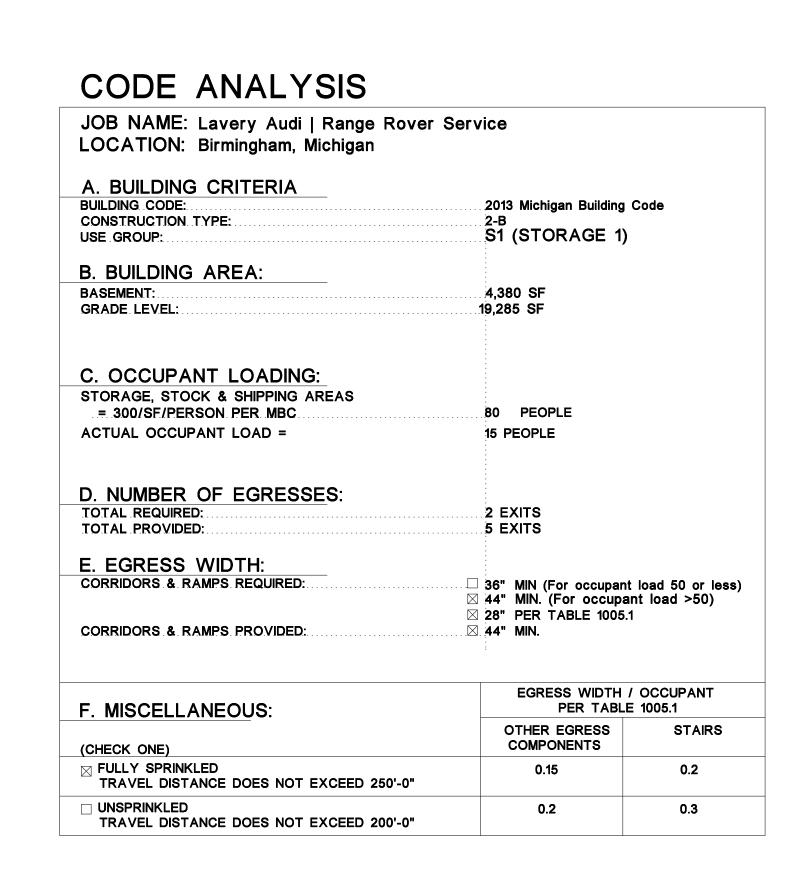
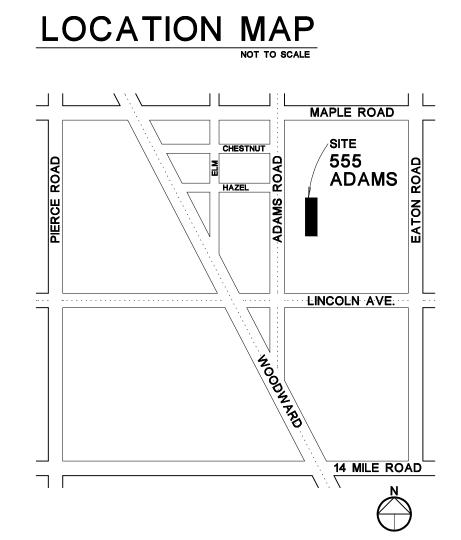
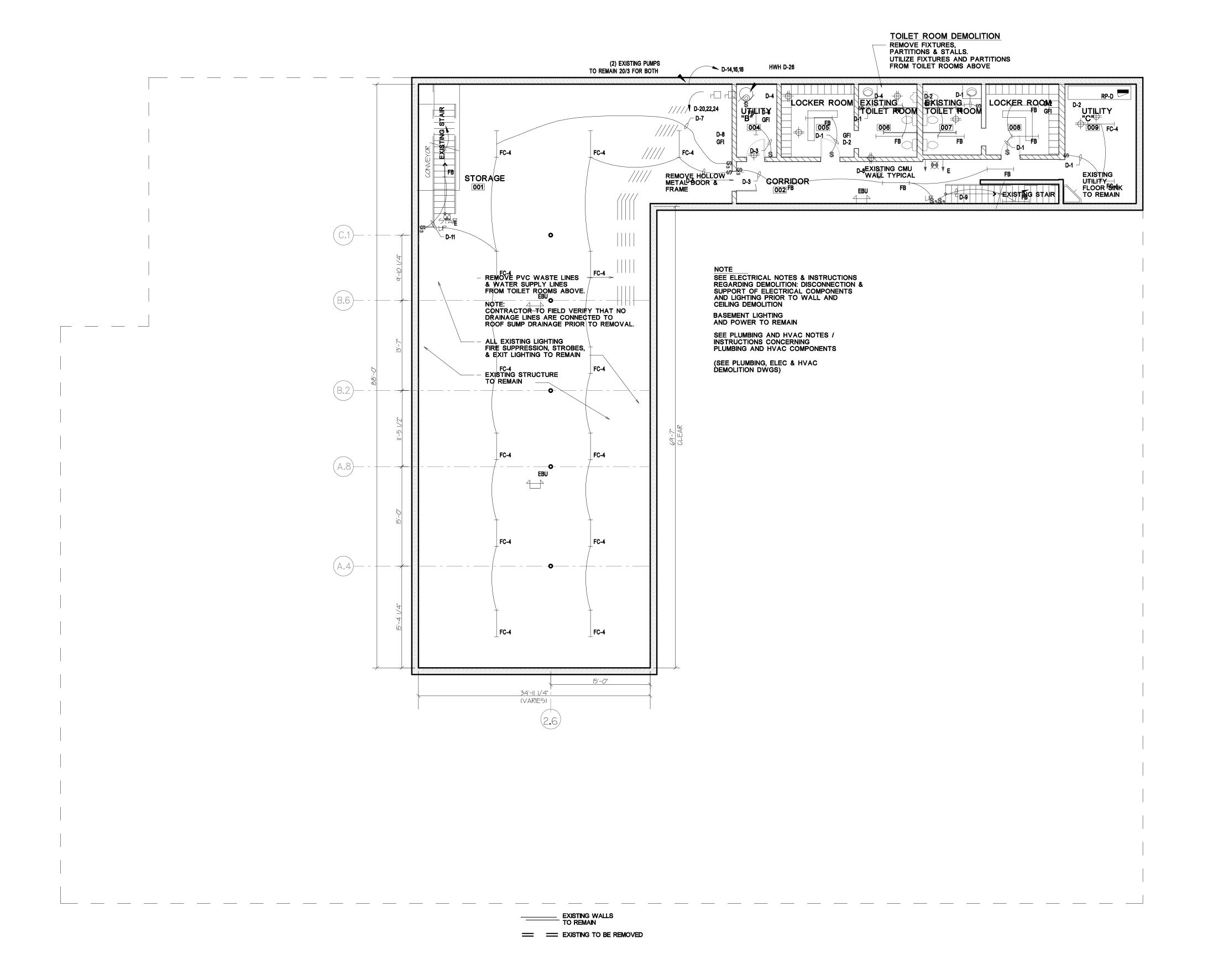
# LAVERY Audi - Range Rover Service 555 S. Adams Road, Birmingham, Michigan

Architect's Project Number: 3014 Date Issued: FEB 4, 2015

OWNER REVIEW		CONSTRUCTION PERMIT	CONSTRUCTION BID	ARC	HITECTURAL DRAWINGS
				A.101	TITLE SHEET
				A.101 A.102	DEMOLITION PLAN
				A.102 A.102.1	BASEMENT DEMOLITION PLAN
				A.102.1	MAIN FLOOR PLAN 1/8"
		•		A103.1	MAIN LEVEL EGRESS PLAN
				A.104	BASEMENT FLOOR PLAN / EGRESS PLAN
				A1.05	FLOOR PLANS 1/4"
		•		A.106	INTERIOR ELEVATIONS
		•		A.106.1	INTERIOR ELEVATIONS
		•		A.107	BUILDING SECTION
		•		A.108	REFLECTED CEILING PLAN
		•		A.109	DETAILS
		•		S.001	GENERAL STRUCTURAL NOTES
		•		S.002	STRUCTURAL INSPECTION SCHEDULES
		•		S.103	STRUCTURAL PLAN
		•		S.201	STRUCTURAL DETAILS
				M1	MAIN LEVEL MECHANICAL
				M2	BASEMENT MECHANICAL
				P1	MAIN LEVEL PLUMBING
				P2	BASEMENT PLUMBING
		•		E00	ELECTRICAL SYMBOLS & LEGENDS
		•		E01	ELECTRICAL - BASEMENT POWER & LIGHTING
		•		E10	ELECTRICAL - 1ST FLOOR POWER PLAN
				E20	ELECTRICAL - 1ST FLOOR LIGHTING PLAN
				E30	ELECTRICAL - RISER / PANEL SCHEDULE
				E40	ELECTRICAL SPECIFICATIONS
				E41	ELECTRICAL SPECIFICATIONS







DEMOLITION PLAN
A102.1 BASEMENT LEVEL® REFLECTED CEILING

# Luckenbach Ziegelman Architects PLLC

36800 Woodward Suite Suite 100 Bloomfield Hills, Michigan 48304 248.644.0600

## **GENERAL NOTES**

ACCEPTABLE MANNER.

- 1. ACTIVATE EXISTING ROOFTOP UNIT TO SUPPLY TEMPORARY HEAT AND AIR CIRCULATION DURING DEMOLITION WORK.
- 2. ALL ROOF PENETRATIONS, VENTS, DRAINS, ETC. TO REMAIN AFTER DEMOLITION.
- 3. DEMOLITION SHALL CONSIST OF COMPLETE REMOVAL OF ALL WALLS,
- DOORS, CEILING & LIGHTING AS NOTED.
- 4. SEE DRAWING NOTES REGARDING SALVAGE AND STORAGE FOR FUTURE USE BY THE OWNER AND OR TENANT.
- 5. WHERE SERVICES OR CIRCUITS ARE DISCONNECTED OR DISCONTINUES, IT IS MANDATORY THAT ANY EXISTING UNUSED
- WIRING BE REMOVED TO THE SOURCE. SEE ELECTRICAL DEMOLITION NOTES.
- 6. EXISTING ELECTRICAL SERVICE AND PANELS SHALL REMAIN. NECESSARY CONCRETE FLOOR CUTTING SHALL BE DONE WITH WET
- 8. ALL AREAS OF CONCRETE FLOOR DAMAGED OR REMOVED SHALL BE
- RESTORED TO THE ORIGINAL FLOOR LEVEL. 9. ANY ABANDONED VENTS THROUGH THE ROOF SHALL BE CAPPED
- ABOVE THE ROOF TO PROVIDE A WEATHER-TIGHT SEAL.
- 10. ANY PIPES AND/OR VENTS ABANDONED FROM SERVICE BUT LEFT IN PLACE ABOVE THE EXISTING CEILING SHALL BE SECURELY FASTENED
- TO THE EXISTING STRUCTURE. 11. IN NO CASE SHALL ABANDONED PIPES AND/OR VENTS BE ALLOWED
- TO INTERFERE WITH THE PLACEMENT OF NEW CONSTRUCTION. 12. CLEAN-UP: UPON COMPLETION OF WORK, REMOVE SURPLUS MATERIALS, RUBBISH AND DEBRIS FROM THE SITE. LEAVE ENTIRE

SITE AND WORK RELATED TO THIS SECTION IN A NEAT, CLEAN

## GENERAL ELECTRICAL DEMOLITION NOTES:

1. ELECTRICAL FIXTURES, DEVICES, PANELBOARDS, AND OTHER ITEMS OF ELECTRICAL EQUIPMENT ON THIS DRAWING SHOWN HATCHED SHALL BE DISCONNECTED AND REMOVED BY THE CONTRACTOR. REMOVE ASSOCIATED WIRING, TERMINATION'S AND CONDUIT BACK TO THE SOURCE.

2. ALL UNUSED LOW VOLTAGE WIRING SHALL BE REMOVED IN ITS ENTIRETY.

3. REMAINING LUMINAIRES LOCATED IN THE BASEMENT, SWITCHES, RECEPTACLES, MOTORS, ETC., NOT PART OF THE DEMOLITION SHALL BE CHECKED FOR PROPER OPERATION, AND CIRCUITS OPENED BY THE REMODELING WORK SHALL BE PROPERLY RECONNECTED.

4. CONTRACTOR SHALL BE RESPONSIBLE FOR DISCONNECTING THE ELECTRICAL CIRCUITS FOR ALL ELECTRICAL IN THE AREA OF DEMOLITION.

5. ALL DISCREPANCIES WITH THESE DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION PRIOR TO BIDS. IN OTHERWISE DOING SO, THE ELECTRICAL CONTRACTOR

## MECHANICAL DEMOLITION NOTES:

SHALL BE LIABLE FOR ANY REQUIRED REVISIONS.

1. REMOVE ALL HORIZONTAL DUCTWORK ON FIRST FLOOR, INCLUDING DIFFUSERS & GRILLES, TOILET EXHAUST FANS & DUCTWORK TO UNDERSIDE OF ROOF.
EXISTING VERICAL DUCT DROPS FROM SEVEN ROOF UNITS TO REMAIN.

2. RETURN AIR DUCTWORK (SOUND ELBOWS) TO REMAIN ON ROOF UNITS 1-7

3. PLUMBING: REMOVE ALL TOILET FIXTURES & ATTENDANT PIPING FOR MAIN LEVEL. REMOVE ALL WATER & WASTE PIPING.

4. BASEMENT: REMOVE EXISTING SUSPENDED HEATER AND FLUE. CAP GAS LINE TO HEATER. 5. CAP ANY REMAINING UTILITY LINES, GAS, WATER, WASTE, VENT OR ROOF PENETRATIONS.

RANGE ROVER **SERVICE** 555 ADAMS ROAD

LAVERY AUDI-

BIRMINGHAM, MI

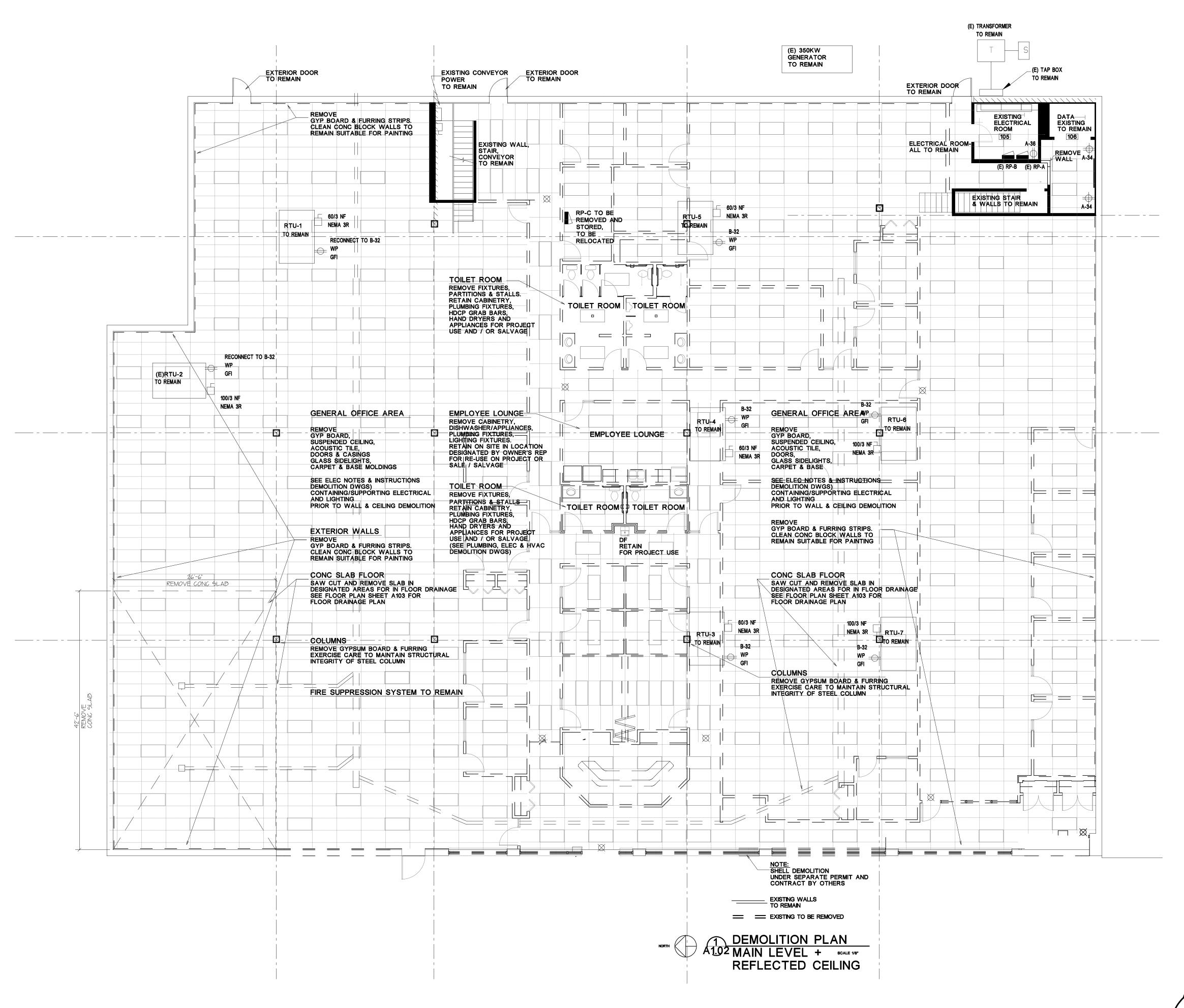
**DEMOLITION** BASEMENT **LEVEL** 

TENANT SPACE INTERIOR

Date Issued

DEMOLITION PERMIT 12.11.14 /1\ MECH DEMOLITION NOTES 12.23.14

Project Number



36800 Woodward Suite Suite 100 Bloomfield Hills, Michigan 248.644.0600

## **GENERAL NOTES**

ACCEPTABLE MANNER.

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5. CAP ANY REMAINING UTILITY LINES, GAS, WATER, WASTE, VENT OR ROOF PENETRATIONS.

# LAVERY AUDI-RANGE ROVER SERVICE

555 ADAMS ROAD BIRMINGHAM, MI

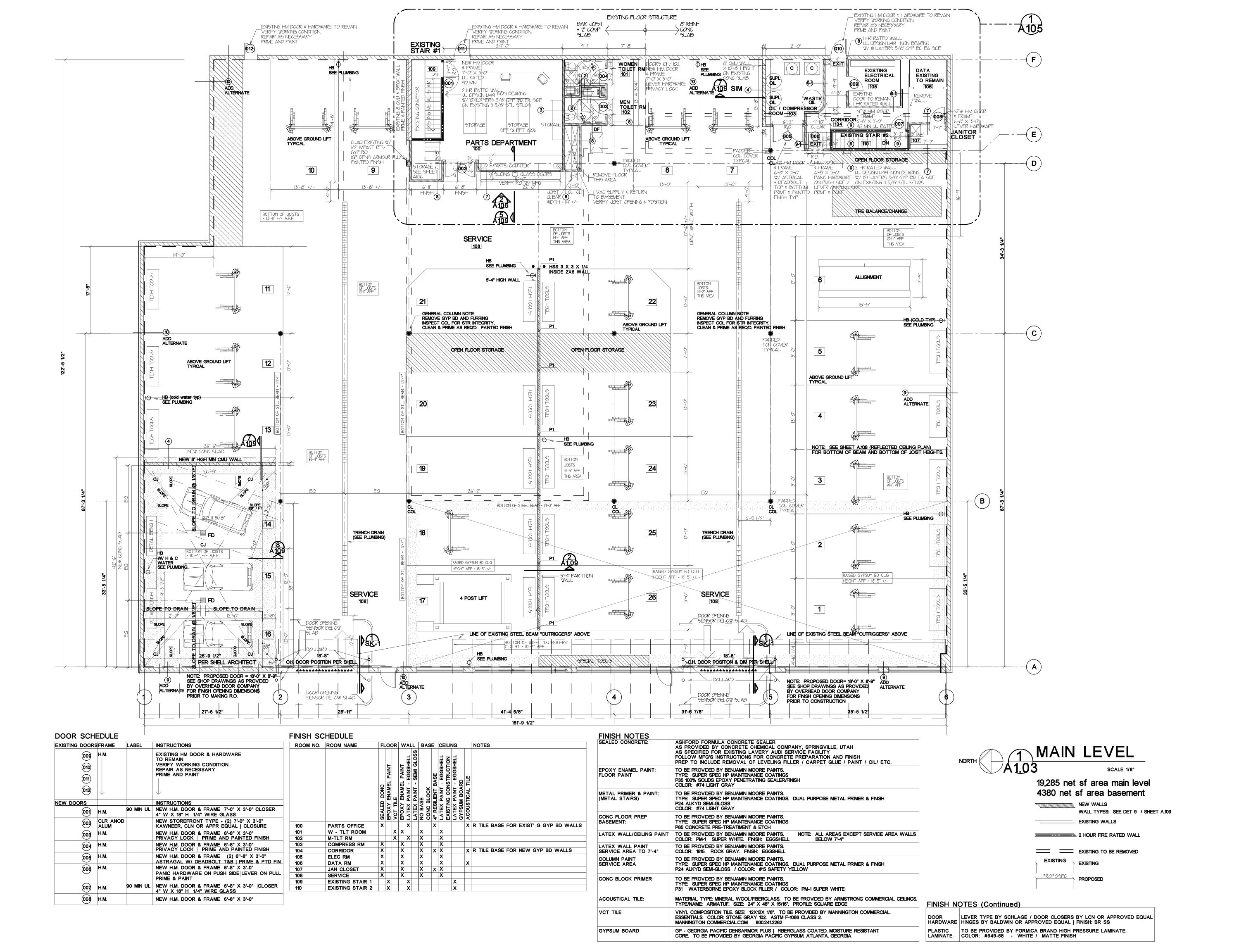
# DEMOLITION MAIN LEVEL

TENANT SPACE **INTERIOR** 

Date Issued DEMOLITION PERMIT 12.11.14

/1\ MECH DEMOLITION NOTES 12.23.14

Project Number



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LAVERY AUDI-RANGE ROVER

555 ADAMS ROAD BIRMINGHAM, MI

**SERVICE** 

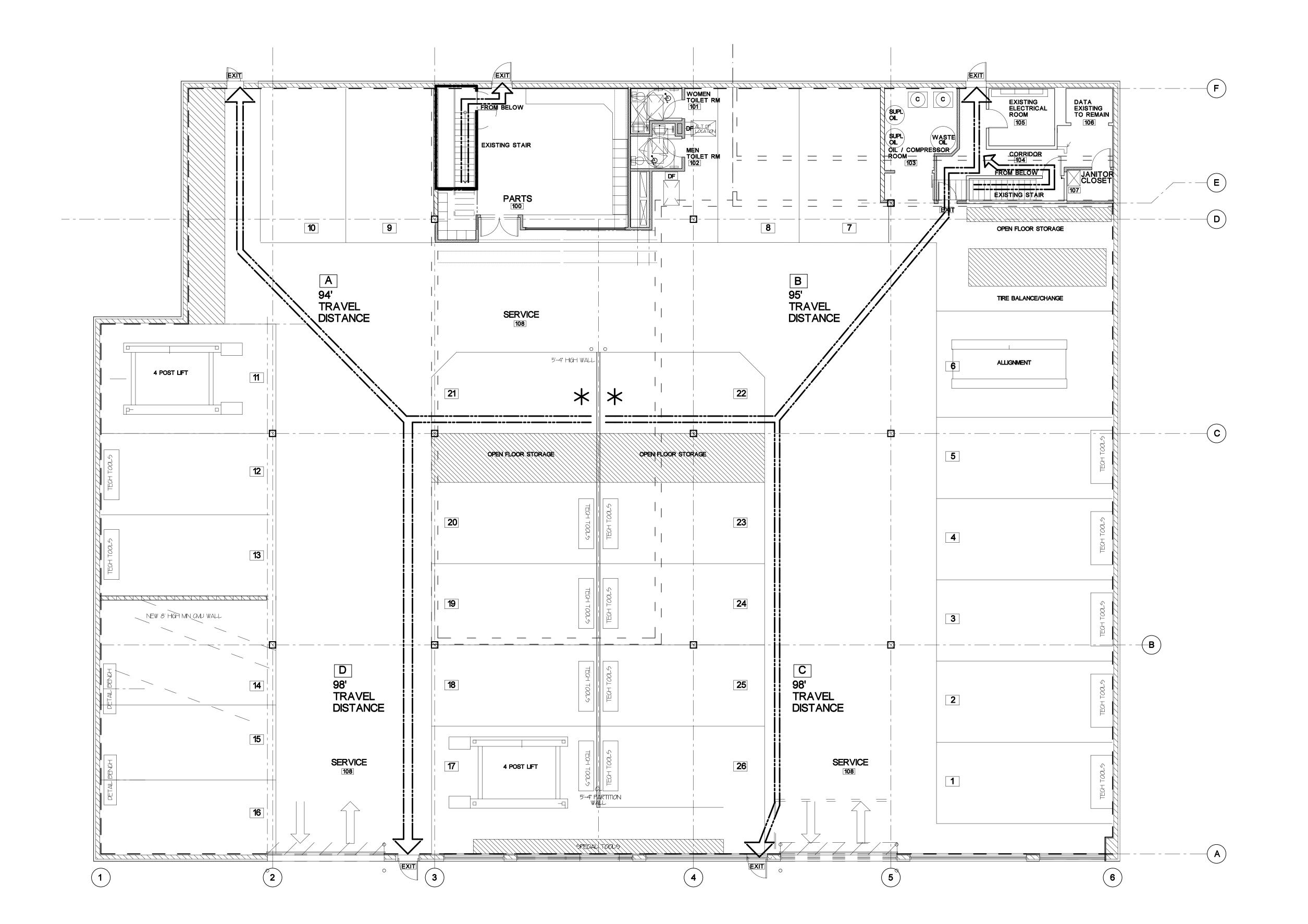
Sheet Title

MAIN LEVEL FLOOR PLAN

Date Issued
PERMIT 02.04.2015

Project Number

Sheet Number
A 103





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LAVERY AUDI-RANGE ROVER

555 ADAMS ROAD BIRMINGHAM, MI

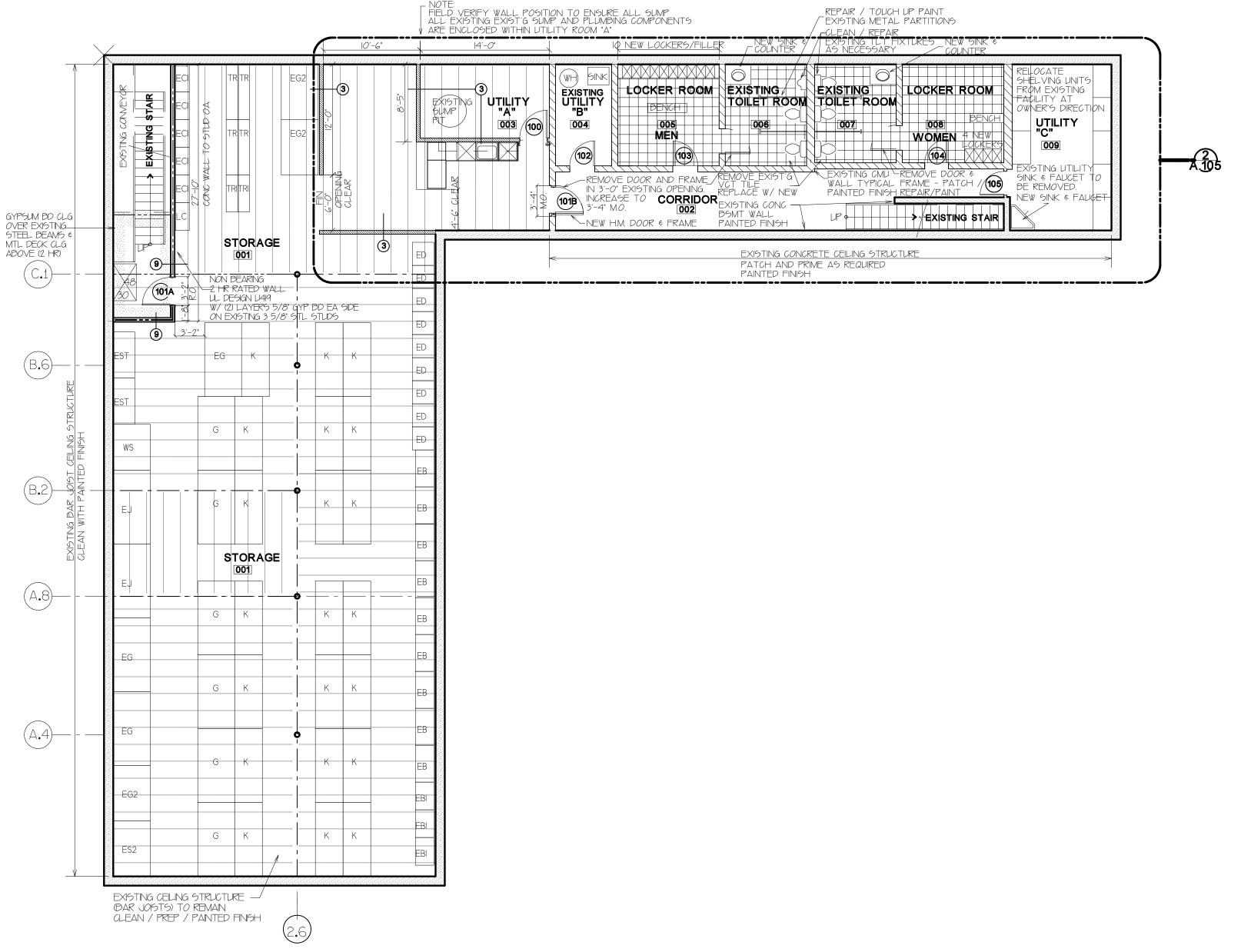
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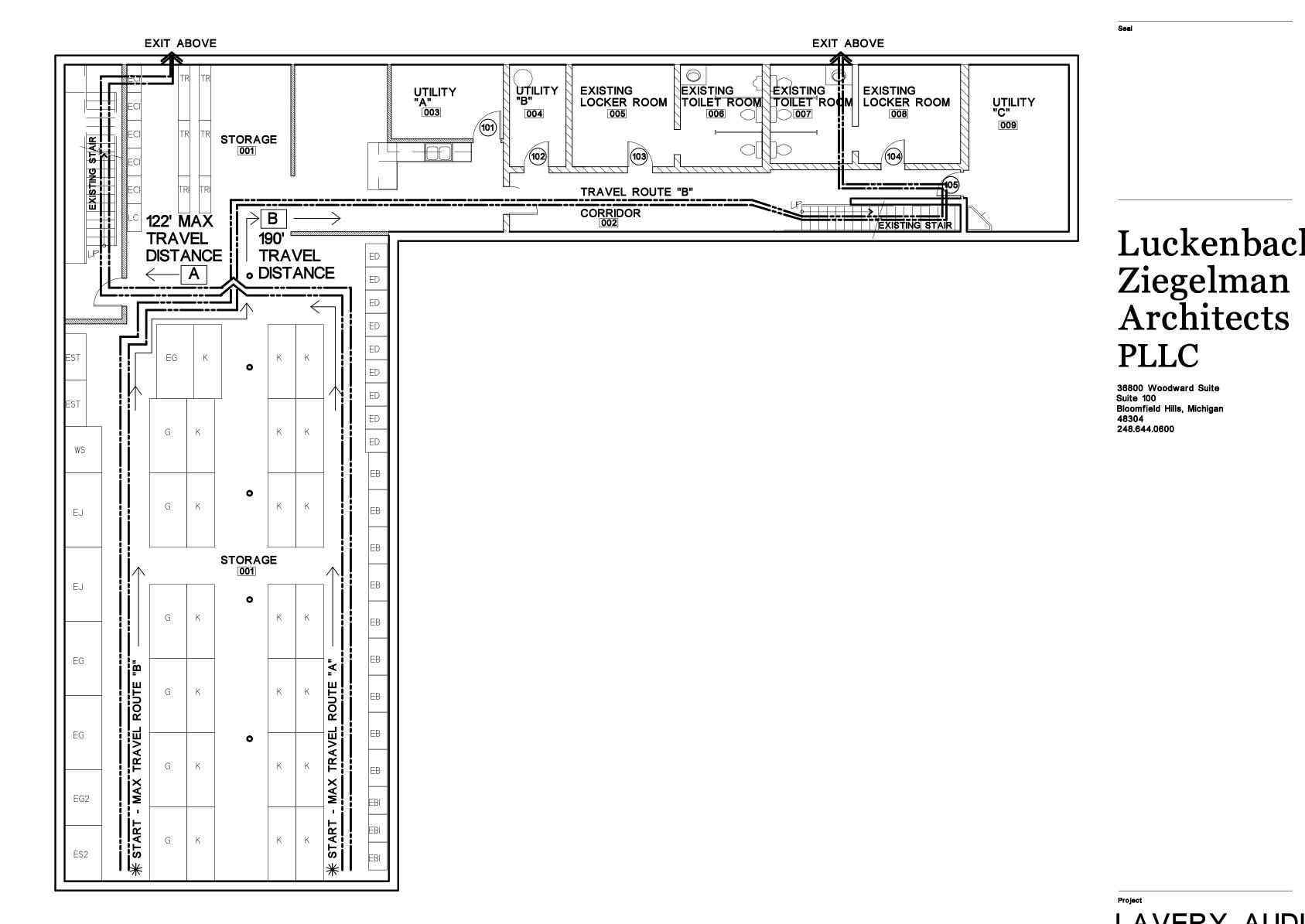
MAIN LEVEL EGRESS PLAN

TENANT SPACE INTERIOR

Date Issued

A.103.1







DRAWING KEY NEW WALLS EXISTING WALLS 2 HOUR FIRE RATED WALL == EXISTING TO BE REMOVED EXISTING BAR JOIST CEILING FLOOR MOUNTED STORAGE UNITS (SEE KEY) LC EJ TRI

A1.04 EGRESS PLAN SCALE 1/8"

LEVER TYPE BY SCHLAGE / DOOR CLOSERS BY LCN OR APPROVED EQUAL HINGES BY BALDWIN OR APPROVED EQUAL | FINISH: BRUSHED STAINLESS

TO BE PROVIDED BY FORMICA BRAND HIGH PRESSURE LAMINATE. COLOR: #949-58 - WHITE / MATTE FINISH

DOOR HARDWARE

PLASTIC LAMINATE

DOOR SCHE	DULE			FINISH S	CHEDULE						FINISH NOTES	
NEW DOORS	FRAME	LABEL	INSTRUCTIONS	ROOM NO.	ROOM NAME	FLOOR W	ALL BAS	SE CEILING	G N	NOTES	SEALED CONCRETE:	ASHFORD FORMULA CONCRETE SEALER
100	H.M.		NEW H.M. DOOR & FRAME 6'-8" X 3'-0" PRIME AND PAINT			<b>5 5</b>	SHELL	SE EGGSHELL TRUCTION	SHELL			AS PROVIDED BY CONCRETE CHEMICAL COMPANY, SPRINGVILLE, UTAH AS SPECIFIED FOR EXISTING LAVERY AUDI SERVICE FACILITY FOLLOW MFG'S INSTRUCTIONS FOR CONCRETE PREPARATION AND FINISH PREP TO INCLUDE REMOVAL OF LEVELING FILLER / CARPET GLUE / PAINT / OIL/ ETC.
101A 101B	H.M.	UL	NEW H.M. DOOR & FRAME 6'-8" X 3'-0" 90 MINUTE UL RATED 4" W X 18" H 1/4" WIRE GLASS			ONC IAMEL PAII	NT - EGG NT - SEMI	NT BASE INT - EGG CONSTRUC	INT - EGG SOARD AL TILE		EPOXY ENAMEL PAINT: FLOOR PAINT	TO BE PROVIDED BY BENJAMIN MOORE PAINTS.  TYPE: SUPER SPEC HP MAINTENANCE COATINGS  P35 100% SOLIDS EPOXY PENETRATING SEALER/FINISH  COLOR: #74 LIGHT GRAY
102	H.M.	90 MIN	PRIME AND PAINTED FINISH CLOSER  NEW H.M. DOOR			EALED CONTRACT EN CT TILE POXY EN	ATEX PA ATEX PA O BASE	RESILIEI ATEX PA XISTING	ATEX PA YPSUM B COUSTIC		METAL PRIMER & PAINT: (METAL STAIRS)	TO BE PROVIDED BY BENJAMIN MOORE PAINTS.  TYPE: SUPER SPEC HP MAINTENANCE COATINGS. DUAL PURPOSE METAL PRIMER & FINISH P24 ALKYD SEMI-GLOSS  COLOR: #74 LIGHT GRAY
-		UL	6'-8" X 2'-8" (MATCH EXISTING SIZE)	201	0707407		J J Ž C	47 1	ງ ໖ ∢		CONC FLOOR PREP	TO BE PROVIDED BY BENJAMIN MOORE PAINTS.
103	H.M.	90 MIN UL	90 MINUTE UL RATED EXIST'G HM FRAME TO REMAIN	001 002	STORAGE	X X	X	XX	F	R TILE BASE FOR NEW GYP BD WALLS	BASEMENT:	TYPE: SUPER SPEC HP MAINTENANCE COATINGS P85 CONCRETE PRE-TREATMENT & ETCH
104	H.M.		PRIME AND PAINTED FINISH CLOSER	003	UTILITY A	XX	$\frac{ x }{ x }$	XX		R TILE BASE FOR NEW GYP BD WALLS	LATEX WALL/CEILING PAINT	TO BE PROVIDED BY BENJAMIN MOORE PAINTS.
		UL	CEGGER	004	UTILITY B	X X	X	X			LATEX WALL/CEILING FAINT	COLOR: PM-1 SUPER WHITE.
105	H.M.	90 MIN		005	M- LOCKER RM	XX	X	X	1 -	REMOVE EXISTING MINERAL FIBER CLG MAT'L		FINISH: EGGSHELL
				006	M-TLT RM	XX	X	X	F	PREP, PRIME & PAINTED FINISH	CONC BLOCK PRIMER	TO BE PROVIDED BY BENJAMIN MOORE PAINTS.
				007 008	W-LOCKER RM W-TLT RM	XX	^   X	^ X				TYPE: SUPER SPEC HP MAINTENANCE COATINGS P31 WATERBORNE EPOXY BLOCK FILLER
				009	UTILITY C	XXX	$\frac{ \mathbf{x} }{ \mathbf{x} }$	X				COLOR: PM-1 SUPER WHITE.
						1					ACOUSTICAL TILE:	MATERIAL TYPE: MINERAL WOOL/FIBERGLASS. TO BE PROVIDED BY ARMSTRONG COMMERCIAL CEI TYPE/NAME: ARMATUF. SIZE: 24" X 48" X 15/16". PROFILE: SQUARE EDGE
											VCT TILE	VINYL COMPOSITION TILE. SIZE: 12X12X 1/8". TO BE PROVIDED BY MANNINGTON COMMERCIAL. ESSENTIALS. COLOR: STONE GRAY 102. ASTM F-1066 CLASS 2. MANNINGTONCOMMERCIAL.COM 800.241.2262
											GYPSUM BOARD	GP - GEORGIA PACIFIC DENSARMOR PLUS   FIBERGLASS COATED, MOISTURE RESISTANT CORE. TO BE PROVIDED BY GEORGIA PACIFIC GYPSUM, ATLANTA, GEORGIA

