



May 20, 2019

Cara Bertron  
City of Austin Historical Commission

Elizabeth Brummett  
Texas Historical Commission

## Methodology of Moonlight Tower Part Fabrication and Replacement

NA150000018 – Inspection, Repair, and Restoration of Moonlight Towers (Austin, Texas)

Ms. Bertron and Ms. Brummett:

*Enertech Resources* is pleased to submit this letter to summarize the restoration project of the seventeen (17) Moonlight Towers located in Austin, Texas. To date, eight (8) towers (Towers 17, 10, 13, 12, 15, 3, 16 and 8) have been decommissioned. Using completely restored original parts, five towers (17, 10, 13, 12 and 15) have been reinstalled in their designated locations. Most parts from Tower 3, 16 and 8 were utilized in the restoration and reinstallation of the first 5 towers. *Enertech* has requested to fabricate new parts in order restore the twelve (12) remaining Moonlight Towers while maintaining a certain (minimum) percentage of original parts in each tower.

The process of restoring a Moonlight Tower includes tower decommission, disassembly, sandblasting, visual inspection and non-destructive testing (NDT). Sandblasted parts which are deemed acceptable by visual and NDT will be painted and reused in restoring process. The failing parts will be replaced by newly fabricated components.

Facilities using green sand-casting are not available at this time due to the member tolerances required. Modern manufacturing methods such as milling and modern casting procedures shall be utilized to provide the new fabricated star posts and sockets.

To ensure the remaining twelve (12) towers will be restored with the largest percentage of original parts possible. *Enertech* has determined the following process to determine approximate quantity of required parts fabrication and replacement by taking the following steps, (see attached table):

- Summarizing the total quantities of each part per tower.
- Assumed 40% failing rate based on current observation for nine (9) towers and 100% failing rate for the three (3) completely consumed towers.
- Estimated the maximum percentage of original parts distributed to remaining twelve (12) towers
- Determining the required quantities for new fabrication parts

With this proposed restoration methodology, the overall percentage of original parts for the remaining twelve (12) Moonlight Towers is estimated to be approximately 40%. Please note the actual failing rate may vary among towers, the final percentages are subject to change.

Sincerely,

Gilbert Martinez  
Project Manager

Attachment:

Moonlight Tower – Estimated Quantities of Refabricated Parts

cc:

Michael Pittman (Austin Energy)



## **Moonlight Tower Locations:**

### **Tower 1 – (Eastside/Leland)**

Scheduled for Restoration 2019

### **Tower 2 – (1<sup>st</sup>/W. Monroe) –**

Scheduled for Restoration 2020

### **Tower 3 – (3<sup>rd</sup>/Trinity)**

Decommissioned between 2004-2009 as noted in Historical Notes

Stored from 2009 to 2015 at Austin Energy Surplus Yard

All tower parts consumed in the restoration of first five (5) towers of current restoration work.

**No Final Location has been defined.**

Scheduled for Restoration 2022

### **Tower 4 – (9<sup>th</sup>/Guadalupe) –**

Scheduled for Restoration 2021

### **Tower 5 – (12<sup>th</sup>/Blanco)**

Scheduled for Restoration 2019

### **Tower 6 – (12<sup>th</sup>/Rio Grande) –**

Scheduled for Restoration 2021

### **Tower 7 – (15<sup>th</sup>/San Antonio) –**

Scheduled for Restoration 2021

### **Tower 8 – (22<sup>nd</sup>/Nueces)**

Decommissioned 2017 to make room for local construction project

All tower parts consumed in the restoration of first five (5) towers of current restoration work.

Scheduled for Restoration 2022

### **Tower 9 – (41<sup>st</sup>/Speedway)**

Scheduled for Restoration 2020

### **Tower 10 – (Zilker Park)**

Restoration Complete 100% Original Parts (2016)

### **Tower 11 – (MLK/Chicon) –**

Scheduled for Restoration 2020



**Tower 12 – (13<sup>th</sup>/Coletto) –**

Restoration Complete 100% Original Parts (2017)

**Tower 13 – (Pennsylvania/Leona)**

Restoration Complete 100% Original Parts (2016)

**Tower 14 – (11<sup>th</sup>/Trinity) –**

Scheduled for Restoration 2020

**Tower 15 – (11<sup>th</sup>/Lydia)**

Restoration Complete 100% Original Parts (2017)

**Tower 16 – (1<sup>st</sup>/Trinity)**

Decommissioned in 2008-2009 for Construction of Convention Center

Stored from 2009 to 2015 at Austin Energy Surplus Yard

All tower parts consumed in the restoration of first five (5) towers of current restoration work.

**No Final Location has been defined.**

Scheduled for Restoration 2022

**Tower 17 – (Canterbury/Lynn)**

Restoration Complete 100% Original Parts (2016)

Moonlight Tower - Estimated Quantities of Refabrication Parts

Star Post

Tower No.	1 1/2" Horizontal				2" Horizontal				2" Vertical				2 1/2" Vertical			
	Original	Refabricated	Total	Original Percentage	Original	Refabricated	Total	Original Percentage	Original	Refabricated	Total	Original Percentage	Original	Refabricated	Total	Original Percentage
1	6	3	9	67%	14	19	33	42%	6	3	9	67%	13	17	30	43%
5	6	12	18	33%	14	19	33	42%	6	12	18	33%	13	17	30	43%
9	6	9	15	40%	14	19	33	42%	6	9	15	40%	13	17	30	43%
2	6	12	18	33%	14	19	33	42%	6	12	18	33%	13	17	30	43%
11	6	12	18	33%	14	19	33	42%	6	12	18	33%	13	17	30	43%
14	6	9	15	40%	14	19	33	42%	6	9	15	40%	13	17	30	43%
6	6	9	15	40%	14	19	33	42%	6	9	15	40%	13	17	30	43%
7	6	9	15	40%	14	19	33	42%	6	9	15	40%	13	17	30	43%
4	6	9	15	40%	14	19	33	42%	6	9	15	40%	13	17	30	43%
3	6	12	18	33%	14	19	33	42%	6	12	18	33%	13	17	30	43%
16	6	12	18	33%	14	19	33	42%	6	12	18	33%	13	17	30	43%
8	6	12	18	33%	14	19	33	42%	6	12	18	33%	13	17	30	43%
Total	72	120	192	38%	168	228	396	42%	72	120	192	38%	156	204	360	43%

