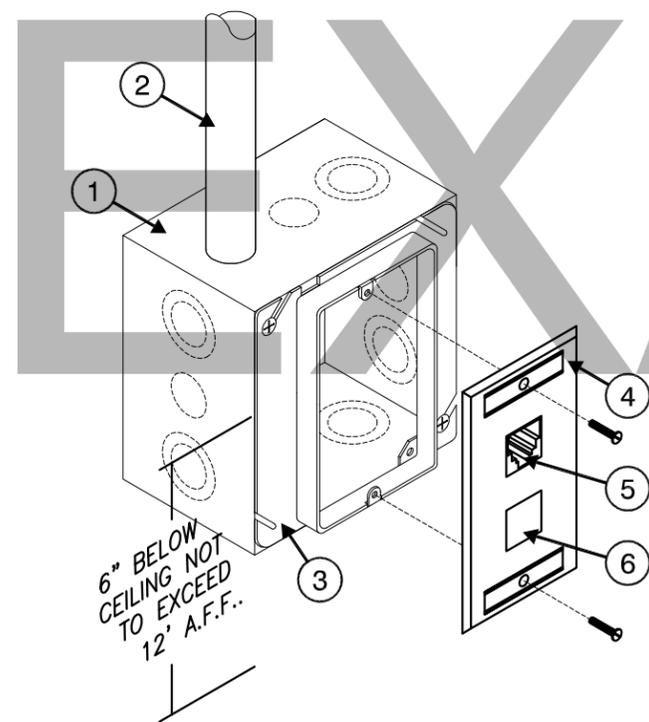
- ① 4 11/16" x 4 11/16" x 2 1/8" RECESSED DOUBLE GANG BOX (BY DIV 26)
- ② 1-INCH EMT CONDUIT FROM DOUBLE GANG BOX WITH 200 LBS PULL STRING AND NYLON BUSHING STUBBED OUT ABOVE ACCESSIBLE CEILING (BY DIV 26)
- ③ DOUBLE GANG PLASTER RING (BY DIV 26)
- ④ DOUBLE GANG WALL PLATE WITH DESIGNATION IN WINDOW (BY DIV 27)
- ⑤ DATA INSERT (BY DIV 27)
- ⑥ BLANK INSERT (BY DIV 27)
- ⑦ ELECTRICAL RECEPTACLE, GANG BOX AND CONDUIT SHOWN FOR REFERENCE ONLY (REFER TO DIV 26)

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XX
TYPICAL OFFICE WORKSTATION CONFIGURATION
SCALE: N.T.S.



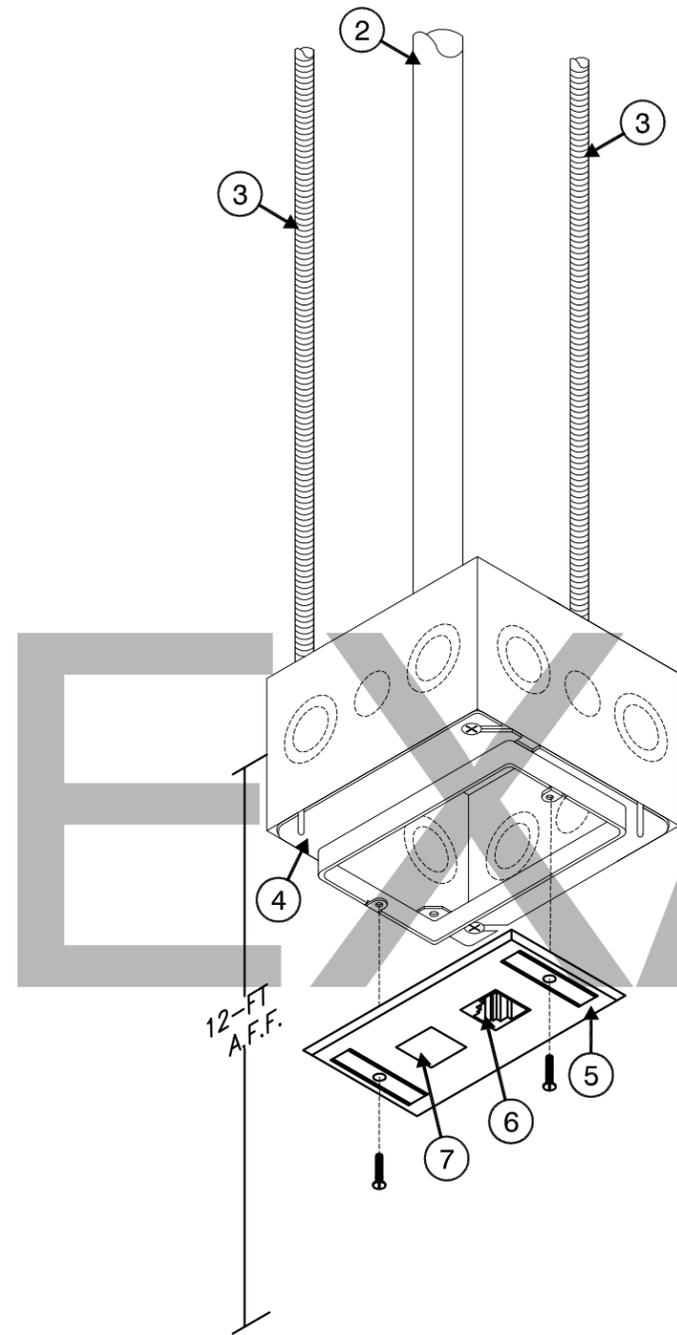
- ① 4 11/16" x 4 11/16" x 2 1/8" RECESSED DOUBLE GANG BOX (BY DIV 26)
- ② 1-INCH EMT CONDUIT FROM DOUBLE GANG BOX WITH 200 LBS PULL STRING AND NYLON BUSHING STUBBED OUT ABOVE ACCESSIBLE CEILING (BY DIV 26)
- ③ SINGLE GANG PLASTER RING (BY DIV 26)
- ④ SINGLE GANG WALL PLATE (BY DIV 27)
- ⑤ DATA INSERT (BY DIV 27)

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TYPICAL WALL PHONE CONFIGURATION
SCALE: N.T.S.



- ① 4 11/16" x 4 11/16" x 2 1/8" RECESSED DOUBLE GANG BOX (BY DIV 26)
- ② 1-INCH EMT CONDUIT FROM DOUBLE GANG BOX WITH 200 LBS PULL STRING AND NYLON BUSHING STUBBED OUT ABOVE ACCESSIBLE CEILING (BY DIV 26)
- ③ SINGLE GANG PLASTER RING (BY DIV 26)
- ④ SINGLE GANG WALL PLATE (BY DIV 27)
- ⑤ DATA INSERT (BY DIV 27)
- ⑥ BLANK INSERT (BY DIV 27)

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XX
TYPICAL WALL MOUNTED IP CAMERA/WIRELESS ACCESS POINT CONFIGURATION
SCALE: N.T.S.