		TE: DRAGE UNIT PLAN PER SIZE DESIGNATIONS BY AME F NTACT: BRYAN TALAGA / JOB # 14-91033 / DATED:		TO DEALERS - TROY, MICHIGAN - 248.720.0245
	ST	ORAGE UNIT KEY		
ORMULA CONCRETE SEALER ED BY CONCRETE CHEMICAL COMPANY, SPRINGVILLE, UTAH	NE	WRACKING		EXISTING RACKING
ED FOR EXISTING LAVERY AUDI SERVICE FACILITY FG'S INSTRUCTIONS FOR CONCRETE PREPARATION AND FINISH ICLUDE REMOVAL OF LEVELING FILLER / CARPET GLUE / PAINT / OIL/ ETC.	G	BULK STORAGE 48D X 96W X 87H INCLUDES 4 LEVELS OF STEEL DECKING	EC1	EXISTING SHELVING UNIT 18D X 36W X 120H WITH 8 LEVELS
/IDED BY BENJAMIN MOORE PAINTS. ER SPEC HP MAINTENANCE COATINGS DLIDS EPOXY PENETRATING SEALER/FINISH	К	BULK STORAGE 36D X 96W X 87H INCLUDES 4 LEVELS OF STEEL DECKING	LC	LOCKING CABINET 18D X 36W
LIGHT GRAY	V	BULK STORAGE 48D X 96W X 87H	ED	EXISTING DRAWER UNIT 28D X 30W X 61H
/IDED BY BENJAMIN MOORE PAINTS.  FR SPEC HP MAINTENANCE COATINGS. DUAL PURPOSE METAL PRIMER & FINISH SEMI-GLOSS  LIGHT GRAY	V	INCLUDES 2 LEVELS OF STEEL DECKING  BULK STORAGE 48D X 48W X 87H	EB	EXISTING SHELVING UNIT 24D X 48W X 120H WITH 8 LEVELS
/IDED BY BENJAMIN MOORE PAINTS. R SPEC HP MAINTENANCE COATINGS TE PRE-TREATMENT & ETCH	TF	INCLUDES 2 LEVELS OF STEEL DECKING  TIRE RACK 15D X 72W X 87H WITH 3 LEVELS	EB1	EXISTING SHELVING UNIT  24D X 36W X 120H WITH 3 LEVELS
/IDED BY BENJAMIN MOORE PAINTS. -1 SUPER WHITE.		DESIGNED TO HOLD 18 TIRES PER RACK	EG	EXISTING BULK RACK
SHELL /IDED BY BENJAMIN MOORE PAINTS.	TF	TIRE RACK 15D X 48W X 87H WITH 3 LEVELS DESIGNED TO HOLD 12 TIRES PER RACK	500	48D X 96W X 84H WITH 4 LEVELS
R SPEC HP MAINTENANCE COATINGS RBORNE EPOXY BLOCK FILLER -1 SUPER WHITE.	w	WINDSHIELD RACK 48D X 60W X 87H	EGZ	EXISTING BULK RACK 48D X 72W X 84H WITH 4 LEVELS
YPE: MINERAL WOOL/FIBERGLASS. TO BE PROVIDED BY ARMSTRONG COMMERCIAL CEILINGS. ARMATUF. SIZE: 24" X 48" X 15/16". PROFILE: SQUARE EDGE		APPROX. 96 TIRES TOTAL	EJ	EXISTING BULK RACK 48D X 96W X 84H WITH 3 LEVELS
OSITION TILE. SIZE: 12X12X 1/8". TO BE PROVIDED BY MANNINGTON COMMERCIAL.  COLOR: STONE GRAY 102. ASTM F-1066 CLASS 2.  NCOMMERCIAL.COM 800.241.2262			ES2	EXISTING BULK RACK 48D X 96W X 84H WITH 5 LEVELS
BIA PACIFIC DENSARMOR PLUS   FIBERGLASS COATED, MOISTURE RESISTANT BE PROVIDED BY GEORGIA PACIFIC GYPSUM, ATLANTA, GEORGIA			EST	2,401,40 0, 20,72 10020
E BY SCHLAGE / DOOR CLOSERS BY LCN OR APPROVED EQUAL BALDWIN OR APPROVED EQUAL   FINISH: BRUSHED STAINLESS				28D X 60W X 84H
VIDED BY FORMICA BRAND HIGH PRESSURE LAMINATE. 949-58 - WHITE / MATTE FINISH				

LAVERY AUDI-RANGE ROVER

Luckenbach

PLLC

555 ADAMS ROAD

BIRMINGHAM, MI

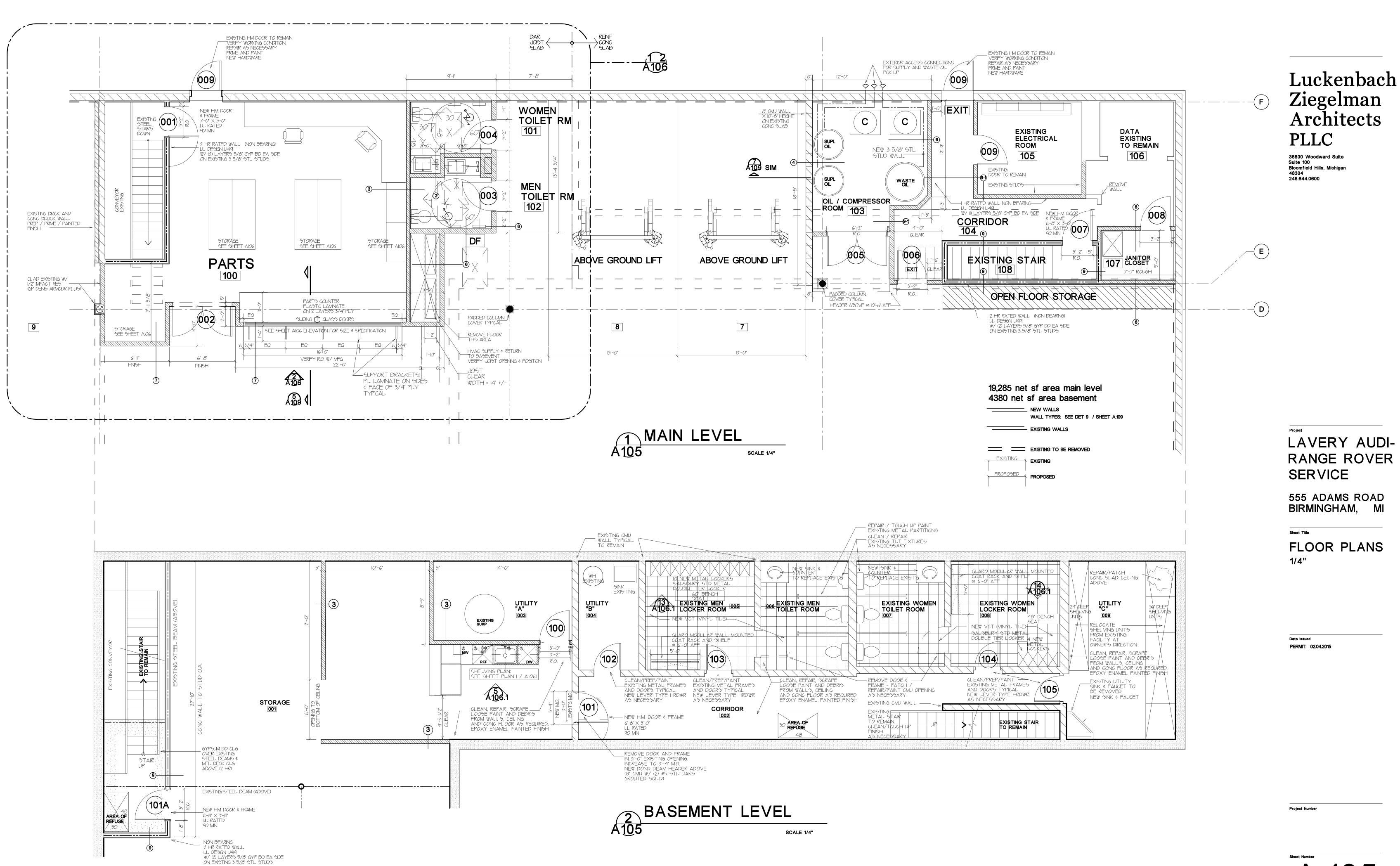
SERVICE

BASEMENT LEVEL PLAN

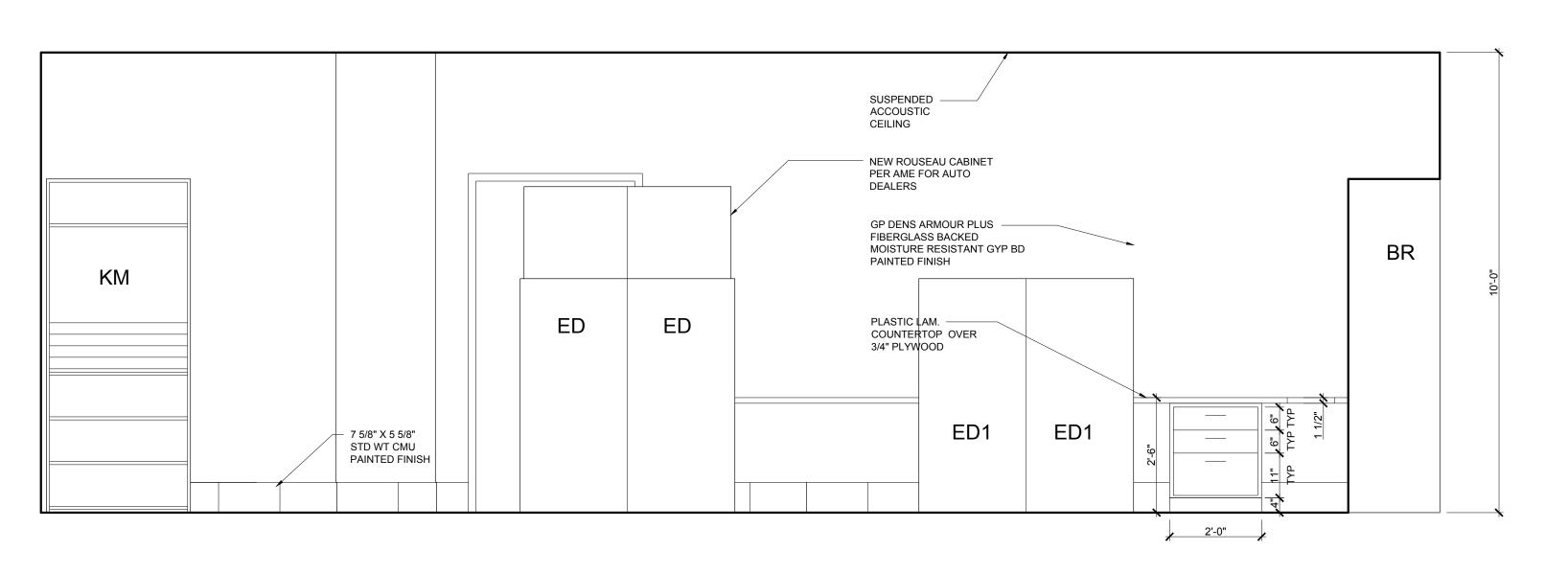
EGRESS PLAN

Date Issued PERMIT 02.04.15

Project Number



Ziegelman Architects



# STORAGE KEY BATTERY RACK 24D X 48W X 87H WITH 8 REIN SHELVES BACKS CLOSED

- BR BATTERY RACK 24D X 48W X 87H WITH 8 REIN. SHELVES. BACKS CLOSED, INTERMEDIATE SIDES OPEN AND ENDS OF ROWS CLOSED
- B SHELVING UNIT 24D X 48W X 87H WITH 8 REIN. SHELVES. BACKS CLOSED, INTERMEDIATE SIDES OPEN AND ENDS OF ROWS CLOSED
- B1 SHELVING UNIT 24D X 36W X 87H WITH 8 REIN. SHELVES. BACKS CLOSED, INTERMEDIATE SIDES OPEN AND ENDS OF ROWS CLOSED
- KM 24D X 36W X 87H CLOSED BACKS, CLOSED SIDES, ROLL OUT SHELF, 3-3" DRAWERS WITH BLUE CUPS, 6 SHELVES INCLUDING TOP & BOTTOM
- R3 ROTOR STORAGE 30D X 60W X 87H WITH 5 LEVELS OF STEEL DECKING
- PB PEG BOARD

| X |

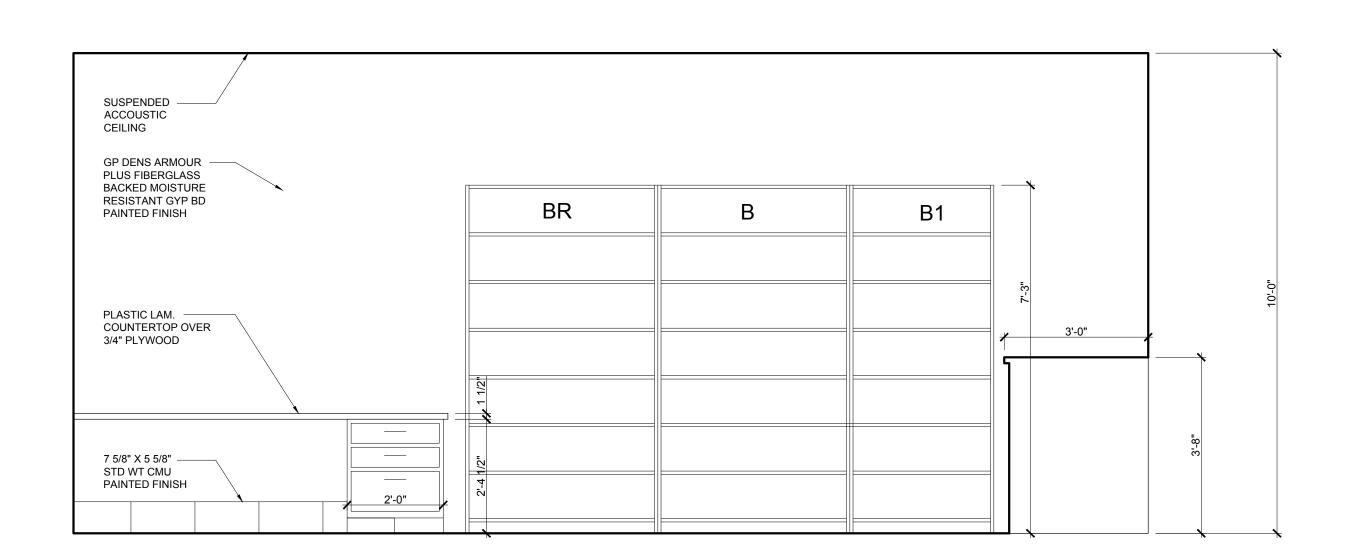
- ED | EXISTING DRAWER UNIT 28D X 30W X 61H WITH NEW ROUSSEAU CABINET ON TOP
- ED1 EXISTING DRAWER UNIT 28D X 30W X 44H

NOTE: STORAGE DESIGNED AND PLANNED BY AME FOR AUTO DEALERS.

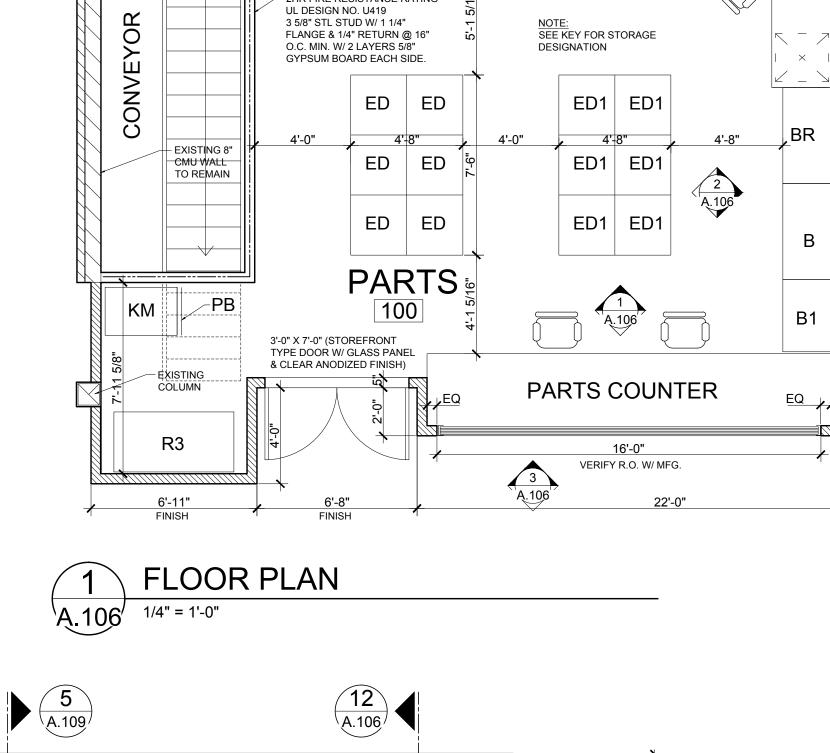
Luckenbach
Ziegelman
Architects
PLLC

36800 Woodward Suite 100 Bloomfield Hills, Michigan 48304 248.644.0600









NOTE:
NEW HM DOOR &

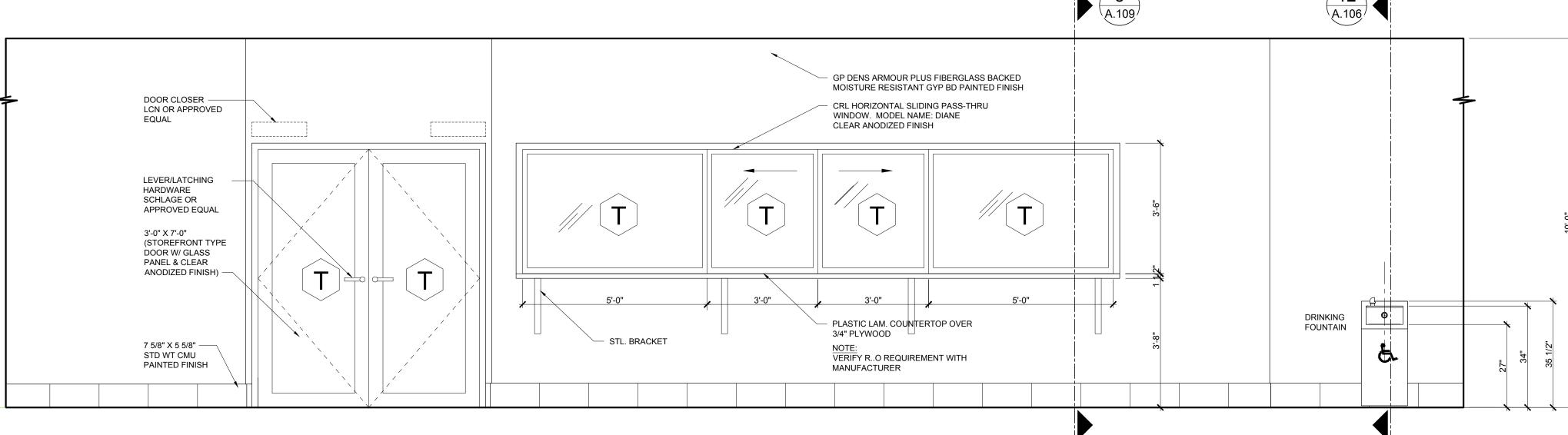
2HR FIRE RESISTANCE RATING

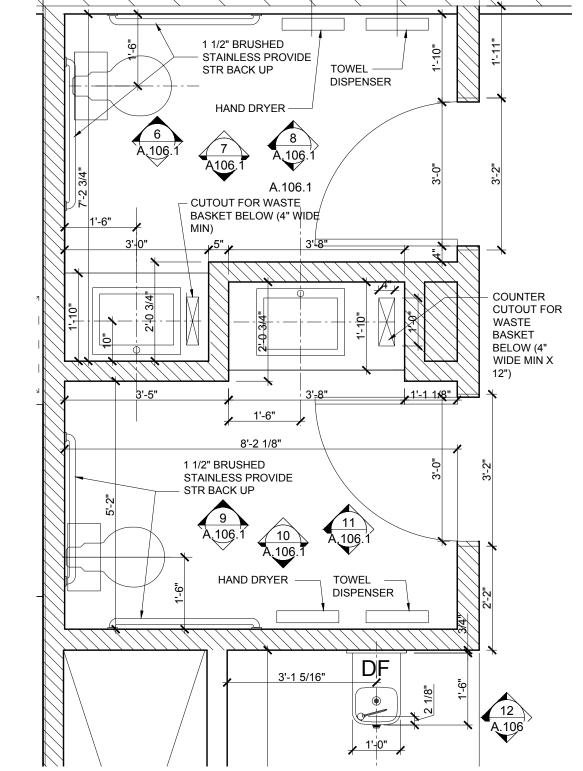
FRAME 7'-0" X 3'-0" UL RATED

NOTE: EXISTING STAIR

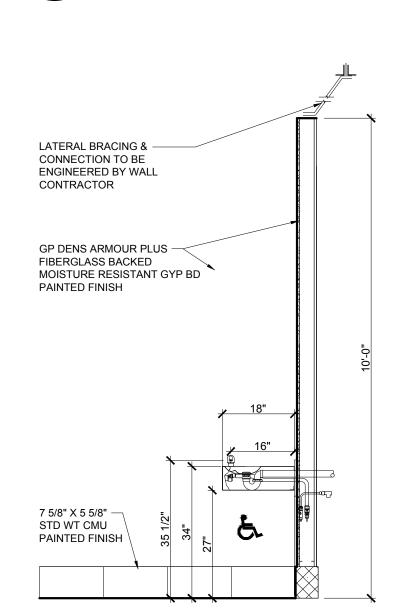
REMAIN

AND CONVEYER TO











LAVERY AUDI RANGE ROVER SERVICE

BIRMINGHAM, MI.

INTERIOR ELEVATIONS

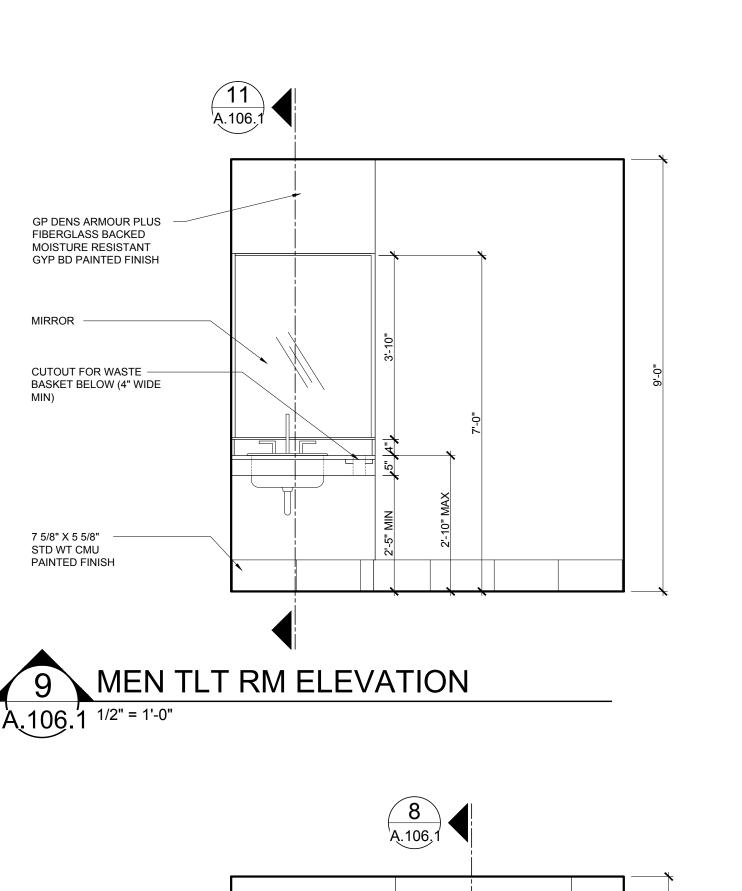
Date Issued
PERMIT 2.4.2015

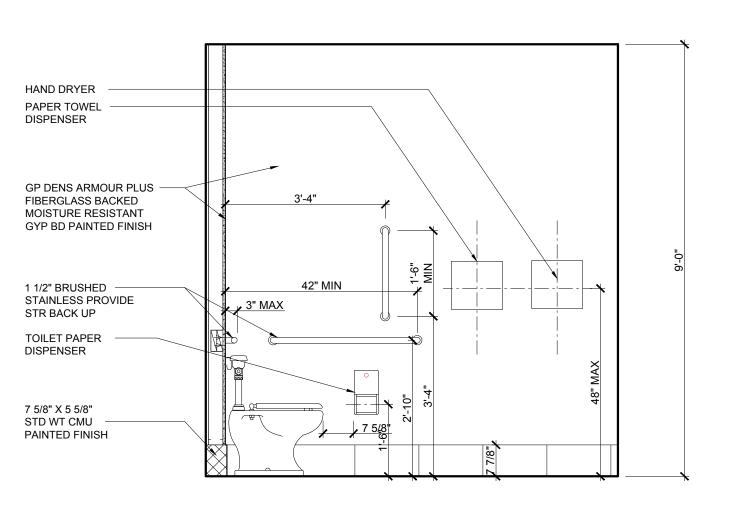
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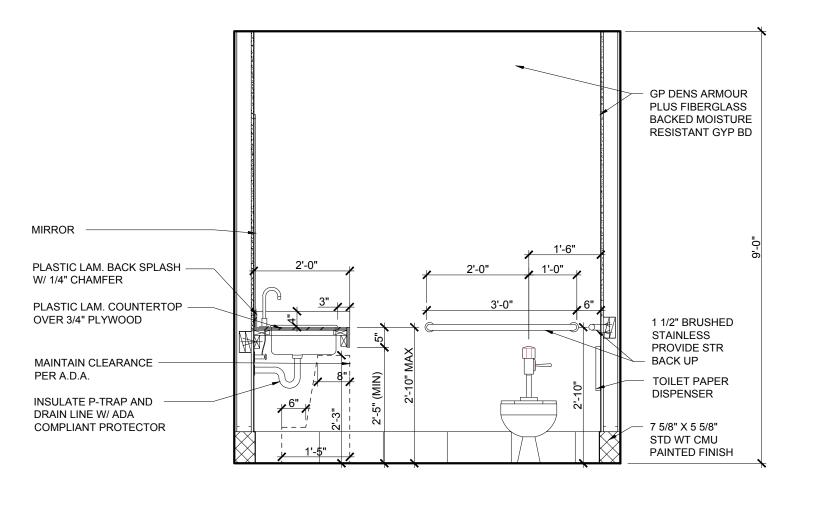
A.106

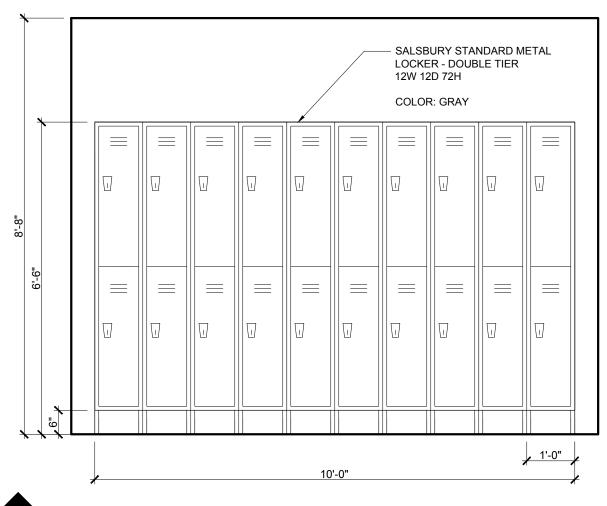
3 PARTS COUNTER ELEVATION

A 106 1/2" = 1'-0"







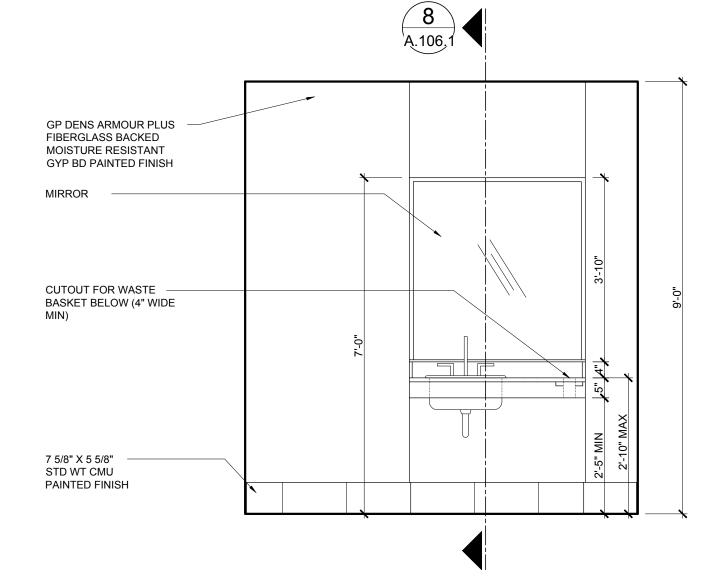






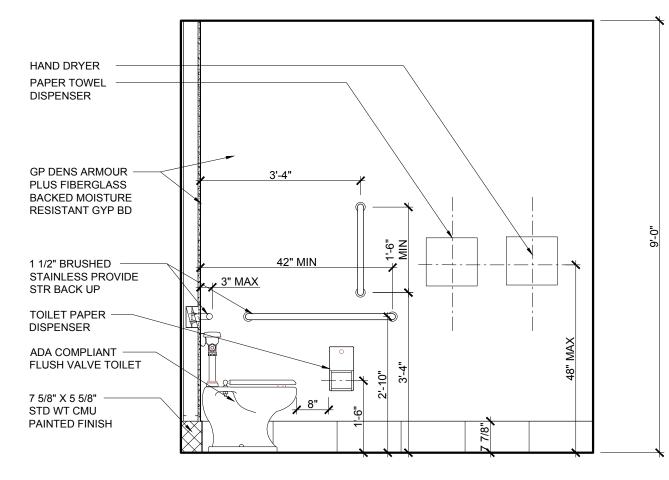






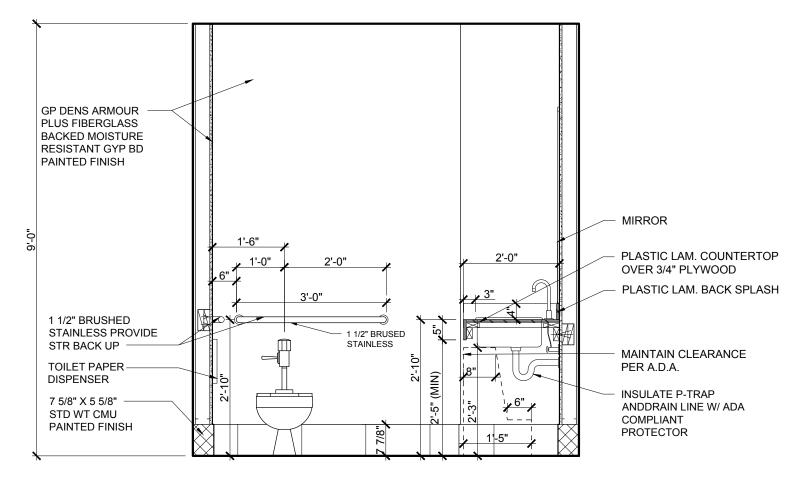
WOMEN TLT RM ELEVATION

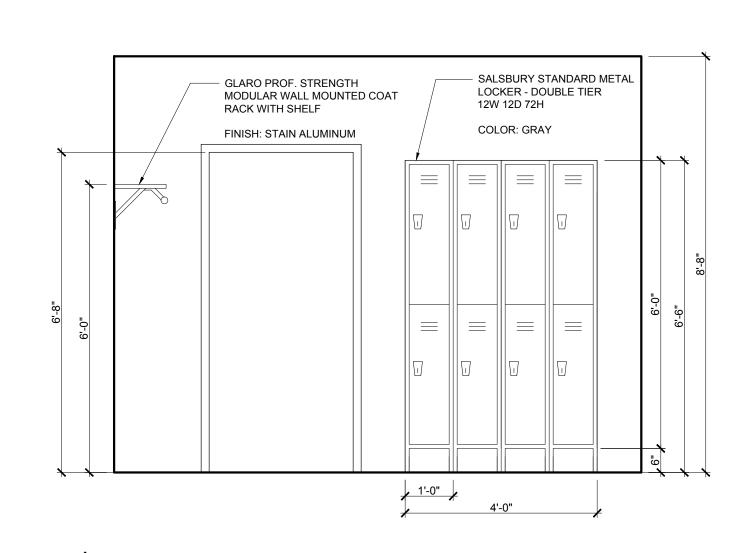
A.106.1 1/2" = 1'-0"

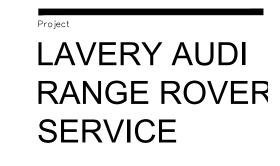


WOMEN TLT RM ELEVATION

A.106.1 1/2" = 1'-0"







BIRMINGHAM, MI.

Date Issued

PERMIT 2.4.2015

INTERIOR **ELEVATIONS** 

WOMEN LOCKER RM - ELEVATION A.106.1 1/2" = 1'-0"

← PAINTED GYP BD.