Sockets

Tower No.	Socket 1				Socket 2				Socket 3				Socket 4				Socket 5			
	Original	Refabricated	Total	Original Percentage	Original	Refabricated	Total	Original Percentage	Original	Refabricated	Total	Original Percentage	Original	Refabricated	Total	Original Percentage	Original	Refabricated	Total	Original Percentage
1	2	1	3	67%	16	11	27	59%	2	1	3	67%	3	3	6	50%	2	1	3	67%
5	2	1	3	67%	16	11	27	59%	2	1	3	67%	9	6	15	60%	2	1	3	67%
9	2	1	3	67%	16	11	27	59%	2	1	3	67%	7	5	12	58%	2	1	3	67%
2	2	1	3	67%	16	11	27	59%	2	1	3	67%	9	6	15	60%	2	1	3	67%
11	2	1	3	67%	16	11	27	59%	2	1	3	67%	9	6	15	60%	2	1	3	67%
14	2	1	3	67%	16	11	27	59%	2	1	3	67%	7	5	12	58%	2	1	3	67%
6	2	1	3	67%	16	11	27	59%	2	1	3	67%	7	5	12	58%	2	1	3	67%
7	2	1	3	67%	16	11	27	59%	2	1	3	67%	7	5	12	58%	2	1	3	67%
4	2	1	3	67%	16	11	27	59%	2	1	3	67%	7	5	12	58%	2	1	3	67%
3	2	1	3	67%	16	11	27	59%	2	1	3	67%	9	6	15	60%	2	1	3	67%
16	2	1	3	67%	16	11	27	59%	2	1	3	67%	9	6	15	60%	2	1	3	67%
8	2	1	3	67%	16	11	27	59%	2	1	3	67%	9	6	15	60%	2	1	3	67%
Total	24	12	36	67%	192	132	324	59%	24	12	36	67%	92	64	156	59%	24	12	36	67%





# CITY OF AUSTIN

SITE NAME

## TOWER 18 - EXAMPLE

SITE ADDRESS

STREET ADDRESS  
CITY, TEXAS ZIP

### SHEET INDEX

SHEET NO.	DESCRIPTION	REV. NO.
T1	TITLE SHEET	-
C1	OVERALL TOWER ELEVATION	-
C2	ENLARGED ELEVATIONS & BOM	-
C3	ENLARGED ELEVATIONS & BOM	-
C4	ENLARGED ELEVATIONS & BOM	-
C5	ENLARGED ELEVATIONS & BOM	-
C6	ENLARGED ELEVATIONS & BOM	-

### PROJECT TEAM

MOONLIGHT TOWERS  
PROJECT MANAGER

AUSTIN ENERGY  
CONTACT: MICHAEL PITTMAN P.E.  
PHONE: (512) 505.7678  
EMAIL: MICHAEL.PITTMAN  
@AUSTINENERGY.COM

CONTRACTOR

ENERTECH RESOURCES, LLC  
1820 WATSON LANE EAST  
NEW BRAUNFELS, TEXAS 78130  
PHONE: (830) 387.4502

### VICINITY MAP



FOR  
INFORMATION  
ONLY

### MOONLIGHT TOWERS

CITY OF AUSTIN



ENERTECH



TEXAS FIRM F-15232

SET ISSUED FOR  
REVIEW

DATE  
05/24/19

#### REVISIONS

NO.	DATE	DESCRIPTION

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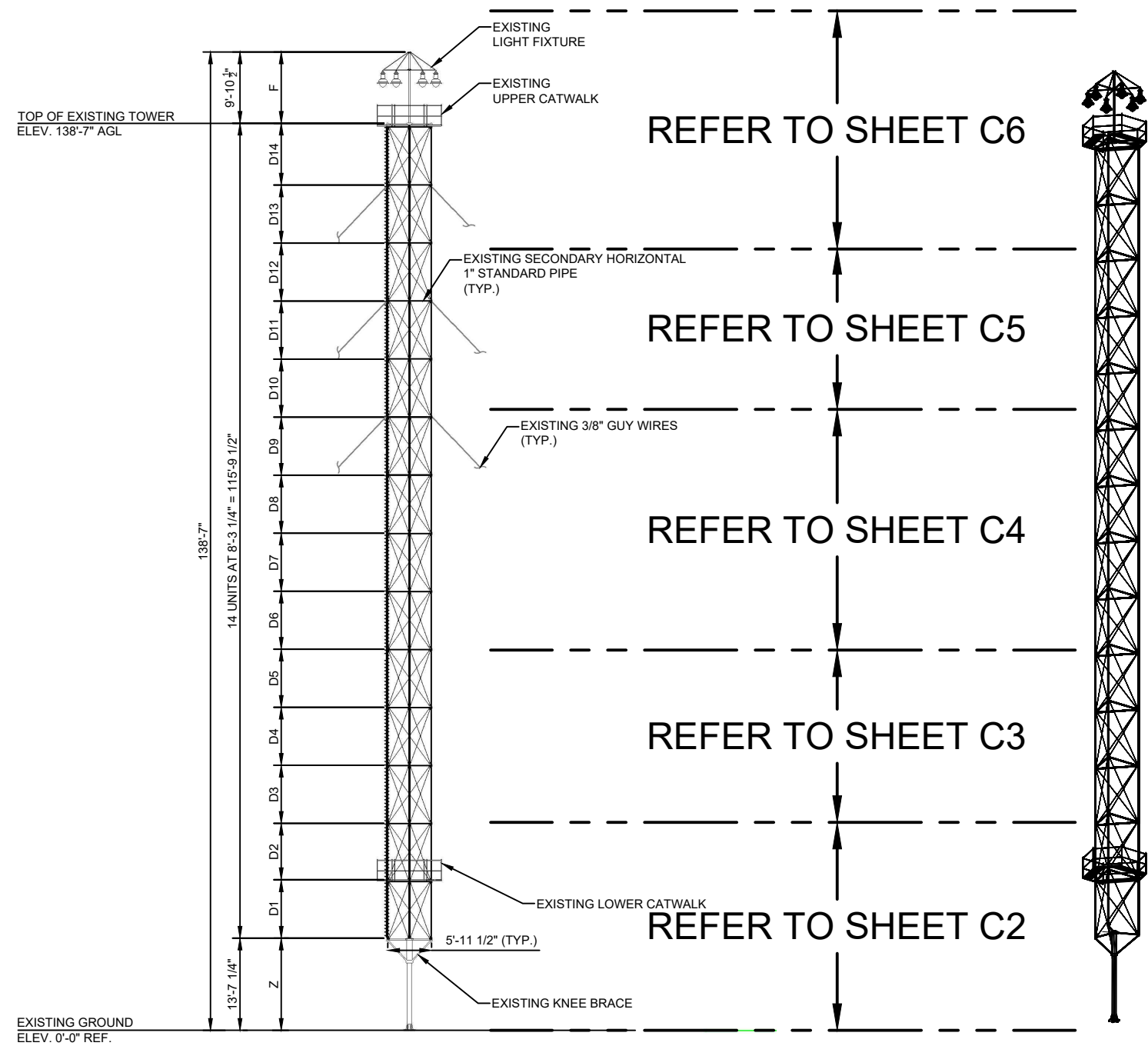
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GJC