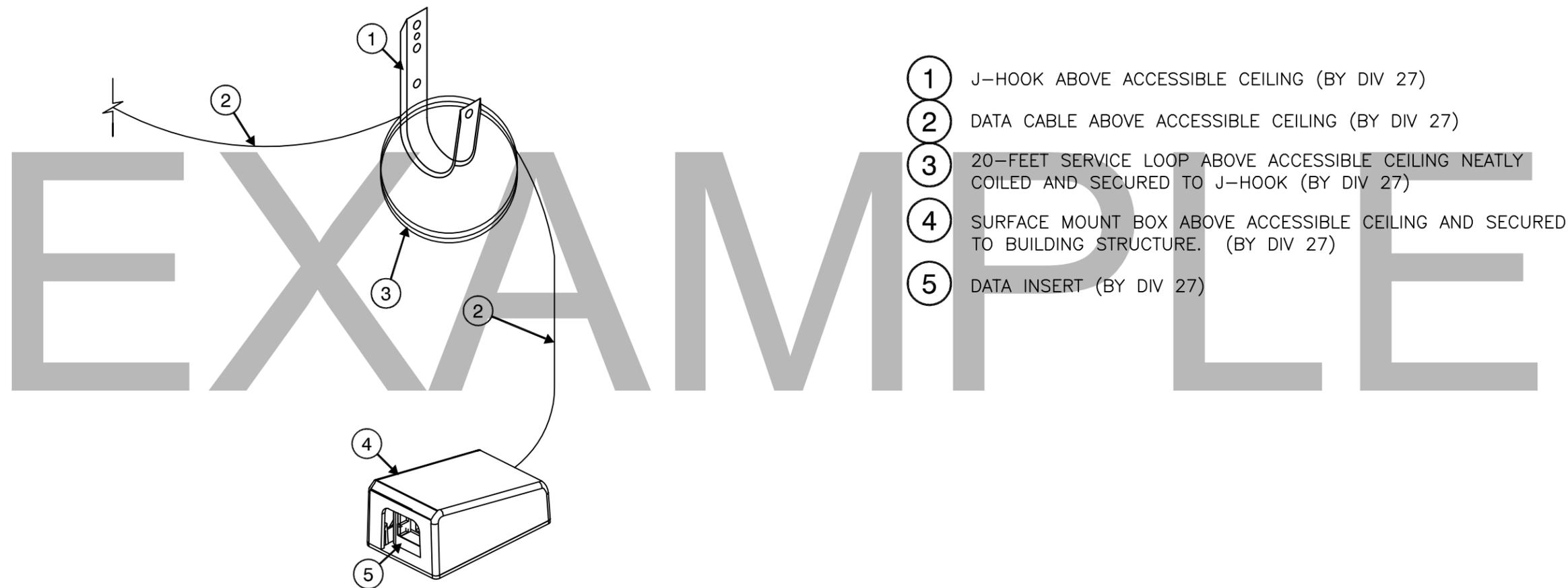


- ① 4 11/16" x 4 11/16" x 2 1/8" RECESSED DOUBLE GANG BOX (BY DIV 26)
- ② 1-INCH EMT CONDUIT FROM DOUBLE GANG BOX WITH 200 LBS PULL STRING AND NYLON BUSHING STUBBED OUT AT BUILDING STRUCTURE (BY DIV 26)
- ③ ALL THREAD TO BUILDING STRUCTURE.
- ④ SINGLE GANG PLASTER RING (BY DIV 26)
- ⑤ SINGLE GANG WALL PLATE (BY DIV 27)
- ⑥ DATA INSERT (BY DIV 27)
- ⑦ BLANK INSERT (BY DIV 27)

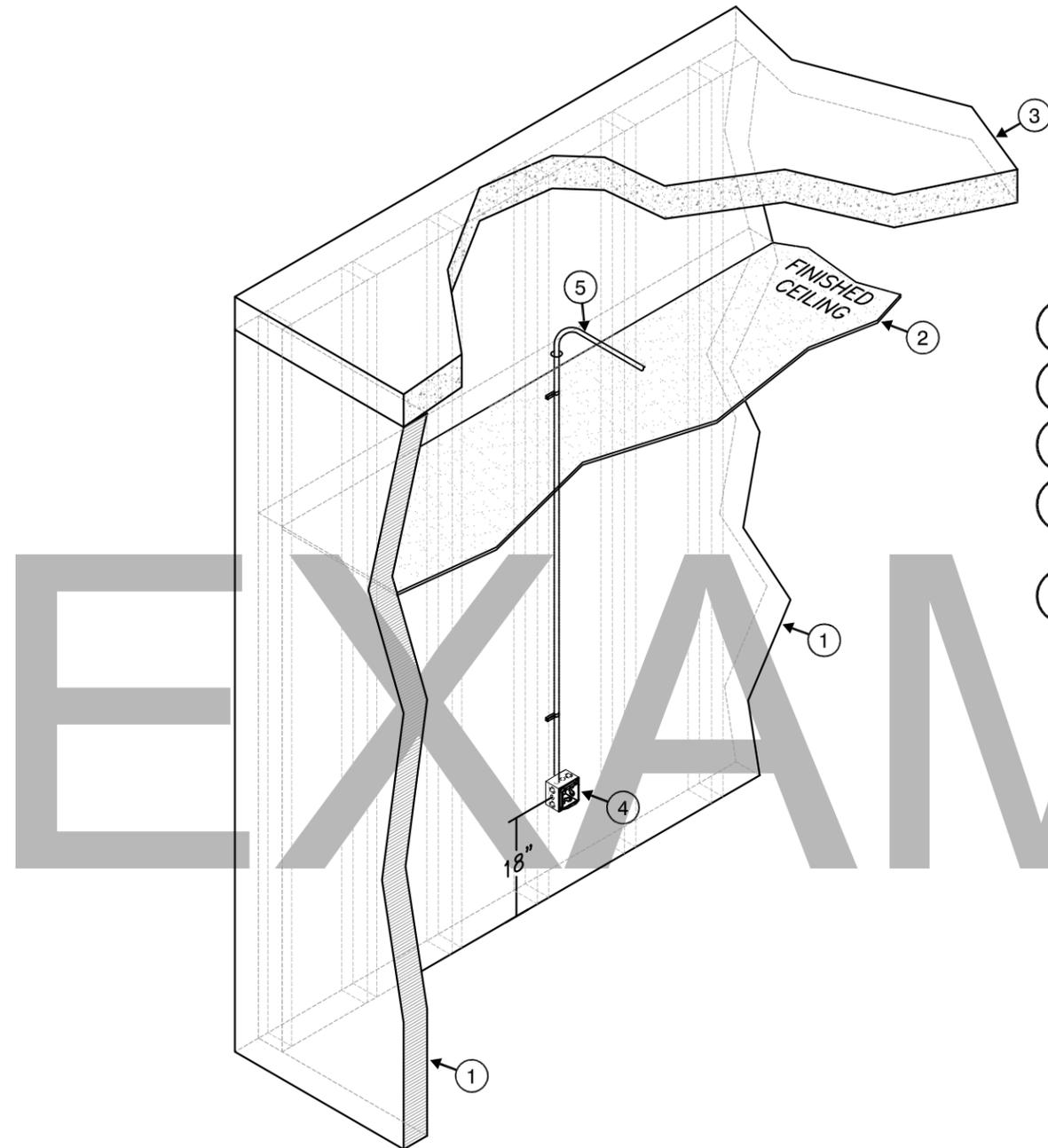
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TYPICAL STRUCTURE MOUNTED IP CAMERA/WIRELESS ACCESS POINT CONFIGURATION

SCALE: N.T.S.