PLAM CABINETS (WHITE)

4" HANGER TYPE CAB PULLS BRUSHED ALUM TY

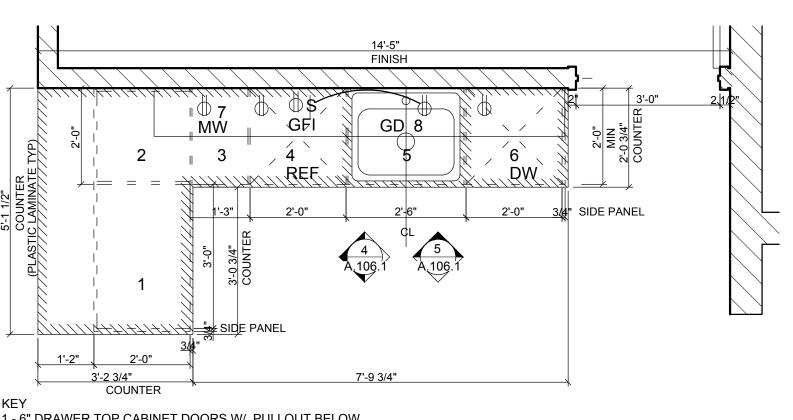
PAINTED GYR BD

\_PLAM CABINETS

PLAM BACKSPLASH

(WHITE)

UTILITY ROOM DOOR OPNG



- 1 6" DRAWER TOP CABINET DOORS W/ PULLOUT BELOW 2 - FILLER CABINET BOX 3 -DRAWERS 4 - OPEN FOR ADA COMPLIANT REFRIGERATOR 5 -SINK CABINET 6 - OPEN W/ SIDE PANEL FOR ADA COMPLIANT DISHWASHER
- BREAK ROOM ELEVATION

3'-0"

\(BEYOND)/

PLAM COUNTER

PLAM CABINETS

EXISTING CEILING STRUCTURE TO REMAIN (PAINTED FINISH)

PAINTED GYP BOARD - 2" H M FRAME CASING

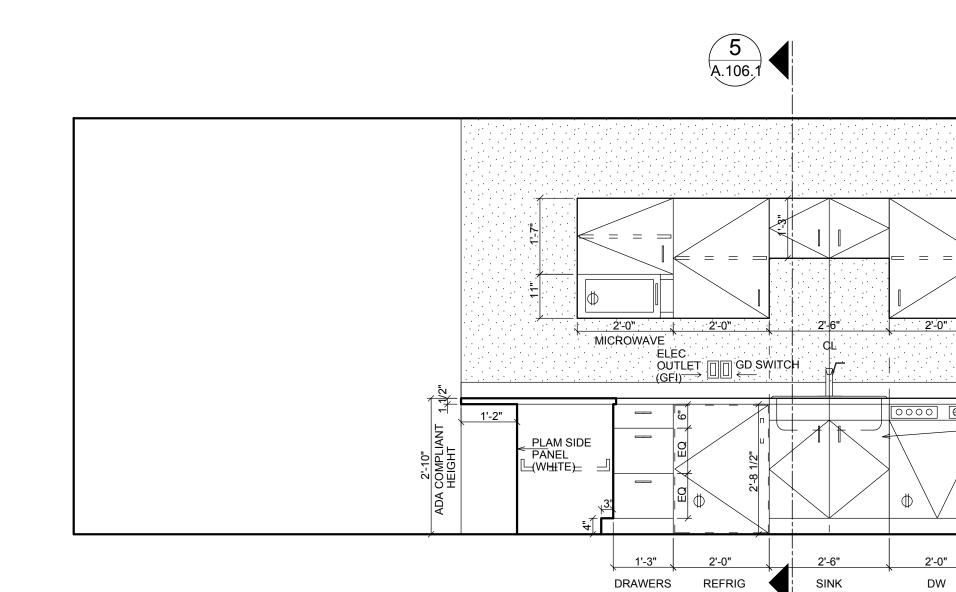
PLAM CABINETS

ADJ SHELF -

4" HANGER TYPE CAB PULLS **BRUSHED ALUM TYP** 

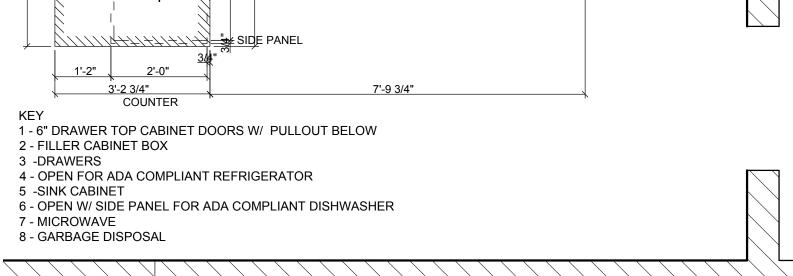
PAINTED GYP BOARD

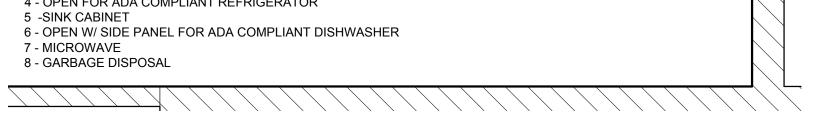
PLASTIC LAMINATE BACKSPLASH





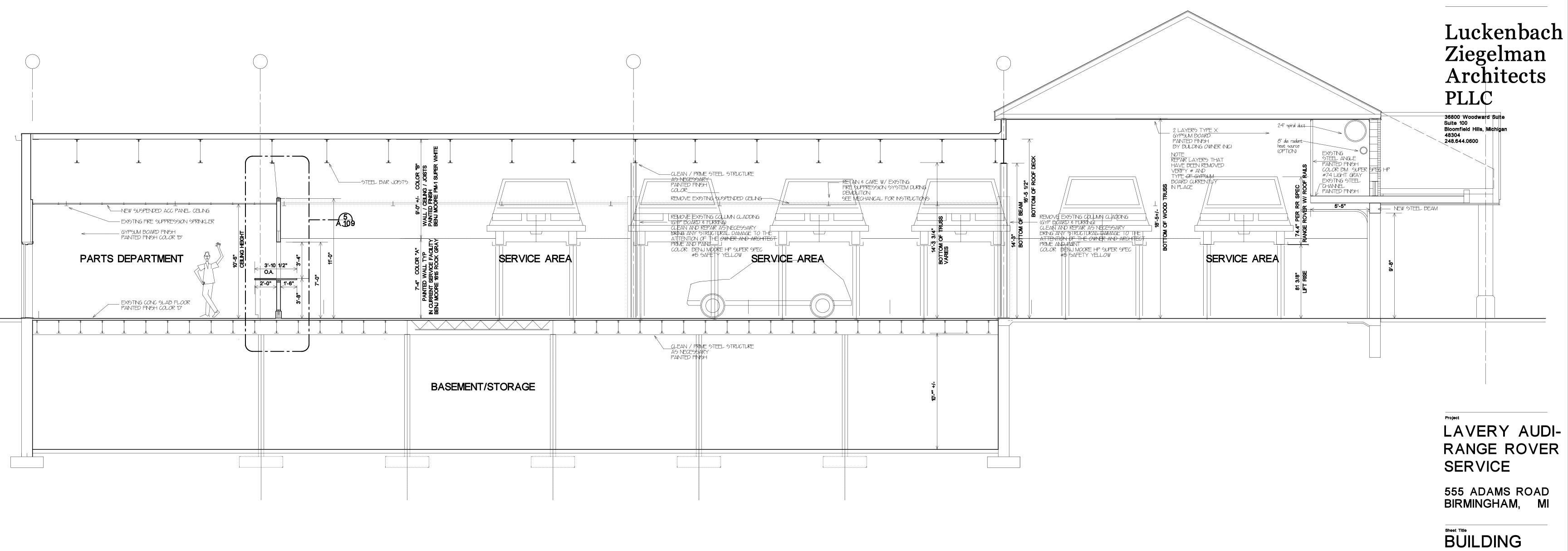
Sheet Number A.106.1





PLAN - BREAK ROOM A.106.1 1/2" = 1'-0"

WOMEN TLT RM ELEVATION A.106.1 1/2" = 1'-0"



BUILDING SECTION
4.107

SCALE 1/4"

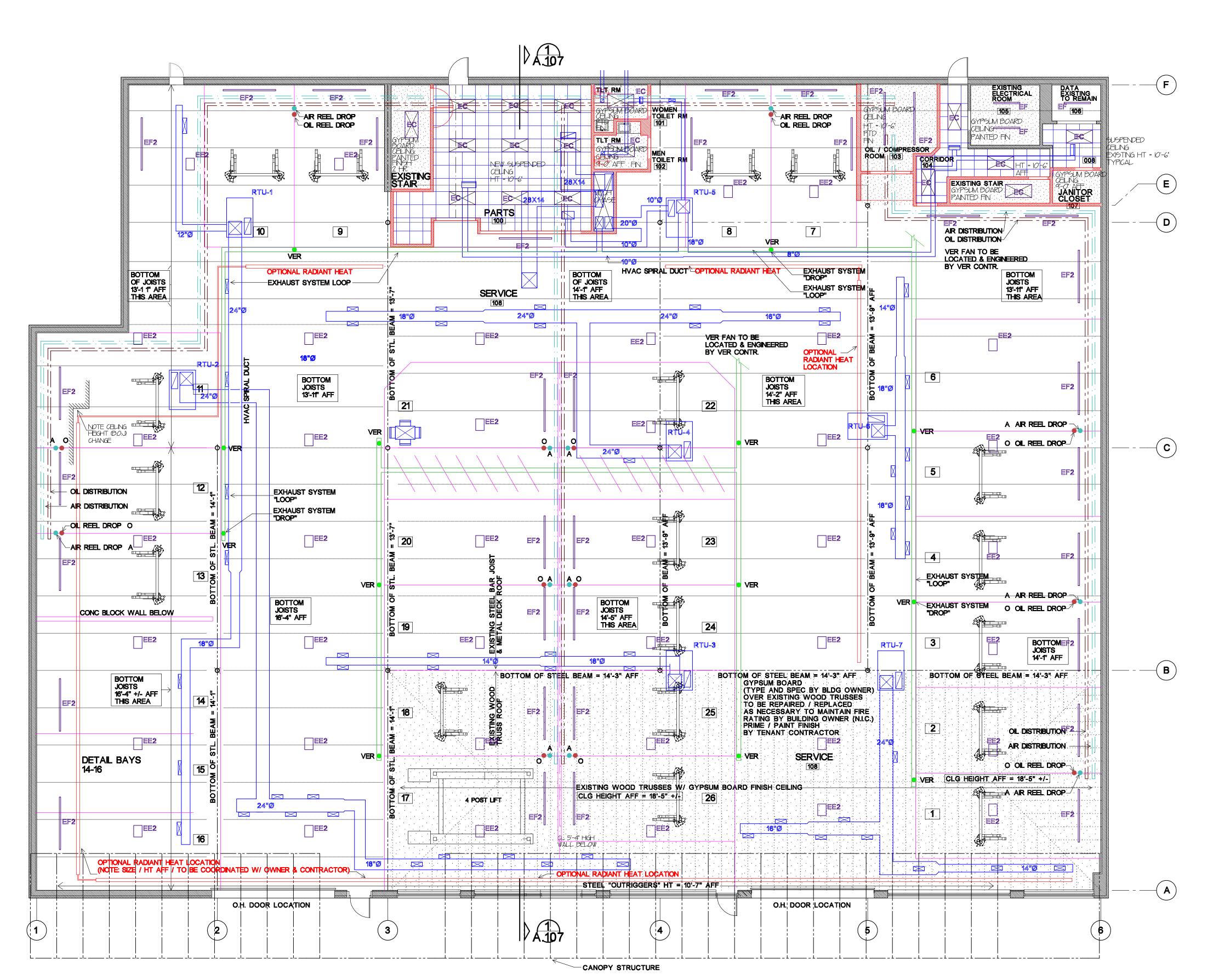
TENANT SPACE INTERIOR

SECTION

Date Issued

Sheet Number

A 107





36800 Woodward Suite Suite 100 Bloomfield Hills, Michigan 48304 248.644.0600

**GENERAL NOTES:** 

• BUILDING IS EQUIPPED WITH AUTOMATIC FIRE SUPPRESSION SYSTEM. SYSTEM TO BE EVALUATED / UPDATED FOR PROPOSED USE AND NEW FINISH CEILING CONDITIONS AND HEIGHTS BY THE FIRE SUPPRESSION DESIGN/BUILD CONTRACTOR.

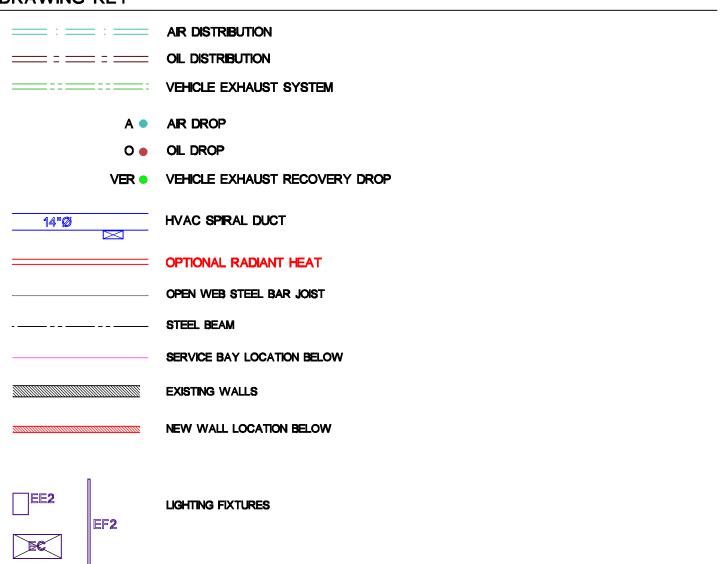
CEILING JOIST LOCATIONS ARE BASED ON "AS BUILT" DRAWINGS CREATED BY A2 DESIGNS, LLC FOR SHORE MORTGAGE TENANT BUILD OUT PROJECT CIRCA 2001 FOR THIS LOCATION.

BOTTOM OF JOIST AND BEAM HEIGHTS HAVE BEEN FIELD MEASURED BY LZA ARCHITECTS FOR GENERAL PLANNING PURPOSES.

LZA ARCHITECTS FOR GENERAL PLANNING PURPOSES.

EXACT TRUSS LOCATIONS AND STRUCTURAL HEIGHTS A.F.F. TO BE FIELD VERIFIED BY THE GENERAL AND TRADE CONTRACTORS SPECIFIC TO THE WORK.

DRAWING KEY



LAVERY AUDI-RANGE ROVER

555 ADAMS ROAD BIRMINGHAM, MI

SERVICE

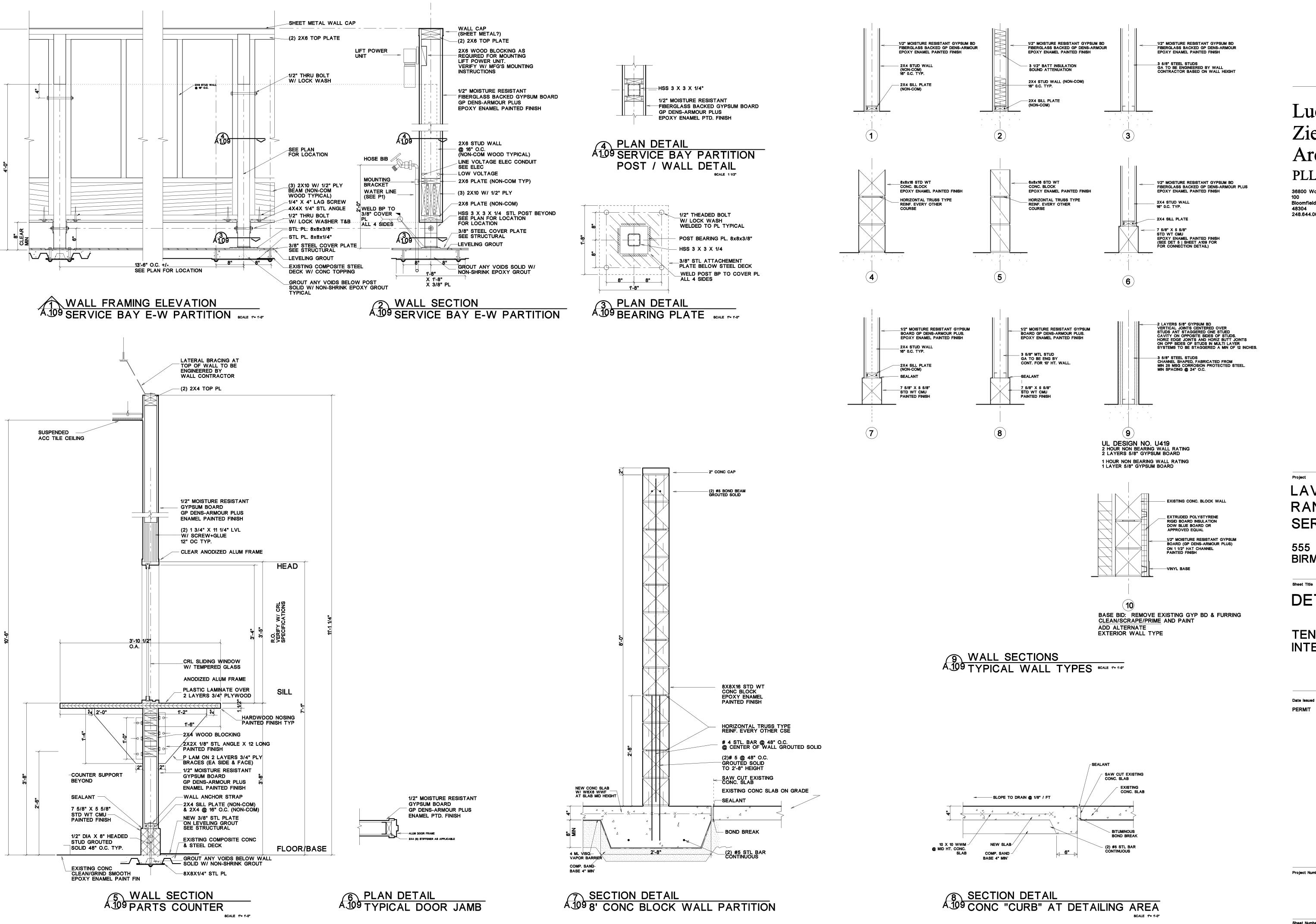
REFLECTED CEILING PLAN

TENANT SPACE INTERIOR

Date leaved
PERMIT 02.04.15

Project Number

A 108



36800 Woodward Suite 100 Bloomfield Hills, Michigan 48304 248.644.0600

LAVERY AUDI RANGE ROVER SERVICE

555 ADAMS ROAD BIRMINGHAM, MI

DETAILS

TENANT SPACE INTERIOR

Date Issued
PERMIT 02.04.2015

Project Number

A.109

#### **GENERAL STRUCTURAL NOTES**

- The structural notes are intended to augment the drawings and specifications. Should conflicts exist between the drawings, specifications and the structural notes, the strictest provision shall govern.
- The structural drawings form an integral part of Contract Documents, which include Architectural, Structural, Mechanical, Electrical, Civil/Site drawings and specifications. Coordinate the structural drawings with the requirements shown in the other components of the Contract Documents.
- Typical details and other sections/details apply to conditions that are similar to the conditions described in the sections/details, even if they are not specifically referenced on the plans.
- The Contractor shall be responsible for means, methods sequences and procedures of construction.
- The structure is designed to be self\_supporting and stable after it is fully completed per requirements of contract documents, Contractor shall determine erection procedures and sequence, and ensure the safety of the building and its component parts during erection. This includes the addition of temporary bracing, guys or tie\_downs if necessary. Contractor shall retain ownership of such material after completion of the project.
- 6. Construction shall comply fully with the applicable provisions of OSHA and the local governing codes, current edition, and all requirements specified in the codes shall be adhered to as if they were called for or shown on the drawings. This shall not be construed to mean that requirements set forth on the drawing may be modified because they are more stringent than the code requirements or because they are not specifically required by code.
- 7. Governing Building Code Michigan (International) Building Code 2009. Standards listed in structural note sections refer to the version and effective date identified in the REFERENCED STANDARDS Chapter in the governing building code.
- Work constructed per these drawings shall be inspected by an Independent Testing Agency retained to ensure compliance with the requirements shown on the drawings. Special Inspections required by the governing building code, local building department and the contract documents shall be performed by a qualified Special Inspector. Project site visits by the Engineer do not constitute or replace inspection.

#### SHOP DRAWINGS

- 1. Submit shop drawings for review as indicated in material section of general structural notes.
- 2. Use of Engineering Drawings as erection drawings by the contractor is strictly prohibited.
- Review of shop drawings and other submittals by the Structural Engineer does not relieve the Contractor of the responsibility to check the shop drawings prior to submittal. Errors and omissions associated with the preparation of shop drawings not conforming to the Construction Documents are the responsibility of the
- Contractor shall provide two hard copies of shop drawing sets for review one for record and one to be returned with review comments. Contractor shall provide a set of approved shop drawings bearing the review stamp of the Structural Engineer, to the local building department and to the project site.
- Notes on submitted shop drawings for work "by others" cannot be responsibly approved by Structural Engineer. Contractor shall coordinate responsibility for materials, connections, etc. prior to shop drawing submittal to the Structural Engineer.
- Contractor shall verify all relevant dimensions and elevations for equipment installations against purchased manufacturer's certified equipment drawings. Contractor shall coordinate dimensions that depend upon specific equipment, such as elevator openings, mechanical equipment supports, etc. prior to submittal, Such dimensions shall be provided on the shop drawings prior to submittal to the Structural Engineer. Contractor's failure to provide such dimensions on submitted shop drawings will result in shop drawing return without

### **EXISTING CONSTRUCTION**

1. Contractor shall visit the site and become familiar with the existing conditions.

- Existing building dimensions and conditions shown are based upon original drawings or partial survey and have not been completely field verified. The Owner and Architect/Structural Engineer take no responsibility for the accuracy of existing dimensions shown. Contractor shall field measure existing dimensions prior to shop drawing preparation and fabrication.
- 3. The existing structure analysis is based upon information shown on original drawings.
- 4. Contractor shall verify conditions covering or affecting the structural work; obtain and verify all dimensions and elevations to ensure the proper strength, fit and location of the structural work; report to the Architect/Structural Engineer any and all conditions/discrepancies which may interfere with or otherwise affect or prevent the proper execution and completion of the new work in compliance with the construction documents. All discrepancies shall be fully resolved prior to commencing work.
- Existing construction not undergoing alteration is to remain undisturbed. Where such construction is disturbed as a result of the operations of this contract, contractor shall repair or replace as required and to the satisfaction of the Architect/Structural Engineer and Owner's Representative.
- Contractor shall verify the existence, location and elevation of existing utilities, sewers, drains, etc. in demolition areas before proceeding with the work. All discrepancies shall be documented and reported to the Architect/Structural Engineer and Owner's Representative for resolution.
- 7. Should uncharted piping or other utilities be encountered during excavation, Contractor shall consult the Architect/Structural Engineer and Owner's Representative for resolution.
- Contractor shall provide fire watch during field cutting and welding operations, meeting the Owner's
- Contractor shall provide temporary protection of existing equipment during execution of work, satisfying the
- owner's requirements. 10. Contractor shall provide temporary protection to prevent damage from the weather and vandalism.
- 11. Contractor shall coordinate work with the Owner's personnel to avoid any interference in their operations.

## FOOTINGS AND FOUNDATIONS

- 1. Contractor shall verify all conditions, including underground utilities and field measurements at job site and report any discrepancies to owner's representative.
- 2. Provide necessary sheeting, shoring, bracing, etc. as required during excavations to protect sides of
- 3. Comply fully with requirements of OSHA and other regulatory agencies for safety provisions.
- Top of spread footing elevations noted on plan are minimum elevations. In all cases footings are to bear on undisturbed natural soils or engineered fill having a minimum net allowable bearing capacity of 3,000 PSF.
- Sides of foundations shall be formed unless conditions permit earth forming. Foundations poured against the earth required the following precautions: Slope sides of excavations as approved by geotechnical engineer and clean up sloughing before and during concrete placement.
- Where footing steps are necessary, they shall be no steeper than one vertical to two horizontal unless noted

7. No footings or slabs shall be placed on or against sub-grade containing free water, frost or ice. Should water

- or frost, however slight, enter a footing excavation after sub-grade approval, the sub-grade shall be re\_inspected by the Geotechnical Engineer/ Testing Laboratory after removal of water or frost.
- The contractor shall provide all necessary measures to prevent any frost or ice from penetrating any footing or slab sub-grade before and after placing of concrete until the full building enclosure is completed and
- Excavated material shall be legally disposed off the owner's property or stored at the site or used for backfilling operations as required in accordance with the Geotechnical Engineer's recommendations and project specification requirements.
- 10. Contractor shall furnish all required de-watering equipment to maintain a dry excavation until backfill is
- 11. Where new footings are adjacent or abut existing foundations, carefully hand excavate and determine bottom of existing foundation. If different than anticipated, adjust new foundations to match existing. In no case shall the new footing be lower than the existing without protection against undermining such as underpinning or
- 12. Foundation bearing soils shall be inspected by a qualified soils engineer. The testing shall include, but not be limited to, identification of soils at and below the foundation bearing level, and the allowable bearing capacity

#### CAST-IN-PLACE CONCRETE:

- Concrete work shall conform to the requirements of ACI 301, "Specifications for Structural Concrete of Buildings", and ACI 318 "Building Code Requirements for Structural Concrete".
- Cement shall conform to ASTM C150 "Specification for Portland Cement" Type I or III.
- 3. Concrete aggregates shall conform to ASTM C33 "Specification for Concrete Aggregates".
- Reinforcing shall conform to ASTM A-615 Grade 60.
- Reinforcement shall be fabricated and erected according to the ACI standards: "Details and Detailing of Concrete Reinforcement", ACI 315 - and "Manual of Engineering and Placing Drawings for Reinforced Concrete Structures". ACI 315R.
- Concrete for foundations shall be normal weight, and have a minimum 28-day compressive strength of 4000
- Exterior concrete subjected to freeze/thaw cycles, salt, etc., including walls, shall be air- entrained 6% +/-
- Contractor shall submit the concrete mix design(s) for review by the Structural Engineer. Proportion mix designs and provide proof of mix design strength as defined in ACI 301. The submittal shall include cement type and source, cement cube strength, aggregate gradations, water tests, admixture catalog information and cylinder strength test results from 30 tests, on specimens with identical mix design, for each concrete mix, or other proof of strength per ACI 301.
- Use of calcium chloride, chloride ions, or other salts in concrete is not permitted.
- 10. Samples for strength tests of each class of concrete placed each day shall be taken by the testing agency in accordance with ACI 301.
- 11. Contractor shall prepare and submit reinforcement shop drawings to the Structural Engineer for review prior to fabrication. The shop drawings shall clearly show reinforcement lengths and bends, locations of bars, methods of support, and details of placement.

#### POST INSTALLED ANCHORS

- Post installed anchors include all mechanical and adhesive anchors noted on Construction Documents. All post installed anchors shall conform to AC-193 for mechanical anchors and AC308 for adhesive anchors.
- Use only code approved anchors with valid ICC-ESR evaluation report for use in base material shown on the Construction Documents, Submit ICC-ESR evaluation report to Structural Engineer and Special Inspection
- 3. Installer of post installed anchors shall be trained by anchor manufacturer.
- Clean existing concrete surface to solid structural concrete. Grind smooth for full steel contact and to prevent gaps between steel and concrete. Alternatively, provide non-shrink grout in all voids between steel
- Drill smaller diameter pilot hole in existing concrete and check for existing reinforcing. Do not cut or damage existing reinforcing.
- If existing reinforcing is found, shift hole to avoid existing reinforcing. Submit location of new hole to Structural Engineer for review.
- Install mechanical anchors and adhesive anchors in strict accordance with manufacturer's written recommendations and procedure detailed in ICC-ESR evaluation report.
- Special Inspections are required for all mechanical and adhesive anchors. Inspect and test post installed anchors as specified in ICC-ESR evaluation report.

## **MASONRY NOTES**

1. Concrete masonry has been designed in accordance with MBC, ACI 530, Building Code Requirements for Masonry Structures and shall be constructed in accordance with ACI 530.1, Specifications for Masonry

- Concrete Masonry to have a minimum 28-day compressive strength FM'=1,500 PSI U.O.N.
- 3. Concrete Masonry units shall conform to the following standards:
- a. Load\_Bearing Units: ASTM C90
- 105 to 125 PCF b. Medium Weight Units:
- c. Normal Weight Units: greater than 125 PCF
- Load-bearing Concrete Masonry units shall be at minimum medium weight units, unless noted otherwise.
- Mortar for all masonry shall conform to ASTM C270 with minimum compressive strength of 1,800 PSI. Mortar below grade shall be type M. Elsewhere mortar may be either type M or S unless specifically i ndicated otherwise. Use either Portland cement/lime or masonry cement for mortar
- Grout shall conform to ASTM C476 with minimum 28-day compressive strength of 3000 PSI. Steel bar reinforcement shall conform to ASTM A615, grade 60. Horizontal joint reinforcement shall be
- "Ladder" type with (W1.7 for low walls without cavity wall with veneer) (3/16" for high walls and walls with Vertical cells containing reinforcing and grout shall form a continuous cavity, free of mortar droppings.
- Minimum vertical CMU wall reinforcing shall be continuous #5 bars at 48" on center, unless noted otherwise. Dowels to concrete foundation to match size and spacing of reinforcing unless noted otherwise. Reinforce CMU core at corners, each side of control joints and each side of wall openings with additional (2)-#5 continuous vertical reinforcing bars
- Horizontal bond beam and vertical reinforcing shall be continuous U.O.N. Lap splice reinforcing per the schedule or use mechanical splices adequate for 125% of specified yield strength of the bar. Lap vertical reinforcement with minimum dowels of same size and spacing that have been previously installed in the f oundations. Dowel embedment in concrete shall conform to the requirements of the concrete notes.
- LAP SPLICE LENGTH
- Reinforcing bars shall be held in position by wire ties or other approved means to insure design location and lap. Place bars and lap prior to grouting.
- 12. Grouting of masonry walls shall conform to recommended procedure for "low lift grouting" or "high lift grouting" as outlined in the NCMA-TEK 3-2A - grouting for concrete masonry walls and ACI 530/ASCE 5 Specification for Masonry Structures. Grout lifts shall not exceed 5 feet without mechanically consolidated
- Lifts of grout shall be keyed 4 inches into the previous course of masonry below.
- Masonry below grade shall be grouted solid.
- Sampling and Testing of mortar and grout shall be in accordance ASTM C 780 ASTM C 1019 -
- respectively. One test of each is required for each 5000 square foot of wall. Construction and testing of masonry prisms shall be in accordance with the procedure outlined in the ASTM
- Special inspection of masonry construction is required. Refer to project specifications and ACI 530 for quality assurance requirements. Special inspection shall include at minimum:
- a. Mortar and grout testing.
- b. Reinforcement placement and lap verification.
- Verification of clear grout space prior to grouting. d. Verification of proper grouting procedures. (grout lift and consolidation)
- Contractor shall brace masonry walls to resist wind loads until floors and roofs are in place, and the masonry has reached 75% of the required strength F'M. Bracing shall be provided in accordance with OSHA - C onstruction Safety Standards for Masonry Wall Bracing and NCMA TEK 3-4B - "Bracing Concrete Masonry Walls during Construction."
- Contractor shall shore masonry walls above masonry bond beam lintels until the masonry is placed full height and has reached the required strength.

#### STRUCTURAL STEEL

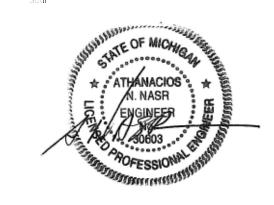
- 1. Design, fabrication and erection of structural steel shall be in accordance with the American Institute of Steel Construction (AISC) 360 Specification for Structural Steel Buildings and the Steel Construction Manual, Allowable Strength Design ASD.
- 2. Structural steel shall conform to the following ASTM specifications and minimum yield strength:
- Miscellaneous shapes and plates A 36 Fy = 36 KSI

Architecturally Exposed Structural Steel.

- Structural steel bolting shall be ASTM A 325 type N, 3/4" diameter snug tight except where other size, ASTM A 490 N, pre-tensioned or slip critical type bolts are indicated.
- Shear connectors shall conform to the requirements of Structural Welding Code Steel, AWS D1.1, Fu = 65 KSI, as manufactured by Nelson Stud Welding, Div. of TRW, or approved substitute, and welded as per manufacturer's written instructions.
- Welding shall be done with appropriate E70 series electrodes compatible with the new and existing steel. Welds and welding procedures shall conform to the "Structural Welding Code - Steel" of the American Welding Society ANSI/AWS D1.1.
- Where specifically noted as AESS, steel and connections are Architecturally Exposed Structural Steel. Finish steel in compliance with AISC Code of Standard Practice for Steel Buildings and Bridges, Section 10.
- Detailing shall be performed using rational engineering design and standard practice in accordance with the Contract Documents. The Typical Details shown are approximate only and do not indicate the required number of bolts or weld sizes, unless specifically noted.
- Contractor shall submit for review, engineered drawings showing shop fabrication details, field assembly details and erection diagrams for all structural steel. Show at minimum all details included in these contract documents with additional erection details as required to completely define the interconnection of structural
- Fabricator shall be AISC Certified or have an AISC equivalent Quality Assurance program as certified by a qualified independent testing agency.
- Contractor shall reference architectural drawings for miscellaneous shapes and plates not shown on structural drawings. These items shall be shop welded to the structural framing sections to minimize field
- The length, dimension and connection detail from new structural member to existing structures shall be field verified before fabrication. Field modifications to the fabricated member or connection are not allowed without prior approval by the Structural Engineer. Contractor shall submit sketches or shop drawings detailing proposed modifications for approval.
- Welding shall be done by welders qualified in accordance with the requirements of the current "Structural Welding Code \_ Steel," American Welding Society, AWS D1.1.
- Where noted Architecturally Exposed Structural Steel (AESS), contractor shall fabricate and install steel to comply with AISC 303 Code of Standard Practice for Steel Buildings and Bridges Sections 10.
- Structural steel to remain unpainted except for exposed steel.
- Contractor shall provide temporary bracing as required to ensure stability of the structure under full design loads until the permanent bracing is in place. Provide necessary shoring where required during construction.

### DESIGN LOADS

1. The reinforcing plate and existing support floor is designed to support 2,000 lbs wheel load in any direction applied to the plates sections.



36800 Woodward Suite Bloomfield Hills, Michigan 248.644.0600



LAVERY AUDI-RANGE ROVER SERVICE

555 ADAMS ROAD BIRMINGHAM, MI

**GENERAL** STRUCTURAL

Date Issued PERMIT 02.04.15

Project Number

	SPECIAL INSPECTION REQUIREMENTS	S - MASONR	Y: LEVEL 1	(OCCUPAN	ICY CATE	EGORIES I	, II, III)
		INSPECTION	FREQUENCY	REFE			
	TASK	CONTINUOUS	PERIODIC	IBC SECTION	ACI 530 ASCE 5 TMS 402	ACI 530.1 ASCE 6 TMS 602	RESPONSIBLE AGENT
1.	COMPLIANCE WITH REQUIRED INSPECTION PROVISIONS OF THE CONSTRUCTION DOCUMENTS AND THE APPROVED SUBMITTALS SHALL BE VERIFIED.	-	×	-	-	ART. 1.5	SI
2.	VERIFICATION OF I'M AND I'AAC PRIOR TO CONSTRUCTION EXCEPT WHERE SPECIFICALLY EXEMPTED BY THIS CODE.	-	Х	-	-	ART. 1.4B	SI
3.	VERIFICATION OF SLUMP FLOW AND VSI AS DELIVERED TO THE SITE FOR SELF-CONSOLIDATING GROUT.	X	-	-	-	ART 1.5B.1.b.3	SI
4.	INSPECTION OF ANCHORS INSTALLED IN HARDENED MASONRY AND GROUT (POST-INSTALLED)	-	X	-	-	-	SI/TA
5.	AS MASONRY CONSTRUCTION BEGINS, THE FOLLOWING SHALL BE VERIFIED TO ENSURE COMPLIANCE:						
	A. PROPORTIONS OF SITE-PREPARED MORTAR.	-	Χ	-	-	ART. 2.6A	
	B. CONSTRUCTION OF MORTAR JOINTS.	-	X	-	-	ART. 3.3B	01
	C. LOCATION OF REINFORCEMENT, CONNECTORS, PRESTRESSING TENDONS, AND ANCHORAGES.	-	X	-	-	ART. 3.4, 3.6A	SI
	D. PRESTRESSING TECHNIQUE.	-	Х	-		ART. 3.6B	
	E. GRADE AND SIDE OF PRESTRESSING TENDONS AND ANCHORAGES.	_	X	-	_	ART. 2.4B, 2.4H	
3.	DURING CONSTRUCTION THE INSPECTION PROGRAM SHALL VERIFY:						
	A. SIZE AND LOCATION OF STRUCTURAL ELEMENTS.	-	X	-	=	ART. 3.3F	
	B. TYPE, SIZE AND LOCATION OF ANCHORS, INCLUDING OTHER DETAILS OF ANCHORAGE OF MASONRY TO STRUCTURAL MEMBERS, FRAMES OR OTHER CONSTRUCTION.	-	Х	-	SEC. 1.2.2(e) 1.16.1	-	SI
	C. SPECIFIED SIZE, GRADE AND TYPE OF REINFORCEMENT, ANCHOR BOLTS, PRESTRESSING AND ANCHORAGES.	-	Х		SEC. 1.15	ART. 2.4, 3.4	SI
	D. WELDING OF REINFORCING BARS	Х	-	-	SEC. 2.1.9.7.2, 3.3.3.4 (b)	-	
	E. PREPARATION, CONSTRUCTION AND PROTECTION OF MASONRY DURING COLD WEATHER (TEMPERATURE BELOW 40°F) OR HOT WEATHER (TEMPERATURE ABOVE 90°F).	-	X	SEC. 2104.3, 2104.4	-	ART. 1.8C, 1.8D	SI/TA
	F. APPLICATION AND MEASUREMENT OF PRESTRESSING FORCE.	Χ	-	-	-	ART. 3.6B	
	PRIOR TO GROUTING, THE FOLLOWING SHALL BE VERIFIED TO ENSURE COMPLIANCE:						
	A. GROUT SPACE IS CLEAN.	-	Х	-	<u>-</u>	ART. 3.2D	
	B. PLACEMENT OF REINFORCEMENT AND CONNECTORS, AND PRESTRESSING TENDONS AND ANCHORAGES.	-	Х	-	SEC. 1.13	ART. 3.4	SI
	C. PROPORTIONS OF SITE-PREPARED GROUT AND PRESTRESSING GROUT FOR BONDED TENDONS.	-	X	-	-	ART. 2.6B	
	D. CONSTRUCTION OF MORTAR JOINTS.	-	X	-	-	ART. 3.3B	
•	GROUT PLACEMENT SHALL BE VERIFIED TO ENSURE COMPLIANCE:	Х	-	-	-	ART. 3.5	SI/TA
	A. GROUTING OF PRESTRESSING BONDED TENDONS.	Х	-	-	-	ART. 3.6C	
	PREPARATION OF ANY REQUIRED GROUT SPECIMENS, MORTAR SPECIMENS, AND/OR PRISMS SHALL BE OBSERVED.	-	X	SEC. 2105.2.2, 2105.3	-	ART. 1.4	SI/TA

		INSPECTION I	FREQUENCY	REFERENCED		RESPONSIBLE
	TASK	CONTINUOUS	PERIODIC	STANDARD	IBC REFERENCE	AGENT
1.	INSPECTION OF STEEL FABRICATOR:			AISC QUALITY CERTIFICATION	4704.0	CI
	A. VERIFY Q.C. PROCEDURES ARE AISC COMPLIANT AND CURRENT.	-	Χ	AISC QUALITY CERTIFICATION	1704.2	SI
2.	MATERIAL VERIFICATION OF HIGH-STRENGTH BOLTS, NUTS, AND WASHERS:			-	-	
	A. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS.	-	Х	AISC 360, SECTION A3.3 AND APPLICABLE ASTM MATERIAL STANDARDS	-	SI
	B. MANUFACTURER'S CERTIFICATE OF COMPLIANCE REQUIRED.	-	X	-	-	
3.	INSPECTION OF HIGH-STRENGTH BOLTING:					
	A. SNUG-TIGHT JOINTS.	-	X			
	B. PRETENSIONED AND SLIP-CRITICAL JOINTS USING TURN-OF-NUT WITH MATCHMARKING, TWIST-OFF BOLT OR DIRECT TENSION INDICATOR METHODS OF INSTALLATION.	-	Х	AISC 360, SECTION M2.5	1704.3.3	SI/TA
	C. PRETENSIONED AND SLIP-CRITICAL JOINTS USING TURN-OF-NUT WITHOUT MATCHMARKING, OR CALIBRATED WRENCH METHODS OF INSTALLATION.	X	-			
4.	MATERIAL VERIFICATION OF STRUCTURAL STEEL AND COLD-FORMED STEEL DECK:					
	A. FOR STRUCTURAL STEEL, IDENTIFICATION MARKINGS TO CONFORM TO AISC 360.	-	Х	AISC 360, SECTION M5.5  APPLICABLE ASTM MATERIAL STANDARDS		
	B. FOR OTHER STEEL, IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS.	-	Х			
	C. MANUFACTURER'S CERTIFIED TEST REPORTS.	-	X	-		SI/TA
5.	MATERIAL VERIFICATION OF WELD FILLER MATERIALS:			AISC 360		
	A. IDENTIFICATION MARKINGS TO CONFORM TO AWS SPECIFICATION IN THE APPROVED CONSTRUCTION DOCUMENTS.	-	X	SECTION A3.5 AND APPLICABLE AWS		
	B. MANUFACTURER'S CERTIFICATE OF COMPLIANCE REQUIRED.	-	Χ	A5 DOCUMENTS		
3.	INSPECTION OF WELDING:					
	A. STRUCTURAL STEEL AND COLD - FORMED STEEL DECK:					
	1. COMPLETE AND PARTIAL JOINT PENETRATION GROOVE WELDS.	X	-			
	2. MULTIPASS FILLET WELDS.	X	-	AWS D1.1	1704.3.1	
	3. SINGLEPASS FILLET WELDS > 5/16"	X	-			
	4. PLUG AND SLOT WELDS.	X	-			
	5. SINGLEPASS FILLET WELDS ≤ 5/16"	-	X			
	6. FLOOR AND ROOF DECK WELDS.	-	X	AWS D1.3		
	B. REINFORCING STEEL:					SI/TA
	1. VERIFICATION OF WELDABILITY OF REINFORCING STEEL OTHER THAN ASTM A 706.	-	X	AWS D1.4, ACI 318: SECTION 3.5.2		
	2. REINFORCING STEEL RESISTING FLEXURAL AND AXIAL FORCES IN INTERMEDIATE AND SPECIAL MOMENT FRAMES, AND BOUNDARY ELEMENTS OF SPECIAL STRUCTURAL WALLS OF CONCRETE AND SHEAR REINFORCEMENT.	×	-			
	3. SHEAR REINFORCEMENT.	Х	-			
	4. OTHER REINFORCING STEEL.	-	X			
7.	INSPECTION OF STEEL FRAME JOINT DETAILS FOR COMPLIANCE:		<del></del>			
•	A. DETAILS SUCH AS BRACING AND STIFFENING.	_	X	_		
	B. MEMBER LOCATIONS.	_	X	<b>⊣</b> -	1704.3.2	SI
	C. APPLICATION OF JOINT DETAILS AT EACH CONNECTION.	_	X			