### TITLE SHEET

T1

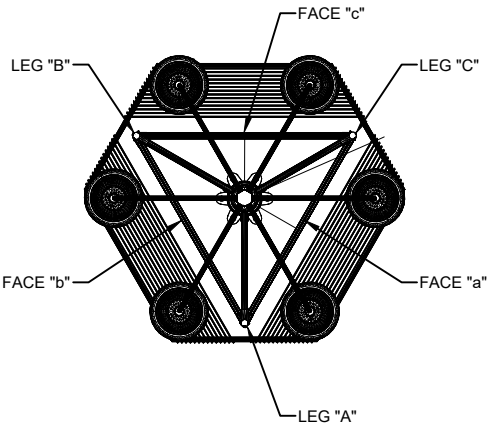


- NOTES:**
- FOR SECTIONS D1-D10, VERTICAL STAR POSTS ARE 2 1/2 INCHES AND HORIZONTAL STAR POSTS ARE 2 INCHES. DIAGONAL RODS ARE 5/8 INCH IN DIAMETER.
  - FOR SECTIONS D11-D13, VERTICAL STAR POSTS ARE 2 INCHES AND HORIZONTAL STAR POSTS ARE 1 1/2 INCHES. DIAGONAL RODS ARE 1/2 INCH IN DIAMETER.



**1** EXISTING TOWER ELEVATION -  
FRONT VIEW  
SCALE: N/A

**2** EXISTING TOWER ELEVATION -  
ISOMETRIC VIEW  
SCALE: N/A



**3** TOWER PLAN  
SCALE: N/A

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INFORMATION  
ONLY**

**MOONLIGHT  
TOWERS**

**CITY OF AUSTIN**



**ENERTECH**



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REVIEW

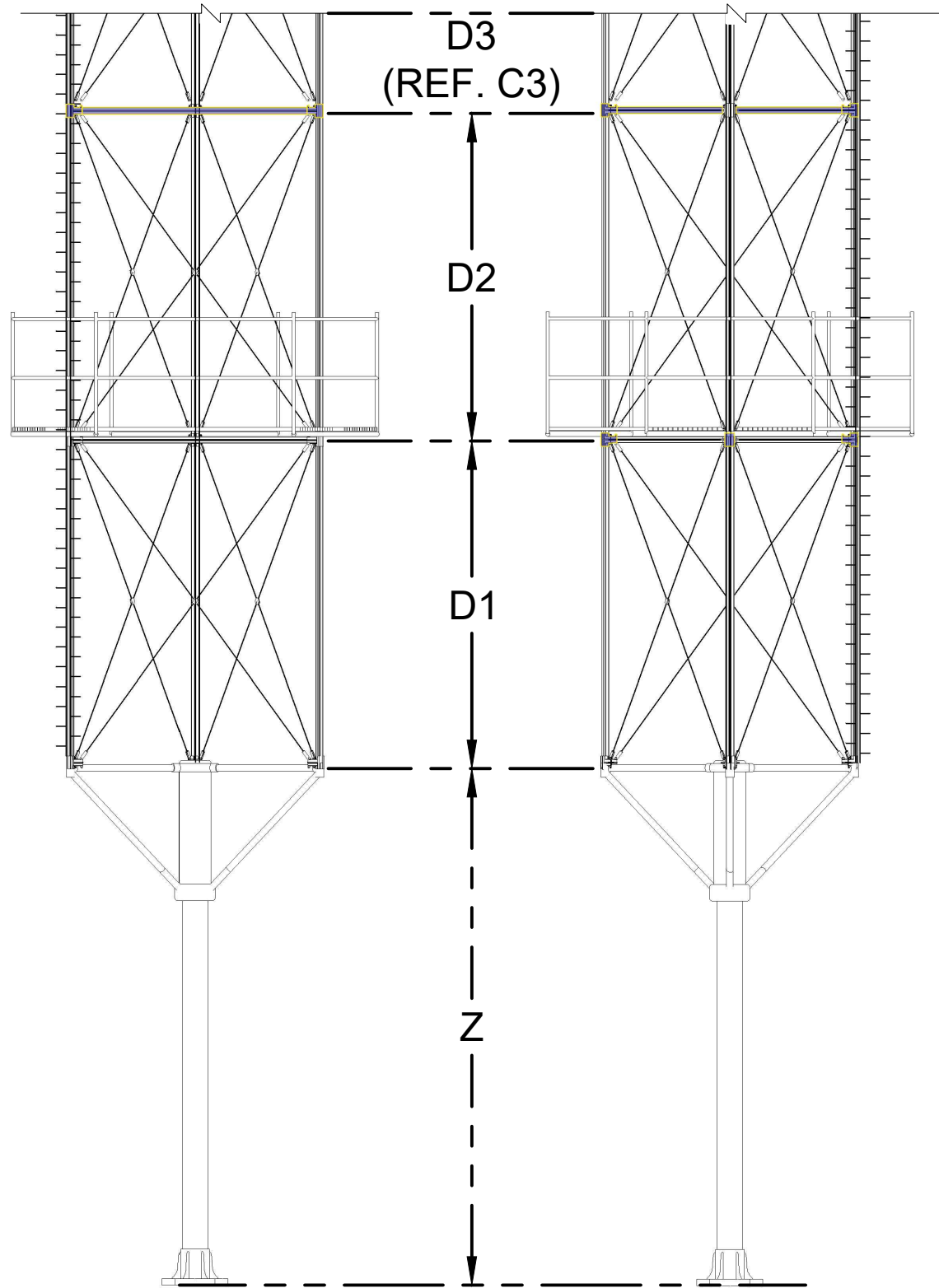
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05/24/19