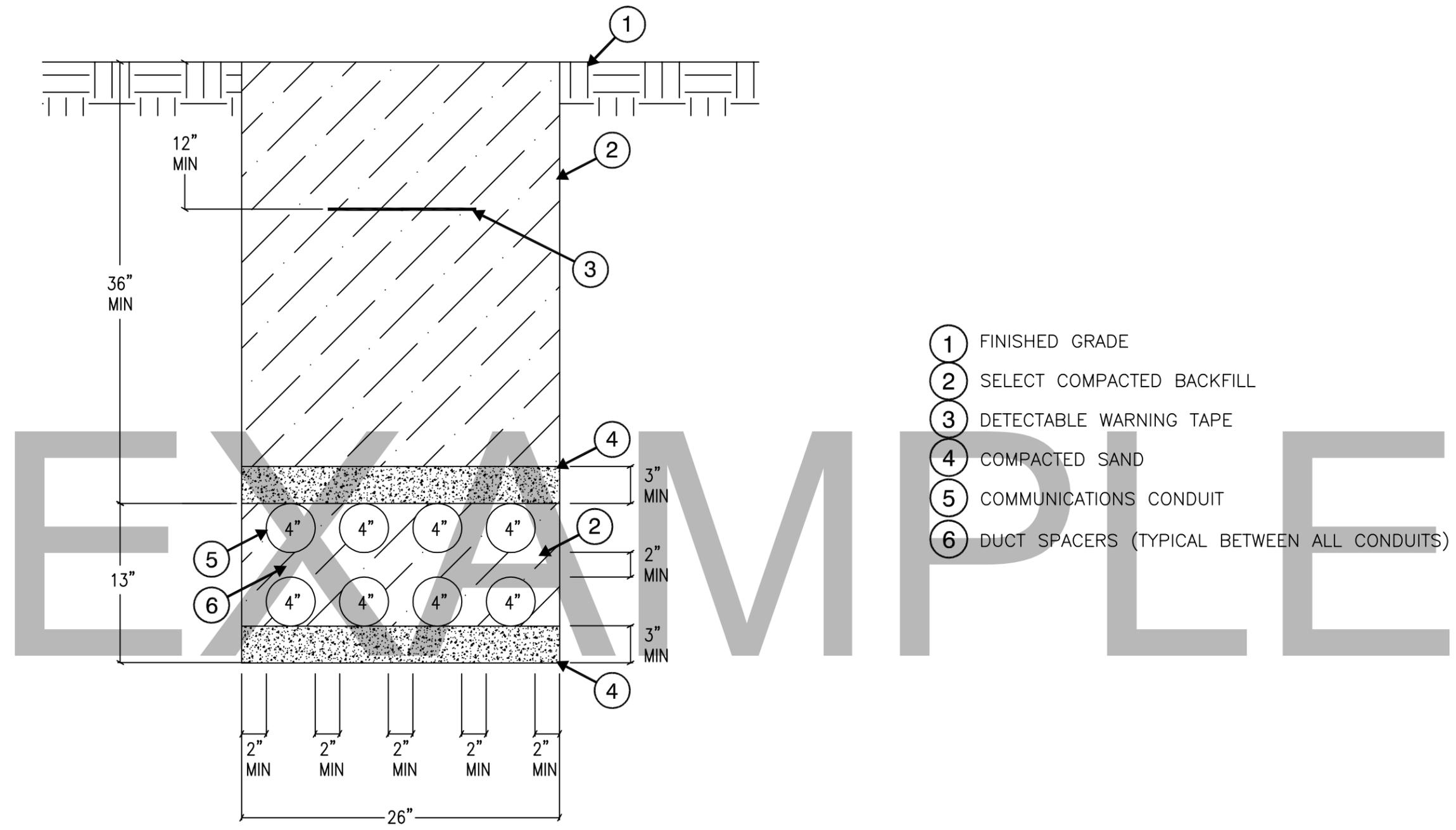
1
XX
TYPICAL ABOVE ACCESSIBLE CEILING DATA OUTLET
SCALE: N.T.S.



KEYED NOTES:

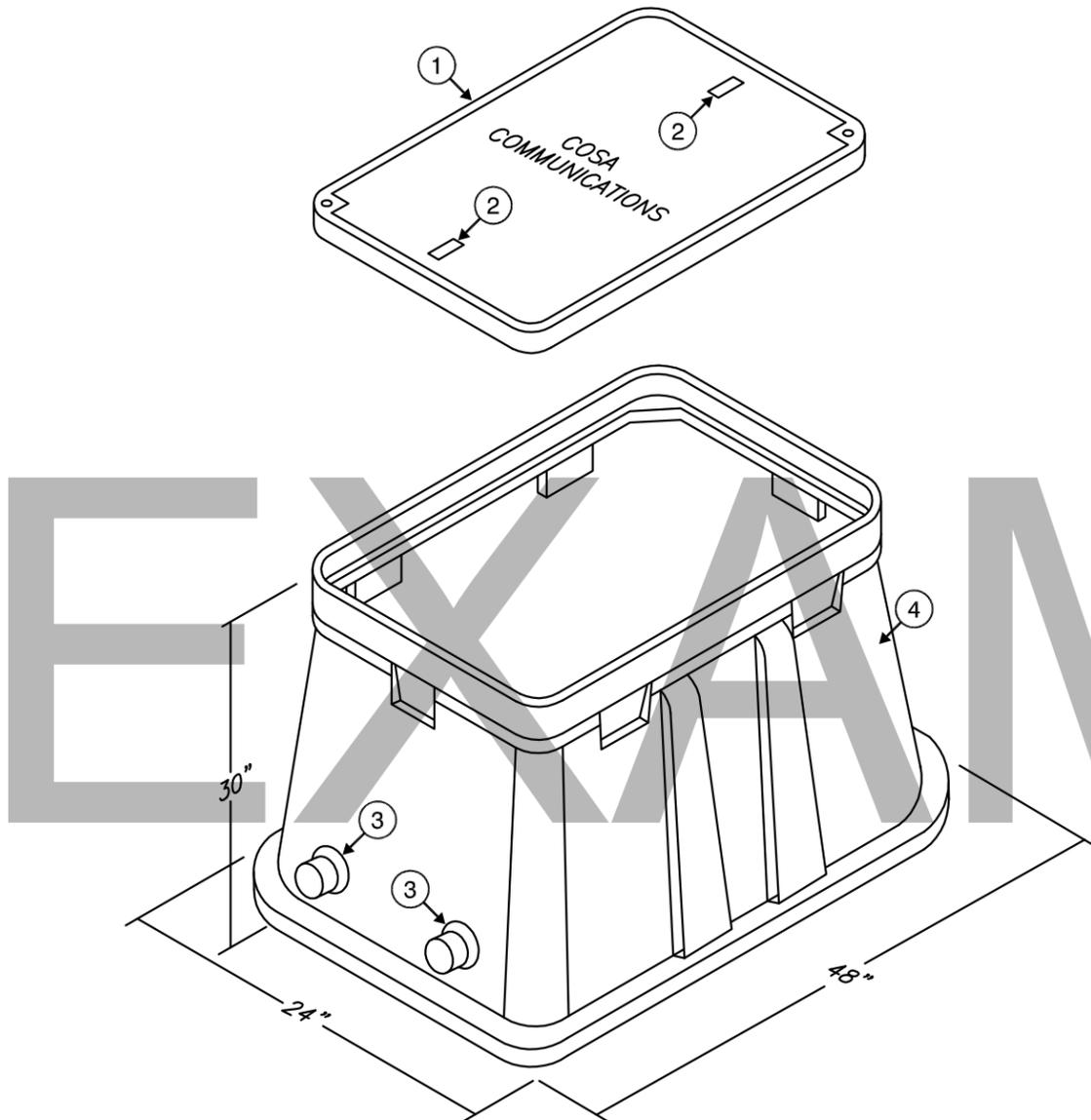
- ① SCHEDULED WALL.
- ② SCHEDULED CEILING.
- ③ SCHEDULED DECK ABOVE.
- ④ 4 11/16" x 4 11/16" x 2 1/8" RECESSED DOUBLE GANG BOX WITH DOUBLE GANG PLASTER RING (BY DIV 26)
- ⑤ 1-INCH EMT CONDUIT FROM DOUBLE GANG BOX WITH 200 LBS PULL STRING AND NYLON BUSHING STUBBED OUT ABOVE ACCESSIBLE CEILING IN THE SAME ROOM WHERE THE DEVICE IS LOCATED. IF THE ROOM WHERE THE DEVICE IS LOCATED DOES NOT HAVE AN ACCESSIBLE CEILING, THE CONDUIT SHALL ROUTE TO THE NEAREST ACCESSIBLE CEILING OFF OF A MAIN CORRIDOR. CONDUIT PATHWAY SHALL TAKE THE SHORTEST ROUTE TO THE APPLICABLE MDF/IDF ROOM TO MINIMIZE THE CABLE LENGTH. (BY DIV 26)