	SPECIAL INSPECTION REQUIREMENTS - SOILS AND FOUNDATIONS						
		TAOL	INSPECTION F	REQUENCY	REFERENCED	IDO DEFEDENCE	RESPONSIBLE
		TASK	CONTINUOUS	PERIODIC	STANDARD	IBC REFERENCE	AGENT
1.	SITE	PREPARATION:					
	A. VERIFY SITE PREPARED IN ACCORDANCE WITH APPROVED GEOTECHNICAL REPORT.		-	X	GEOTECHNICAL REPORT	1704.7, 1803	SI/GE
2.	2. EXCAVATION:						
	A.	VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.	-	X	GEOTECHNICAL REPORT	1704.7	SI/GE
3.	FILL	PLACEMENT:					
	A.	PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS.	-	X		1704.7, 1803.5	
	В.	VERIFY USE OF PROPER MATERIALS, DENSITIES, AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL.	Х	-	GEOTECHNICAL REPORT		SI/GE/TA
	C.	PRIOR TO PLACEMENT OF COMPACTED FILL, OBSERVE SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY.	-	Х			
4.	SHA	LLOW FOUNDATIONS:					
	A.	IDENTIFICATION OF SOILS AT AND BELOW FOUNDATION BEARING LEVEL.	-	Χ	GEOTECHNICAL REPORT	1704.7	SI/GE
	B.	VERIFY ALLOWABLE BEARING CAPACITY OF FOUNDATION BEARING SOILS.	-	X			

	SPECIAL INSPECTION REQUIREMENTS - CONCRETE CONSTRUCTION					
	TASK	INSPECTION F	REQUENCY	REFERENCED	IBC REFERENCE	RESPONSIBLE
	TAOR	CONTINUOUS	PERIODIC	STANDARD	IDO REI ERENGE	AGENT
1.	INSPECTION OF REINFORCING STEEL AND PLACEMENT.	-	Х	ACI 318: 3.5, 7.1-7.7	1913.4	SI
2.	INSPECTION OF ANCHOR RODS AND EMBEDS TO BE INSTALLED IN CONCRETE PRIOR TO PLACEMENT OF CONCRETE WHERE ALLOWABLE LOADS HAVE BEEN INCREASED OR WHERE STRENGTH DESIGN IS USED.	х	-	ACI 318: 8.1.3, 21.2.8	1911.5, 1912.1	SI/TA
3.	INSPECTION OF ANCHORS INSTALLED IN HARDENED CONCRETE (POST-INSTALLED)	-	Х	ACI 318: 3.8.6, 8.1.3, 21.2.8	1912.1	SI/TA
4.	VERIFYING USE OF REQUIRED DESIGN MIX.	-	Х	ACI 318: CHAPT 4, 5.2-5.4	1904.3, 1913.2, 1913.3	SI/TA
5.	AT THE TIME FRESH CONCRETE IS SAMPLED TO FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE.	X	-	ASTM C 172 ASTM C 31 ACI 318: 5.6, 5.8	1913.10	SI/TA
6.	INSPECTION OF CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES.	Х	-	ACI 318: 5.9, 5.10	1913.6, 1913.7, 1913.8	SI
7.	INSPECTION FOR MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES.	-	Х	ACI 318: 5.11-5.13	1913.9	SI
8.	INSPECT FORMWORK FOR SHAPE, LOCATION, AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED.	-	Х	ACI 318: 6.1.1	-	SI/SE/TA



- . SPECIAL INSPECTIONS SHALL BE PERFORMED IN ACCORDANCE WITH THE 2009 MICHIGAN (INTERNATIONAL) BUILDING CODE CHAPTER 17 AND AS MODIFIED HEREIN.
- . <u>DESIGNATIONS</u>
- SI: SPECIAL INSPECTOR QUALIFIED WITH DEMONSTRATED COMPETENCE DOCUMENTED BY CERTIFICATIONS FROM RECOGNIZED AGENCIES SUCH AS AWS, ACI, MASONRY INSTITUTE OF MICHIGAN (MIM), ETC., AS SUBMITTED AND APPROVED BY THE BUILDING OFFICIAL. SPECIAL INSPECTOR MAY BE A FIRM WITH MULTIPLE SPECIALISTS AND A PROJECT MANAGER PROVIDING REPORTS.
- TA: TESTING AGENCY QUALIFIED TO TEST AND INSPECT MATERIALS AND ASSEMBLIES. TESTING AGENCY SHALL BE UNDER THE SUPERVISION OF THE SPECIAL INSPECTOR.
- GE: GEOTECHNICAL ENGINEER WHO PROVIDED THE ORIGINAL PROJECT GEOTECHNICAL SOILS INVESTIGATION REPORT.
- SE: SPECIALTY ENGINEER RESPONSIBLE FOR DESIGNING ASSEMBLIES SUCH AS PRECAST CONCRETE, STEEL JOISTS, COLD FORMED FRAMING ASSEMBLIES, ETC. SPECIALTY ENGINEER SHALL PROVIDE OBSERVATION OF FABRICATED AND INSTALLED ITEMS OF THEIR DESIGN, IN ADDITION TO THE SPECIAL INSPECTION.
- 3. TA, GE AND SE SHALL SUBMIT RECORDS OF THE INSPECTION RESULTS TO THE SI. THE SI SHALL COMPILE AND SUBMIT INSPECTION RECORDS TO THE ARCHITECT/ENGINEER AND BUILDING OFFICIAL. RECORDS SHALL INCLUDE STATEMENTS OF TESTS, WHETHER INSTALLED/FABRICATED ITEM COMPLIES WITH CONTRACT DOCUMENTS, REMEDIAL WORK PERFORMED, RETESTS.
- 4. SI SHALL PROVIDE A DAILY REPORT OF ANY DISCREPANCIES FROM THE CONTRACT DOCUMENTS FOUND ON THE SAME DAY OF THE INSPECTION TO THE ENGINEER OF RECORD. FORMAL REPORTS OF COMPLIANCE CAN FOLLOW BY A MAXIMUM OF 2 WEEKS. SI SHALL PROVIDE AND SIGN A FINAL REPORT WITH A SUMMARY OF ALL TESTS PERFORMED AND RESULTS TO THE ENGINEER OF RECORD AND BUILDING OFFICIAL.
- SI, TA & GE SHALL BE PAID BY THE OWNER IN COMPLIANCE WITH THE MICHIGAN (INTERNATIONAL) BUILDING CODE.



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info@desainasr.com DNCE Project No. 8939 — 00

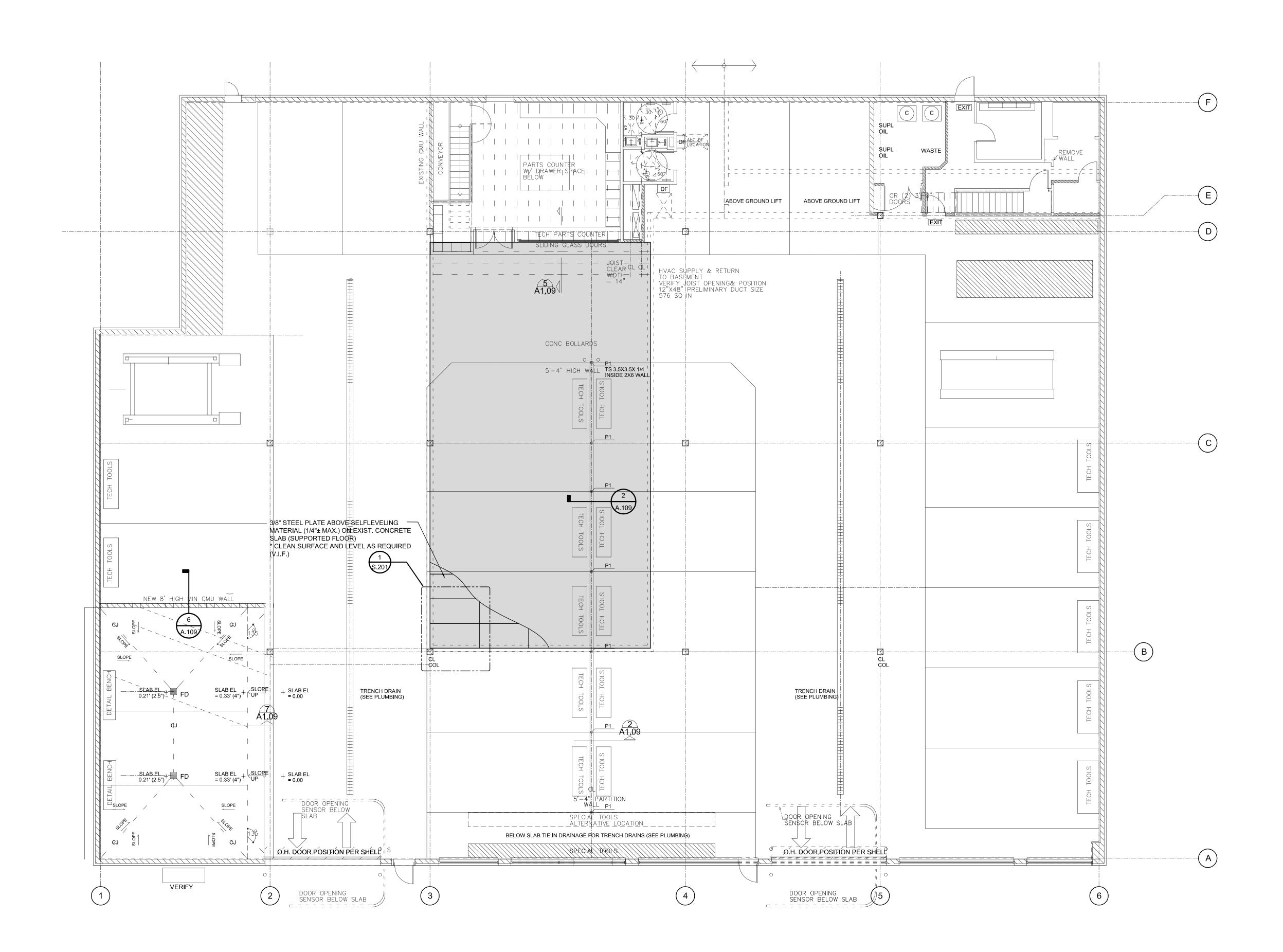
LAVERY AUDI-RANGE ROVER SERVICE

555 ADAMS ROAD BIRMINGHAM, MI

SPECIAL INSPECTIONS SCHEDULES

Date Issued
PERMIT 02.04.15

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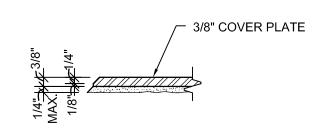


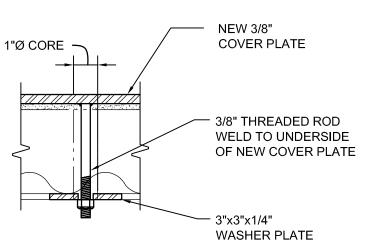
LAVERY AUDI-RANGE ROVER SERVICE

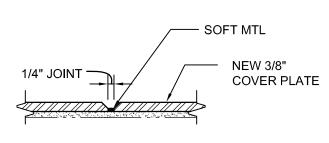
555 ADAMS ROAD BIRMINGHAM, MI

FLOOR PLAN
MAIN LEVEL
TENANT SPACE
INTERIOR

Date Issued
PERMIT 02.04.15



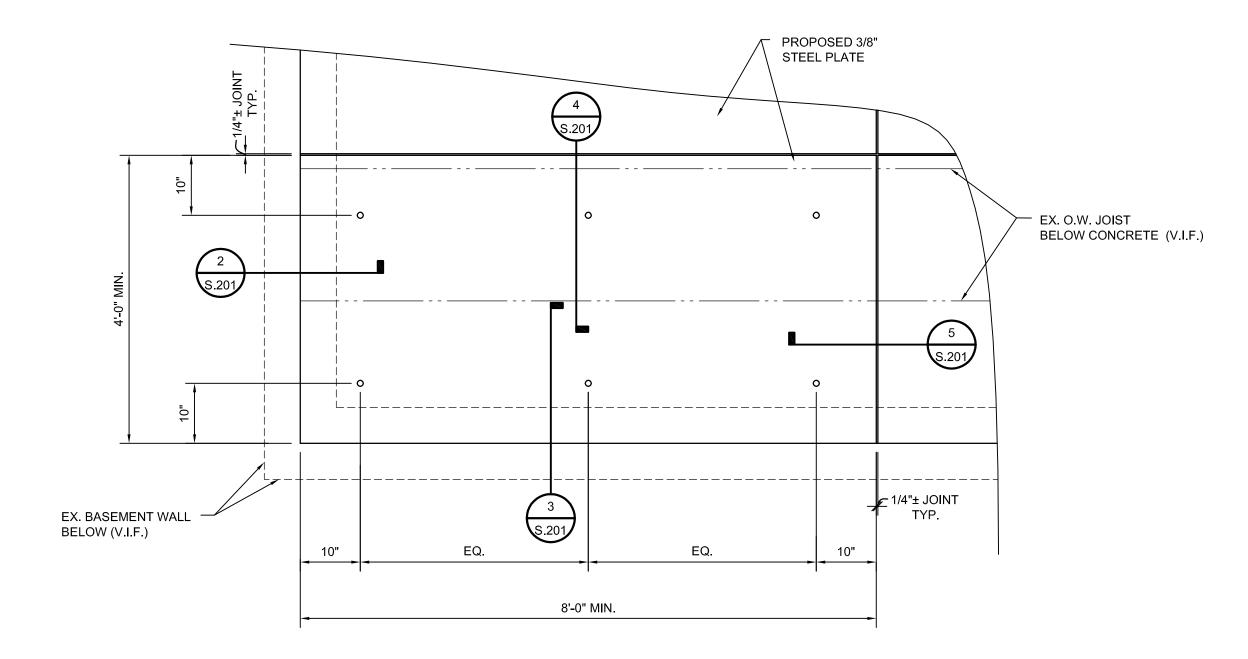


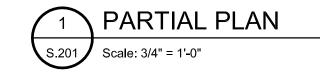


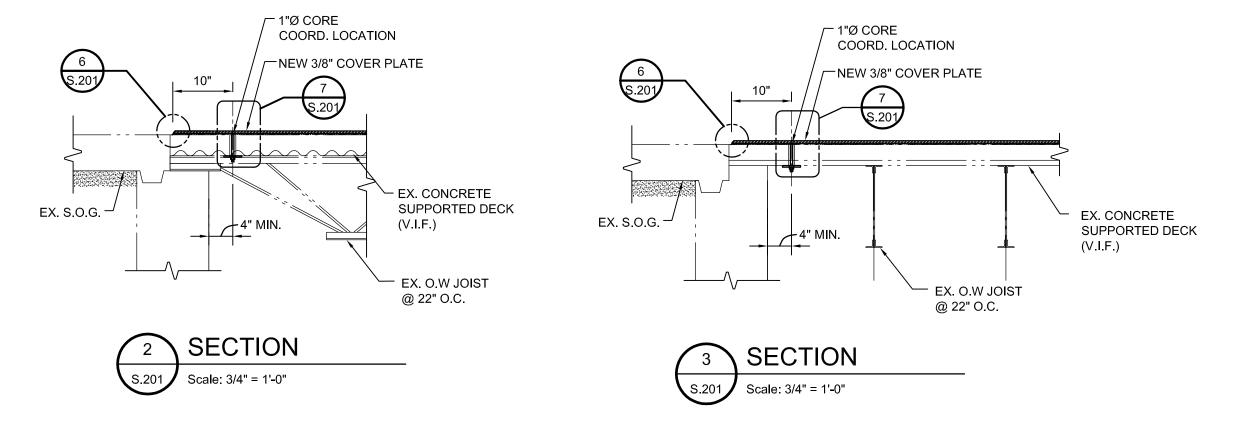


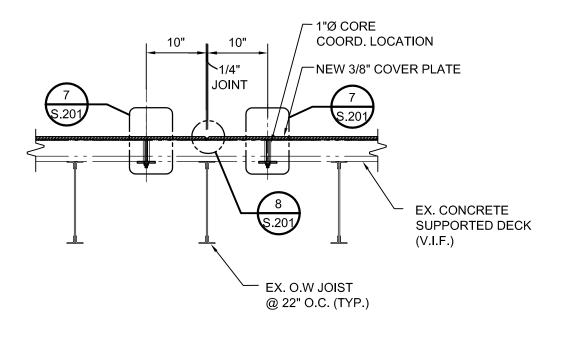


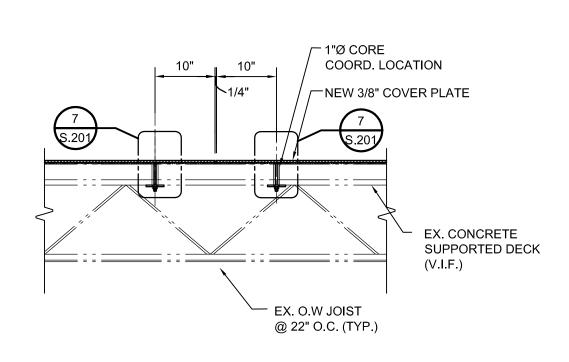




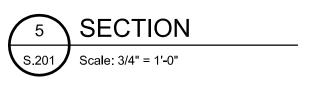


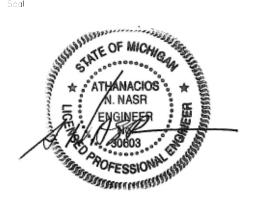












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LAVERY AUDI-RANGE ROVER SERVICE

555 ADAMS ROAD BIRMINGHAM, MI

PARTIAL
PLAN
SECTIONS
AND
DETAILS

Date Issued
PERMIT 02.04.15

Snoot Number

Project Number

#### HV & A/C UNIT SCHEDULE

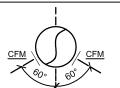
MARK	CFM	ESP	COOLING (1)	HEATING (2)	MCA (3)	MODED
RTU-1	4000	0.95	9 tons	220,000	49.1	(4)(5)(6)
RTU-2	5000	1.2	13 tons	250,000	60.6	(4)(5)
RTU-3	2400	1.0	6.5 tons	150,000	34.7	(4)(5)
RTU-4	4000	0.95	9 tons	220,000	49.1	(4)(5)
RTU-5	2000	0.5	5 tons	150,000	28.9	(4)(5)(6)
RTU-6	4100	1.2	10 tons	220,000	53.4	(4)(5)
RTU-7	4100	1.2	10 tons	220,000	53.4	(4)(5)

(1) Nominal 95 Ambient - 75% SHR

(2) Natural Gas @ ¼ PSI (3) At 208/3

(3) At 208/3
(4) Carrier
(5) Curb, economizer, digital controls with 7-day program, W.P. receptacle, disconnect, relief, Premier Link controls, smoke detectors (factoryinstalled) with audible and visual signal, coil guard, hinged access panels.
(6) R.A. sound trap on RTU-1 & RTU-5

# TYPICAL SPIRAL DUCT AIR DELIVERY



### VERTICAL DELIVERY

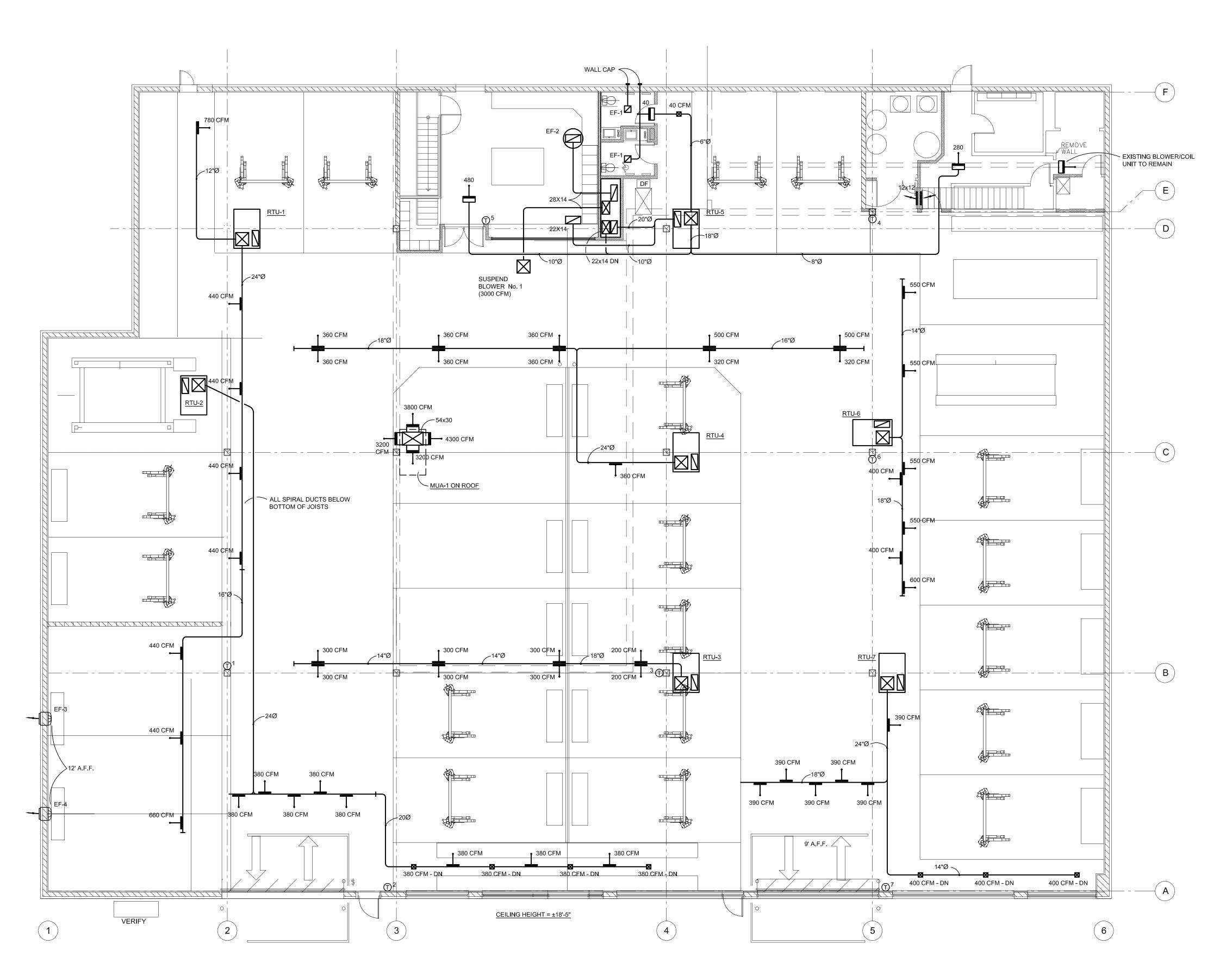


SPIRAL DUCT DIFFUSER SCHEDULE PRICE MFG. MODEL 520 HORIZONTAL FRONT BLADES

) <

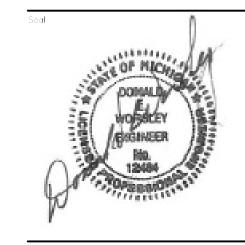
PROVIDE SPIRAL DUCT ATTACHMENT BOX

NOTE: MOTOR VEHICLE TAILPIPE EXHAUST SYSTEMS ARE TO BE PROVIDED BY THE OWNER, INCLUDING ALL DUCTWORK & POWERED EXHAUST SYSTEMS. (INTERNATIONAL RADIANT)



# MAIN LEVEL MECHANICAL PLAN SCALE: 1/8"=1'-0"

AREA - MAIN LEVEL - 19,265 SQ. FT. AREA - BASEMENT - 4,380 SQ. FT.



# Luckenbach Ziegelman Architects PLLC

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LAVERY AUDI-RANGE ROVER SERVICE

555 ADAMS ROAD BIRMINGHAM, MI

MAIN LEVEL MECHANICAL PLAN

Date Issued **REVIEW 1.9.15** PERMITS 1.16.15 REV.#1 2.5.15

Sneet Title

**EQUIPMENT - NEW** 1. MUA-1, RUPP Model Ram 20, operating at 14,400 cfm, 0.75 inch ESP, 10 H.P. with intake hood, roof mounting curb, low fire start, summer/winter control, remote adjustment remote CO sensors to control unit operation, with manual set point adjustment, 0°-75° T.R. custom discharge head, Integ digital gas

Interlock EF 3&4 with MUA-1, to operate together.

EF 3&4 to have "Hand-Auto-Off" Control in starter, to allow ventilation option, without MUA-1 operation.

Starter for EF 3&4 furnished by E.C.

Minimum airflow to garage working space to be from RTU-1 through RTU-7, 1,200 cfm per Section 404.2.

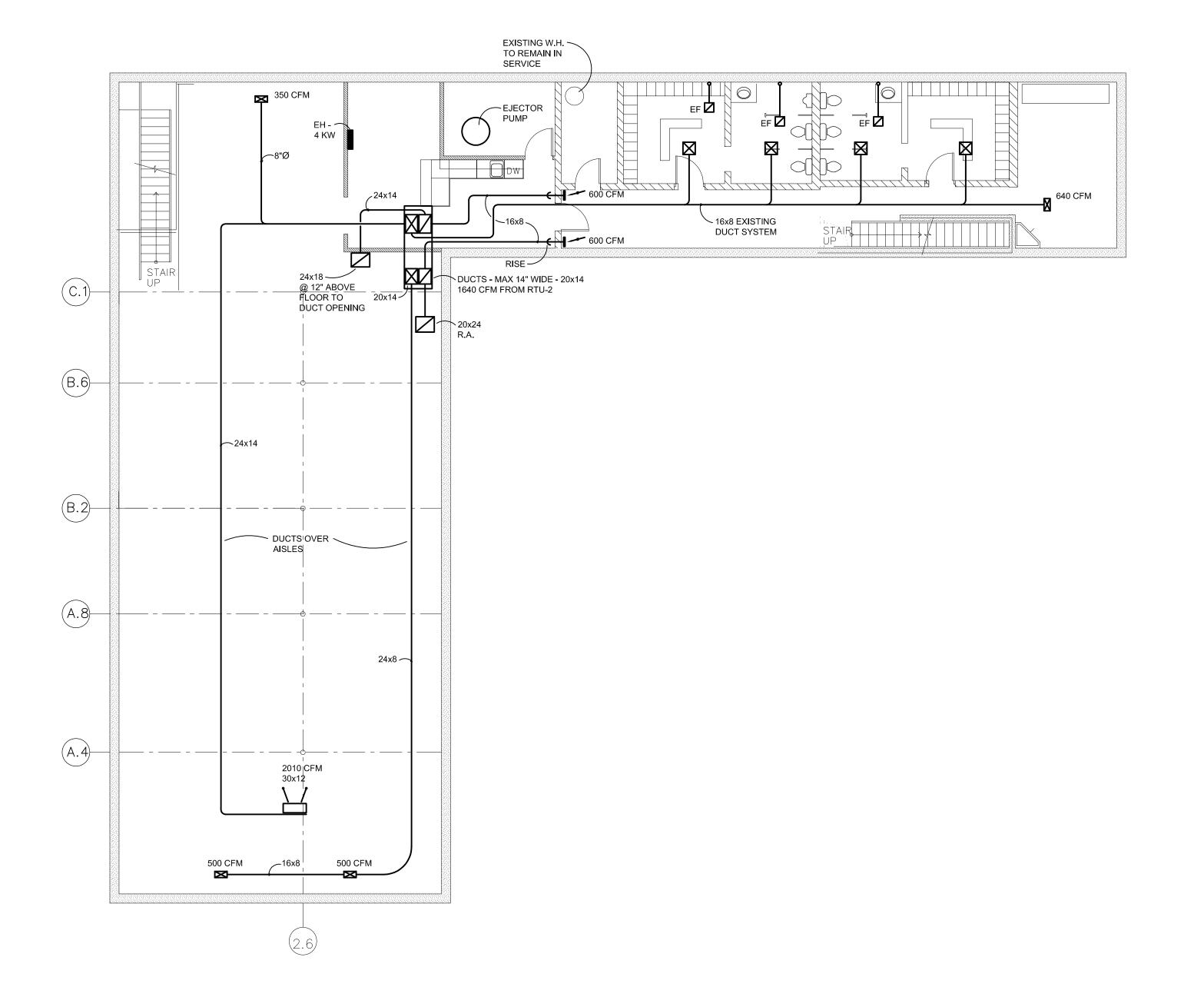
### MECHANICAL REQUIREMENTS

- 1. All new ductwork to comply with A.S.H.R.A.E. Construction adn State of Michigan Ventilation Standards, Michigan Mechanical Code, Table
- 2. All work shall comply with the State of Michigan Mechanical Code and Local code requirements, 2012 Michigan Mechanical Code.
- 3. Coordinate installation in field with Architectural/Electrical trades. 4. Verify all existingjob conditions and accommodate as required for a
- complete installation. 5. Diffusers and grilles to be\_aluminum or steel construction with
- adjustable flow and pattern. Price or approved (max,30 N/C). See Schedule.
- 6. Mount thermostat at 48" A.F.F. to center of thermostat. Thermostat to
- have "Occupied/Unoccupied" program.
- 7. All systems are new, See schedules on M-1.
- 8. General Contractor will provide all framing and framed openings. 9. See Fan Schedule on M-1.
- 10. Provide shop drawings for all equipment and systems before starting
- any work.
- 11. Diffusers Price MFG. CO 12. Outside Air Requirements
- O.A. supplied automatically when controls are operating in "Occupied" mode. See Schedule.
- 13. Units to be competed and fully installed per the plans as shown.14. Exposed spiral ducts to be Metro Duct or equal.
- 15. Systems to conform to the Michigan Energy Code.16 Provide R.A. smoke detectors, per 2012 Michigan Mechanical Code, Section 606.
- 17. Provide shop drawings for all methods on exterior terminations, for approval.
- 18. Insulate all fresh-air ducts (cold temperatures), supply and return-air ducts outside conditioned spaces, (above ceilings), in new conditioned
- 19. Systems conform to A.S.H.R.A.E. 90.1 requirements.
- 20. Spiral duct mounted diffusers to be Hart & Cooley Model SVH, maximum 0.5 sones, or other as shown on M-sheets.
- 21. Service existing roof units 1-7, to assure proper operation, replace worn belts, thermostats, inoperable controls, etc., to assure proper equipment, reliability.
- 22. Outside air requirements, MMC-2012, Table 403.3.
- 23. All systems to comply with A.S.H.R.A.E. 90.1, 2007, for climate zone 5A., comply with Section 603 & 6.1.1.3.

EXHAUST FANS	CFM	ESP	Sones	Power
EF-1	60	0.15	0.75	120V
EF-2	3060	0.75	-	2HP, Cube 360
EF-3	8000	0.20	Greenheck	Size 24, 2HP, BDP
Ef-4	8000	0.20	450 Hood, Motor Wall Houseing	
Basement-Existing				

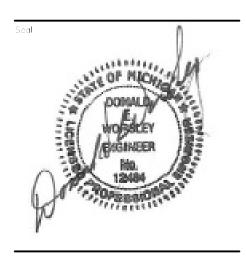
Blower No. 1
Suspended from joists. 3200 CFM CO .75 inch ESP, 1.5 HP, Constant duty drive, maximum sones 13, isolations, filter box maximum height 20 inches. Greenheck BCF210

Control systems for the roof units, make-up air unit No.1, blower ventilation unit No.1, roof units 1-7, interlock with MUA-1 & EF 3&4, CO detection for MUA-1 IN copmliance with MMC 404.1, 404.2 for installation of automatic detection system, supplied with the MUA-1. Submit shop drawings for approval.