REVISIONS		
NO.	DATE	DESCRIPTION

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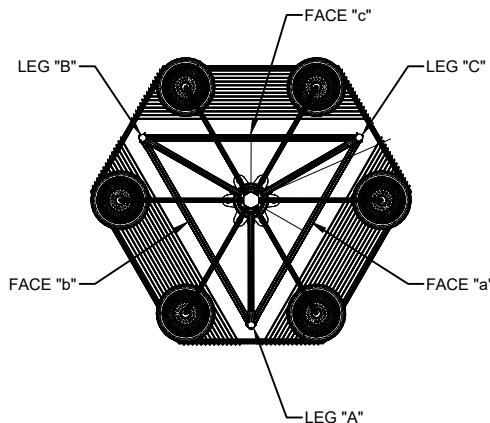
**EXISTING  
TOWER  
ELEVATION**

**C1**



1 EXISTING PARTIAL TOWER  
ELEVATION - FACE "c"  
SCALE: 1/4" = 1'-0"

2 EXISTING PARTIAL TOWER  
ELEVATION - FACES "a" & "b"  
SCALE: 1/4" = 1'-0"



3 TOWER PLAN  
SCALE: N/A

#### LEGEND

- ORIGINAL PARTS (PRE 2015)
- NEW PART - (2015 - 2020)

BASE SECTION			
Part Name & No.	Total Qty	Origina	New
Base Foot	1		
lower Post (Z2)	1		
Knee-Brace Collar (Z3)	1		
Upper Post (Z4)	1		
Knee- Brace Connector (Z5)	6		
Knee-Brace Pipe (Z6)	3		
Connector Joint (Z7)	3		
Horizontal Base Pipe (Z8)	3		
Steel Strap (Z9)	1		
Post Cap (Z10)	1		
Connector A (Z11)	3		
Connector B (Z12)	3		
Lower Catwalk Connector	3		
Horizontal Base Pipe (B2)	3		
Elbow (B3)	6		
Vertical Pipe (B4)	6		
Vertical Pipe Cap (B5)	6		
Mid-Rail Socket (B6)	6		
horizontal Mid-Rail Pipe (B7)	6		
Supper Rail Socket (B8)	6		
Horizontal Upper Rail Pipe (B9)	6		
Platform Clamp (B10)	12		
Secure Bar (B11)	6		
Spacer Device (B12)	9		
Platform Bar (B13)	3		
Platform Bar ( B14)	3		
Platform Bar (B15)	3		
Platform Bar (B16)	3		
Platform Bar (B17)	3		
Platform Bar (B18)	3		
Platform Bar (B19)	3		
Platform Bar (B20)	3		
Platform Bar (B21)	3		
ELEVATOR CLEVIS (C1)	1		
Rod (C2)	1		
Rod Top Fitting (C3)	1		
Connector Arm (C4)	1		
Cable Cradle (C5)	2		
Cable Clamp (C6)	2		
Counterweight (C7)	1		
Connector (C8)	1		
Pulley Arm Pipe (C9)	2		
Pulley Holder (C10)	2		
Pulley Wheel (C11)	1		
Pulley Axle (C12)	1		
Connector (C13)	1		
Connector (C14)	1		
Cable Cradle (C15)	1		
Cable Connector Cap (C16)	1		
Pipe (C17)	1		
Connector (C18)	1		
Six Hole Socket (C19)	1		
Pipe Segment (C20)	2		
Joint Sleeve for Braking Cradle (C21)	2		
Pipe Segment (C22)	2		
Elbow (C23)	6		
Braking Cradle (C24)	2		
Brake Pad (C25)	2		
Fix Brake Pad (C26)	2		
Brake Arm (C27)	2		
Pipe (C28)	4		
Platform Clamp Bar (C29)	4		
Platform (C30)	2		
Vertical Rail-Pipe (C31)	4		
Steel Strap (C32)	1		
Mid-Rail Joint (C33)	8		
Top-Rail Joint (C34)	4		
Horizontal Mid-Rail Pipe (C35)	6		
Horizontal Top-Rail Pipe (C36)	6		
Vertical Lift Frame Pipe (C37)	2		
Lift Frame Connector (C38)	2		
Cable Sleeve (C39)	2		
Horizontal Lift Frame Pipe (C40)	1		
Pipe Ends (C41)	2		
Cable Eye (C42)	1		
Cable Cradle (C43)	1		
Upper Arm (C44)	1		
Cable Cradle (C45)	2		
Connector (C46)	2		
Pulley Arm Pipe (C47)	2		
Pulley Holder (C49)	2		
Upper Pulley (C50)	1		
Pulley Axle (C51)	1		
Upper Counter Weight (C52)	1		
Cable Cradle (C53)	1		