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TYPICAL TECHNOLOGY CONDUIT ROUGH-IN
SCALE: N.T.S.



- ① FINISHED GRADE
- ② SELECT COMPACTED BACKFILL
- ③ DETECTABLE WARNING TAPE
- ④ COMPACTED SAND
- ⑤ COMMUNICATIONS CONDUIT
- ⑥ DUCT SPACERS (TYPICAL BETWEEN ALL CONDUITS)

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XX
TYPICAL COMMUNICATIONS DUCT BANK DETAIL - (8) 4-INCH CONDUITS
SCALE: N.T.S.

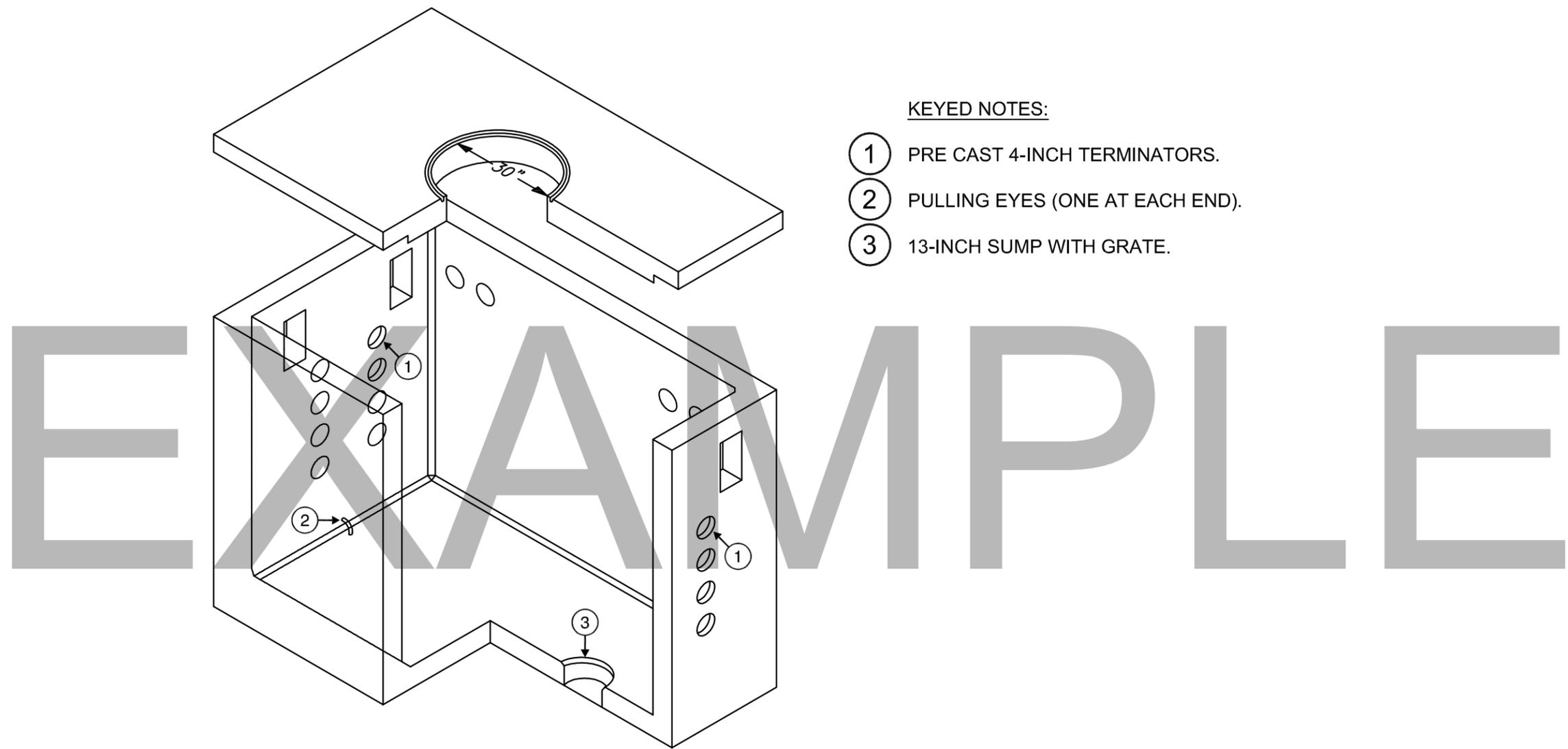


KEYED NOTES:

- ① 40-INCH X 18-INCH H2O COVER.
- ② LIFTING EYE.
- ③ 4-INCH TERMINATOR.
- ④ 48-INCH LONG X 24-INCH WIDE X 30-INCH DEEP H2O RATED HANDHOLE.