BASEMENT MECHANICAL PLAN

SCALE: 1/8"=1'-0"



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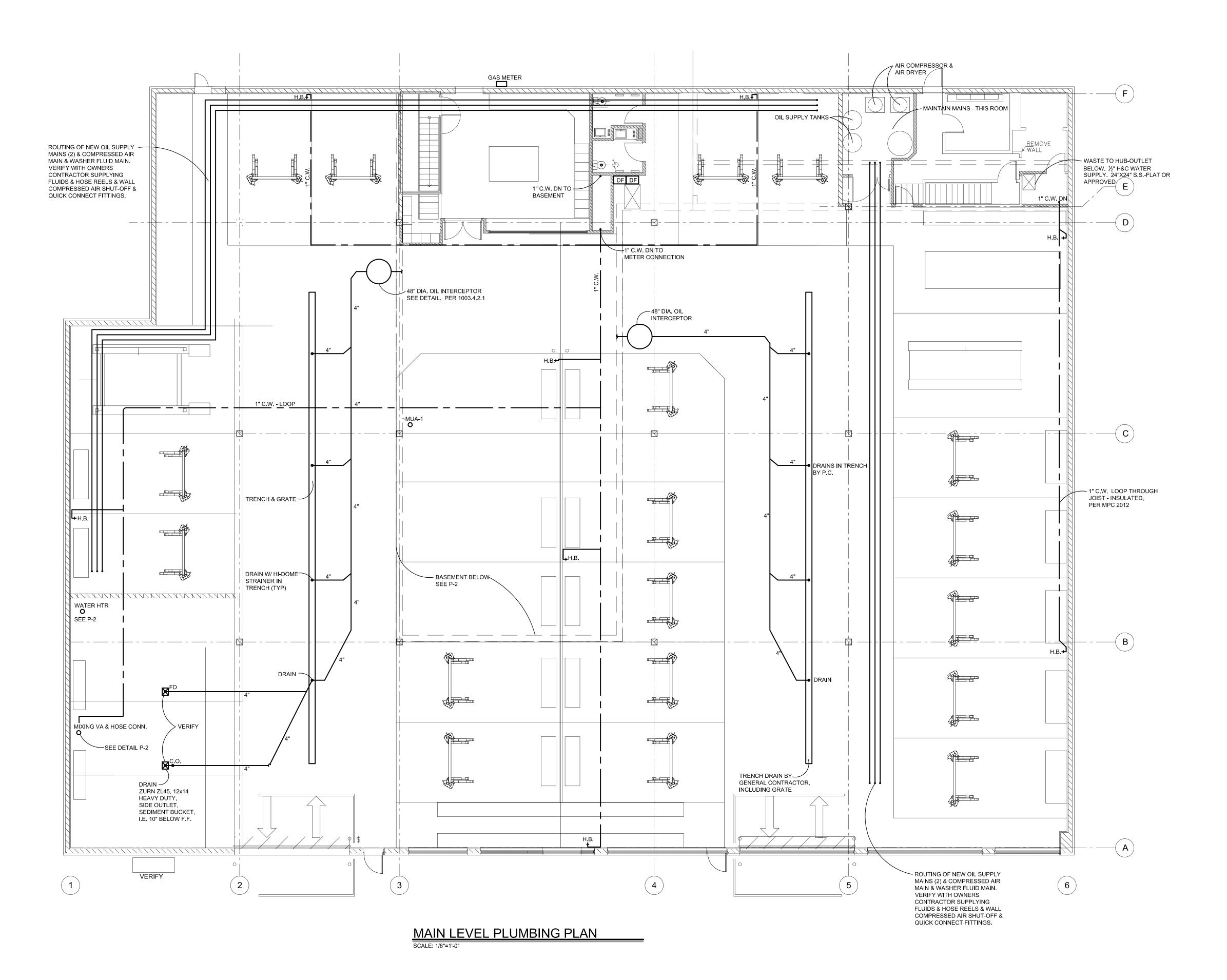
LAVERY AUDI-RANGE ROVER SERVICE

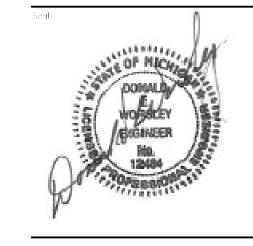
555 ADAMS ROAD BIRMINGHAM, MI

**BASEMENT MECHANICAL** PLAN

Date Issued

**REVIEW 1.9.15** PERMITS 1.16.15 REV. #1 2.5.15





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# LAVERY AUDI-RANGE ROVER SERVICE

555 ADAMS ROAD BIRMINGHAM, MI

MAIN LEVEL PLUMBING PLAN

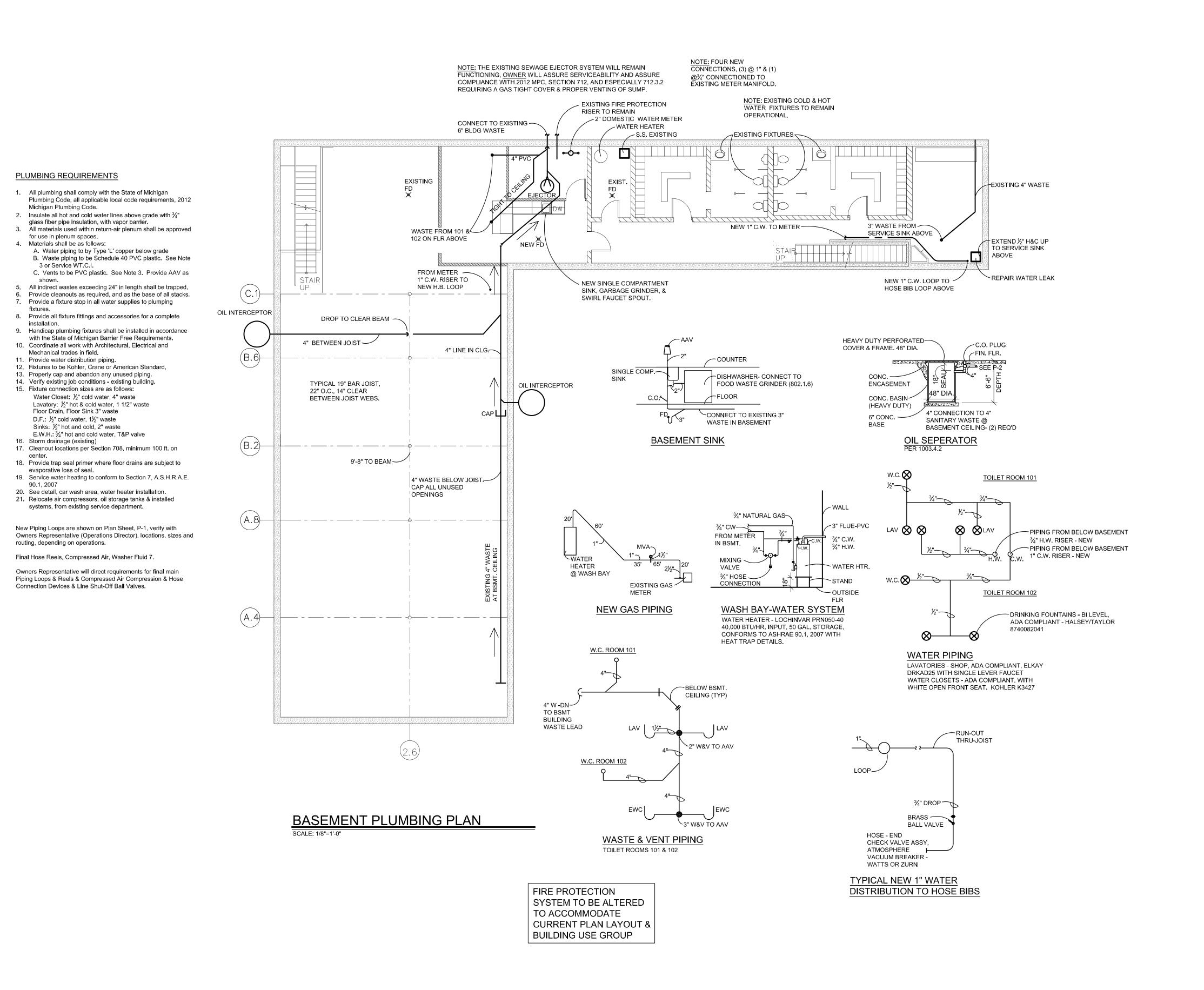
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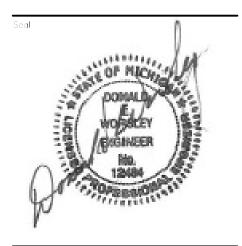
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PERMITS 1.16.15

REV. #1 2.5.15

Sneet Title





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# LAVERY AUDI-RANGE ROVER SERVICE

555 ADAMS ROAD BIRMINGHAM, MI

Sneet Title

## BASEMENT PLUMBING PLAN

Date Issued

REVIEW 1.9.15

PERMITS 1.16.15

REV. #1 2.5.15

Project Number

P-2

## ELECTRICAL SYMBOL LIST

	ELECT	RICAL SYMBO	DL LIST
SYMBOL	<u>DESCRIPTION</u>	SYMBOL	DESCRIPTION
\$	SINGLE POLE TOGGLE SWITCH	# 6	QUAD ISOLATED GROUND RECEPTACLE WITH DEDICATED NEUTRAL CONDUCTOR
<b>\$</b> 2	TWO POLE TOGGLE SWITCH	F	QUAD FLOOR MOUNTED RECEPTACLE
<b>\$</b> 3	3 WAY TOGGLE SWITCH	<u> </u>	
<b>\$</b> 4	4 WAY TOGGLE SWITCH	<b>⊕</b> <sub>F</sub>	DUPLEX FLOOR MOUNTED RECEPTACLE  SPECIAL RECEPTACLE—NEMA
<b>\$</b> K	KEY OPERATED SWITCH		CONFIGURATION AS NOTED
<b>\$</b> 3K	3 WAY KEY OPERATED SWITCH	<b>⊕⊅</b>	QUAD RECEPTACLE/LOW VOLTAGE SYSTEM FLOOR BOX
<b>\$</b> 4K	4 WAY KEY OPERATED SWITCH	<b>Ф▼</b> <sub>F</sub>	DUPLEX RECEPTACLE/LOW VOLTAGE SYSTEM FLOOR BOX
<b>\$</b> D	DIMMER SWITCH	⊠	VERTICAL RISER FOR SURFACE RACEWAY
<b>\$</b> 3D	3 WAY DIMMER SWITCH		SURFACE RACEWAY
<b>\$</b> P	PILOT SWTCH		BUS DUCT
<b>\$\$</b>	DUAL SWITCHING FOR INNER/OUTER LAMPS OF FLUORESCENT LIGHT FIXTURES		PANEL 480/277 VOLT
\$6\$5	3-WAY DUAL SWITCHING FOR INNER/OUTER		PANEL 208Y/120 VOLT
	LAMPS OF FLUORESCENT LIGHT FIXTURES		DISTRIBUTION PANEL
<b>\$</b> os	OCCUPANCY SENSOR WALL SWITCH		MAIN DISTRIBUTION PANEL/MAIN SWITCHBOARD MOTOR CONTROL CENTER
<b>\$</b> L	LOCKABLE SINGLE POLE SWITCH	T#	TRANSFORMER
<b>\$</b> M	HORSE POWER RATED SWITCH	<u> </u>	ELECTRIC MOTOR
<b>\$</b> s	SINGLE POLE LINE VOLTAGE OVERIDE SWITCH CONNECTED TO RELAY IN LIGHTING CONTROLLER EQUAL TO SENTRY SWITCH BY SENTRY LLC		MANUAL MOTOR STARTER
<b>\$</b> 3S	3 POLE LINE VOLTAGE OVERIDE SWITCH	<b>⊿</b> P	MANUAL MOTOR STARTER WITH PILOT LIGHT
	CONNECTED TO RELAY IN LIGHTING CONTROLLER EQUAL TO SENTRY SWITCH BY SENTRY LLC		MOTOR STARTER
os	CEILING MOUNTED OCCUPANCY SENSOR	⊠h	COMBINATION MOTOR STARTER
D	CEILING MOUNTED DAYLIGHT SENSOR	마	NON-FUSED DISCONNECT SWITCH
P	OCCUPANCY SENSOR POWER PACK	Вh	FUSED DISCONNECT SWITCH
LC #	PROGRAMMABLE LIGHT CONTROL SWITCH	•	PUSH BUTTON
BLTC	BALLAST LOAD TRANFSER CONTROL	0	JUNCTION BOX
<b>√</b> c	TIMER CONTROLLER	•	HARD WIRE POWER CONNECTION
C	CONTACTOR		HARD WIRE CONNECTION AT FLOOR BOX
<b>(E)</b>	PHOTOELECTRIC CONTROLLER	C	CIRCUIT BREAKER
ф	SINGLE RECEPTACLE	7	SWITCH
ф	DUPLEX RECEPTACLE	$\sum$	AUTOMATIC OR MANUAL TRANSFER SWITCH
#	QUAD RECEPTACLE	<b>©</b>	ENGINE GENERATOR
<del>-</del>	DUPLEX RECEPTACLE MOUNTED 42" AFF OR 6" ABOVE COUNTER TOP. (UNLESS NOTED OTHERWISE) (SIMILAR FOR EMERGENCY RECEPTACLES)		FUSE
ф <sup>GFI</sup>	DUPLEX RECEPTACLE-GROUND FAULT	m	TRANSFORMER
	INTERRUPTER	7	CURRENT TRANSFORMER
<del>⊕</del> GEI	DUPLEX RECEPTACLE MOUNTED 42" AFF OR 6" ABOVE COUNTER TOP. (UNLESS NOTED OTHERWISE) WITH GROUND FAULT INTERRUPTER	38	POTENTIAL TRANSFORMER
φ <b>"</b>	DUPLEX RECEPTACLE-MOUNTED ABOVE WINDOW	PNL	PANEL (LIGHTING OR RECEPTACLE)
	ON WALL FOR SHOW WINDOW	<b>⊕</b> I	NODE
<b>⇔</b> usa	COMBINATION 2A USB / 20A RECEPTACLE PASS&SEYMOUR TR5361USB OR EQUAL	<u>.</u>	GROUND
••		Ţ	TRANSFORMER GROUND

<u>SYMBOL</u>	DESCRIPTION
$\dashv \vdash$	NORMALLY OPEN CONTACTS
• <del>/</del>	NORMALLY CLOSED CONTACTS
<del>,                                    </del>	N.O. PUSH BUTTON SINGLE CIRCUIT
مله	N.C. PUSH BUTTON SINGLE CIRCUIT
S	SPEAKER
LS S	DOUBLE FACE SPEAKER - WALL MOUNTED
HS	SPEAKER - WALL MOUNTED
M	MICROPHONE
$\bigcirc$	VOLUME CONTROL
Θ	SINGLE FACE CLOCK - CEILING MOUNTED
Ю	SINGLE FACE CLOCK — WALL MOUNTED (MOUNT 7'-6" AFF TO CENTER)
<del>- &amp;</del>	DOUBLE FACE CLOCK - WALL MOUNTED
MD	MOTION DETECTOR
DC	DOOR CONTACT
KP	KEY PAD
	SECURITY CAMERA
CR	CARD READER
NC	NURSE CALL DEVICE
F	MANUAL FIRE ALARM STATION
SD	SMOKE DETECTOR
DS	DUCT SMOKE DETECTOR
(DSD)	DUCT SMOKE DAMPER. CONNECT 120V TO SMOKE DAMPER AND FIL ALARM CONNECTION TO SMOKE DAMPER AS WELL AS DUCT SMOKE DETECTORS AS REQUIRED PER NFPA — COORDINATE WITH MECH TRADES. PROVIDE RESET SWITCH IN ACCESSIBLE LOCATION IN AREA SERVED BY DUCT.
DS <b>4</b> <del>Š</del>	DUCT SMOKE AUDIBLE/VISUAL ALARM DEVICE WITH KEYED TEST AND RESET SWITCH
(HD)	THERMAL DETECTOR
	FIRE ALARM BELL
Hq	FIRE ALARM HORN
<u>s</u> 4	FIRE ALARM STROBE
HS►	FIRE ALARM HORN/STROBE
DR	MAGNETIC DOOR RELEASE
TS	TAMPER SWITCH
FS	FLOW SWITCH
FACP	FIRE ALARM CONTROL PANEL
FAAP	FIRE ALARM ANNUNCIATOR PANEL

## ELECTRICAL ABBREVIATION LIST

ABBREVATION	DESCRIPTION	<u>ABBREVATION</u>	<u>DESCRIPTION</u>	<u>ABBREVATION</u>	<u>DESCRIPTION</u>
A	AMPHERE	GFI	GROUND FAULT INTERRUPTER	NC	NORMALLY CLOSED
AFF	ABOVE FINISH FLOOR	GRD	GROUND	NF	NON-FUSIBLE
AFG	ABOVE FINISH GRADE			NIC	NOT IN CONTRACT
AHU	AIR HANDLING UNIT	HOA	HAND-OFF-AUTO	NL	NIGHT LIGHT
AIC	AMPS INTERRUPTING CAPACITY	HP	HORSEPOWER	NO	NORMALLY OPEN
		HZ	HERTZ	NTS	NOT TO SCALE
BKR	BREAKER				
BPS	BOLTED PRESSURE SWITCH	IG	ISOLATED GROUND	RECEPT.	RECEPTACLE
				RP	RECEPTACLE PANEL
CB	CIRCUIT BREAKER	JB	JUNCTION BOX	RTU	ROOF TOP UNIT
CIR/CKT	CIRCUIT				
CLG	CEILING	KW	KILOWATT	SD	SMOKE DETECTOR
CP	CIRCULATION PUMP	KWH	KILOWATT - HOURS	SPEC	SPECIFICATION
CUH	CABINET UNIT HEATER	KVA	KILO VOLT-AMPERES		
				TELCOM	TELECOMMUNICATIONS
DED	DEDICATED	LP	LIGHTING PANEL	TYP	TYPICAL
DISC	DISCONNECT	LO	LOCK-ON		
DP	DISTRIBUTION PANEL			UH	UNIT HEATER
DWG	DRAWING	MCA	MINIMUM CIRCUIT AMPACITY	U.O.N.	UNLESS OTHERWISE NOTED
		MCB	MAIN CIRCUIT BREAKER		
EBU	EMERGENCY BATTERY UNIT	MCC	MOTOR CONTROL CENTER	WP	WEATHERPROOF
EF	EXHAUST FAN	MDP	MAIN DISTRIBUTION PANEL	WG	WIRE GUARD
EM	EMERGENCY	MLO	MAIN LUGS ONLY		
EM/NL	EMERGENCY/NIGHT LIGHT	MSB	MAIN SWITCHBOARD	T#	TRANSFORMER
EUH	ELECTRIC UNIT HEATER	MTD	MOUNTED		
EWC	ELECTRIC WATER COOLER	MUA	MAKE-UP AIR UNIT	(E)	EXISTING
EWH	ELECTRIC WATER HEATER			(p)	
				(R)	RELOCATED
FLA	FULL LOAD AMPS			(N)	NEW
F	FUSE			(14)	NEW

TVSS

TRANSIENT VOLTAGE SURGE SUPPRESSION

## STANDARD MOUNTING HEIGHTS

TELECOMMUNICATIONS BACKBOARD

SPECIAL SYSTEMS

SINGLE GANG OUTLET BOX FOR LOW VOLTAGE SYSTEMS. 3/4"C. STUB UP INTO ACCESSIBLE CEILING SPACE. PROVIDE BUSHING.

SINGLE GANG OUTLET BOX FOR LOW VOLTAGE SYSTEMS MOUNTED 42"

AFF OR 6" ABOVE COUNTERTOP (COORDINATE WITH MILLWORK) UNLESS NOTED OTHERWISE. 3/4"C. STUB UP INTO ACCESSIBLE CEILING SPACE.

PROVIDE BUSHING. PROVIDE BLANK COVERPLATE. WIRING BY OTHERS.

MOUNTED. 3/4"C. STUB UP INTO ACCESSIBLE CEILING SPACE. PROVIDE

SINGLE GANG OUTLETBOX FOR LOW VOLTAGE SYSTEMS FLOOR

BUSHING. PROVIDE BLANK COVERPLATE. WIRING BY OTHERS.

PROVIDE BLANK COVERPLATE. WIRING BY OTHERS.

CONVENIENCE AND SPECIAL PURPOSE RECEPTACLE OUTLETS AND LOW VOLTAGE SYSTEMS OUTLETS NOT OTHERWISE SPECIFIED	18" AFF TO CENTER OF BOX
CONVENIENCE AND SPECIAL PURPOSE RECEPTACLE OUTLETS AND LOW VOLTAGE SYSTEMS OUTLETS NOT OTHERWISE SPECIFIED IN CMU WALLS	24" AFF TO TOP OF BOX
LIGHT SWITCHES, MOTOR CONTROL DEVICES AND FIRE ALARM PULL STATIONS NOT OTHERWISE SPECIFIED	48" AFF TO CENTER OF BOX
FIRE ALARM HORNS, SPEAKERS, STROBES	80" AFF OR 6" BELOW CEILING, WHICHEVER IS LESS
CLOCKS AND COMBINATION DEVICES NOT OTHERWISE SPECIFIED	96" AFF OR 6" BELOW CEILING, WHICHEVER IS LESS
GFI RECEPTACLES IN TOILET ROOMS AND JANITOR CLOSETS NOT OTHERWISE SPECIFIED	42" AFF TO CENTER OF BOX
	6'-6" AFF TO TOP OF ENCLOSURE
** COORDINATE EXACT MOUNTING HEIGHTS WITH ARCHITEC	CT/MILLWORK PRIOR TO ROUGH-IN. **

## GENERAL ELECTRICAL NOTES:

ALL "SPECIAL SYSTEMS" (TYPICALLY TELEPHONE, TV, AND DATA) WIRING AND DEVICES BY OTHERS, UNLESS NOTED ON PLANS OR SPECIFICATIONS. E.C. TO PROVIDE BOXES, RACEWAYS, BACKBOARDS, AND COVERPLATES FOR UNUSED BOXES (PER SPECIFICATIONS IF APPLICABLE). COORDINATE EXACT REQUIREMENTS WITH MANUFACTURER/SUPPLIER.

\*\*COORDINATE EXACT MOUNTING HEIGHTS WITH ARCHITECT/MILLWORK PRIOR TO ROUGH-IN.\*\*

		LUMINAIRE SCHEDUL	 E		
SYMBOL	TYPE	DESCRIPTION	VOLT	LAMP	MANUFACTURER
	EF2	8FT LONG LED SUSPENDED STRIP	120V	94 WATTS 10402 LUMENS LED	ALC401Hx788SNNSTKW
4#	EE2	LED HIGH BAY TO BE INSTALLED EVEN WITH THE BOTTOM OF THE JOISTS. PROVIDE REMOTE EMERGENCY DRIVER FOR EM AND EM/NL FIXTURES SHOWN ON DRAWINGS.	120V	270 WATTS 28000 LUMENS LED	ABH2x3V47-120V
•	EC	2X4 LAY-IN LED. PROVIDE INTEGRAL DRIVER FOR EM AND EM/NL FIXUTRES SHOWN ON DRAWINGS.	120V	46 WATTS 4500 LUMENS LED	BT24-0A3AP-WHTE
	EF	4FT LONG LED SUSPENDED STRIP	120V	47 WATTS 5201 LUMENS LED	ALC401Hx784SNNSTKW
	FW	4FT LONG LED WALL MOUNTED FIXTURE	120V	42 WATTS 7302 LUMENS LED	ALM1 0 2 T 47 D
ightharpoons	WP/EM	EXTERIOR POLYCARBONATE SURFACE MOUNTED DAMP/WET LOCATIONS EMERGENCY LIGHT WITH LEAD CALCIUM WHITE OR BLACK COLOR. DAMP AND WET LOCATION LISTED WITH BATTERY HEATER UL 924 LISTED,	120V	LED	LIGHTOLIER: LVL SERIES LITHONIA: AFN SURE-LITES: AEL
₩	X/EBU	POLYCARBONATE SURFACE MOUNTED EMERGENCY BATTERY UNIT/EXIT SIGN WITH WHITE FINISH AND EMERGENCY BATTERY PACK CAPABLE OF FULL WATTAGE OUTPUT FOR A MINIMUM OF 90 MINUTES. PROVIDE WIRE GUARD IN GYMNASIUM. PROVIDE STEM MOUNTING FOR ALL AREAS THAT EXCEED 12FT IN HEIGHT AND WALL MOUNT IS NOT AN OPTION.	120V	2-1.5 WATT LED	LITHONIA: LHQM-LED SERIES OR EQUAL
<del>+</del>	EBU	POLYCARBONATE SURFACE MOUNTED EMERGENCY BATTERY UNIT WITH WHITE FINISH AND EMERGENCY BATTERY PACK CAPABLE OF FULL WATTAGE OUTPUT FOR A MINIMUM OF 90 MINUTES.	120V/277V	2-1.5 WATT LED	LITHONIA: ELM2 LED SERIES OR EQUAL

## GENERAL LIGHTING NOTES

1. EMERGENCY LIGHT FIXTURES (INDICATED ON PLANS AS "EM") SHALL BE EQUIPPED WITH EMERGENCY BALLAST. EMERGENCY/NIGHT LIGHT (INDICATED ON PLANS AS "EM/NL") FIXTURES SHALL BE WIRED AHEAD OF THE SWITCH AND EQUIPPED WITH EMERGENCY BALLAST. NIGHT LIGHT FIXTURES (INDICATED ON PLANS AS "NL") SHALL BE WIRED AHEAD OF THE SWITCH.

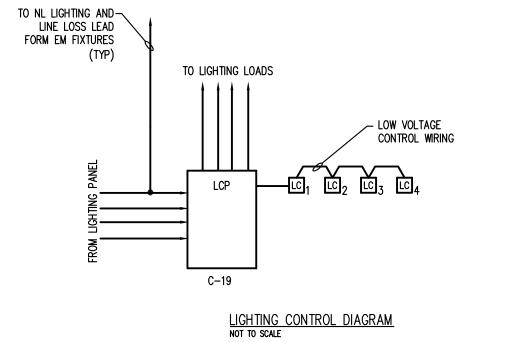
2. EMERGENCY BALLASTS FOR LED, T5, T5HO AND T8 LAMPS SHALL BE MINIMUM 1400 LUMEN OUTPUT UNLESS OTHERWISE SPECIFIED. EMERGENCY BALLASTS FOR COMPACT FLUORESCENT LAMPS SHALL BE MINIMUM 900 LUMEN OUTPUT UNLESS OTHERWISE SPECIFIED.

3. EMERGENCY BALLAST SHALL MEET NFPA REQUIREMENTS FOR 90 MINUTES OF OPERATION.

4. E.C. SHALL COORDINATE VOLTAGE SELECTION FOR EMERGENCY BALLASTS WITH CIRCUITING ON M-VOLT FIXTURES.

5. ALL BATTERY BALLASTS/DRIVERS SHALL USE PUSH-TO-TEST BUTTON ON FIXTURE WHERE ACCESSIBLE (WITH NORMAL A-FRAME LADDER). OTHERWISE REMOTE MOUNT BUTTON WHERE ACCESSIBLE.

6. PROVIDE LOCAL DISCONNECT FOR INDIVIDUAL BALLASTS ON ALL DOUBLE-ENDED FLUORESCENT LUMINAIRES PER NEC 410.130(G) EXCEPT WHERE EXCEPTIONS 1-5 APPLY.



RFI AY	SCHEDULE
	I
RELAY	CONTROL CIRCUIT
R1	C1-21
R2	C1-23
R3	C1-25
R4	C1-27
R5	C1-29
R6	C1-31
R7	C1-33
R8	C1-35
R9	C1-37
R10	C1-28

LIGHTING C	CONTROL SCHEDULE	
CONTROL	CONTROL RELAYS	NO. OF BUTTONS
LC1	R1 THROUGH R5 R6 THROUGH R10	2
LC2	R1 THROUGH R5 R6 THROUGH R10	2
LC3	R1 THROUGH R5 R6 THROUGH R10	2
LC4	R1 THROUGH R5 R6 THROUGH R10	2

SAYLES
ENGINEER
No.
38685

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Project

# LAVERY AUDI-RANGE ROVER SERVICE

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555 ADAMS ROAD BIRMINGHAM, MI

Sheet Title

ELECTRICAL SYMBOLS AND LEGENDS

Date Issued

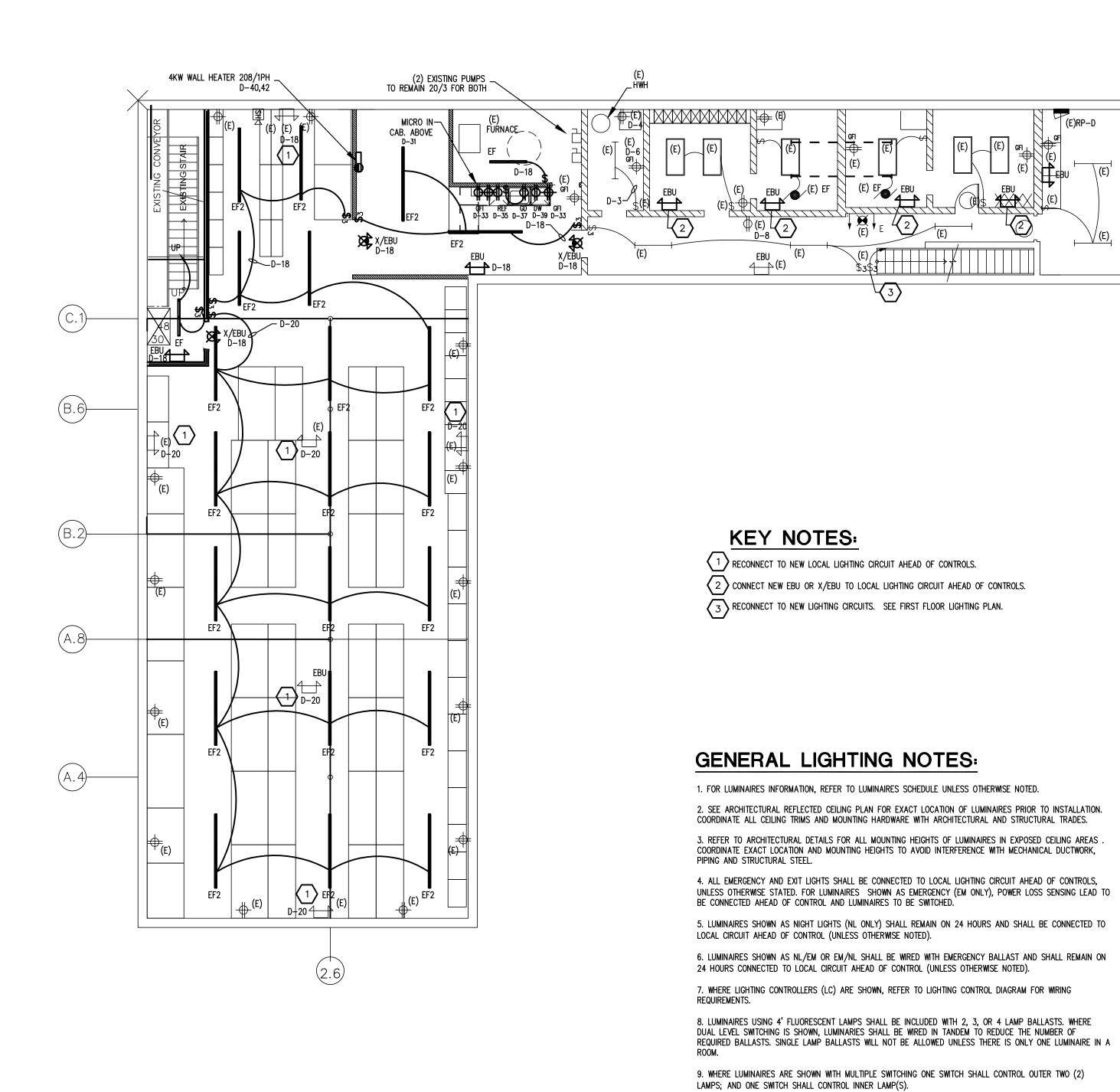
2-04-15

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E-00





## **GENERAL POWER NOTES:**

GROUND CIRCUITS.

REQUIRED REVISIONS.

10. ALL DISCREPANCIES WITH THESE DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION PRIOR TO BIDS. IN OTHERWISE DOING SO, THE ELECTRICAL CONTRACTOR SHALL BE LIABLE FOR ANY

11. ALL ITEMS SHOWN ON PLAN ARE NEW UNLESS MARKED AS (E) FOR EXISTING OR (R) FOR RELOCATED.

1. ALL ELECTRICAL DEVICES AND ASSOCIATED OUTLET BOXES SHALL BE FLUSH MOUNTED UNLESS OTHERWISE NOTED. ALL CONDUIT AND WIRING SHALL BE CONCEALED WHERE PHYSICALLY POSSIBLE, SURFACE RACEWAY SHALL ONLY BE PERMITTED WHERE NOTED.

2. PROVIDE (1) NO. 10 AWG NEUTRAL CONDUCTOR FOR ANY 20 AMP SINGLE PHASE CIRCUITS SHARING A NEUTRAL IN A SINGLE CONDUIT. WHERE MULTIWIRE BRANCH CIRCUITS ARE USED, PROVIDE SIMULTANEOUS DISCONNECTING MEANS IN PLACE OF SINGLE POLE BREAKERS.

3. PROVIDE AN EQUIPMENT GROUNDING CONDUCTOR WITHIN THE RACEWAYS ALONG WITH PHASE CONDUCTORS FOR ALL FEEDERS AND BRANCH CIRCUITS. CONDUIT IS NOT PERMITTED TO ACT AS AN EQUIPMENT GROUNDING CONDUCTOR UNLESS NOTED. AN ISOLATED GROUND CONDUCTOR (GREEN/WHITE) IS REQUIRED FOR ALL ISOLATED

4. WHEREVER 4 OR MORE CURRENT CARRYING CONDUCTORS ARE INSTALLED IN A SINGLE RACEWAY, E.C. SHALL INCREASE CONDUCTOR SIZE AS REQUIRED FOR DERATING PER NEC 315.B.2.9.

5. ALL CIRCUITS SHALL USE A MINIMUM OF 12 AWG FOR 20 AMP CIRCUITS UNLESS OTHERWISE NOTED.

6. COORDINATE WITH OTHER TRADES FOR ANY ELECTRICAL DEVICE LOCATIONS PRIOR TO ROUGH-IN. COMPLY WITH ALL APPLICABLE CODES FOR PROPER MOUNTING HEIGHTS, NFPA, NEC, ADA, ETC.

7. WHERE LOW VOLTAGE DEVICES AND RECEPTACLES ARE SHOWN NEXT TO EACH OTHER, INSTALL AS CLOSE AS POSSIBLE, DO NOT SCALE DRAWINGS.

8. ALL "SPECIAL SYSTEMS" WIRING AND DEVICES (IE. TELEPHONE, DATA, TV,) SHALL BE PROVIDED AND INSTALLED BY OTHERS UNLESS NOTED ON PLANS OR SPECIFICATIONS. E.C. TO PROVIDE BOXES AND RACEWAYS PER LEGEND

9. ALL DISCREPANCIES WITH THESE DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION PRIOR TO BIDS. IN OTHERWISE DOING SO, THE ELECTRICAL CONTRACTOR SHALL BE LIABLE FOR ANY

AND SPECIFICATIONS. COORDINATE EXACT REQUIREMENTS WITH MANUFACTURER/SUPPLIER.

10. E.C. TO COORDINATE EXACT EQUIPMENTS OF ALL OTHER SYSTEMS (INCLUDING ELEVATORS AND HVAC EQUIPMENT) WITH MANUFACTURER AND OTHER TRADES PRIOR TO ROUGH-IN AND PURCHASE OF ANY ELECTRICAL EQUIPMENT ASSOCIATED WITH SYSTEM. ANY DISCREPANCIES WITH THIS PLAN AND MANUFACTURER REQUIREMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER PRIOR TO PURCHASE OR ELECTRICAL ROUGH-IN OF THIS EQUIPMENT.

11. ALL ITEMS SHOWN ON PLAN ARE NEW UNLESS MARKED AS (E) FOR EXISTING OR (R) FOR RELOCATED.



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# LAVERY AUDI-RANGE ROVER SERVICE

555 ADAMS ROAD BIRMINGHAM, MI

Sheet Title

**ELECTRICAL BASEMENT** POWER & LIGHTING PLAN

Date Issued 2-04-15

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Project

## LAVERY AUDI-RANGE ROVER SERVICE

555 ADAMS ROAD BIRMINGHAM, MI

Sheet Title

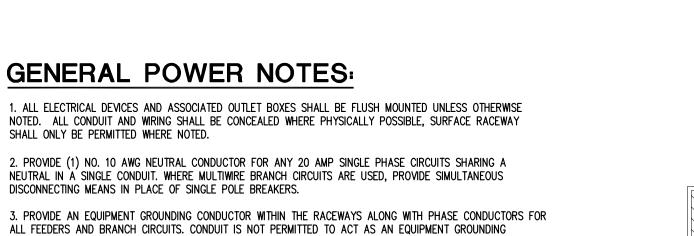
## **ELECTRICAL** FIRST FLOOR **POWER PLAN**

Date Issued 2-04-15

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CONDUCTOR UNLESS NOTED. AN ISOLATED GROUND CONDUCTOR (GREEN/WHITE) IS REQUIRED FOR ALL ISOLATED 4. WHEREVER 4 OR MORE CURRENT CARRYING CONDUCTORS ARE INSTALLED IN A SINGLE RACEWAY, E.C. SHALL INCREASE CONDUCTOR SIZE AS REQUIRED FOR DERATING PER NEC 315.B.2.9.

GENERAL POWER NOTES:

DISCONNECTING MEANS IN PLACE OF SINGLE POLE BREAKERS.

SHALL ONLY BE PERMITTED WHERE NOTED.

5. ALL CIRCUITS SHALL USE A MINIMUM OF 12 AWG FOR 20 AMP CIRCUITS UNLESS OTHERWISE NOTED. 6. COORDINATE WITH OTHER TRADES FOR ANY ELECTRICAL DEVICE LOCATIONS PRIOR TO ROUGH-IN. COMPLY WITH ALL APPLICABLE CODES FOR PROPER MOUNTING HEIGHTS, NFPA, NEC, ADA, ETC.

7. WHERE LOW VOLTAGE DEVICES AND RECEPTACLES ARE SHOWN NEXT TO EACH OTHER, INSTALL AS CLOSE AS POSSIBLE, DO NOT SCALE DRAWINGS.

8. ALL "SPECIAL SYSTEMS" WIRING AND DEVICES (IE. TELEPHONE, DATA, TV,) SHALL BE PROVIDED AND INSTALLED BY OTHERS UNLESS NOTED ON PLANS OR SPECIFICATIONS. E.C. TO PROVIDE BOXES AND RACEWAYS PER LEGEND AND SPECIFICATIONS. COORDINATE EXACT REQUIREMENTS WITH MANUFACTURER/SUPPLIER.

9. ALL DISCREPANCIES WITH THESE DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION PRIOR TO BIDS. IN OTHERWISE DOING SO, THE ELECTRICAL CONTRACTOR SHALL BE LIABLE FOR ANY

10. E.C. TO COORDINATE EXACT EQUIPMENTS OF ALL OTHER SYSTEMS (INCLUDING ELEVATORS AND HVAC EQUIPMENT) WITH MANUFACTURER AND OTHER TRADES PRIOR TO ROUGH-IN AND PURCHASE OF ANY ELECTRICAL EQUIPMENT ASSOCIATED WITH SYSTEM. ANY DISCREPANCIES WITH THIS PLAN AND MANUFACTURER REQUIREMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER PRIOR TO PURCHASE OR ELECTRICAL ROUGH-IN OF THIS EQUIPMENT.

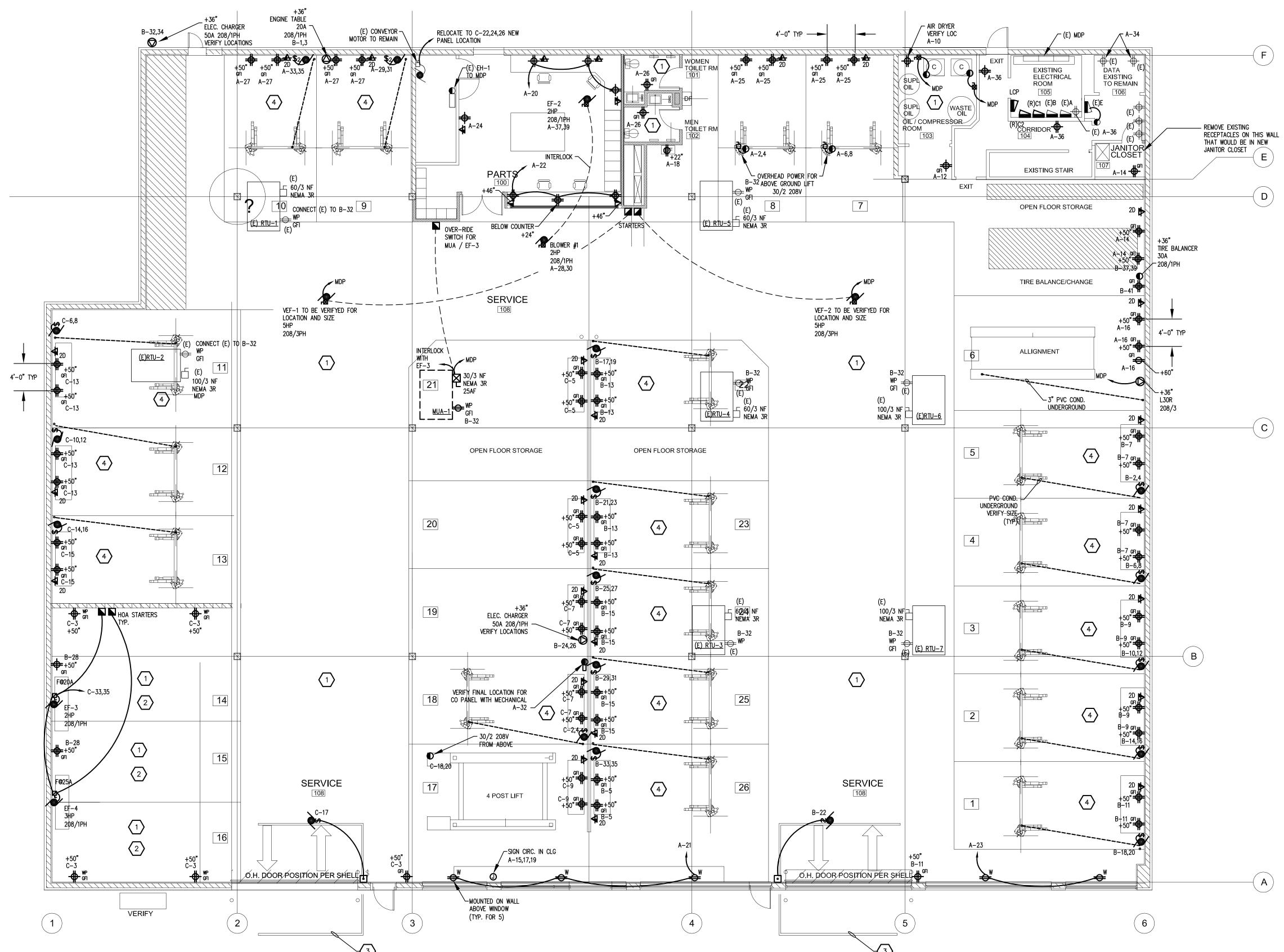
11. ALL ITEMS SHOWN ON PLAN ARE NEW UNLESS MARKED AS (E) FOR EXISTING OR (R) FOR RELOCATED.