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INFORMATION  
ONLY

## MOONLIGHT TOWERS

CITY OF AUSTIN



ENERTECH

TEXAS FIRM F-15232



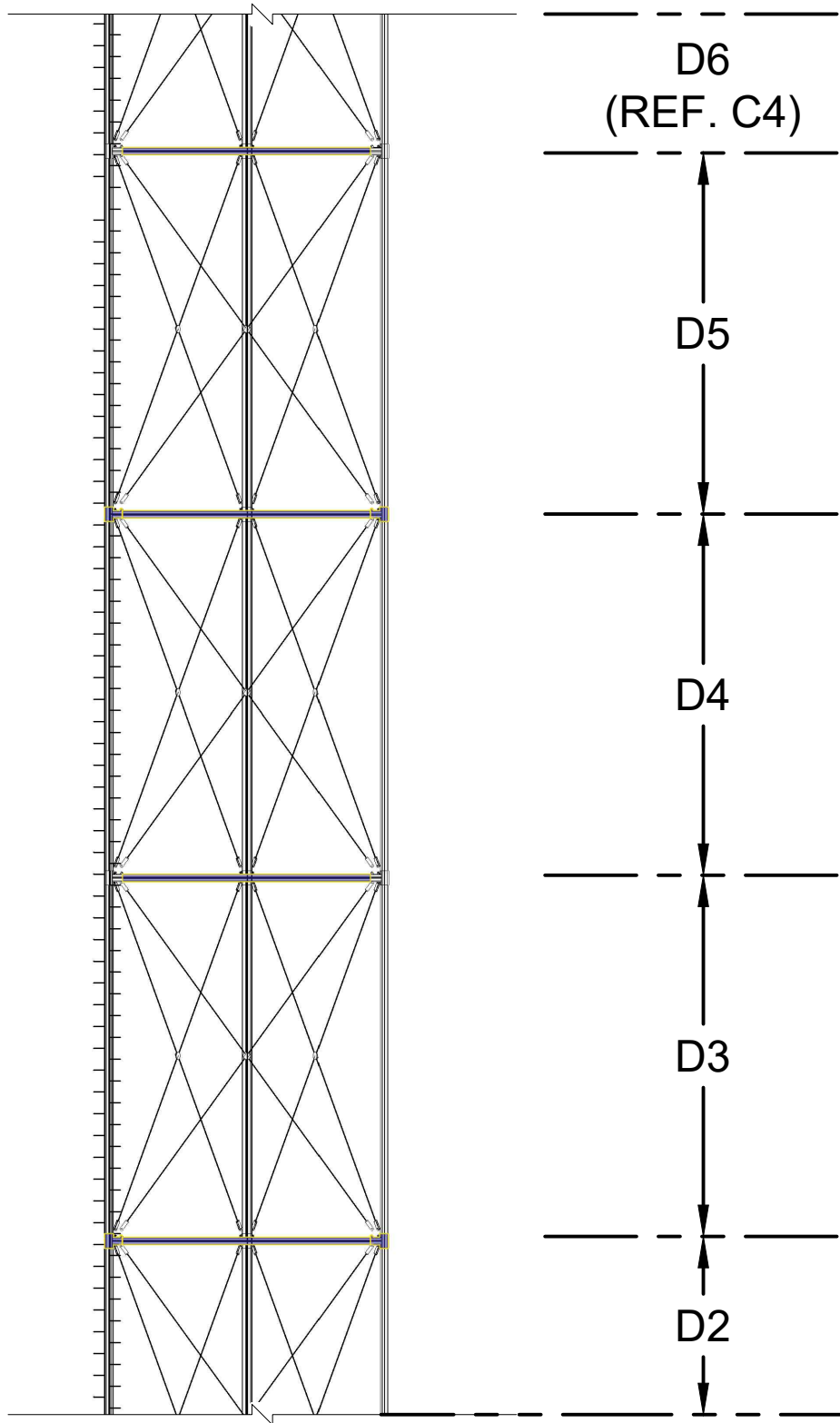
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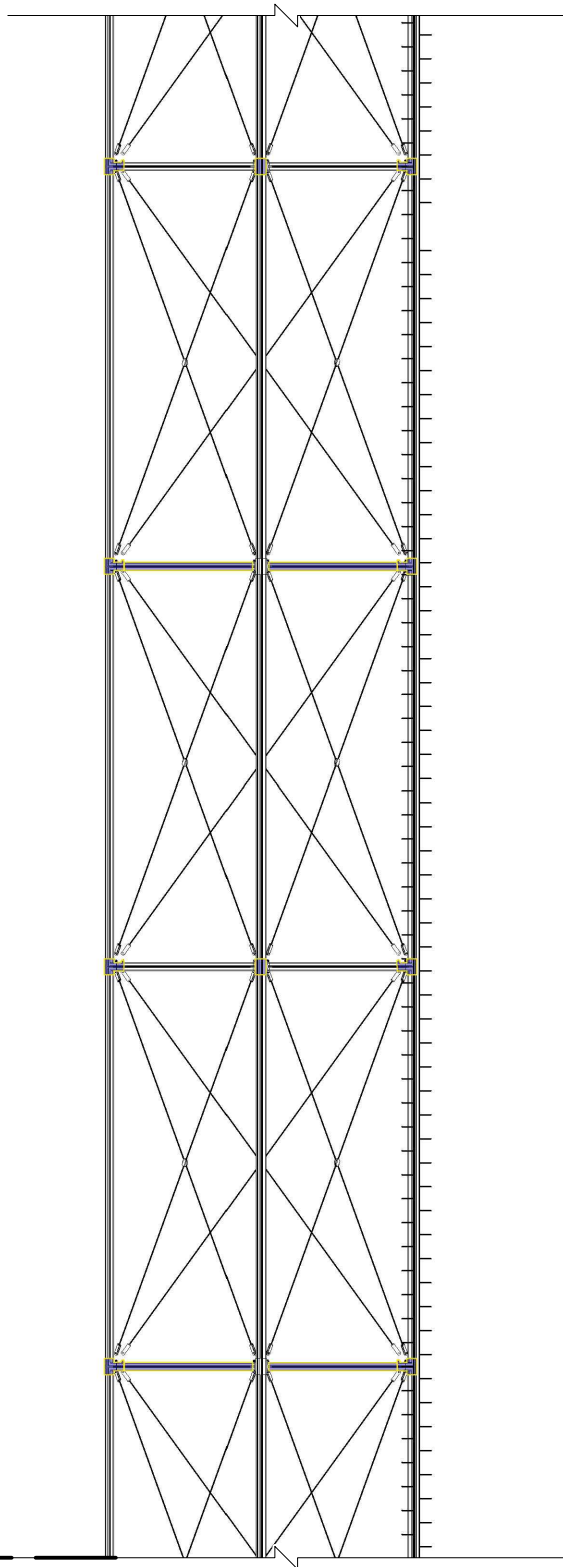
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ENLARGED  
ELEVATION  
& BOM