EXAMPLE

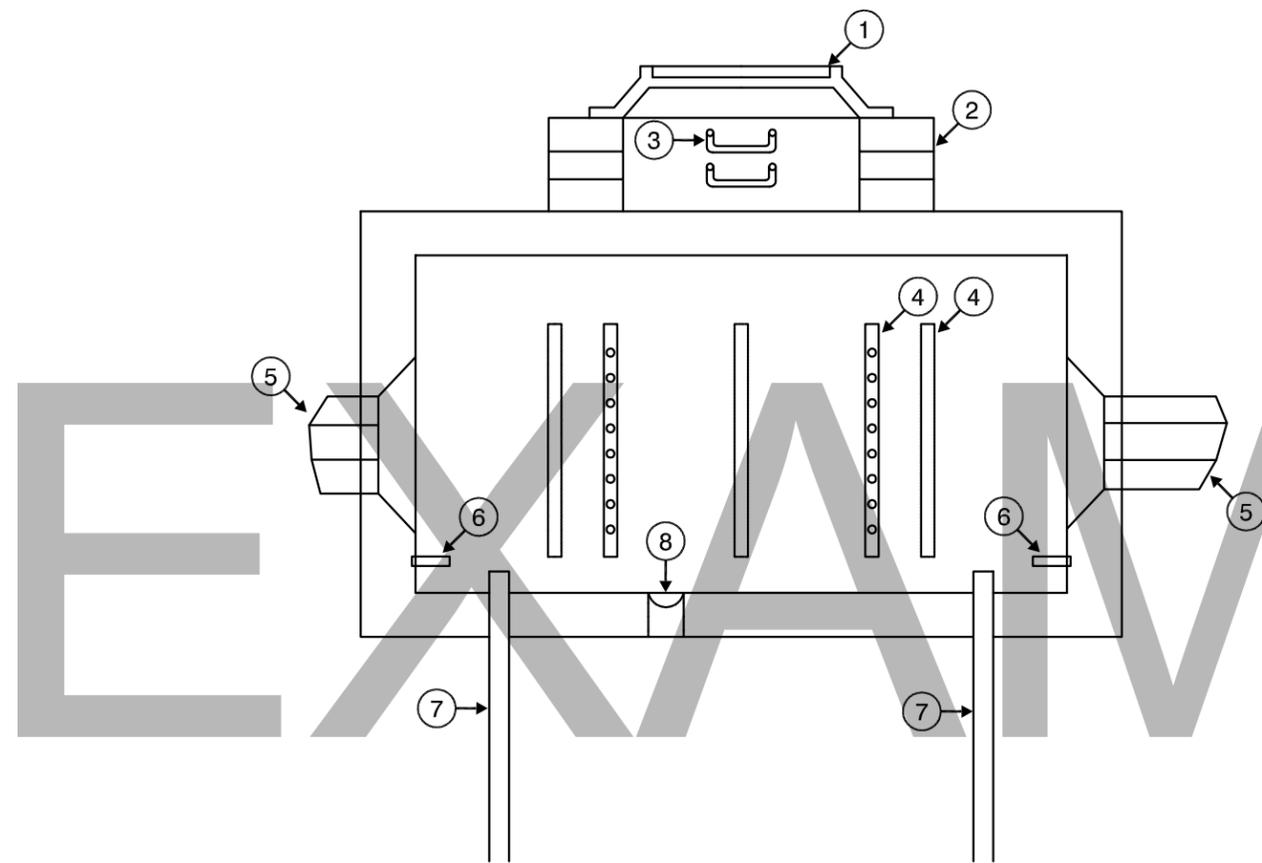
① TYPICAL TECHNOLOGY HANDHOLES (HH)
 XX SCALE: N.T.S.



KEYED NOTES:

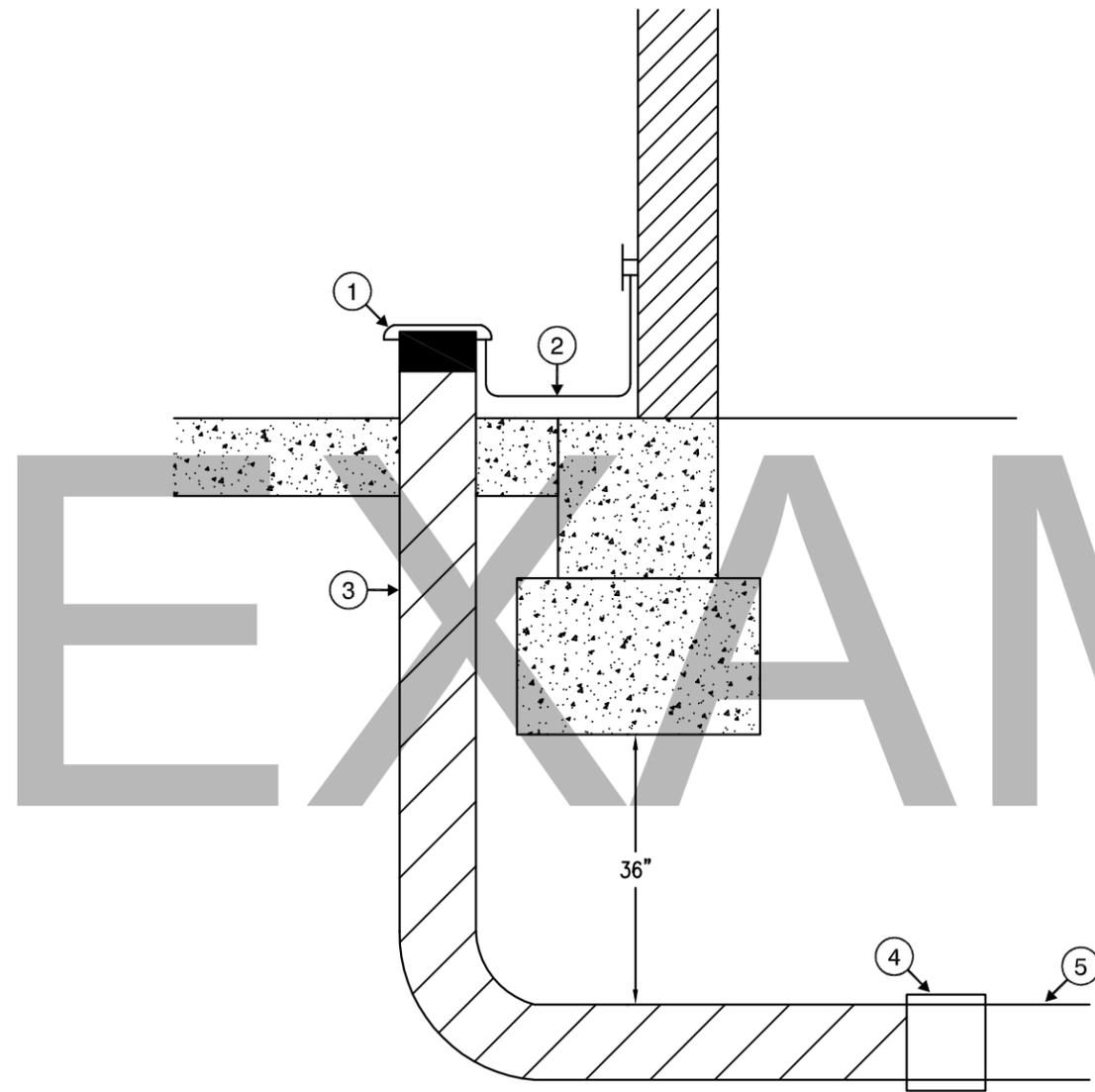
- ① PRE CAST 4-INCH TERMINATORS.
- ② PULLING EYES (ONE AT EACH END).
- ③ 13-INCH SUMP WITH GRATE.