12. FIRE ALARM SYSTEM SHALL BE PROVIDED AND INSTALLED BY CERTIFIED FIRE ALARM CONTRACTOR. ALL REQUIRED DRAWINGS SHALL BE PREPARED AND SUBMITTED TO A.H.J. DIRECTLY FOR APPROVAL. E.C. TO INCLUDE DESIGN/BUILD COST FOR A COMPLETE SYSTEM IN HIS BID.

13. E.C. TO VISIT SITE PRIOR TO IDENTIFY EXISTING SYSTEM, AND EXISTING CONDUITS THAT REMAIN. INCLUDE IN BID, TO REMOVE ALL EXISTING CONDUITS THAT ARE NOT TO BE RE-USED.

## **KEY NOTES:**

- ALL BRANCH CIRCUITS SHALL BE RUN FROM ABOVE AND TERMINATE IN BOXES 20" AFF. ALL BRANCH CIRCUITS BELOW 18" SHALL HAVE XP SEAL-OFF'S AND USE CLASS 1 DIV. 1 RACEWAY.
- 2 ALL ELECTRICAL IN THIS AREA BELOW 10FT AFF SHALL USE WET LOCATION RATED RACEWAY AND BOXES. DEVICES SHALL HAVE W.P. WHILE IN USE COVERS.
- 3 UNDERGROUND LOOP DETECTOR SUPPLIED AND INSTALLED BY OVERHEAD DOOR INSTALLER.
- 4 LIFT POWER REQUIRES 10A @ 208/1PH PROVIDE AND INSTALL 1" PVC CONDUIT UNDERGROUND TO PIT AND UP WALL TO 36" FOR CONTROLS COORDINATE EXACT LOCATION WITH HOIST INSTALLER.



ELECTRICAL FIRST FLOOR POWER PLAN SCALE: 1/8"=1'-0"

1. FOR LUMINAIRES INFORMATION, REFER TO LUMINAIRES SCHEDULE UNLESS OTHERWISE NOTED.

2. SEE ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATION OF LUMINAIRES PRIOR TO INSTALLATION. COORDINATE ALL CEILING TRIMS AND MOUNTING HARDWARE WITH ARCHITECTURAL AND STRUCTURAL TRADES.

3. REFER TO ARCHITECTURAL DETAILS FOR ALL MOUNTING HEIGHTS OF LUMINAIRES IN EXPOSED CEILING AREAS . COORDINATE EXACT LOCATION AND MOUNTING HEIGHTS TO AVOID INTERFERENCE WITH MECHANICAL DUCTWORK, PIPING AND STRUCTURAL STEEL.

4. ALL EMERGENCY AND EXIT LIGHTS SHALL BE CONNECTED TO LOCAL LIGHTING CIRCUIT AHEAD OF CONTROLS, UNLESS OTHERWISE STATED. FOR LUMINAIRES SHOWN AS EMERGENCY (EM ONLY), POWER LOSS SENSING LEAD TO BE CONNECTED AHEAD OF CONTROL AND LUMINAIRES TO BE SWITCHED.

5. LUMINAIRES SHOWN AS NIGHT LIGHTS (NL ONLY) SHALL REMAIN ON 24 HOURS AND SHALL BE CONNECTED TO LOCAL CIRCUIT AHEAD OF CONTROL (UNLESS OTHERWISE NOTED).

6. LUMINAIRES SHOWN AS NL/EM OR EM/NL SHALL BE WIRED WITH EMERGENCY BALLAST AND SHALL REMAIN ON 24 HOURS CONNECTED TO LOCAL CIRCUIT AHEAD OF CONTROL (UNLESS OTHERWISE NOTED).

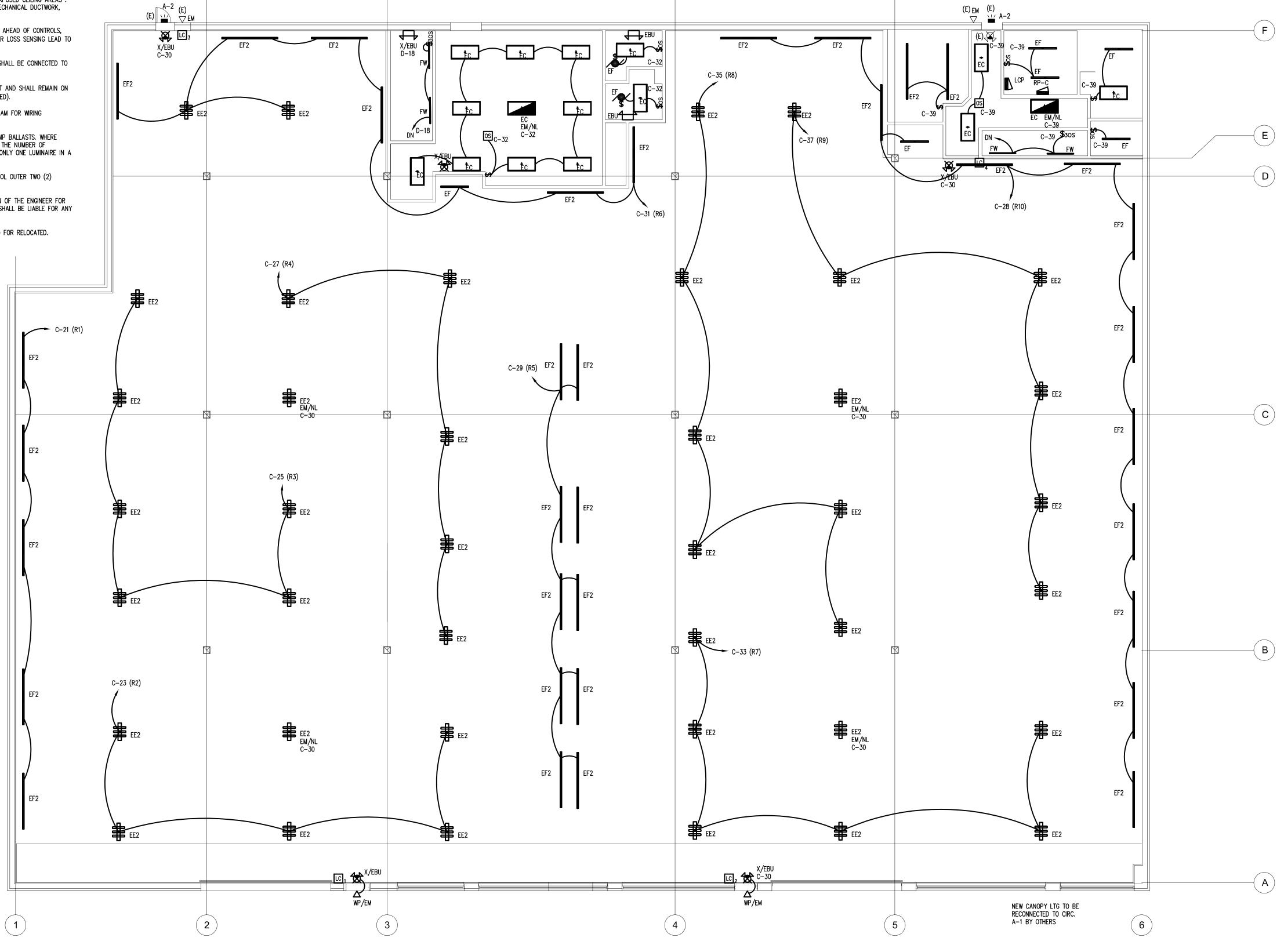
7. WHERE LIGHTING CONTROLLERS (LC) ARE SHOWN, REFER TO LIGHTING CONTROL DIAGRAM FOR WIRING

8. LUMINAIRES USING 4' FLUORESCENT LAMPS SHALL BE INCLUDED WITH 2, 3, OR 4 LAMP BALLASTS. WHERE DUAL LEVEL SWITCHING IS SHOWN, LUMINARIES SHALL BE WIRED IN TANDEM TO REDUCE THE NUMBER OF REQUIRED BALLASTS. SINGLE LAMP BALLASTS WILL NOT BE ALLOWED UNLESS THERE IS ONLY ONE LUMINAIRE IN A

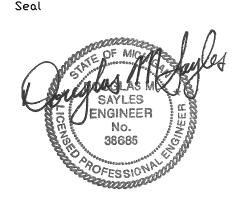
9. WHERE LUMINAIRES ARE SHOWN WITH MULTIPLE SWITCHING ONE SWITCH SHALL CONTROL OUTER TWO (2) LAMPS; AND ONE SWITCH SHALL CONTROL INNER LAMP(S).

10. ALL DISCREPANCIES WITH THESE DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION PRIOR TO BIDS. IN OTHERWISE DOING SO, THE ELECTRICAL CONTRACTOR SHALL BE LIABLE FOR ANY REQUIRED REVISIONS.

11. ALL ITEMS SHOWN ON PLAN ARE NEW UNLESS MARKED AS (E) FOR EXISTING OR (R) FOR RELOCATED.



1 ELECTRICAL FIRST FLOOR LIGHTING PLAN
E-20 SCALE: 1/8" = 1'-0"



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———— Project

# LAVERY AUDI-RANGE ROVER SERVICE

555 ADAMS ROAD BIRMINGHAM, MI

Sheet Title

## ELECTRICAL FIRST FLOOR LIGHTING PLAN

PERMITS

Date Issued 2-04-15

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Sheet Nu

E-20

SB LOAD SCHEDULE	800A		208	V 3PH/4W
LOAD	CONNECTED		DEMAND	•
	KVA	Α	KVA	A
RP-A	32	88	34	95
RP-B	51	143	51	143
RP-C1/C3	42	117	45	126
EH-1	3	8	3	8
RTU-1	15	42	15	42
RTU-2	15	42	15	42
RTU-3	15	42	15	42
RTU-4	15	42	15	42
RTU-5	13	36	13	36
RTU-6	15	42	15	42
RTU-7	15	42	15	42
RP-E	4	11	4	11
MUA-1	9	25	9	25
VEF-1	9	25	9	25
VEF-2	9	25	9	25
COMP. 1	9	25	9	25
COMP. 2	9	25	9	25
TOTAL	280	779	286	794

FEEDER SC	HEDULE							
FEEDER TAG	CONDUIT SIZE	WIRE SIZE	FEEDER TAG	CONDUIT SIZE	WIRE SIZE	FEEDER TAG	CONDUIT SIZE	WIRE SIZE
20-3	3/4"	3#12 & 1#12G	150-3	1 1/2"	3#1/0 & 1#6G	475-3	4"	3-750 KCMIL & 1#2G
20-4	3/4"	4#12 & 1#12G	150-4	1 1/2"	4#1/0 & 1#6G	475-4	4"	4-750 KCMIL & 1#2G
30-3	3/4"	3#10 & 1#10G	200-3	2-1/2"	3#3/0 & 1#6G	610-3	2 @ 3"	3-350 KCMIL & 1#1/0G
30-4	3/4"	4#10 & 1#10G	200-4	2 1/2"	4#3/0 & 1#6G	610-4	2 @ 3"	4-350 KCMIL & 1#1/0G
50-3	3/4"	3#8 & 1#10G	230-3	2-1/2"	3#4/0 & 1#4G	760-3	2 @ 4"	3-500 KCMIL & 1#1/0G
50-4	3/4"	4#8 & 1#10G	230-4	2 1/2"	4#4/0 & 1#4G	760-4	2 @ 4"	4-500 KCMIL & 1#1/0G
65-3	1"	3#6 & 1#8G	255-3	2 1/2"	3-250 KCMIL & 1#4G	1000-3	3 @ 4"	3-500 KCMIL & 1#2/0G
65-4	1"	4#6 & 1#8G	255-4	2 1/2"	4-250 KCMIL & 1#4G	1000-4	3 @ 4"	4-500 KCMIL & 1#2/0G
100-3	1 1/4"	3#3 & 1#8G	300-3	2 1/2"	3-350 KCMIL & 1#3G	(1200-3)	4 @ 3"	3-350 KCMIL & 1#1/0G
100-4	1 1/4"	4#3 & 1#8G	300-4	2 1/2"	4-350 KCMIL & 1#3G	1200-4	4 @ 3 1/2"	4-350 KCMIL & 1#1/0G
130-3	1 1/4"	3#1 & 1#6G	380-3	3"	3-500 KCMIL & 1#3G	(1600-3)	5 @ 4"	3-500 KCMIL & 1#1/0G
130-4	1 1/2"	4#1 & 1#6G	380-4	4"	4-500 KCMIL & 1#3G	1600-4	5 @ 4"	4-500 KCMIL & 1#1/0G
						2000-4	5 <b>@</b> 4"	4-750 KCMIL & 1#1/0G

## GENERAL RISER NOTES:

1. THE ELECTRICAL CONTRACTOR SHALL CONTACT THE LOCAL UTILITY COMPANY AND SUBMIT REQUIRED INFORMATION FOR PERMANENT ELECTRICAL SERVICE WHEN REQUIRED PRIOR TO CONSTRUCTION. ALL UTILITY ARRANGEMENTS SHALL BE CONFIRMED BY THE LOCAL UTILITY PRIOR TO ORDERING EQUIPMENT. ALL UTILITY EQUIPMENT LOCATIONS SHOWN ON THIS DRAWING SHALL BE VERIFIED WITH THE LOCAL UTILITY PRIOR TO

2. ALL CONCRETE PADS REQUIRED SHALL BE SUPPLIED AND INSTALLED BY THE ELECTRICAL CONTRACTOR AND MEET ALL LOCAL UTILITY AND MUNICIPALITY REQUIREMENTS.

3. ALL ITEMS SHOWN AS HATCHED SHALL BE DISCONNECTED AND REMOVED BY THE ELECTRICAL CONTRACTOR. REMOVE ASSOCIATED WIRING, TERMINATIONS AND CONDUIT BACK TO THE SOURCE.

4. ALL WIRE SIZES INDICATED ON THIS DRAWING SHALL BE COPPER WITH TEMP RATING OF 75 DEGREES C. PER 2008 NEC TABLE 310-16 UNLESS OTHERWISE NOTED.

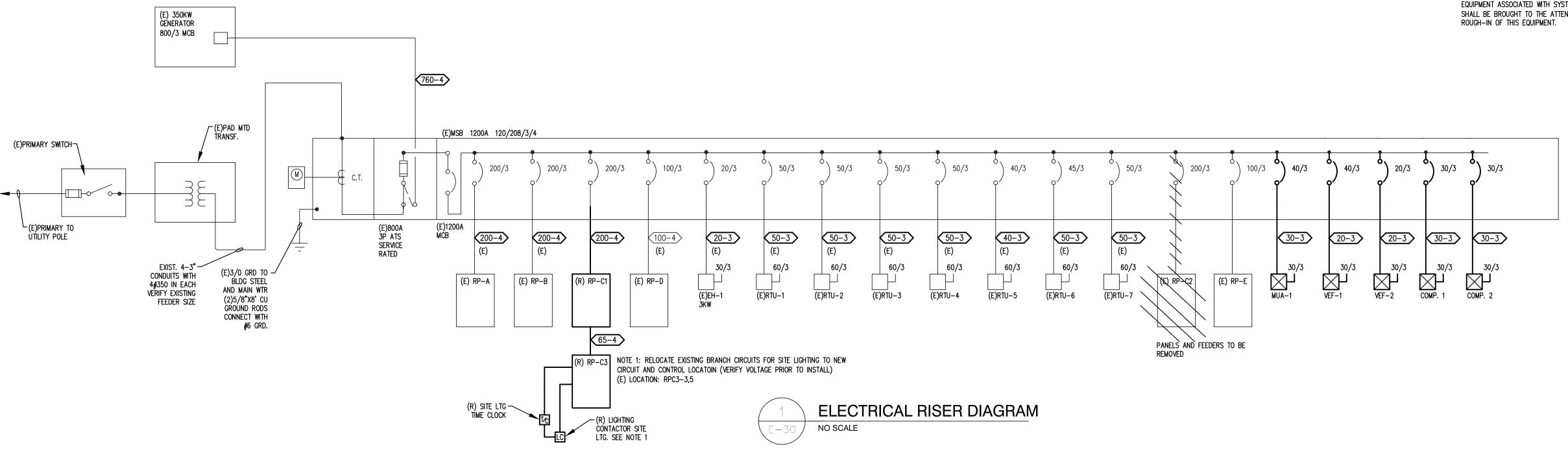
5. PROVIDE AND INSTALL "ARC-FLASH" LABELS IN ACCORDANCE WITH NEC 110.16.

6. ALL DISCREPANCIES WITH THESE DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION PRIOR TO BIDS. IN OTHERWISE DOING SO, THE ELECTRICAL CONTRACTOR SHALL BE LIABLE FOR ANY

7. ALL ITEMS SHOWN ON PLAN ARE NEW UNLESS MARKED AS (E) FOR EXISTING OR (R) FOR RELOCATED.

8. WHERE MAIN G.F.I. IS SHOWN FOR PROJECT, E.C. TO PROVIDE PROPER SETTINGS FOR MAIN G.F.I. RELAY TRIP SETTINGS AND TIME DELAY PERFORMED BY AN INDEPENDENT TESTING COMPANY INCLUDED IN E.C. CONTRACT. PROVIDE ACTUAL DOCUMENTATION AT THE COMPLETION OF THE PROJECT FROM THE INDEPENDENT TESTING

9. E.C. TO COORDINATE EXACT EQUIPMENTS OF ALL OTHER SYSTEMS (INCLUDING ELEVATORS AND HVAC EQUIPMENT) WITH MANUFACTURER AND OTHER TRADES PRIOR TO ROUGH-IN AND PURCHASE OF ANY ELECTRICAL EQUIPMENT ASSOCIATED WITH SYSTEM. ANY DISCREPANCIES WITH THIS PLAN AND MANUFACTURER REQUIREMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER PRIOR TO PURCHASE OR ELECTRICAL



		ELEC. RM F, WIRE - 120/208V, 3PH, 4W									- Surface AIC - 10K -Plug-in
CIR.	BKR	DESCRIPTION	REC.	LTG	MISC.	CIR.	BKR	DESCRIPTION	REC	LTG	MISC.
NO.			VA	VA	VA	NO.			VA	VA	VA
1	20/1	(E) CANOPY LTG		462		2	20/2	LIFT			2080
3	30/2	(E) SITE LTG		1600		4					
5						6	20/2	LIFT			2080
7	30/2	(E) SITE LTG		1600		8					
9						10	20/1	AIR DRYER			500
11	30/2	(E) SITE LTG		1600		12	20/1	CONF RM (1)	180		
13						14	20/1	TIRE BALANCER (6)	1080		
15	20/1	SIGN		1500		16		ALIGNMENT (5)	900		
17		SIGN		1500		18	20/1		500		
19	20/1			1500		20		PARTS (3)	540		
21		SHOW WINDOW	540			22		PARTS (4)	720		
23	20/1	SHOW WINDOW	360			24		PARTS DED. (1)	180		
25	20/1	LIFT AREA (8)	1440			26		BATH GFI (2)	360		
27		LIFT AREA (8)	1440			28		BLOWER #1			1622
29	20/2				2080	30		2#12+#12G., 3/4"C.			
31						32	20/1	CO DETECTOR			300
33	20/2	LIFT			2080	34	20/1	(E) DATA RM	360		
35						36	20/1	(E) ELEC. RM (3)	540		
37	20/2	EF-2			1622	38	20/1	SPARE			
39						40	20/1	SPARE			
41	20/1	SPARE				42	20/1	SPARE			
OTAL F	RECEPTAC	CLES			9.1	KVA		•	•	25.4	AMP
	IGHTING					KVA				27.1	
	MISCELLAN					KVA				34.3	
	CONNECTE DEMAND	בט				KVA KVA				86.9 93.6	
IOTES:	ZIMI NIO	ALL MECHANICAL EQUIPMENT     AIC RATINGS SHALL BE CALC     ALL UNSWITCHED LIGHT LOAD     DEMAND LOAD COMPUTED AS	ULATED AND C S TO BE SERV FOLLOWS:	ONFIRMED FICED USING	ACR BREAKI PRIOR TO OF SWITCH DU	er. Rdering Ty Break	ŒR.	NT		30.0	7.1111
		RECEPTACLES: 10K' LIGHTING (CONTINUOL MISCELLANEOUS (NOI KITCHEN LOAD @ 65 5. WHEN USING A SHARED NEUT	JS LOAD): 125 N-CONTINUOUS % PER TABLE :	% of conni Load): 10 220.56	ected load 0% of coni	PER 210 NECTED L	0.19 OAD PER				

	•	XISTING) ELEC. RM								MTG -	- SURFACE
OLTAGE	, PHASE	, WIRE - 120/208V, 3PH, 4W								MINIMUM	AIC - 10K
OOA CIR.	MLO BKR	DESCRIPTION	REC.	LTG	MISC.	CIR.	BKR	DESCRIPTION	REC	BKR. TYPE LTG	-PLUG-IN MISC.
NO.	DKK	DESCRIPTION	VA	VA	WISC.	NO.	DKIN	DESCRIPTION	VA	VA	VA
1	20/2	ENGINE TABLE			2000	2	20/2	LIFT			2080
3		2#12+#12G., 3/4°C.				4					
5	20/1	LIFT (4)	720			6	20/2	LIFT			2080
7	20/1	LIFT (8)	1440			8					
9	20/1	LIFT (8)	1440			10	20/2	LIFT			2080
11	20/1	LIFT (4)	720			12					
13	20/1	LIFT (8)	1440			14	20/2	LIFT			2080
15	20/1	LIFT (8)	1440			16					
17	20/2	LIFT			2080	18	20/2	LIFT			2080
19						20					
21	20/2	LIFT			2080	22	15/3	OH DOOR			1000
23						24	50/2	ELEC. CHARGER			6000
25	20/2	LIFT			2080	26		2#8+#10G., 3/4°C			
27						28	20/1	WASH BAY (3)	540		
29	20/2	LIFT			2080	30	20/1	SPARE			
31						32	50/2	ELEC. CHARGER			6000
33	20/2	LIFT			2080	34		2#8+#10G., 3/4°C			
35						36	20/1	SPARE			
37	30/2	WHEEL BALANCER			2000	38	20/1	SPARE			
39						40	20/1	SPARE			
41	20/1	WHEEL BALANCER	360			42	20/1	SPARE			
OTAL F	ECEPTAC	CLES			8.1	KVA				22.5	AMP
	IGHTING					KVA					AMP
	ISCELLAN					KVA				105.0	
	ONNECTE EMAND	יטב				KVA KVA				127.5 127.5	
OTES:		ALL MECHANICAL EQUIPMEN     AIC RATINGS SHALL BE CA     ALL UNSWITCHED LIGHT LO     DEMAND LOAD COMPUTED     RECEPTACLES: 10	LCULATED AND C ADS TO BE SERVI AS FOLLOWS:	ONFIRMED P	ACR BREAKE RIOR TO OF SWITCH DU	er. Rdering I Ty Break	ŒR.	WT		127.0	ZWII
		LIGHTING (CONTINI MISCELLANEOUS (I KITCHEN LOAD @  5. WHEN USING A SHARED NE	JOUS LOAD): 1253 NON-CONTINUOUS 65% PER TABLE 2	% OF CONNE LOAD): 100 220.56	CTED LOAD % OF CONN	PER 210 NECTED L	0.19 OAD PER				

		, WIRE - 120/208V, 3PH, 3W							MIN	NIMUM AIC R	
200A CIR.	MLO BKR	DESCRIPTION	REC.	LTG	MISC.	CIR.	BKR	DESCRIPTION	REC	BKR. TYPE LTG	- PLUG-IN MISC.
NO.	DKK	DESCRIPTION	VA	VA	VA	NO.	DKK	DESCRIPTION	VA	VA	VA
1	20/1					2	20/1				
3	20/1					4	20/1				
5	20/1					6	20/1				
7		(E) EJECTOR PUMP			9,360	8		SPARE			
9	33,3				0,000	10		SPARE			
11						12		(E) STORAGE AREA GFI	180		
13	20/1	SPARE				14		(E) BASEMENT LTG	100	864	
15		SPARE				16		SPARE			
17		(E) FURNACE			1200	18		(E) STORAGE RM LTG		1152	
19		BASEMENT LTG		864		20		(E) STORAGE RM LTG		576	
21		(E) BATH GFI	360			22	20/1	(-)			
23		(E) HALL RECEPT	180			24	20/1				
25		(E) HALL LTG		320		26	20/1				
27		(E) BATH GFI	360			28	20/1				
29		(E) UTILITY RM GFI	360			30	20/1				
31		NEW MICRO	180			32	20/1				
33		NEW COUNTER (2)	360			34	20/1				
35	20/1	NEW REF	500			36	20/1				
37	20/1	NEW GD	180			38	20/1	SPARE			
39	20/1	NEW DW	1000			40	30/2	NEW 4KW WALL HTR			4000
41	20/1	SPARE				42		2#10+#12G., 3/4"C			
	RECEPTAC	CLES			3.7	KVA					AMP
	IGHTING	NEON O				KVA					AMP
	MISCELLA CONNECTI					KVA KVA					AMP AMP
TOTAL D						KVA				63.7	
NOTES:		1. ALL MECHANICAL EQUIPMENT			ACR BREAK	ER.					
		2. AIC RATINGS SHALL BE CAL 3. ALL UNSWITCHED LIGHT LOA						NT			
		4. DEMAND LOAD COMPUTED A		CED USING	SWITCH DO	II DNEAR	ALIN.				

Project Number

E-30

Ziegelman Architects **PLLC** 

36800 Woodward Suite 100 Bloomfield Hills, Michigan 48304 248.644.0600



LAVERY AUDI-RANGE ROVER SERVICE

555 ADAMS ROAD BIRMINGHAM, MI

Sheet Title

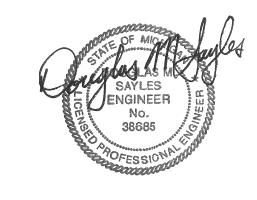
**ELECTRICAL** RISER DIAGRAM & PANEL SCHEDULES

Date Issued 2-04-15

		ELEC. RM									- SURFA
VOLTAGE 200A	, PHASE MLO	, WIRE - 120/208V, 3PH, 4W								MINIMUM BKR. TYPE	
CIR. NO.	BKR	DESCRIPTION	REC.	LTG VA	MISC.	CIR.	BKR	DESCRIPTION	REC VA	LTG VA	MISC.
	00.4						00 /0	LIET	- "	<u> </u>	
<u> </u>	20/1	WASH BAY (5)	900			4	20/2				2080
5		LIFT (8)	1440			6	20/2	LIFT			2080
7	20/1	LIFT (8)	1440			8					
9	20/1	LIFT (4)	720			10	20/2	LIFT			2080
11	20/1	LIFT (8)	1440			12					
13	20/1	LIFT (8)	1440			14	20/2	LIFT			2080
15	20/1	LIFT (4)	720			16					
17	20/1	OH DOOR			1000	18	30/2	4 POST LIFT			2500
19	20/1	LCP			500	20					
21	20/1	NORTH BAY LTG		470		22	30/3	CONVEYOR BELT			2500
23	20/1	N.W. BAY LTG		1350		24	(E)				
25	20/1	NORTH BAY LTG		1620		26	(-)				
27	20/1	NORTH CENTER LTG		1350		28	20/1	S.W. BAY LTG		1128	
29	20/1	CENTER LTG		564		30	20/1	NIGHT LTG		1080	
31	20/1	NE BAY LTG		1151		32	20/1	PARTS LTG		636	500
33	40/2	EF-3/4			6440	34	70/3	SUB PANEL C3	0	3000	50
35		2#8+#12G., 3/4"C.				36	(E)				
37	20/1					38					
39	20/1	SPARE				40	20/1	SPARE			
41	20/1	SPARE				42	20/2	SPARE			
	RECEPTAC	CLES				KVA				22.5	
TOTAL L						KVA					AMP
	(ISCELLA)					KVA				60.6	
TOTAL D	ONNECTE	ים				KVA KVA				117.4 126.0	
NOTES:		ALL MECHANICAL EQUIPMENT     ALL UNSWITCHED LIGHT LOA     DEMAND LOAD COMPUTED A     RECEPTACLES: 104     LIGHTING (CONTINUO)	CULATED AND ( DS TO BE SERV S FOLLOWS: (VA @ 100% O	CONFIRMED F ICED USING VER 10KVA	ACR BREAKI PRIOR TO OI SWITCH DU	er. Rdering Ty Breai	KER.	NT		-	

MISCELLANEOUS (NON-CONTINUOUS LOAD): 100% OF CONNECTED LOAD PER 210.19 KITCHEN LOAD @ 65% PER TABLE 220.56 5. WHEN USING A SHARED NEUTRAL, SUBSTITUE A 3 POLE BREAKER FOR SINGLE POLE BREAKERS SHOWN

		ELEC. RM , WRE - 120/208V, 3PH, 4W									<ul><li>SURFA</li><li>AIC - 1</li></ul>
	MLO	,								BKR. TYPE	
CIR.	BKR	DESCRIPTION	REC.	LTG	MISC.	CIR.	BKR	DESCRIPTION	REC	LTG	MISC.
NO.			VA	VA	VA	NO.			VA	VA	VA
1	20/1	RELOCATED TIME CLOCK			50	2	20/1	SPARE			
3	30/3	RELOCATED SITE LTG		3000		4	20/1	SPARE			
5	(E)					6	20/1	SPARE			
7	20/1	SPARE				8	20/1	SPARE			
9	20/1	SPARE				10	20/1	SPARE			
11	20/1	SPARE				12	20/1	SPARE			
13	20/1	SPARE				14	20/1	SPARE			
15	20/1	SPARE				16	20/1	SPARE			
17	20/1	SPARE				18	20/1	SPARE			
19	20/1	SPARE				20	20/1	SPARE			
TOTAL R	ECEPTAC	CLES			0.0	KVA					AMP
TOTAL L					3.0	KVA				8.3	AMP
	ISCELLAI					KVA					AMP
	ONNECTE	ED .				KVA					AMP
TOTAL D NOTES:	EMAND	1. ALL MECHANICAL EQUIPMENT	TO DE CEDVIO	ED TIGING H		KVA				10.6	AMP
NOTES.		2. AIC RATINGS SHALL BE CALC					EQUIPMEI	NT			
		3. ALL UNSWITCHED LIGHT LOADS									
		4. DEMAND LOAD COMPUTED AS	FOLLOWS:								
		RECEPTACLES: 10KV									
		LIGHTING (CONTINUOU	•								
		MISCELLANEOUS (NON		•	0% OF CON	NECTED L	OAD PER	R 210.19			
		KITCHEN LOAD @ 65% 5. WHEN USING A SHARED NEUT									



# Luckenbach Ziegelman Architects PLLC

36800 Woodward Suite 100 Bloomfield Hills, Michigan 48304 248.644.0600



# LAVERY AUDI-RANGE ROVER SERVICE

555 ADAMS ROAD BIRMINGHAM, MI

Sheet Title

## **ELECTRICAL** & PANEL SCHEDULES

PERMITS

Date Issued 2-04-15

-Project Number

Sheet Number

E-31

A. When equipment furnished for or by the Owner is indicated on these Drawings, this Contractor shall provide the proper size switches, conduit, wires, boxes and fittings that may be required; and make connections complete. This Contractor shall verify exact requirements and locations before installation B. If equipment, other than that which the Drawings were designed around, does not properly adapt itself to the

space allotted or lend itself accessible for repair and maintenance, provide additional access panels, pipe, fittings, materials, and labor, to achieve the same end results. C. The Contractor shall take field measurements necessary for his Work and shall be responsible for the accurate location and size of openings, recesses, slots, and the like. D. The Contractor shall be required to cooperate with the other trades and other Contractors in the coordination of his Work to avoid interferences with installations by other trades and Contractors. E. Extra costs which might result from deviations from the Drawings, so as to avoid interferences, shall be

interferences occur in course of the Work, due to an error, omission, or oversight by the Contractor, no additional compensation shall be allowed. Interferences which may occur during the course of construction shall be brought to the immediate attention of the Architect/Engineer, and his decision, confirmed in writing, shall be final. A. Work shall be in complete accordance with codes, rules, ordinances, regulations of authorities, bodies,

considered a "Job Condition" and no additional compensation will be considered applicable. In the event that such

associations, and governments, having proper and legal jurisdiction. Specifically, the following requirements shall be met in their entirety.

1. State and Local Rules, Regulations, Codes, Statutes, and Ordinances 2. National Fire Protection Association – applicable requirements

3. National Board of Fire Protection 4. National Electric Code - applicable requirement 5. Other Codes and Standards as specifically noted in each Section of the Specifications

B. Electrical equipment shall be Underwriter's approved; also, shall meet requirements established by NEC, NEMA, and ANSI and as specified hereinafter. 1.3 SUBMITTALS A. General: E.C. to provide 8 sets of submittals for all substantial electrical componenets and systems. 1.5 RECORD DOCUMENTS (AS-BUILTS)

A. Prepare record documents for project closeout. The Contractor shall keep a running record of each change and deviation from the Drawinas. Record shall be kept clean and undamaged upon a set of drawinas used for no other purpose. Upon completion of the Project, the Contractor shall submit two complete sets of record drawings; one for the owner and also one copy set for Architect/Engineer. Electronic drawings of the original drawings, without corrections, are available from the Architect/Engineer at a charge of \$100 per drawing. Record documents shall indicate installed conditions for:

1. Major raceway systems, size and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements. Equipment locations (exposed and concealed), dimensioned from prominent building lines.

Approved substitutions, Contract Modifications, and actual equipment and materials installed. 1.6 MAINTENANCE MANUALS A. Prepare maintenance manuals including the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts. 2. Manufacturer's printed operating procedures to include start—up, break—in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and

reassembly, aligning and adjusting instructions. 4. Servicing instructions and lubrication charts and schedules 1.7 DELIVERY, STORAGE, AND HANDLING A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels,

and other information needed for identification. 1.8 TEMPORARY WORK A. Except when otherwise stipulated, completed portions of the permanent installation or materials for use in the permanent installation shall not be used in temporary work without specific permission.

. Installed raceways for the permanent installation may be utilized for installation of temporary wiring. B. Overload protection and grounding for circuits and equipment of the temporary light and power system shall comply with applicable codes relating to permanent work. Panelboards and other protective equipment shall be furnished and installed as required by field conditions. C. Contractor shall locate temporary electric service main disconnect in an approved enclosure with lock. Contractor shall arrange to daily disconnect electric power on load side of "Main(s)" and lock the enclosure(s)

containing same. Solid grounding of the temporary electric service is required. D. Provide ground fault interrupter circuit breakers for branch circuits in accord with codes and regulations, including "OSHA" and "MIOSHA". E. Lighting fixtures employed shall be of the type, quality, and quantity required to provide a temporary lighting

system in accord with codes and regulations, including "OSHA" and "MIOSHA", and same shall not be on the same circuits with receptacles and other devices. F. Upon request, the Contractor shall submit shop drawings and detail information for temporary service and distribution to the Architect/Engineer for approval.

1.9 WORK IN EXISTING BUILDINGS A. During phasing of the Work and General Construction Schedule, all existing systems, including power, lighting, fire alarm, telephone system, central sound system (intercom system), etc., shall be maintained in operation, even if it requires temporary relocation, until the new work and new system is completed and operational; at which time the old work is to be removed.

B. This Contractor shall examine the existing site and familiarize himself with the existing conditions that will in any manner affect his work under this contract and include these conditions and required work in his bid. C. Contractor shall include in his bid all necessary changes in services (power, telephone, fire glarm, central sound system, etc.) to provide a minimum of interference with the operation and interruption of these services (including utility services) in the building. When changes require shutdown of any building services, the Contractor shall obtain Owner/Architect approval AT LEAST 48 hours in advance. Shutdown of any building services shall be scheduled after normal business hours, on weekends, and holidays.

D. General – Electrical fixtures, devices, panelboards, and other items of electrical equipment located in remodeled portions of the existing building which become obsolete or are shown to be removed, shall be disconnected and removed by the Contractor. Where existing work is removed, remove associated wiring, terminations, and obsolete exposed and interfering conduit and work. F. Remaining lights, switches, receptacles, motors, etc., not disturbed in the remodeling shall be checked for proper operation, and circuits opened by the remodeling work shall be properly reconnected.

A. Verify final locations for rough—ins with field measurements and with the requirements of the actual equipment

B. Coordinate rough—in requirements and locations with all other applicable trades. 3.2 ELECTRICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements: 1. For purpose of clearness and legibility, the Electrical "E" drawings are essentially diagrammatic and, although size and location of equipment are closely drawn to scale whenever possible, each Contractor shall make use of the data in all of the Contract Documents and shall verify this information at the building site. 2. The Drawings indicate required size and points of termination of wiring and other related items and they may

suggest proper routes for such items to conform to structure, avoid obstructions, and preserve clearances. It is not intended that Drawings indicate every necessary offset, and it shall be the Work of the Contractor to install each item in a manner as to conform to structure, avoid obstructions, preserve headroom, and keep opening and passageways clear, without further instructions or costs to the Owner. 3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.

4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed

5. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building. 6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible. 7. Coordinate connection of electrical systems with exterior underground and overhead utilities and services.

Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service. Install utility metering equipment according to utility company's written requirements. Provide grounding and empty conduits as required by utility company. 8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.

9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces. 10. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference

with other installations. 11. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a

3.3 CUTTING AND PATCHING A. General: Perform cutting and patching in accordance with the following:

1. Perform cutting, fitting, and patching of electrical equipment and materials required to:

a. Uncover Work to provide for installation of ill-timed Work. b. Remove and replace defective Work. c. Remove and replace Work not conforming to requirements of the Contract Documents.

d. Remove samples of installed Work as specified for testing e. Install equipment and materials in existing structures f. Upon written instructions from the Architect, uncover and restore Work to provide for Architect observation of

2. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the 3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

4. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to 5. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

6. Patch existing finished surfaces and building components using new materials matching existing or original materials by experienced Installers 3.4 PERMITS, FÉES, REGULATIONS, AND INSPECTIONS

A. The Contractor shall arrange and pay for permits, fees, and inspections required in connection with his work. B. Work shall be inspected by approved local and state inspection bureaus, Electrical Inspection Agency or authority, C. Upon completion of the Work, the Contractor shall furnish to the Architect/Engineer a certification of inspection and approval from said Bureau or Agency before final payment on contract. 3.6 HOISTS, RIGGING, TRANSPORTATION, AND SCAFFOLDING

A. The Contractor shall provide scaffolding, staging, cribbing, tackle, hoists, and rigging necessary for placing of his materials and equipment in their proper places in the Project. Temporary work shall be removed from the premises when its use is no longer required on the iob. B. The Contractor shall pay costs for transportation of materials and equipment to the jobsite and shall include such costs in his proposal.