C2



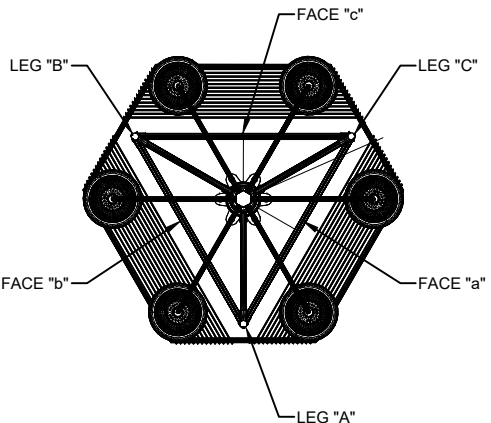
1 EXISTING PARTIAL TOWER  
ELEVATION - FACE "c"  
SCALE: 1/4" = 1'-0"  
4' 0' 2' 4'



2 EXISTING PARTIAL TOWER  
ELEVATION - FACES "a" & "b"  
SCALE: 1/4" = 1'-0"  
4' 0' 2' 4'

MIDDLE SECTION			
Part Name & No.	Total Qty	Original	New
Socket Type A (D1)	3		
Clevis (D2)	192		
Diagonal Rod (D3)	192		
Tension Ring (D4)	48		
Step (D5)	96		
Star Wedge (D6)	96		
Socket - Type B (D7)	27		
Socket - Type C (D8)	3		
Socket - Type O (D9)	15		
Socket - Type E (D10)	3		
Vertical Star Post 2-1/2" (D11)	30		
Vertical Star Post 2" (D12)	18		
Horizontal Star Post 2" (D13)	33		
Horizontal Star Post 1-1/2" (D14)	18		

LEGEND	
	ORIGINAL PARTS (PRE 2015)
	NEW PART - (2015 - 2020)



3 TOWER PLAN  
SCALE: N/A

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MOONLIGHT  
TOWERS

CITY OF AUSTIN



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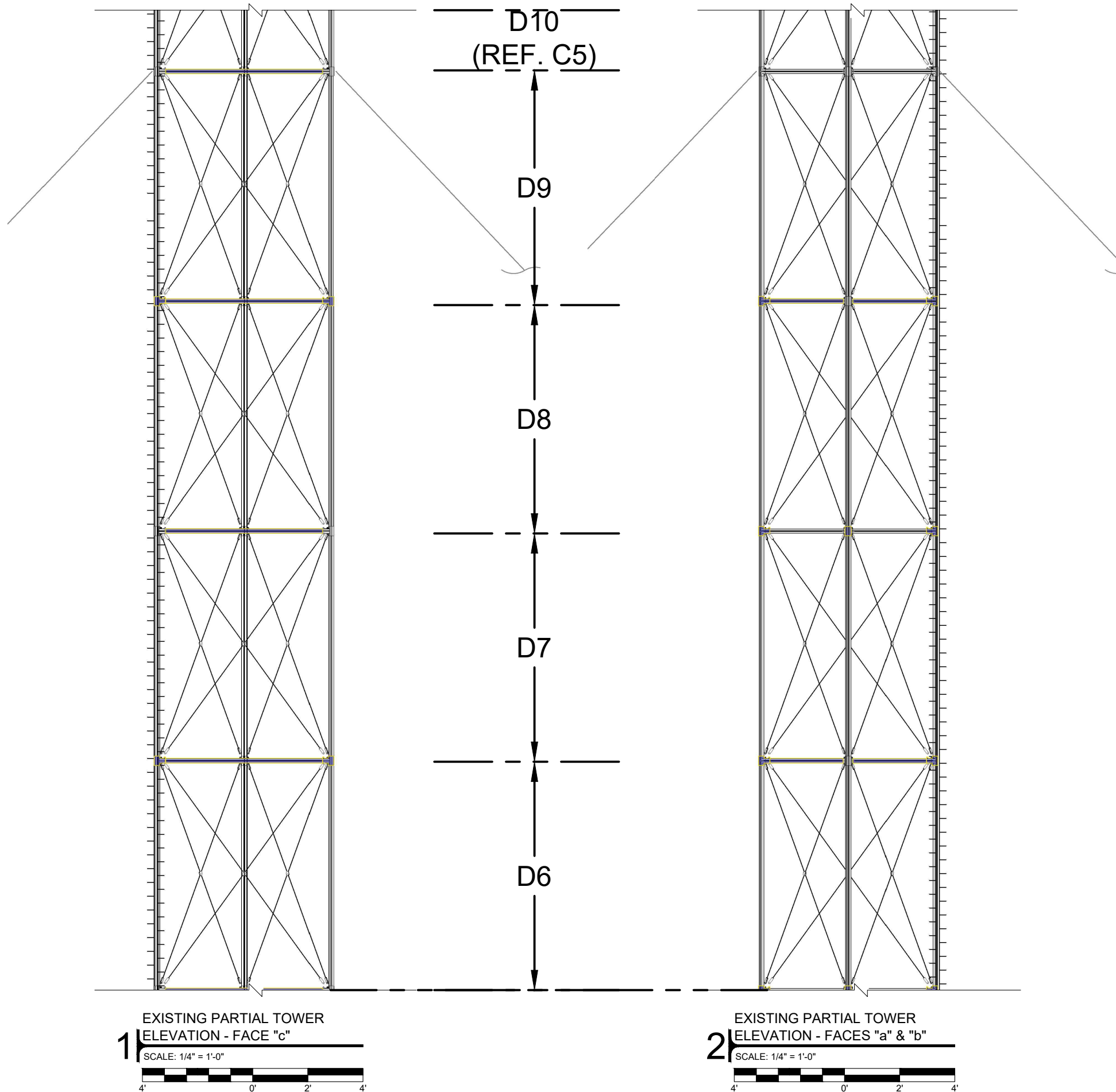
REVISIONS		
NO.	DATE	DESCRIPTION