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TYPICAL TECHNOLOGY MAINTENANCE HOLES (MH)
SCALE: N.T.S.



- KEYED NOTES:**
- ① H-20 RATED COVER.
 - ② PRE CAST COLLAR.
 - ③ STEPS (AS REQUIRED).
 - ④ CABLE RACKS.
 - ⑤ 4-INCH DUCTS.
 - ⑥ PULLING EYES.
 - ⑦ 3/4-INCH X 10-FT. GROUND ROD.
 - ⑧ 13-INCH SUMP WITH GRATE.

①
XX
TYPICAL TECHNOLOGY MAINTENANCE HOLES (MH)
SCALE: N.T.S.

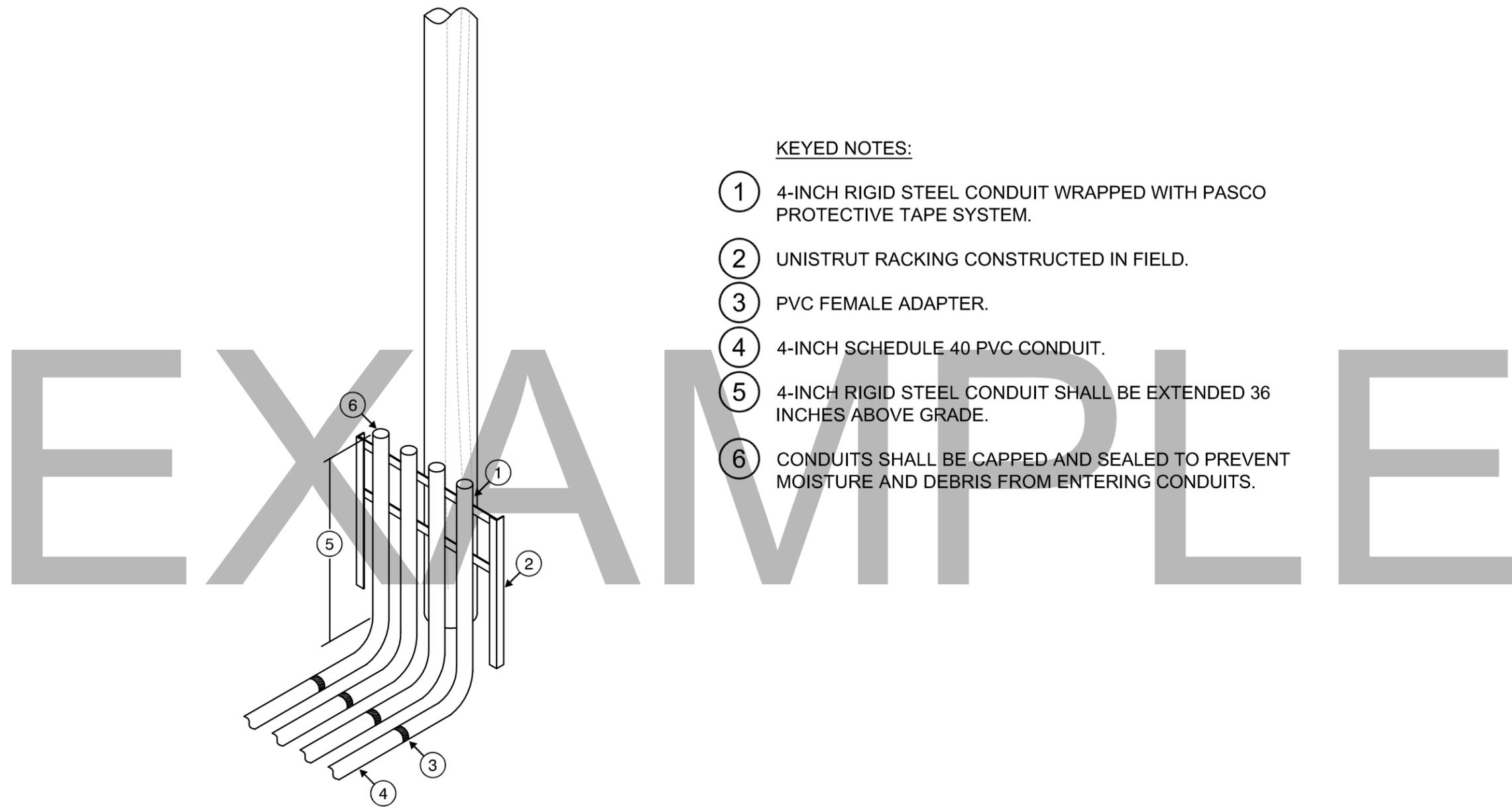


KEYED NOTES:

- ① GROUNDING BUSHING.
- ② #6 GROUND WIRE TO TMGB/TGB.
- ③ 4-INCH RIGID STEEL CONDUIT WRAPPED WITH PASCO PROTECTIVE TAPE SYSTEM.
- ④ PVC FEMALE ADAPTER.
- ⑤ SCHEDULE 40 PVC.

EXAMPLE

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TYPICAL TECHNOLOGY DUCT ENTRY INTO BUILDING
SCALE: N.T.S.