C. Scaffolding and hoisting equipment shall comply with requirements of pertinent Federal, State, and Local Laws 3.7 DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEM A. Provide a minimum of 24 hours total instruction to personnel selected by the Owner. Instructions shall include

1. Show location of items of equipment and explain what they do. Refer to operating instructions manual for record and clarify. 3. Coordinate written and verbal instructions so that each is understood by personnel

3.8 FINAL COMPLETION A. Work shall be cleaned prior to Substantial Completion of the Work. B. Retouch or repaint factory painted prime and finish coats, where scratched or damaged. Whenever retouching will not be satisfactory, in the opinion of the Architect/Engineer, the Architect/Engineer has the option to require complete repainting until the desired appearance is obtained C. Remove temporary wiring as soon as permanent system(s) or portions thereof are in operating condition and

have been inspected and approved. D. The Contractor shall clean equipment; restore damaged materials; remove grease, oil, chemical, paint spots, and stains; and generally leave the Work in A-1 condition. E. On completion of his Work, the Contractor shall remove and see that each of his subcontractors removes from the site tools, equipment, surplus materials, and rubbish pertaining to his operations, and pay costs for such

A. Conform to Michigan Building Code.

Firestopping: Material or combination of materials to retain integrity of fire rated construction by maintaining an effective barrier against the spread of flame, smoke, and gases. . Through—Penetration Firestop Systems: Material or combination of materials which are field—constructed of fill, void, or cavity materials and forming materials, designed to resist fire spread when installed as a complete firestop Through—Penetration Firestop Devices: Factory built products designed to resist fire spread. Complete when delivered to site; ready for installation

<u>Section 16120 - Wire and Cable</u>

commercially pure copper.

otherwise stipulated.

device or piece of equipment

allow for voltage drop.

to allow for voltage drop.

allow for voltage drop.

on the plans or not.

aid compounds such as "WIRE-EASE.

gutters, and main switchboard

panelboards, and the like.

4. Color coding shall be as follows:

Phase "B" Red

Phase "C" Blue

Phase "A" Black Brown

Neutral "N" White Gray

Ground "G" Green Gre

"HI-LEG" phase shall be orange throughout.

followed with a 2 inch layer of concrete above the sand.

elbowed out above an accessible ceiling and suitably capped.

galvanizing crack or flake when bent to smallest radius allowed by NEC.

2.1 HEAVY WALL — (RIGID) CONDUITS — "GRC"

WC-581A. latest edition and ANSI C80.

coated with "Kopr-Shield" before coupling.

2.2 NON-METALLIC CONDUITS - "PVC"

D. Conduit shall meet requirements of NEC Article 346.

120/208V 277/480

Orano

Yellow

G. Color Coding of Conductor Insulation

3.1 INSTALLATION

for voltage drop.

A. Wire and cable shall be brought to the site in unbroken packages and reels.

B. Insulating wall must conform in thickness to the latest requirements of the NEC.

not less than 90 degrees C (194 degrees F) insulation and may be type "SA".

C. Insulating wall shall have integral color code for branch circuits.

shall be Type SA 125 degrees C (257 degrees F.)

equal to G.E. Co. S1-58073, unless otherwise specified.

A. Unless otherwise specified, wires and cables shall be insulated and of 98 percent conductivity soft drawn

). Wire terminating in light fixtures shall be of the heat resisting type, approved for the specific application, bu

. Feeders or branch circuits in extremely hot locations where ambient temperatures are 90 degrees C or above

G. Cords for make-up connections to equipment shall be 600V, heat resistant, rubber insulated, portable cable with

I. Where cable is denoted on the Drawings to be directly buried in earth, the cable shall be type "RHW/RHH/USE"

l. Conductors sized No. 12 AWG through No. 1 AWG shall have type "THWN/THHN" insulating wall, unless otherwise

K. Conductors sized No. 1/0 AWG and larger shall have type "THWN/THHN" or type "XHHW" insulating wall, unless

M. Conductors for use on voltages above 600V shall have an insulation system per G.E. Co. S1-58224, unless

otherwise stipulated, and neutral conductors shall have "full insulation" (not 600V - same as phase conductors).

N. Conductors installed within 12 inches of roof decks shall have a 90 degree C insulation system, unless otherwise

O. The minimum conductor size shall be No. 12 except No. 14 AWG for control circuits, unless otherwise stipulated.

1. It is intended that the voltage drop shall not exceed 3 percent from the origination of the feeder to the last

2. All 120V single phase wiring runs exceeding 120 linear feet shall be increased a minimum of one wire size to

3. All 208V, 240V, or 277V single phase wiring runs exceeding 200' shall be increased a minimum of one wire size

4. All 208V or 240V three phase wiring runs exceeding 250' shall be increased a minimum of one wire size to allow

5. All 480V single or three phase wiring runs exceeding 350' shall be increased a minimum of one wire size to

6. Contractor shall be responsible to adequately size conductors to allow for voltage drop per NEC whether show

B. Grease or common lubricating oil shall not be used in pulling wire. Use only conventional manufactured pulling

C. Wires shall not be pulled until mechanical work which is liable to injure the wires has been completed. Remov

D. Type "XHHW" wire shall be pulled with the aid of Ideal "Yellow 77" to prevent chemical damage to this type of

E. In general, splicing of conductors larger than No. 6 AWG will not be permitted. However, should splicing be

required, splice work shall be performed by craftsmen skilled in this work and under the supervision of the

1. The Contractor shall tag feeders, subfeeders, branch circuits, and main cables in junction boxes, pull boxes, wire

2. Circuit conductors shall be tagged by pressure—sensitive, all temperature, self sticking, perma—code, plastic

2. Branch circuit wire and cable shall be identified with a visual color code which shall be an integral part of the

3. Feeder circuit wire and cable shall be identified in accord with above or by applying 1/2 lap wrap of Scotch No.

Architect/Engineer. Written approval of the Architect/Engineer is required before doing such splicing.

coated white wire markers with black lettering, as manufactured by Brady, Seton, or approved equivalent.

. The Contractor shall exercise great care in identifying the wires and cables of the electrical circuits.

27 colored tape to the entire length of the conductor where visible for inspection as in boxes, cabinets,

braid or outer insulation and shall be of the permanent indelible type not affected by moisture, oil, grease, and

Except: when the system is the secondary of a 4 wire delta connected transformer secondary, then the

H. Generally, conductors of different systems (panelboard, etc.) shall not occupy the same raceway system or

conductors shall be routed in a dedicated raceway for emergency circuits and shall be properly identified and

J. Directly buried cables will only be permitted where denoted on the Drawings. Where permitted, direct burial

A. Extra Materials: Unless additional requirements are stipulated, provide a minimum of not less than 2 spare

inch and 2 spare 3/4 inch EMT conduits for each flush mounted distribution panel or panelboard with conduits

A. Heavy wall conduit shall be galvanized, having Underwriter's approved mark, meeting Federal Specification

B. Conduit shall be standard weight, free from burrs and scale. Conduit shall not crack or split, nor shall

Č. Conduit threads shall be standard and properly cut. Threads shall be galvanized. Field cut threads shall be

A. Non-metallic conduit shall be Underwriter's approved Schedule 40 heavy wall "PVC" polyvinyl chloride plastic type,

I. Where emergency circuits appear in the same spaces with conductors of other systems, the emergency circuit

cable shall be mechanically protected with clean masonry sand extending 2 inches above and below the conductors,

enclosures. Where dual occupancy is approved by the Architect/Engineer, the provisions of the NEC shall be

A. All wire shall be installed in conduit or raceway unless noted otherwise.

foreign matter and dirt from the raceway system before installing conductors and devices.

E. Wire and cable for general wiring shall be of sizes denoted or required and shall be rated 600V.

lead cured neoprene jacket, Type "SO" and/or "G" with extra flexible stranded copper conductors.

H. Use of "MC" cable is ONLY permitted for fixture whips not exceeding 6 feet in length.

 Provide through—penetration firestop systems and through—penetration firestop devices, sealants, and related products for floor and wall penetrations for electrical equipment (and sealing top of rated walls to deck when required by code officials). B. Restoration of time-rated building components following their penetration using through-penetration firestop systems, and through-penetration firestop devices, sealants, and related products.

A. Provide labor, materials, services, coordination, and equipment necessary for complete installation of Firestopping

1.3 SUBMITTALS A. Provide submittals indicating product information, proposed installation drawings, and qualifications of firestopping 1.4 QUALITY ASSURANCE

B. Meet requirements of ASTM E814 Through Penetration Fire Test by a nationally recognized testing agency and other ASTM Standards as applicable for the installation. C. Installer shall have successfully completed within the last 3 years at least 2 firestop projects similar in type and size to that of this Project. The installer is required to have been trained by each manufacturer of products he is installing in the proper handling and installation of that product. D. Obtain firestop materials from a single manufacturer for each different product required.

E. Application Certification: Upon completion of the Work, the Contractor shall furnish to the Architect certification that materials have been installed in accordance with manufacturer's installation requirements. Certification shall be signed by the installer. F. Contact the manufacturers of each product intended for use for a list of qualified Firestop Specialty Installers. .5 Sequencing

. Coordinate this Work as required with work of other trades. B. Coordinate with other Contractors to make or keep penetration areas accessible to firestopping installer. 2.1 ACCEPTABLE MANUFACTURER'S PRODUCTS

1. Dow Corning "Firestop Foam" and "Firestop Sealant" or equal by Insta-Foam Products, 3M Brand, Metalines Inc., Hilti, Biop Fireshield, or Tremco B. Intumescent sealants and firestopping bags for use in openings and sleeves involving plastic pipe, insulated pipe, 1. Dow Corning "Firestop Intumescent Wrap Strip" or equal by 3M Brand, Hilti, Bio Fireshield, or Tremco. 2.2 MATERIALS - GENERAL

A. Provide flame (F) rating minimum one hour, but not less than fire resistance rating of the assembly in which installed, per ASTM E814. B. Maintain effective barrier against flame, smoke, and hot gasses per ASTM E814 and UL 1479. C. Suitable for firestopping of penetrations by steel, glass, plastic, and insulated pipe. Also flexible cable, bus duct,

3.1 EXAMINATION A. Examine surfaces to receive penetration sealant or foam and report unacceptable conditions to the Architect

before starting firestopping work. Start of work indicates firestopping installers acceptance of sizing of holes and application conditions. 3.2 PREPARATION . Clean penetration holes of dirt, loose materials, and foreign matter which may affect bond or installation. B. Remove coatings such as paint, curing compounds, water repellent, and sealers as required.

3.3 APPLICATION A. Install firestopping materials, including forming, packing, and other accessory materials to fill openings around mechanical and electrical services, penetrating floors and walls to provide firestops with fire resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established B. Install firestopping materials systems in strict accordance with manufacturer's installation instructions and code

C. Employ installation techniques which will ensure that firestopping is deposited to fill and seal holes and openings. D. Tool exposed surfaces of applied sealant smooth. 3.4 CLEAN-UP A. Clean surfaces adjacent to sealed joints free of excess sealant and soiling from this Work as work progresses, using solvent or cleaning agent recommended in writing by the sealant manufacturer. Mee

<u>Section 16050 — Basic Electrical Materials and Methods</u>

2.2 MISCELLANEOUS METALS

3.2 SELECTIVE DEMOLITION

B. Leave finished Work in neat, clean condition; remove excess debris and materials.

1.2 QUALITY ASSURANCE A. Installer Qualifications: Engage an experienced Installer for the installation and application joint sealers. access panels, and doors, B. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code – Steel." C. Fire—Resistance Ratings: Where a fire—resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in the UL "Building Materials Directory" for rating

. Provide UL Label on each fire-rated access door. D. Materials shall be new, complete with manufacturer's guarantee or warranty, and shall be approved by the Underwriters' Laboratories, Inc, National Electrical Manufacturers' Association, Insulated Power Cable Engineers Association, National Safety Code, and the Institute of Electrical and Electronics Engineers. E. Work shall be executed in a workmanlike manner and shall present a neat mechanical appearance when ompleted. Methods and techniques of installation shall be subject to the approval of the Architect. . Materials of the same type or class shall be the product of one manufacturer. For example, panelboards shall

be from one manufacturer, lighting switches from one manufacturer. H. Environmental Conditions: Apply joint sealers under temperature and humidity conditions within the limits permitted by the joint sealer manufacturer. Do no apply joint sealers to wet substrates. .3 SEQUENCE AND SCHEDULING . Coordinate the shut—off and disconnection of electrical service with the Owner and the utility company. B. Perform demolition in phases as coordinated with Architect/Owner.

A. Steel plates, shapes, bars, and bar grating: ASTM A 36. B. Cold-Formed Steel Tubing: ASTM A 500. C. Hot-Rolled Steel Tubing: ASTM A 501. D. Steel Pipe: ASTM A 53. Schedule 40. welded. E. Nonshrink, Nonmetallic Grout: Premixed, factory—packaged, nonstaining, noncorrosive, nongaseous grout

recommended for interior and exterior applications. F. Fasteners: Zinc-coated, type, grade, and class as required. .3 MISCELLANEOUS LUMBER A. Framing Materials: Standard Grade, light-framing-size lumber of any species. Number 3 Common or Standard Grade boards complying with WCLIB or AWPA rules, or Number 3 boards complying with SPIB rules. Lumber shall be

B. Materials and Equipment To Be Salvageď: Remove, demount, and disconnect existing electrical materials and

D. Electrical Materials and Equipment: Demolish, remove, demount, and disconnect the following items:

a. Raceways embedded in floors, walls, and ceilinas may remain if such materials do not interfere with nev

Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational components indicated

A. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support

B. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive

A. Conduits or raceways shall be securely supported and anchored with proper devices, using lead shields in walls or

sides of beams, expansion shields or other approved type device for direct down-pull loads. Minerallac type hanger

shall be limited to above ceilings. Holes made in walls or ceilings for use with anchoring devices shall be covered

by large steel (fender) washers of equal approved device. Include special hangers, as required. One hole strap

C. In lieu of hanger rods, the use of hanger wire No. 12 or No. 8 for the suspension of luminous ceilings, lighting

D. The material alloy of hanging devices, supports, rods, wires and the like, located in corrosive ambients shall be

. Concrete: Use Grinnell Fig. 285, or equal, Light Weight Concrete insert for loads up to 400 pounds; or Grinnell

B. Steel Beams: Where pipe size is 2 inches or less, use Grinnell Fig. 87 or equal, malleable iron C-clamp and

D. Intermediate Attachments: Continuous threaded rod shall be used wherever possible. No chain, wire, or

perforated strap shall be used. Up to 2 inches trade size pipe use 3/8 inch (minimum) rod, 2-1/2 inches and

E. Pipe Attachments: For steel pipe use Grinnell Fig. 115 Ring and Turnbuckle Adjuster, or equal, or Fig. 260

F. Trapeze Hangers: Framing for parallel runs shall consist of Unistrut, or approved equal, with approved clamps

A. Conduits shall be supported to meet the conditions of the Work in a thoroughly workmanlike manner, using

8 feet and at both sides of each outlet, except at one side only of conduit terminating outlet.

. Whenever possible, use supports, clamps, hangers, etc., designed especially for conduit.

. The maximum permitted load on hanger rod, plain or all—thread, shall be as follows:

B. Exposed conduits shall be installed parallel with or at right angles to building structure, fastened at least every

C. Conduit risers shall be supported with friction clamps with two point bearing anchored to building construction

fittings shall not be permitted within 8 feet of the floor surface where exposed raceways are installed.

B. Hangers shall be individual ring or clevis type, one hole straps or multiple trapeze hangers.

fixtures, and the like, shall be approved by Architect/Engineer prior to installation.

Fig. 282, or equal, Universal Concrete insert for loads up to 1430 pounds.

C. Wooden Ceilings and Beams: Use Grinnell Fig. 153, or equal.

retaining clip. Where pipe size is over 2 inch, use Grinnell Fig. 229, or equal.

. Cut, fit, and place wood grounds, nailers, blocking, and anchorage accurately in location, alignment, and

finish materials. Make tight connections between members. Install fasteners without splitting wood members.

Inactive and obsolete raceway systems, controls, and fixtures.

istallations. Remove materials above accessible ceilings

Perform cutting and patching required for demolition

3.4 ERECTION OF METAL SUPPORTS AND ANCHORAGE

B. Field Welding: Comply with AWS "Structural Welding Code."

elevation to support and anchor electrical materials and equipment.

C. Attach to substrates as required to support applied loads.

SECTION 16070 — HANGERS AND SUPPORTING DEVICES

approved by Architect/Engineer prior to installation.

.2 STRUCTURAL ATTACHMENTS

arger use 1/2 inch (minimum) rod.

proper type and size straps, clamps, and hangers.

D. The following hanger methods are not permitted:

5. The minimum size hanger rod permitted is 1/4 inch size.

1. Wood plugs, Perforated band iron, Hook chain supports, and Bailina wire.

levis, or eaual.

and hanger rods.

3.1 INSTALLATION

and at every floor.

1. 1/4 inch size — 750 pounds

3. 1/2 inch size – 2000 pounds

2. 3/8 inch size -1000 pounds

4. 5/8 inch size – 3000 pounds

and anchor electrical materials and equipment.

3.5 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

properly supported and anchored. Conduit shall be terminated in end-bells or bushings. Provide bonding or grounding conductors in accordance with NEC. preservative treated in accordance with AWPB LP-2, and kiln dried to a moisture content of not more than 19 2.3 THIN WALL CONDUITS - "EMT" B. Construction Panels: Plywood panels; APA C-D PLUGGED INT, with exterior glue; thickness as indicated, or if not A. Thin wall conduit shall be Underwriter's approved electrical metallic tubing (EMT). EMT shall meet Federal indicated, not less that 15/32 inches. Specification WW 806, latest edition. . Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation

2.4 INTERMEDIATE METAL CONDUIT - "IMC" A. Intermediate metal conduit (IMC) shall be galvanized on the exterior and coated with a corrosion resistant tolerances and other conditions affecting installation and application of joint sealers and access panels. Do not lubricating coating on the interior and exterior surface, meeting requirements of NEC Article 300–6. proceed with installation until unsatisfactory conditions have been corrected. . General: Demolish, remove, demount, and disconnect abandoned electrical materials and equipment indicated to be removed and not indicated to be salvaged or saved.

B. Conduit 4 inches diameter and under shall be UL approved, meeting requirements of UL 1242 (UL listing No. C. Conduit shall be manufactured from high strength low alloy ASTM-A568 steel. It shall be further strengthened by the work hardening forming process to achieve a tensile strength of approximately 67,000 psi ). Threads shall be standard conduit taper cut to fit standard coupling threads. Threads shall be galvanized. Field equipment indicated to be removed and salvaged, and deliver materials and equipment to the location designated cut threads shall be coated with "Kopr-Shield" before coupling.

E. Conduit shall meet requirements of NEC Article 345, Federal Specification WC 581, and ANSI-C80. C. Disposal and Cleanup: Remove from the site and legally dispose of demolished materials and equipment not 2.5 FLEXIBLE METAL CONDUIT indicated to be salvaged. The following paragraphs are examples of the types of demolition that may be required. A. Galvanized steel, made with a single continuous strip of interlocked, double wrapped steel, galvanized inside and outside, forming a smooth internal wiring channel.

B. Federal Specification WWC-566, UL listed, and in accordance with NEC Article 350. 2.6 LIQUID-TIGHT FLEXIBLE METAL CONDUIT A. Galvanized steel, made with a single continuous strip of interlocked, double wrapped steel, galvanized inside and outside, forming a smooth internal wiring channel. 3. Conduit to have a continuous liquid—tight jacket of flexible PVC.

C. Federal Specification WWC-556, UL listed and in accordance with NEC Article 351. A. Fittings shall be UL listed, constructed of formed material, electrically conductive of the same size and finish as B. Conduit one inch and larger in size shall be provided with a grounding and insulated bushing similar and equal to O.Z. Electrical Products Company's Type "BL." Insulating bushings and double locknuts (that is, one inside and one outside) shall be provided at junction boxes, outlet boxes, pull boxes, and cabinet entrances. C. Provide UL seal-off fittings for conduits due to high or low temperature places such as walk-in coolers, and for

hazardous applications such as gasoline pumps, paint storage, paint spray booth, storm water, or sewage water lift 1. Fill seal off as recommended by Crouse Hinds Co. for explosion—proof applications. D. Bonded galvanized expansion joints shall provide for a minimum of 4 inch movement and shall have a tinned copper flexible braided jumper around the joint, OZ type EX or TX as required, with type BJ jumper. E. Conduit penetrations through floors (not slabs on grade and foundation walls) and firewalls shall be sleeved, using GRC and sealed with a UL approved/listed material giving a minimum fire rating of 2 hours.

F. Foundation wall sleeves into basement areas to be sealed with OZ type CSML. Coat exterior with heavy coat W.P. asphalt compound. G. Provide O.Z. Electrical Products Company's Type "DUX" duct waterstop sealing compound for all service entrance and any other outside feeder conduits to prevent water to drain into electrical equipment space. A. When denoted on Drawings or required for grouping of starters, switches, control equipment; provide a complete

metal raceway or trough for the conveyance and distribution of electric wires and cables, designed for easy accessibility to the wires and cables and provided with concentric knockouts at intervals for the extension of B. Square duct shall be standard in 1, 2, 3, 4, 5, and 10 foot lengths, bolted together to form a continuous, unbroken wireway. Small sizes (4"X4" and smaller) shall be provided with hinged cover and fastening device. Larger sizes (6"x6" and larger shall be provided with screw cover and agaket. Provide tees, elbows, pull box hangers, supports, to make same adaptable to building structure. Ducts shall be permanently supported, anchored to wall ceiling truss. Bond each length together with No. 12 AWG (minimum) green grounding conductor. C. In areas of high moisture or where denoted on the Drawings, components shall be galvanized steel.

D. Exterior wireways shall be weathertight, with screw covers, galvanized and painted, and without knockouts. A. All wire shall be run in conduit unless otherwise noted, and all conduit shall run concealed in wall, above ceilings, or below concrete slabs unless otherwise noted. B. Provide conduits from distribution center through pull and junction boxes and panelboards, to outlets and bond throughout to make a continuous circuit. Conduits shall be concealed accurately in partitions and floors. Do not expose conduit bends at floor or ceiling. Place conduits under structural slabs. Provide bonded galvanized expansion joints where conduit crosses building expansion joints, also in straight runs over 200 feet. C. Make field bends properly and in accord with NEC; for 3 inch conduit and greater, use <u>factory</u>90 degree and 45

D. Leave 14 gauge fish or drag wire in empty conduits. Cap each end of unused conduits. Provide color coded end caps on exposed threads of metal conduit. E. Minimum size conduit permitted is 3/4 inch unless otherwise noted on Drawings, except switch legs may be 1/2 F. Conduit shall be cut square, carefully reamed, coupled watertight, and fastened securely to the structure. Terminate in metal enclosures such as outlet hoxes pull hoxes cabinets switches other types of raceways or as indicated. Equip with double locknuts and approved bushings to protect wire from abrasion, except where equipment affords equal protection. Use of single locknuts is not permitted. Conduit sizes of 1 inch and larger

shall be equipped with grounding and insulating type bushings and with locknuts inside and outside the enclosure

installed horizontally in masonry walls, unless denoted on Drawings, nor shall walls be channeled or cut to install

conduits, unless approved by the Architect/Engineer.

G. Conduit shall not be installed in concrete slabs, structural slabs, or through wood members. Conduit shall not be

H. Conduit installed below on-grade concrete slab is to be at minimum 1 inch from top of conduit to top of I. Never run conduits diagonally when overhead or exposed. Run conduit parallel or perpendicular with the building

When plaster is existing, mortar-in conduit and finish plaster to "like new" condition. J. Running thread connections between conduits is not permitted; Erickson type coupling must be used. K. Connect motors and other equipment or appliances subject to movement, using a short length of UL approved liquid-tight flexible conduit, neoprene jacketed (36 inches maximum length). Also use liquid-tight flexible metal conduit for concealed casework electrical connections (science lab tables, etc.) and in other areas where moisture or water is present. L. In existing areas where concealment of rigid conduit requires demolition or removal of the ceiling or channeling of walls, flexible conduit may be installed with written approval of the Architect/Engineer.

1. Whenever conduit is required underneath plaster, channel out to sufficient depth and properly anchor conduit.

M. Exposed conduits rising from floor to surface panels and boxes shall have a 3 inch high concrete curb encasing the conduits at the floor line. Curb to have chamfered edges. N. Conduit shall be sealed where entering or leaving refrigerated or hazardous spaces, and spaces having ambient temperature differentials of 10 degrees F or greater. O. Minimum size of flexible conduit shall be 1/2 inch diameter trade size. Maximum length of 6 feet. P. No conduit shall rest on or be supported from suspended ceilings, mechanical ceiling suspension systems, or

Q. Interior wiring shall be installed in galvanized rigid heavy wall conduit (GRC) or intermediate metal conduit (IMC) begring the UL labels, except for 2-1/2 inch conduit size and smaller UL labeled advanized electrical metallic tubing (EMT) with threadless compression type steel couplings and connectors in interior partitions and above R. EMT is not approved for installation in concrete slabs, below slabs on grade, underground, in exterior walls, or exposed below 8 feet AFF except for top feed conduit for panelboards, disconnects, and starters. No cast type/pot metal or indenter type fittings are permitted. Size of conduits must meet National Electrical Code

S. Conduit shall be installed concealed in walls, slabs, or above ceilings except as noted. Conduit may be run exposed in electric rooms, mechanical rooms, equipment rooms, tunnels, attics, penthouses, or like unfinished PVC conduit shall not be used except in underground locations.

3.2 UNDERGROUND CONDUITS A. For underground wiring, the conduit shall be regular heavy wall, galvanized rigid steel conduit (GRC), or intermediate metal conduit (IMC) placed at depth indicated, but not less than 30 inches below grade unless below floors. Where conduits are laid in the same trench with others, they shall be separated not less than 8 inches center to center, one from the other. Threads of conduit for underground wiring shall be with "Kopr-Shield" before coupling and then torqued. B. PVC plastic conduit with 3 inch concrete envelope may be used in lieu of GRC or IMC for exterior underground branch and feeders, and same shall be installed similar to steel conduit. Vertical runs, bends, sweeps, and elbows

shall be made with GRC or IMC. Provide PVC expansion joints and ground conductor per 250-95. C. PVC plastic conduit without concrete envelope is approved for use under building slab only, for branch and feeders, and same shall be installed similar to steel conduit. Vertical runs, bends, sweeps, and elbows shall be made with GRC or IMC. Provide PVC expansion joints and ground conductor per 250-95. D. Underground conduits shall be installed level or pitched slightly down to drain to eliminate collection of moisture or condensation. Low points shall have suitable drain provisions. E. Installation of conduits shall be performed in manner that will obviate sinking, breaking up, and damage 3 CONDUIT PLATES AND ESCUTCHEONS

A. The Contractor shall provide approved plates installed around each conduit passing through walls and floors, when

exposed to view. Plates shall be sized to cover exposed ends of the sleeves and shall be finished to match B. Floor plates shall be split type, heavily chrome plated, and securely attached to the pipe. C. Roughing—in shall be properly installed to avoid cutting of plates due to insufficient clearance.

A. Flevated floor slabs, sleeves shall be PVC schedule 40 and be installed 4 inches above finish floor B. Sleeve to be oversized as required to install firestopping through floors and fire walls. C. On slabs, provide 1/4 inch foam expansion joint material for 2 inch conduits and larger. Conduits which penetrate masonry walls shall be sleeved and grouted into the masonry wall. E. Coordinate locations of all penetrations with other trades.

<u>SECTION 16135 — CABINETS, BOXES AND FITTINGS</u>

A. Cabinets: An enclosure designed either for surface or for flush mounting and having a frame, or trim in which a door or doors may be mounted. B. Device Box: An outlet box designed to house a receptacle device or a wiring box designed to house a switch. C. Enclosure: A box, case, cabinet, or housing for electrical wiring or components. D. Hinged Door Enclosure: An enclosure designed for surface mounting and having swinging doors or covers secured directly to and telescoping with the walls of the box. Outlet Box: A wiring enclosure where current is taken from a wiring system to supply utilization equipment. . Wiring Box: An enclosure designed to provide access to wiring systems or for the mounting of indicating devices or of switches for controlling electrical circuits. 2.1 MANUFACTURERS

1. Floor Boxes a. American Electric/Steel City, Appleton electric Co., Cooper Industries, Inc., Walker Systems, Inc., or Hubbell. a. Electric Panelboard, Inc., Erickson Electrical Equipment Co., Hoffman Engineering Co., Parker Electrical Mfg. Co., Spring City Electrical Mfg. Co., or Square D Co.

A. Manufacturers: Subject to compliance with requirements, provide products by the following where/if indicated on

6. Boxes and Fittings for Hazardous Location: a. Adalet-PLM., Cooper Industries, Inc., Killark Electric Mfg. Co., OZ/Gedney., Robroy Industries, Inc., Spring City Electrical Mfg. Co., or Woodhead Industries, Inc. B. All items under this section shall comply with appropriate UL provisions and NEMA OS 1 for the type of

2.2 CABINETS, BOXES, AND FITTINGS, GENERAL A. Electrical Cabinets, Boxes, and Fittings: Of indicated types, sizes, and NEMA enclosure classes. Where not indicated, provide units of types, sizes, and classes appropriate for the use and location. Provide all items complete with covers and accessories required for the intended use. Provide gaskets for units in damp or wet

2.3 MATERIALS AND FINISHES A. Sheet Steel: Flat—rolled, code—gage, galvanized steel. B. Fasteners for General Use: Corrosion resistant screws and hardware including cadmium and zinc plated items. D. Cast Metal for Boxes, Enclosures, and Covers; Copper—free aluminum except as otherwise specified. F. Exterior Finish: Gray baked enamel for items exposed in finished locations except as otherwise indicated. F. Fittings for Boxes. Cabinets, and Enclosures: Conform to UL 514B. Malleable iron or zinc plated steel for conduit hubs, bushings and box connectors.

2.4 METAL OUTLET. DEVICE. AND SMALL WIRING BOXES A. Boxes shall be of type, shape, size, and depth to suit each location and application. B. Steel Boxes: Boxes shall be sheet steel with stamped knockouts, threaded screw holes and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings and fixture studs. C. Cast-Aluminum Boxes: Copper free aluminum threaded raceway entries and features and accessories suitable for each location including mounting ears, threaded screw holes for devices and closure plugs.Delete below where nonmetallic boxes are not permitted

2.5 PHONE, DATA AND PHONE/DATA BOXES. A. Boxes shall be sheet steel with stamped knockouts, threaded screw holes and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings and fixture studs. B. Boxes shall be single gang, 3—1/2" deep with knockouts for up to 1" conduit unless otherwise indicated. 2.6 PULL AND JUNCTION BOXES A. Boxes shall have screwed or bolted on covers of material same as box and shall be of size and shape to suit

B. Steel Boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing. C. Hot-Dipped Galvanized Steel Boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing. Hot-dip galvanized after fabrication. Cover shall be D. Stainless-Steel Boxes: Fabricate of stainless steel conforming to Type 302 of ASTM A 167. "Specification for

Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip." Where necessary to provide a rigid assembly, construct with internal structural stainless steel bracing. Cover shall be aasketed. A. Construction: Sheet steel, NEMA 1 class except as otherwise indicated. Cabinet shall consist of a box and a front consisting of a one piece frame and a hinged door. Arrange door to close against a rabbet placed all around the inside edge of the frame, with a uniformly close fit between door and frame. Provide concealed fasteners, not over 24-inches apart, to hold fronts to cabinet boxes and provide for adjustment. Provide flush or concealed door hinges not over 24-inches apart and not over 6-inches from top and bottom of door. For flush

cabinets, make the front approximately 3/4 inch larger than the box all around. For surface mounted cabinets make front same height and width as box. B. Doors: Double doors for cabinets wider than 24-inches. Telephone cabinets wider than 48-inches may have sliding or removable doors. C. Locks: Combination spring catch and key lock, with all locks for cabinets of the same system keyed alike. Locks may be omitted on signal, power, and lighting cabinets located within wire closets and mechanical-electrical rooms. Locks shall be of a type to permit doors to latch closed without locking.

3.1 INSTALLATION, GENERAL A. Cap unused knockout holes where blanks have been removed and plua unused conduit hubs. B. Sizes shall be adequate to meet NEC volume requirements, but in no case smaller than sizes indicated. C. Remove sharp edges where they may come in contact with wiring or personnel.

Cabinets: Flush mounted, NEMA enclosure type 1 except as otherwise indicated. B. Outlet Boxes and Fittings: Install outlet and device boxes and associated covers and fittings of materials and NFMA types suitable for each location and in conformance with the following requirements: Interior Dry Locations: NEMA type 1, sheet steel or nonmetallic as permitted by local code.

Interior Dry Locations: Sheet steel. NFMA type 1. 3. Locations Exposed to Weather or Dampness: Cast metal, NEMA type 3R. 4. Wet Locations: NFMA type 4 enclosures. Corrosive Locations: NEMA type 4X enclosures.

i. Hazardous (Classified) Locations: NEMA type listed and labeled for the location and class of hazard indicated. C. Pull and Junction Boxes: Install pull and junction boxes of materials and NEMA types suitable for each location except as otherwise indicated 3.3 INSTALLATION OF OUTLET BOXES A. Outlets at Windows and Doors: Locate close to window trim. For outlets indicated above doorsinstall 6" above door frame and center outlets above the door opening except as otherwise indicated.

B. Column and Pilaster Locations: Locate outlet boxes for switches and receptacles on columns or pilasters so the centers of the columns are clear for future installation of partitions. C. Locations in Special Finish Materials: For outlet boxes for receptacles and switches mounted in desks or furniture cabinets or in glazed tile, concrete block, marble, brick, stone or wood walls, use rectangular shaped boxes with square corners and straight sides. Install such boxes without plaster rings. Saw cut all recesses for outlet boxes in exposed masonry walls. D. Gasketed Boxes: At the following locations use cast metal, threaded hub type boxes with gasketed weatherproof

1. Exterior locations. 2. Where surface mounted on unfinished walls, columns or pilasters. (Cover gaskets may be omitted in dry 5. Where exposed to moisture laden atmosphere 4. At food preparation equipment within four ft. of steam connections.

E. Mounting: Mount outlet boxes for switches with the long axis vertical or as indicated. Mount boxes for eceptacles vertically. Three or more gang boxes shall be mounted with the long axis horizontal. Locate box covers or device plates so they will not span different types of building finishes either vertically or horizontally. . Phone, Data and Phone/Data Boxes: Install boxes at indicted mounting heights and extend a 3/4" conduit into accessible ceiling space. Provide suitable bushing on end of conduit. Where cable trays are used for cable distribution, extend conduit over to cable tray and secure with appropriate mounting device. G. Ceiling Outlets: For fixtures, where wiring is concealed, use outlet boxes 4-inches square by 1-1/2-inches

H. Cover Plates for Surface Boxes: Use plates sized to box front without overlap. I. Protect outlet boxes to prevent entrance of plaster, and debris. Thoroughly clean foreign material from boxes before conductors are installed. J. Floor Boxes: Install in concrete floor slabs so they are completely enveloped in concrete except for the top Where normal slab thickness will not envelop box as specified above, provide increased thickness of the slab.

screw, not smaller than no. 10-32, screwed into a tapped hole in the box. Adjust covers of floor boxes flush with 3.4 INSTALLATION OF PULL AND JUNCTION BOXES A. Box Selection: For boxes in main feeder conduit runs, use sizes not smaller than 8-inches square by 4-inches deep. Do not exceed 6 entering and 6 leaving raceways in a single box. Cable Supports: Install clamps, grids, or devices to which cables may be secured. Arrange cables so they may be readily identified. Support cable at least every 30-inches inside boxes.

Provide each compartment of each floor box with grounding terminal consisting of a washer-in-head machine

2. Mount pull boxes in inaccessible ceilings with the covers flush with the finished ceiling 3. Provide pull and junction boxes for telephone, signal, and other systems at least 50 percent larger than would be required by the NEC, or as indicated. Locate boxes strategically and provide shapes to permit easy pulling of future wires or cables of types normal for such systems. 3.5 INSTALLATION OF CABINETS

A. Electrically ground metallic cabinets, boxes, and enclosures 3.7 CLEANING AND FINISH REPAIR A. Upon completion of installation, inspect components. Remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, abrasions and weld marks B. Galvanized Finish: Repair damage using a zinc-rich paint recommended by the tray manufacturer.

C. Painted Finish: Repair damage using matching corrosion inhibiting touch—up coating.

one of the following (unless noted otherwise)

A. Mount with fronts straight and plumb.

B. Install with tops 78-inches above floor

C. Set cabinets in finished spaces flush with walls.

A. NFPA 70 "National Electrical Code". 1. UL and NEMA Compliance: Provide wiring devices which are listed and labeled by UL and comply with applicable UI and NFMA standards. 2.1 MANUFACTURERS A. Manufacturers: (wiring devices and wall switches) Subject to compliance with requirements, provide products by

. Hubbell Inc., Bryant, Leviton, or Arrow Har 2 WIRING DEVICES: A. General: Provide wiring devices, in types, characteristics, grades, colors, and electrical ratings for applications ndicated which are UL listed and which comply with NEMA WD 1 and other applicable UL and NEMA standards.