DRAWN BY ML REVIEWED BY GJC

ENLARGED  
ELEVATION  
& BOM

C3



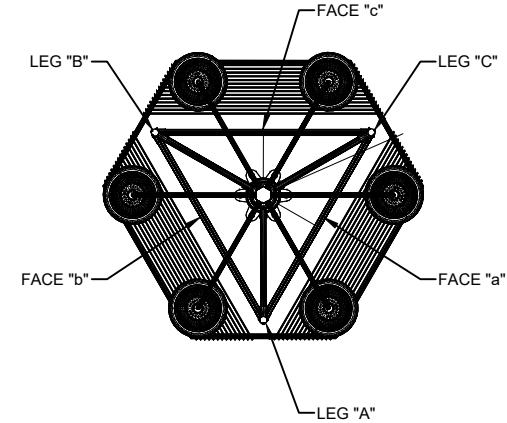


MIDDLE SECTION			
Part Name & No.	Total Qty	Original	New
Socket Type A (D1)	3		
Clevis (D2)	192		
Diagonal Rod (D3)	192		
Tension Ring (D4)	48		
Step (D5)	96		
Star Wedge (D6)	96		
Socket - Type B (D7)	27		
Socket -Type C (D8)	3		
Socket - Type O (D9)	15		
Socket- Type E (D10)	3		
Vertical Star Post 2-1/2" (D11)	30		
Vertical Star Post 2" (D12)	18		
Horizontal Star Post 2" (D13)	33		
Horizontal Star Post 1-1/2" (D14)	18		

LEGEND

ORIGINAL PARTS (PRE 2015)

NEW PART - (2015 - 2020)



3 TOWER PLAN  
SCALE: N/A

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MOONLIGHT  
TOWERS

CITY OF AUSTIN



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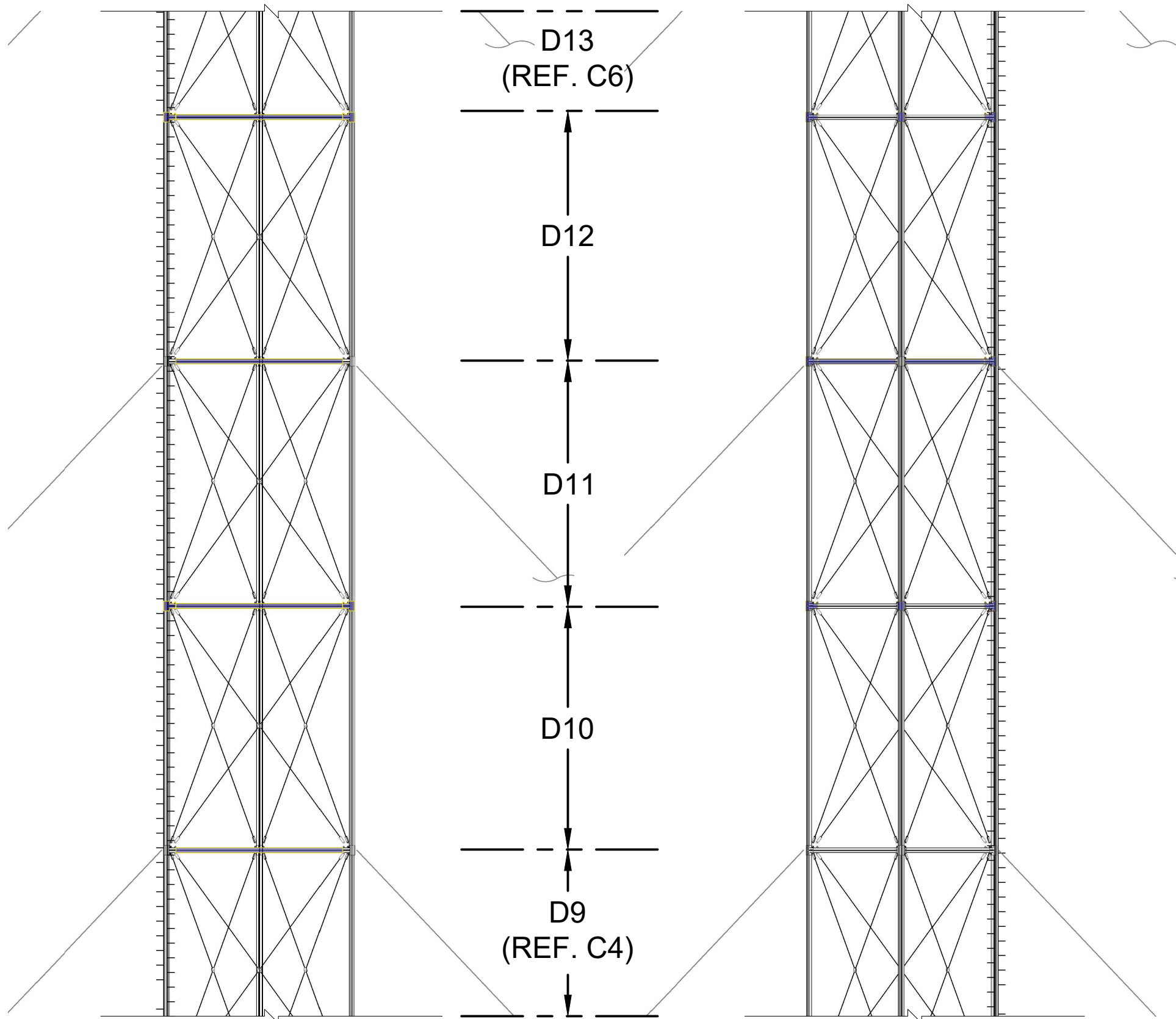
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ENLARGED  
ELEVATION  
& BOM