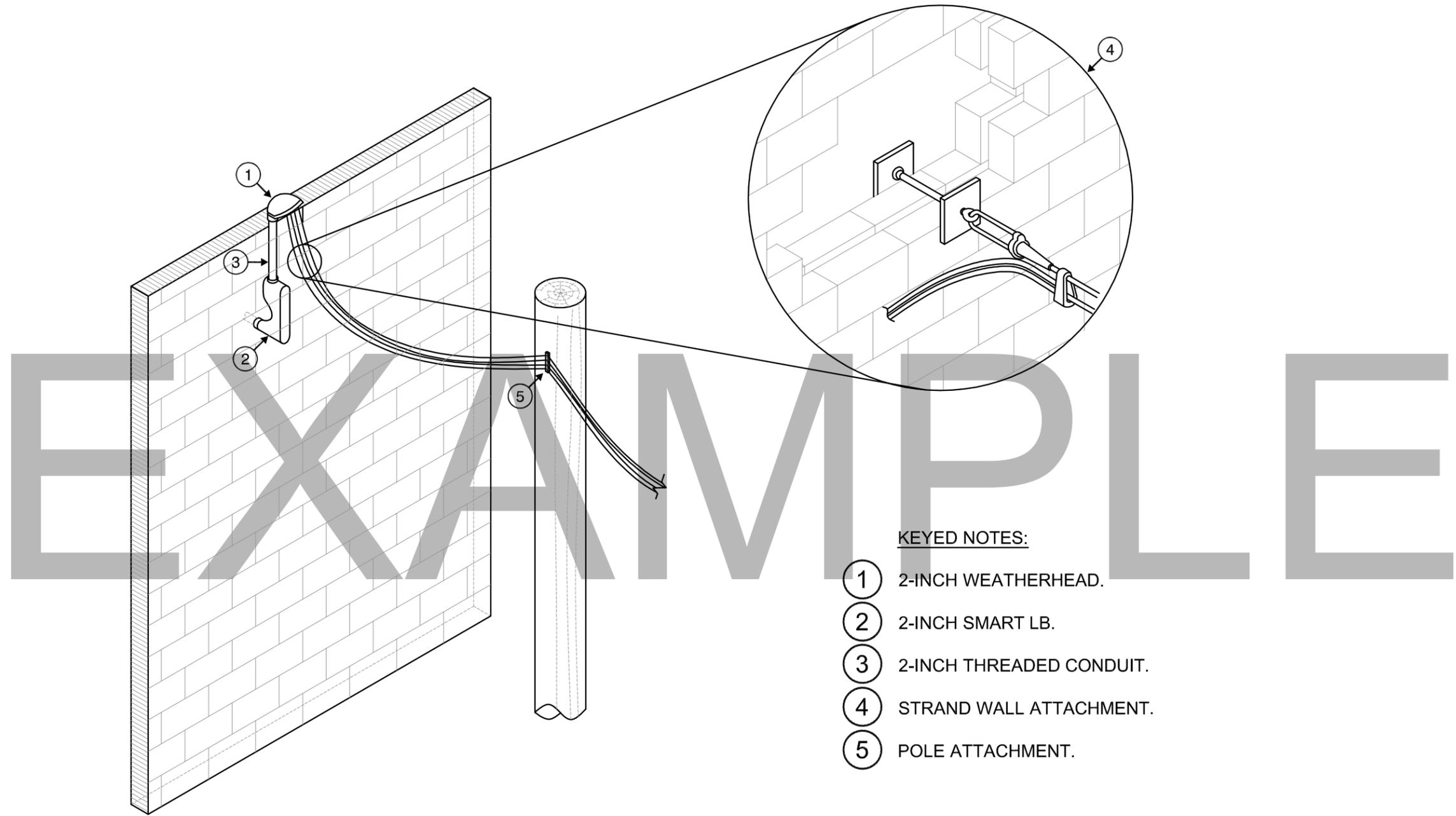


KEYED NOTES:

- ① 4-INCH RIGID STEEL CONDUIT WRAPPED WITH PASCO PROTECTIVE TAPE SYSTEM.
- ② UNISTRUT RACKING CONSTRUCTED IN FIELD.
- ③ PVC FEMALE ADAPTER.
- ④ 4-INCH SCHEDULE 40 PVC CONDUIT.
- ⑤ 4-INCH RIGID STEEL CONDUIT SHALL BE EXTENDED 36 INCHES ABOVE GRADE.
- ⑥ CONDUITS SHALL BE CAPPED AND SEALED TO PREVENT MOISTURE AND DEBRIS FROM ENTERING CONDUITS.

EXAMPLE

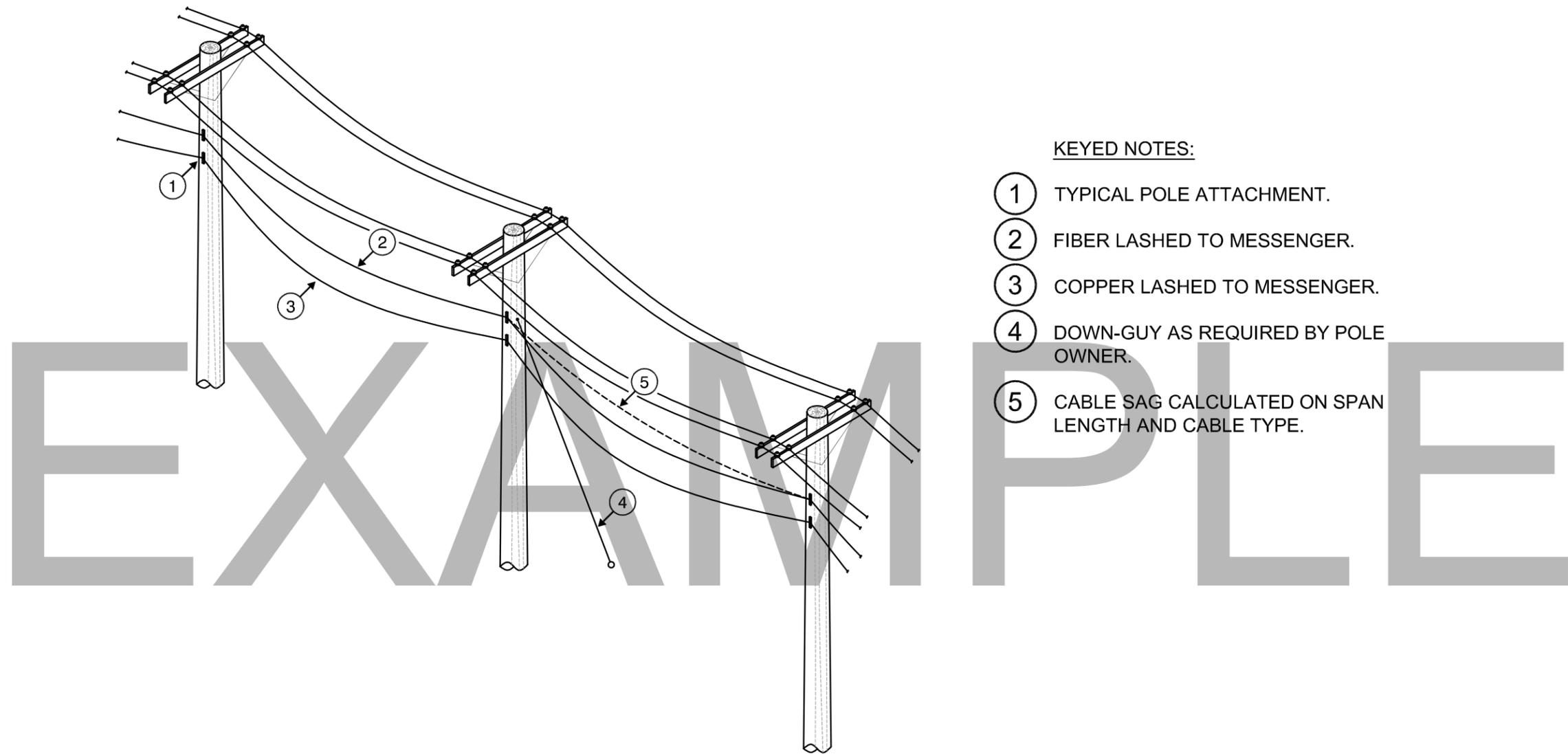
① TYPICAL POLE RISER
 XX
 SCALE: N.T.S.



KEYED NOTES:

- ① 2-INCH WEATHERHEAD.
- ② 2-INCH SMART LB.
- ③ 2-INCH THREADED CONDUIT.
- ④ STRAND WALL ATTACHMENT.
- ⑤ POLE ATTACHMENT.