B. Receptacles: Receptacles shall be heavy duty 20A, 125V duplex or single as indicated on drawings. Construction shall be a reinforced thermoplastic polyester base on a one piece brass mounting strap with integral ground contacts with impact resistant nylon face. Hubbell 5362 or equal by Bryant, Leviton, or Arrow Hart

C. Ground-Fault Interrupter (GFI) Receptacles: Provide individual type ground-fault circuit interrupter, with integral heavy-duty NEMA 5-20R duplex receptacles at each location shown on drawings. Provide unit designed for installation in a 2–3/4 inch deep outlet box without adapter, grounding type, Class A, Group 1, per UL Standard 943 and 498. GFCI shall trip at 5mA (±1mA) and shall trip in 0.025 seconds for 240mA fault. 1. Hubbell GF5362 or equal by Bryant, Leviton, or Arrow Hart. E. Switches: Switch shall be heavy duty industrial/institutional type with abuse resistant toggle, quiet type, back and side wired, fully enclosed in composition case, 120/277 volts AC. Terminal screws on contacts shall be able to

accommodate up to #10 solid conductor wire. All switches shall be 20 amperes. Manufacturers' identity shall be

provided on strap, i.e. Series 1200. Switches shall have "one piece" rivetless spring contact arm to eliminate stress

and weak points. Contacts shall be silver cadmium oxide to eliminate welding. Switches shall have 2 backwire entry points per terminal. Provide switches of same series for three way, four way, key, pilot, etc. . Hubbell HBL1221 or equal by Bryant, Leviton, or Arrow Hart. G. Occupancy Sensors . Wall mounted Occupancy Sensor: Wall switch sensor utilizing passive infrared technology, (120/277V), white finish. Provide push-button manual control on/off a. Lightolier Insight Series (120 or 277) or equal by Leviton, Novitas, Lutron or Hubbell. 2. Ceiling mounted Occupancy Sensor: Ceiling sensor shall utilize both infared and ultrasonic technology. Sensor

a. Leviton ODC Series or equal by Wattstopper or Hubbell. .3 WIRING DEVICE ACCESSORIES A. Wall plates: single and combination, of types, sizes, and with ganging and cutouts as indicated. Provide plates which mate and match with wiring devices to which attached. Provide metal screws for securing plates to devices with screw heads colored to match finish of plates.

1. Material and Finish: 0.04 inch thick, type 302 satin finished stainless steel (unless specifically approved

2. Outdoor device covers shall be weatherproof while in use: eaual to Leviton 5977. Outdoor receptacles shall be

Conform to requirements of Section "Flectrical Identification. 3.1 INSTALLATION OF WIRING DEVICES AND ACCESSORIES A. Install wiring devices and accessories as indicated, in accordance with manufacturer's written instructions,

to be sized according to space served. Provide power packs as required. For larger rooms

applicable requirements of NEC and in accordance with recognized industry practices to fulfill project requirements. 3. Coordinate with other Work, including painting, electrical boxes and wiring installations, as necessary to interface installation of wiring devices with other Work. C. Install wiring devices only in electrical boxes which are clean; free from building materials, dirt, and debris. Install advanized steel wallplates in unfinished spaces. . Wrap each switch and receptacle with two full turns of black electrical tape to cover side terminals before

mounting inside the box. F. Install wiring devices after wiring work is completed. G. Install wall plates after painting work is complete H. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, ghten connectors and terminals to comply with tightening torques specified in UL Standard 486A. Provide separate neutral conductor for all circuits servicing isolated ground devices. Provide isolated ground

conductor for all circuits designated as isolated ground. 3.2 FIELD QUALITY CONTROL A. Testing: Prior to energizing circuits, test wiring for electrical continuity, and for short-circuits. Ensure proper polarity of connections is maintained. Subsequent to energizing, test wiring devices and demonstrate compliance with requirements, operating each operable device at least six times. B. Test ground fault interrupter operation with both local and remote fault simulations in accordance with

manufacturer recommendations. SECTION 16170 - CIRCUIT AND MOTOR DISCONNECTS

I.1 SUBMITTALS B. Maintenance data for circuit and motor disconnects, for inclusion in Operation and Maintenance Manual. 1 MANUFACTURERS A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: . Cutler—Hammer Inc. Heavy Duty Type TH or equal by General Electric, ITE Siemens, or Square D.

.2 CIRCUIT AND MOTOR DISCONNECT SWITCHES A. General: Provide circuit and motor disconnect switches in types, sizes, duties, features ratinas, and enclosures as indicated. Provide NEMA 1 enclosure except for outdoor switches, and other indicated locations provide NEMA 3R enclosures with raintight hubs. For motor and motor starter disconnects, provide units with horsepower ratings suitable to the loads. All switches shall have quick-make quick-break mechanism and can be padlocked in the OFF position. All switches shall have defeatable door interlocks that prevent the door from opening when handle is

in ON position. Line terminal shall be shielded. B. Fusible Switches: Heavy Duty switches, with fuses of classes and current ratings indicated. See Section "FUSES" for specifications. Where current limiting fuses are indicated, provide switches with non-interchangeable feature suitable only for current limiting type fuses. C. Non-fusible Disconnects: Heavy duty switches of classes and current ratings as indicated. D. Double—Throw Switches: Heavy duty switches of classes and current ratings as indicated. E. Service Switches: Heavy duty fusible switches. UL listed for use as service equipment under UL Standard 98 or

F. Switches for Classified (Hazardous) Locations: Heavy duty switches, with UL labels and listings for hazardous ocation classifications in which installed. 2.3 ACCESSORIES A. Electrical Interlocks: Provide number and arrangement of interlock contacts in switches as indicated.

B. Special Enclosure Material: Provide special enclosure material as follows for switches where indicated: Stainless Steel Type 304. 2. Molded fiberglass reinforced plastic. . Heavy cast aluminum. . Captive Fuse Pullers: Provide built—in fuse pullers arranged to facilitate fuse removal.

I INSTALLATION OF CIRCUIT AND MOTOR DISCONNECTS A. General: Provide circuit and motor disconnect switches as indicated and where required by Code. Comply with switch manufacturers' printed installation instructions. 3.2 FIELD QUALITY CONTROL

A. Testing: Subsequent to completion of installation of electrical disconnect switches. eneraize circuits and demonstrate capability and compliance with requirements. Except as otherwise indicated, do not test switches by operating them under load. Demonstrate switch operation through six opening/closing cycles with circuit unloaded Open each switch enclosure for inspection of interior, mechanical and electrical connections, fuse installation, and for verification of type and rating of fuses installed. Correct deficiencies then retest to demonstrate compliance. Remove and replace defective units with new units and retest.

SECTION 16195 - ELECTRICAL IDENTIFICATION

I. Label Size: as follows:

with preprinted numbers and letter.

completion of finish work.

A. Adhesive Marking Labels for Raceway and Metal-Clad Cable: Pre-printed, flexible, self-adhesive labels with legend indicating voltage and service (Emergency, Lighting, Power, Light, Power d.c., Air Conditioning, Communications, Control, Fire).

a. Raceways 1—Inch and Smaller: 1—1/8 inches high by 4 inches long. b. Raceways Larger than 1-Inch: 1-1/8 inches high by 8 inches long. Color: Black leaend on orange background B. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width. D. Wire/Cable Designation Tape Markers: Vinyl or vinyl-cloth, self- adhesive, wraparound, cable/conductor markers

1/16-inch minimum thick for signs up to 20 square inches, or 8 inches in length; 1/8-inch thick for larger sizes. Engraved legend in white letters on black face and punched for mechanical fasteners. F. Baked-Enamel Warning and Caution Signs for Interior Use: Preprinted aluminum signs, punched for fasteners, with colors, legend, and size appropriate to the location. G. Exterior Metal-Backed Butyrate Warning and Caution Signs: Weather-resistant, nonfading, preprinted cellulose acetate butyrate signs with 20-gage, galvanized steel backing, with colors, legend, and size appropriate to the location. Provide 1/4-inch grommets in corners for mounting.

. Engraved, Plastic-Laminated Labels, Signs, and Instruction Plates: Engraving stock melamine plastic laminate,

H. Fasteners for Plastic-Laminated and Metal Signs: Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code. B. Install identification devices in accordance with manufacturer's written instructions and requirements of NEC.

C. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after

2. Identify Raceways of Certain Systems with Color Banding: Band exposed or accessible raceways of the following systems for identification. Bands shall be pretensioned, snap-around colored plastic sleeves, colored adhesive marking tape, or a combination of the two. Make each color band 2 inches wide, completely encircling conduit, ar place adjacent bands of two-color markings in contact, side by side. Install bands at changes in direction, at penetrations of walls and floors, and at 40-foot maximum intervals in straight runs. Apply the following colors a. Fire Alarm System: Red b. Fire Suppression Supervisory and Control System: Red and Yellow c. Security System: Blue and Yellow

d. Clock System: Green e. Telephone System: Green and Yellov Identify Junction, Pull, and Connection Boxes: Code-required caution sign for boxes shall be pressure-sensitive self-adhesive label indicating system voltage in black, preprinted on orange background. Install on outside of box cover. Also label box covers with identity of contained circuits. Use pressure— sensitive plastic labels at exposed locations and similar labels or plasticized card stock tags at concealed boxes.

F. Use conductors with color factory-applied the entire length of the conductors except as follows 1. The following field-applied color-coding methods may be used in lieu of factory-coded wire for sizes larger than a. Apply colored, pressure-sensitive plastic tape in half- lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply the last two laps of tape with no tension to prevent

possible unwinding. Use 1-inch-wide tape in colors as specified. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration. b. In lieu of pressure-sensitive tape, colored cable ties may be used for color identification. Apply three ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal and spaced 3 inches apart. Apply with a special tool or pliers, tighten for snug fit, and cut off excess length. G. Tag or label conductors as follows:

1. Future Connections: Conductors indicated to be for future connection or connection under another contract with identification indicating source and circuit numbers. 2. Multiple Circuits: Where multiple branch circuits or control wiring or communications/signal conductors are present in the same box or enclosure (except for three-circuit, four-wire home runs), label each conductor or cable. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by mean of coded color of conductor insulation. For control and communications/signal wiring, use color coding or wire/cable marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes. 3. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and

similar previously established identification schemes for the facility's electrical installations. H. Apply warning, caution, and instruction signs and stencils as follows: 1. Install warning, caution, or instruction signs where required by NEC, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install but rate signs with metal backing for outdoor items. 2. Emergency Operating Signs: Install engraved laminate signs with white legend on red background with minimum

3/8—inch high lettering for emergency instructions on power transfer, load shedding, or other emergency operations.

I. Install equipment/system circuit/device identification as follows: 1. Apply equipment identification labels of engraved plastic- laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes communication/signal/alarm systems, unless unit is specified with its own self-explanatory identification. Except as otherwise indicated, provide single line of text, with 1/2-inch-high lettering on 1-1/2-inch-high label (2-inch-high where two lines are required), white lettering in black field. Text shall match terminology and numbering of the Contract Documents and shop drawings. Apply labels for each unit of the following categories of electrical equipment. a. Panelboards, electrical cabinets, enclosures, Access doors and panels, switchgear and switchboards, Electrical substations, Motor control centers, motor starters, push button stations, power transfer equipment, contactors, remote-controlled switches, dimmers, control devices, transformers, battery racks, and power generating units. J. Apply circuit/control/item designation labels of engraved plastic laminate for disconnect switches, breakers. pushbuttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panelboards and alarm/signal components, where labeling is specified elsewhere. For panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each

2.1 GROUNDING AND BONDING PRODUCTS

operation and maintenance of equipment.

A. Products: Of types indicated and of sizes and ratings to comply with NEC. Where types, sizes, ratings, and quantities indicated are in excess of NEC requirements, the more stringent requirements and the greater size, rating, and quantity indications govern. Conductor Materials: Copper 2.2 WIRE AND CABLE CONDUCTORS A. General: Conform to NEC Table 8, except as otherwise indicated, for conductor properties, including stranding.

K. Install labels at locations indicated and at locations for best convenience of viewing without interference with

D. Bare Copper Conductors: Conform to the followina: . Solid Conductors: ASTM B-3. 2. Assembly of Stranded Conductors: ASTM B-8. Tinned Conductors: ASTM B-33.

B. Equipment Grounding Conductor: Green insulated.

C. Grounding Electrode Conductor: Stranded cable.

2.3 MISCELLANEOUS CONDUCTORS A. Ground Bus: Bare annealed copper bars of rectangular cross section. B. Braided Bonding Jumpers: Copper tape, braided No. 30 gage bare copper wire, terminated with copper ferrules.

galvanically compatible.

C. Bonding Strap Conductor/Connectors: Soft copper, 0.05 inch thick and 2 inches wide, except as indicated. 2.4 CONNECTOR PRODUCTS A. General: Listed and labeled as grounding connectors for the materials used B. Pressure Connectors: High-conductivity-plated units. C. Bolted Clamps: Heavy—duty units listed for the application. D. Exothermic Welded Connections: Provided in kit form and selected for the specific types, sizes, and

combinations of conductors and other items to be connected. A. Equipment Grounding Conductor Application: Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors, except where larger sizes or more conductors are indicated. . Install separate insulated equipment grounding conductors with circuit conductors for the following in addition to those locations where required by Code: a. Feeders and branch circuits, Lighting circuits, Receptacle Circuits, Single-phase motor or appliance circuits, and

Three-phase motor or appliance branch circuits. 3. Nonmetallic Raceways: Install an insulated equipment ground conductor in nonmetallic raceways unless they are designated for telephone or data cables. 4. Air Duct Equipment Circuits: Install an insulated equipment grounding conductor to duct-mounted electrical devices operating at 120-V and above including air cleaners and heaters. Bond the conductor to each such unit and to the air duct. 5. Water Heater, Heat Tracing, and Anti-Frost Heater Circuits: Install separate insulated equipment ground

conductor to each electric water heater, heat tracing, and surface anti-frost heating cable. Bond this conductor to heater units, piping, and connected equipment and components. B. Underground Conductors: Bare, stranded copper except as otherwise indicated. C. Signal and Communications: For telephone, alarm, and communication systems, provide a #4 AWG minimum green insulated copper conductor in raceway from the grounding electrode system to each terminal cabinet or central equipment location.

D. Separately derived systems required by NEC to be grounded shall be grounded in accordance with NEC paragraph A. General: Ground electrical systems and equipment in accordance with NEC requirements except where the Drawings or Specifications exceed NEC requirements. E. Braided-Type Bonding Jumpers: Install to connect ground clamps on water meter piping to bypass water meters electrically. Use elsewhere for flexible bonding and grounding connections.

G. Bond interior metal piping systems and metal air ducts to equipment ground conductors of pumps, fans, electric heaters, and air cleaners serving individual systems. H. Test Wells: Locate as indicated, and fabricate in accordance with details indicated. A. General: Make connections in such a manner as to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be

1. Use electroplated or hot-tin-coated materials to assure high conductivity and make contact points closer in

those at test wells. Install at connections to around rods and plate electrodes. Comply with manufacturer's

F. Route grounding conductors along the shortest and straightest paths possible without obstructing access or

placing conductors where they may be subjected to strain, impact, or damage, except as indicated.

order of galvanic series. 2. Make connections with clean bare metal at points of contact. 5. Aluminum to steel connections shall be with stainless steel separators and mechanical clamps. 4. Aluminum to galvanized steel connections shall be with tin-plated copper jumpers and mechanical clamps. 5. Coat and seal connections involving dissimilar metals with inert material such as red lead paint to prevent future penetration of moisture to contact surfaces. B. Exothermic Welded Connections: Use for connections to structural steel and for underground connections except

written recommendations. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable. C. Terminate insulated equipment grounding conductors for feeders and branch circuits with pressure—type grounding luas. Where metallic raceways terminate at metallic housings without mechanical and electrical connection to the housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to the ground bus in the housing. Bond electrically noncontinuous conduits at both entrances and exits

with arounding bushings and bare arounding conductors. D. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with torque tightening values specified in UL 486A E. Connections at Test Wells: Use compression—type connectors on conductors and make bolted— and

F. Compression-Type Connections: Use hydraulic compression tools to provide the correct circumferential pressure for compression connectors. Use tools and dies recommended by the manufacturer of the connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on the ground conductor G. Moisture Protection: Where insulated ground conductors are connected to ground rods or ground buses, insulate

clamped-type connections between conductors and ground rods.

SECTION 16475 - OVERCURRENT PROTECTIVE DEVICES

the entire area of the connection and seal against moisture penetration of the insulation and cable. 3.5 CLEANING AND ADJUSTING A. Restore surface features at areas disturbed by excavation and reestablish original grades except as otherwise

A. Overcurrent Protective Device (OCPD): A device operative on excessive current that causes and maintains the interruption of power in the circuit it protects. 1.4 EXTRA MATERIALS A. Maintenance Stock, Fuses: For types and ratings required, furnish spare fuses, amounting to one unit for every 5 installed units, but not less than one set of 3 of each kind

2.2 OVERCURRENT PROTECTIVE DEVICES (OCPDs), GENERAL A. General: Provide OCPDs in indicated types, as integral components of panelboards, switchboards, and motor control centers; and also as individually enclosed and mounted single units. B. Enclosures: NEMA 250 "Enclosures for Electrical Equipment (1,000 Volts Maximum). 2.3 FUSED POWER CIRCUIT DEVICES (Bolted Pressure Switch)

1. Cutler Hammer, General Electric Co., Pringle Electrical Mfg. Co., Square D Co., or ITE Siemens. B. General: UL 977, "Fused Power Circuit Devices," with either bolted-pressure-type or high-pressure contact-type C. Operation: Electrically closed and tripped. D. Ground Fault Protection: Integral, self-powered type with mechanical ground fault indicator, test function, adjustable pick-up current and delay time with inverse and constant time characteristics, internal memory arranged

G. Enclosure for Independent Mounting: NEMA Type 1 enclosure, except as indicated or except as required to suit

to integrate intermittent arcing ground faults, and ground fault current sensor located as indicated.

E. Open Fuse Trip Device: Arranged to trip switch open if a phase fuse opens.

Enclosure for Switchboard Mounting: Suitable for individual mounting.

H. Minimum Fault Current Rating: 200,000 rms symmetrical amperes.

2.4 MOLDED-CASE CIRCUIT BREAKERS Molded—Case Circuit Breakers:

a. Cutler Hammer, General Electric Co., ITE Siemens, or Square D Co. Combination Circuit Breaker and Ground Fault Circuit Interrupters a. Cutler Hammer, General Electric Co., ITE Siemens, Square D Co. Molded—Case Current—Limiting Circuit Breakers a. General Electric Co., ITE Siemens, Square D. Co., or Cutler Hammer. 4. Molded-Case Circuit Breakers With Solid-State Trip Devices: a. General Electric Co., ITE Siemens, Square D. Co., or Cutler Hammer. . Integrally Fused Molded—Case Circuit Breakers:

a. General Electric Co., ITE Siemens, Cutler Hammer, or Square D. Co. A. General: UL 489, "Molded Case Circuit Breakers and Circuit Breaker Enclosures," and NEMA AB 1, "Molded Case Circuit Breakers." B. Construction: Bolt—in type, except breakers 225—ampere frame size and larger may be plug—in type if held in place by positive locking device requiring mechanical release for removal. C. Characteristics: Indicated frame size, trip rating, number of poles, and short—circuit interrupting capacity.

Minimum interrupting rating shall be 14,000 A.I.C. for 480 volt and 480/277 distribution. Minimum interrupting ratinas shall be 10,000 AIC for 240V, 120/240 V and 120/208V distribution. Larger ratings may apply as shown on D. Tripping Device: Quick-make, quick-break toggle mechanism with inverse-time delay and instantaneous overcurrent trip protection for each pole.

E. Adjustable Instantaneous Trip Devices: Factory adjusted to low-trip-settina current values. F. Enclosure for Switchboard or Panelboard Mounting: Suitable for panel mounting in switchboard or panelboards where indicated G. Enclosure for Independent Mounting: NEMA Type 1 enclosure, except as otherwise indicated or required to suit environment where located. H. Combination Circuit Breakers and Ground Fault Circuit Interrupters: UL 943 "Ground Fault Circuit Interrupters,"

arranged for sensing and tripping for ground fault current in addition to overcurrent and short-circuit current.

I. Current-Limiting Circuit Breakers: Arranged to limit let-through ampere-squared-seconds during fault conditions

to a value less than the ampere-squared-seconds of one-half-cycle wave of the prospective symmetrical fault

current. The circuit breaker shall use no fusible devices in its operation. The current-limiting characteristic shall

be in addition to normal time-delay and instantaneous-trip characteristics and other features as indicated. J. Circuit Breakers With Solid-State Trip Devices: Provide indicated circuit breakers with solid-state trip devices . Ambient Compensation: Trip device insensitive to temperature changes between minus 20 deg C and plus 55

2. Adjustability: Breaker ratings and trip settings shall be changeable by operation of controls on front panel of breaker, by change of plug—in element without removing breaker from mounting, or by a combination of the two 3. Ground-Fault Tripping: Adjustable for pick-up and time-delay values. Provide for indicated units.

A. Key Interlocks: Arrange interlocking so keys are held captive at devices indicated. Where future key interlocking

provisions are indicated, provide necessary mountings and hardware as required for the future installation. Instantaneous Undervoltage Trip Device: For indicated OCPDs. Adjustable—Time—Delay Undervoltage Trip Devices: For indicated OCPDs. D. Shunt-Trip Devices for Circuit Breakers: Where indicated, arrange to trip breaker from an external source of power through a control switch or relay contacts.

2.5 OCPD ACCESSORIES

3.2 CONNECTIONS

instructions for proper torque values.

b. 601-1,200 Amperes: Class L, time delay.

A. Install fuses in fusible devices as indicated.

B. Install spare fuse cabinet wall mounted where indicated

SECTION 16477 - FUSES

5. Clean OCPDs using manufacturer's approved methods and materials.

3.1 INSTALLATION A Independently Mounted OCPDs: Locate as indicated and install in accordance with manufacturer's written installation instructions. B. OCPDs in distribution equipment shall be factory installed.

terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and UL 486B. . Provide equipment grounding connections for individually mounted OCPD units as indicated and as required by NEC. Tighten connectors to comply with tightening torques specified in UL Standard 486A to assure permanent and

A. Check connectors, terminals, bus joints, and mountings for tightness. Tighten field-connected connectors and

effective grounding. 3.4 FIELD QUALITY CONTROL A. Visual and mechanical inspection: Include the following inspections and related work. 1. Overcurrent—Protective—Device Ratings and Settings: Verify indicated ratings and settings to be appropriate for final system arrangement and parameters. Where discrepancies are found, test organization shall recommend final protective device ratings and settings. Use accepted revised ratings or settings to make the final system

2. Inspect for defects and physical damage, NRTL labeling, and nameplate compliance with current single line 3. Exercise and perform operational tests of all mechanical components and other operable devices in accordance with manufacturer's instruction manual. 4. Check tightness of electrical connections of OCPDs with calibrated torque wrench. Refer to manufacturer's

6. Verify installation of proper fuse types and ratings in fusible OCPDs A. Upon completion of installation, inspect OCPDs. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish.

1.1 EXTRA MATERIALS A. Maintenance Stock, Fuses: For types and ratings required, furnish spare fuses, amounting to one unit for every 5 installed units, but not less than one set of 3 of each kind. 2.1 MANUFACTURERS A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Bussmann Div., Cooper Industries, Inc. or Gould, Shawmut Inc. 2.2 FUSES, GENERAL A. General: Provide fuses of types, classes, and current ratings as indicated. Voltage ratings shall be consistent with the circuits on which used B. Fuses for Direct Current Circuits: Marked for such use by the manufacturer on the fuse labe 2.3 CARTRIDGE FUSES

A. General: Comply with ANSI/IEEE Standard FU1, "Low Voltage Cartridge Fuses." Provide nonrenewable-cartridge-type fuses except as indicated. A. Cabinet: Wall-mounted, 18 gage minimum steel unit with full-length, recessed piano-hinged door with key B. Size: Provide for orderly storage of all spare fuses of this project plus 15 percent spare capacity, minimum. C. Finish: Gray baked enamel.

D. Cabinet Door: Bear the legend in stenciled 1-1/2-inch-high letters, "Spare Fuses." 3.1 APPLICATION OF FUSES A. General: Apply fuses as indicated and as follows: 1. New General Purpose Fusible Switches: Apply the following class and types: a 30-600 Amperes: Class J time delay b. 601-1,200 Amperes, Motor or Transformer Circuit: Class L, time delay. c. 601-1.200 Amperes. Noninductive Circuit: Class L. fast acting. Bolted Pressure Switches: Class L. time delay. Service Protectors: Class L. time delay. 4 Fusible Switch Panelboards: Class J time delay Combination Starters: Class J time delay. 6 Combination Starters in Motor Control Centers: Class J time delay . Switches in Switchboards: Apply the following classes and types: a. 30-600 Amperes, lighting/receptacle panel circuits: Class J fast acting. b. 30-600 Amperes, motor or transformer circuit: Class J time delay. c. 601 Amperes and Above: Class L, time delay. B. Existing General—Purpose Switches: Apply the following classes and types: a. 30-600 Amperes: Class RK1, time delay.

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Sheet Title

**ELECTRICAL SPECIFICATIONS** 

Date Issued

2-04-15

**PERMITS** 

Project Number

Sheet Number

A. In order to provide adequate lighting for finish work of all trades and for Work yet to be done in each area,

lamps shall be installed by the Contractor at the time the permanent Luminaires are installed and tested. If other

trades and Contractors require lighting in excess of the permanent Luminaire level of illumination, they shall arrange

B. Lamps shall be in working order at the time of Substantial Completion of the Electrical Work. This Contractor

shall replace defective lamps with new lamps until the Work is completed. Install permanent, incandescent lamps

C. Lamps, Luminaires, lenses, and reflectors shall be clean and free or any defects at the time of acceptance by

A. When requested, the Contractor shall check the case temperature and applied voltage of lamp ballasts and

within 5 days prior to Substantial Completion

submit a written report for approval by the Architect/Engineer.

the Owner and Architect/Engineer.

3.3 BALLAST CHECK AND REPORT

iii. Any contact closure can be assigned any scheduled event/action

c. LP Light Control Relay Panel as manufactured by WattStopper

a. Z-MAX Relay Panels as manufactured by Leviton Manufacturing Company, Inc.

b. Apprentice Relay Panels as manufactured by Intelligent Lighting Controls.

1. Acceptable products shall be Control Modules for:

F. Acceptable Products

SECTION 16721 - FIRE ALARM SYSTEM 1.1 RELATED DOCUMENTS

1. Each relay shall occupy a maximum of (1) relay card space

Fluorescent, Electronic Fluorescent, HID, or Motors

d. Motor Rating of 1HP @ 120V, or 2HP at 277V

g. Rated for 10,000,000 cycles under full electrical load

d. Motor Rating of 2HP @ 240V, or 3HP at 480V

application. (Z-MAX Relay cabinets prefer +V).

discretion unless factory commissioning is required

unacceptable material prior to installation.

B. Flectrical

a. Single Pole Contacts

c. Voltage up to 277VAC

a. Two Pole Contacts

c. Voltage up to 277VAC

e. Rated for 30,000 cycles

optional voltage barriers.

2.4 Low Voltage Switches

C. Installation

C. Installation

3.2 INSTALLATION

LED's illuminate properly.

operation of the system.

a. Supported Wire size of 6-20AWG

b. 20A load rated

e. "No-Load" Switching of Relay

f. Zero-Cross Switching Circuitr

i. Supported Wire size of 8-20AWG

b. 20A load rated

2. No relays shall require reduction of total Relay Panel capacity

5. All external termination to the relays shall be via screw-terminals

1. The following relays shall be available: Standard Relay or 2-Pole Relay

3. The Standard Relay shall have the following electrical characteristics:

4. The Two-Pole Relays shall have the following electrical characteristics:

1. All switches shall fit into a standard 1 gang "deep" electrical back box

3. Switches shall be available with one to six buttons as indicated on plans.

5. Standard Color for all stations, wall plates, and trim rings shall be white.

1. Connection to Controlled equipment shall be via standard low voltage wiring

4. Labels for each button shall be as standard: Zone 1, Zone 2, Zone 3, etc. by factory.

2. Switches when depressed may either supply voltage or connect to common as decided by the particular

1. Installation of the Low Voltage switch shall be per Manufactures instructions and performed by the contractor.

2. Programming of switch functionality shall be performed by the contractor at the control panel and at their

B. Field Measurements: The electrical contractor shall be responsible for field measurements and coordinating the

a properly functioning lighting control and relay system as described herein and shown on the plans. The E.C. shall

C. Circuit Testing: The contractor shall test that all branch load circuits are operational before connecting loads to

D. Application of Power: Power shall not be applied to the relay system during construction and prior to turn-on

A. Turn-On: Upon completion of all line, load and interconnection wiring, and after all fixtures are installed and

shall be tested for proper ON/OFF operations, and proper LED illumination. Each installed control panel shall be

tested with each scene: verifying that each controlled fixture adjusts to the selected setting and that all switch

B. At the time of checkout and testing, the owner's representative shall be thoroughly instructed in the proper

lamped. Contractor shall completely check the installation prior to energizing the system. Each installed relay system

C. Inspection: Inspect all material included in this contract prior to installation. Notify Manufacturer of any

B. Compliance: Contractor shall comply with manufacturer's product data, including shop drawings, technical

previous time, are acceptable for product installation in accordance with manufacturer's instructions.

maintain performance criteria stated by manufacturer without defects, damage, or failure.

system load terminals, and then de-energize all circuits before installation

unless specifically authorized by written instructions from the manufacturer.

bulletins, product catalog installation instructions, and product carton instructions for installation

2. Switches shall employ standard "Decora" style screwless wall plates

2. All Relays shall support the following load types at the full rated load of the relay:

3. Relays can be secured to the Relay Panel backplane with a single screw

4. Relays shall contain a low voltage data connector for connection to the backplane which shall employ no wires

a. Incandescent, Tungsten, Halogen, Magnetic Low Voltage, Electronic Low Voltage, Neon, Cold Cathode, Magnetic

h. Withstand 50 times the rated load as inrush current for resistive, inductive, and capacitive loads.

f. Withstand 3 times the rated load as inrush current for resistive, inductive, and capacitive loads.

5. Each group of (8) Relays can be isolated from every other group of (8) Relays in the cabinet with the use of

A. The electrical contractor shall furnish and install a Point-Addressable type manual and automatic fire glarm system in accordance with these specifications and as shown on the project specific documents. B. All equipment must be U.L. listed and shall be so labeled. The installation must meet the requirements of applicable codes and the authority having jurisdiction.

A. The contractor is responsible for providing a complete and operational system with certification from the state Office of Fire Safety and local authorities. The base bid equipment specified is manufactured by National Time & Signal Corporation or equal by Siemens and Gamewell as indicated in this section.

B. All panels and peripheral devices shall be the standard product of a single manufacturer. The catalog numbers specified under this section are those of National Time & Signal Corporation.

C. Equipment submittals must include a minimum of the following: 1. Complete equipment data sheets indicating U.L. listing for all system components. Complete sequence of operations of the system.

3. Typical riser diagram indicating all necessary details and wiring configurations.

4. Battery calculations for the main control panel and all remote panels. 5. Individual NAC signal circuit load calculations. These circuits are not to exceed 80% capacity.

A. The activation of any pull station, smoke detector, duct smoke detector, heat detector, or waterflow switch shall cause the following events to occur: 1. Sound a code 3 temporal pattern signal on all alarm horns.

2. Flash all system strobes with a synchronized sequence. 3. List the device and location of the alarm via LCD displays on the control panel. Close all smoke barrier doors

Activate alarm contacts. 6. Activation of any duct smoke detector shall shut down the associated unit and/or dampers.

7. Log the event in a non-volatile history aug B. Silencing of the system will disable all audible appliances but the strobes will continue to operate. A subsequent receipt of an alarm condition from any other initiating device will again sound all audible appliances. C. Upon restoring the activated device to its normal condition, a manual reset of the system must be performed to

D. The operation of any system tamper switch will sound a supervisory tone within the control panel and light a dedicated supervisory LED. The supervisory tone may be silenced but a visual indication (LED) will remain active until 1. Relays shall be furnished Pre-Installed in the cabinets by the factory or may be User Installed in the field. the condition is cleared. Upon restoring the system to normal, the system shall reset. A log of the event will be 2. Custom configuration of multiple types of Relays in the same cabinet can be performed by the factory or in the stored in the history queue.

restore the system to normal.

E. Any wiring disarrangement, open circuit or a ground condition will sound a trouble tone within the control panel and light a dedicated trouble LED. Trouble tone may be silenced but a visual indication will remain active until the condition is cleared. Upon correction of the condition, the system shall restore itself to normal and log the event in the history queue. 2.1 MANUFACTURER

A. In existing buildings, fire alarm components to match manufacturer and compatability of existing system. National Time Model numbers shown in this section are to indicate the quality of product to be used. B. In new buildings, fire alarm components indicated in this section are by National Time and Signal. Equal systems by Siemens and Gamewell will be acceptable. 2.2 CONTROL PANEL

A. Furnish Style 902 series addressable microprocessor based control panel complete with 80 character LCD display, 252 addressable points, smoke detector drift compensation, dedicated supervisory service indicator with acknowledge switch, system walk test, 2800 event non-volatile history queue, walk test feature, individual circuit or addressable device disconnect/disable capability, selective signaling and/or relay control. Style Y or Z notification appliance circuits and standby batteries for operation of the system in the supervisory mode for 24 hours followed by a minimum of five minutes of an alarm condition.

B. Include separately mounted Style D900-RPS remote Notification Appliance Circuit panels with power supplies as A. Site Verification: Verify that wiring conditions, which have been previously installed under other sections or at a required to provide for operation of horns and strobes. The RPS panel shall contain standby batteries for 24-hour standby operation as required. Remote Power Supply units shall be a fully addressable device and identifiable and diagnostically evaluated by the control panel. Units that require reverse polarity or control module activation are physical size of all equipment with the architectural requirements of the spaces into which they are to be installed. unacceptable. All RPS locations shall be covered with area smoke detection. If a location is selected by the contractor or system supplier during final design engineering that is not shown on the plans, then a smoke detector shall be supplied with the unit at no additional cost. A dedicated circuit for each RPS location shall be provided. Consult system supplier for quantity and locations of these units. A. The E.C., as part of the work of this section, shall coordinate, receive, mount, connect, and place into operation C. The control unit must be Windows based field programmable. The system shall have a capacity for 252 all equipment. The E.C. shall furnish all conduit, wire, connectors, hardware, and other incidental items necessary for

addressable devices and networkable up to 32 panels. D. Contractor to provide a phone outlet at each control panel for monitoring by local fire department.

2.3 MANUAL PULL STATIONS A. Furnish Type #541S single—action, break glass, complete with addressable module. Mounting shall be single gang deep masonry switch boxes or 4" square with single gang plaster ring between 42" and 48" A.F.F. Where it is necessary to surface mount a pull station include a Type 540—B matching surface red box. It is the Electrical Contractor's responsibility to determine the exact number of surface boxes required and to order the boxes. 1. Where guards are noted on the drawings, furnish Type STI-6605 protective shields with horn. Surface mounted locations shall be provided with appropriate spacer. 2. Provide two additional glass rods for each pull station location.

<u> 2.4 SMOKE DETECTORS</u> A. Furnish Type D900-PHOTO smoke sensors with Model D900-BASE6 addressable base for mounting to a 4-inch octagon box. Addressable heads are not acceptable. 2.5 DUCT SMOKE DETECTORS

A. Furnish Type D900—DD—PHOTO addressable duct smoke detectors with appropriate size sampling tubes. NOTE: Duct smoke detectors must not be mounted on the exterior of the building due to U.L. listed temperature operation 2.6 DUCT DETECTOR REMOTE INDICATOR

A. Furnish Type D900-RMT LED remote alarm indicator for flush mounting to a single gang box. One required for each detector. Alarm indicators shall be mounted 60" A.F.F. or in the ceiling tile below unit when concealed.

A. Furnish Type D900—TEMP heat sensors with D900—BASE6 addressable base for mounting to a 4 inch square outlet box. The sensor is a combination fixed temperature and rate of rise type of which both operations are

2.8 SPRINKLER SWITCHES A. Waterflow, gate valve tampers, post indicator valve switches, etc., are to be furnished by the sprinkler contractor but wired by the electrical contractor. The operation of the flow switch will sound a general alarm signal whereas the operation of the tamper switch will only activate waterflow supervisory functions on the system. For each

waterflow and tamper switch on the system, provide Type D900-MONITOR addressable module for mounting on a 4" square or two gang outlet box. 2.9 AUDIO/VISUAL UNITS

A. Furnish Type SG-C3HSZ series. The horn shall be rated at 92dB at 10-feet. The audio and visual signals shall be synchronized. Terminals shall be provided on box plate hardware separate from the device. Testing of circuit wiring configuration shall be possible without the device itself being installed. This also eliminates the necessity of finish trades to be complete prior to installing of fire alarm equipment. Mount to a 4-inch square with plaster ring or a two-gang outlet box. If any audio/visual unit requires surface mounting, it shall be the Electrical Contractor's responsibility to determine the exact number of surface boxes required and to furnish National Time & Signal model SG-CBB boxes with wiremold knockouts for both 500 and 700 series. Use of wiremold boxes is not

acceptable. Provide wire guards as indicated. B. Contractor to verify any candela ratings shown on plan (if applicable); and adjust ratings as necessary to give proper coverage for audio/visual devices.

2.10 VISUAL UNITS A. Furnish Type SG-C3NS series. Terminals shall be provided on box plate hardware separate from the device. Testing of circuit wiring configuration shall be possible without the device being installed. This also eliminates the necessity of finish trades to be complete prior to installing of fire alarm equipment. For those areas where surface mounted visual units are required, the contractor shall furnish National Time & Signal model SG-CBB boxes. Provide wire guards as indicated on documents.

B. Contractor to verify any candela ratings shown on plan (if applicable); and adjust ratings as necessary to give proper coverage for audio/visual devices.

A. Base bid: All wiring shall be enclosed in an approved metal raceway. E.C. may provide deduct price for wiring to be installed in strict compliance with National Electrical Code, Article 760 for power-limited fire protective signaling circuits (non-conduit). B. All signaling line circuits (SLC) shall be 2C 16AWG TSP minimum. All notification appliance circuits (NAC) shall be 14AWG minimum. Consult manufacturer for voltage drop calculation requirements. All 24VDC auxiliary power circuits

shall be 14AWG minimum. <u>3.2 GUARANTEE / OWNERS MANUALS</u> A. The Electrical Contractor shall guarantee all equipment and labor to be free of defects for a period of one year after final acceptance of the system or from the date of beneficial use of any portion thereof by the Owner. This information shall be included in two copies of owner's manuals to be provided to the owner at time of training.

A. Upon completion of the installation, the system shall be fully tested by the system supplier in accordance with applicable NFPA standards and a copy of the final checkout and test documentation shall be furnished to the Owner. This information shall be included in two copies of owner's manuals to be provided to the owner at time of

A. The fire alarm system supplier shall provide adequate staff training of the fire alarm system.

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**ELECTRICAL SPECIFICATIONS** 

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PERMITS

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