C4

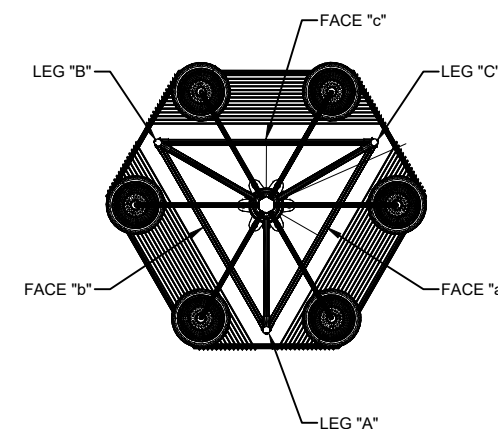


1 EXISTING PARTIAL TOWER  
ELEVATION - FACE "c"  
SCALE: 1/4" = 1'-0"  
4' 0' 2' 4'

2 EXISTING PARTIAL TOWER  
ELEVATION - FACES "a" & "b"  
SCALE: 1/4" = 1'-0"  
4' 0' 2' 4'

MIDDLE SECTION			
Part Name & No.	Total Qty	Original	New
Socket Type A (D1)	3		
Clevis (D2)	192		
Diagonal Rod (D3)	192		
Tension Ring (D4)	48		
Step (D5)	96		
Star Wedge (D6)	96		
Socket - Type B (D7)	27		
Socket -Type C (D8)	3		
Socket - Type O (D9)	15		
Socket- Type E (D10)	3		
Vertical Star Post 2-1/2" (D11)	30		
Vertical Star Post 2" (D12)	18		
Horizontal Star Post 2" (D13)	33		
Horizontal Star Post 1-1/2" (D14)	18		

LEGEND	
	ORIGINAL PARTS (PRE 2015)
	NEW PART - (2015 - 2020)



3 TOWER PLAN  
SCALE: N/A

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## MOONLIGHT TOWERS

CITY OF AUSTIN



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ENLARGED  
ELEVATION  
& BOM

C5

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TOWERS

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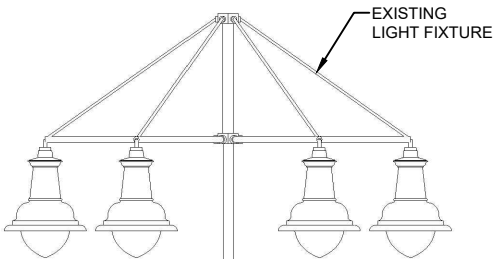
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ENLARGED  
ELEVATION  
& BOM

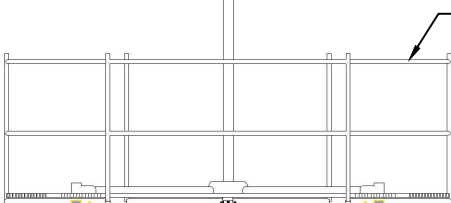
C6

LEGEND

ORIGINAL PARS (PRE 2015)  
NEW PART - (2015 - 2020)



EXISTING  
LIGHT FIXTURE

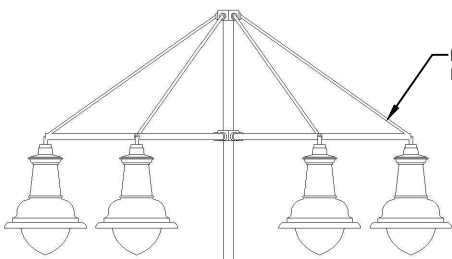


EXISTING  
UPPER CATWALK

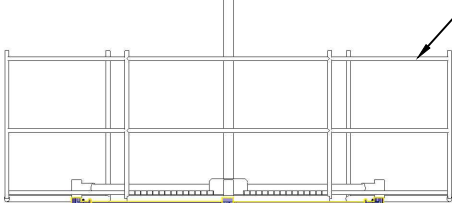
F

D14

D13



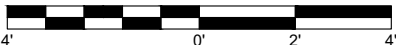
EXISTING  
LIGHT FIXTURE



EXISTING  
UPPER CATWALK

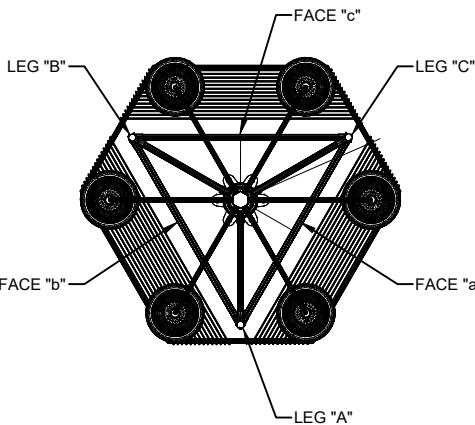
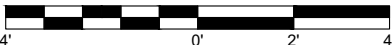
EXISTING PARTIAL TOWER  
ELEVATION - FACE "c"

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



EXISTING PARTIAL TOWER  
ELEVATION - FACES "a" & "b"

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



TOWER PLAN  
SCALE: N/A