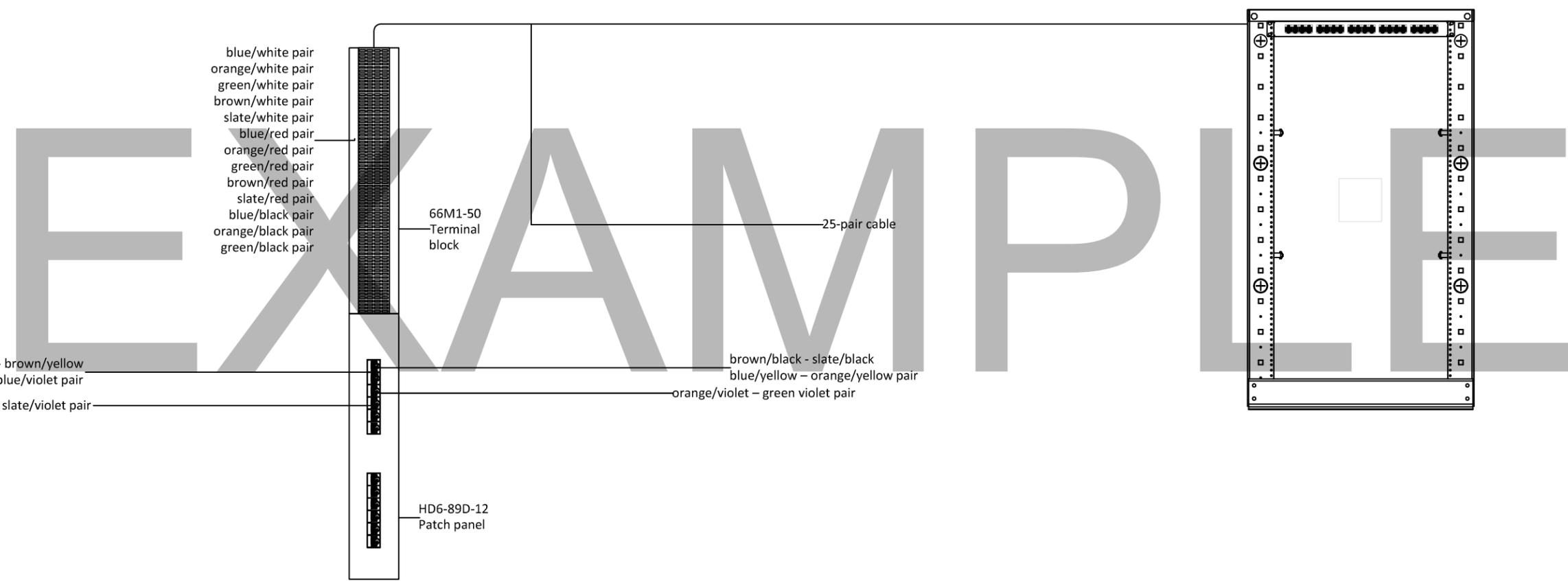
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XX
TYPICAL AERIAL BUILDING ENTRANCE
SCALE: N.T.S.



KEYED NOTES:

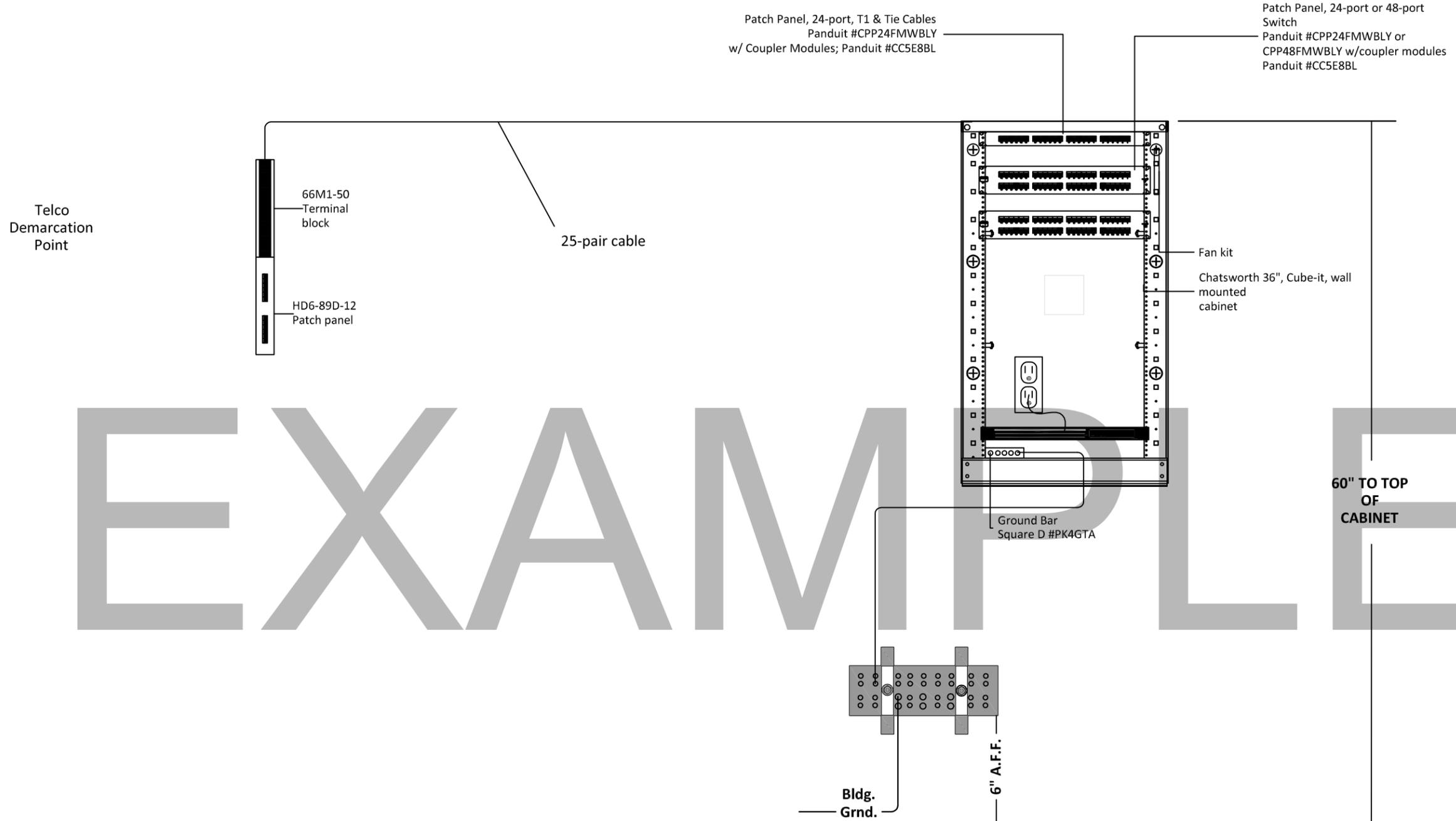
- ① TYPICAL POLE ATTACHMENT.
- ② FIBER LASHED TO MESSENGER.
- ③ COPPER LASHED TO MESSENGER.
- ④ DOWN-GUY AS REQUIRED BY POLE OWNER.
- ⑤ CABLE SAG CALCULATED ON SPAN LENGTH AND CABLE TYPE.

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TYPICAL AERIAL SPAN
SCALE: N.T.S.



EXAMPLE

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XX
TYPICAL TELCO DEMARCATION CABLE TERMINATION DETAIL
SCALE: N.T.S.



EXAMPLE

1
XX
TYPICAL CHATSWORTH CUBE-IT INSTALLATION
SCALE: N.T.S.