### Structural Steel

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Weight</td>
<td>Value: 45.00 kg/m³</td>
</tr>
<tr>
<td>Yield Strength</td>
<td>Value: 290 MPa</td>
</tr>
<tr>
<td>Ultimate Strength</td>
<td>Value: 450 MPa</td>
</tr>
<tr>
<td>Modulus of Elasticity</td>
<td>Value: 200 GPa</td>
</tr>
</tbody>
</table>

### Anchor Bolts and Grout

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolt Diameter</td>
<td>Value: 12.00 mm</td>
</tr>
<tr>
<td>Bolt Length</td>
<td>Value: 100.00 mm</td>
</tr>
<tr>
<td>Grout Type</td>
<td>Value: 2-part epoxy</td>
</tr>
<tr>
<td>Grout Volume</td>
<td>Value: 1.00 L</td>
</tr>
</tbody>
</table>

### Steel Grating

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grating Type</td>
<td>Value: Catwalk Grating</td>
</tr>
<tr>
<td>Span</td>
<td>Value: 5.00 m</td>
</tr>
<tr>
<td>Load Rating</td>
<td>Value: 120 kN</td>
</tr>
</tbody>
</table>

### Electrical Critical

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>Value: 240 V</td>
</tr>
<tr>
<td>Circuit Type</td>
<td>Value: 3-phase</td>
</tr>
<tr>
<td>Overcurrent Protection</td>
<td>Value: Circuit Breaker</td>
</tr>
</tbody>
</table>

### General Notes and Design Criteria

- **File Name:** C:\pw_work\pw_proj\jtheller\d0399660\G-1.dwg
- **Plopped Date:** 8/22/2014 3:46 PM
- **Plopped By:** Justin T. Heller
- **Client Project No.:** 320003
- **Project No.:** N/A
- **Scale:** 1:100
- **Sheet Title:** 003-PHYSICS BUILDING
- **Sheet No.:** 666 W. HANCOCK ELECTRICAL RELIABILITY UPGRADES WAYNE STATE UNIVERSITY FACILITIES PLANNING & MANAGEMENT 5454 CASS AVENUE DETROIT, MICHIGAN
- **Issued For/Revisions Date:** 8-1-2014
- **Drawn By:** JAS
- **Reviewed By:** CJM, RSD, SRB
- **Approved By:** OWNERS REVIEW 8-1-2014
- **Out for Bid Date:** 8-26-2014
- **Designated Date:** 9-1-2014
- **Engineering:** 12-1-2014
- **Documentation:** 12-1-2014
- **Contractor:** 12-1-2014
- **Completion:** 12-1-2014
- **General Contractor:** 12-1-2014
- **Engineers Seal:** 12-1-2014
- **Issued For/Revisions Date:** 8-1-2014
- **Drawn By:** JAS
- **Reviewed By:** CJM, RSD, SRB
- **Approved By:** OWNERS REVIEW 8-1-2014
- **Out for Bid Date:** 8-26-2014
- **Designated Date:** 9-1-2014
- **Engineering:** 12-1-2014
- **Documentation:** 12-1-2014
- **Contractor:** 12-1-2014
- **Completion:** 12-1-2014
- **General Contractor:** 12-1-2014
- **Engineers Seal:** 12-1-2014
SITE DEMOLITION KEY NOTES

1. REMOVE TREE

2. HAND-EXCAVATE TO LOCATE EXISTING NATURAL GAS LINE & OTHER UTILITIES. PROVIDE TEMPORARY SHORING/SUPPORT OF GAS LINE DURING INSTALLATION OF NEW DUCT BANK.

3. REMOVE EXISTING BAR GRATING AND STEEL BEAMS AT TOP OF EXISTING NITROGEN TANK PIT. REMOVE CONCRETE SLAB FOR NEW GENERATOR PAD.

4. REMOVE CHAIN-LINK FENCE & DATE THE WIDTH OF EXIST. PIT (15'-0")

5. REMOVE EXISTING LANDSCAPING & EXCAVATE FOR NEW UTILITY & FOUNDATION

6. PROTECT EAST 6" STORM LINE FOR RECONNECTION IN NEW CONCRETE.

7. SITE SURVEY PROVIDED BY NOWAK & FAULS DATED 6-25-2014 IS USED AS A BASES FOR SITE DEMOLITION, DESIGN & RESTORATION

8. REMOVE EXISTING NITROGEN TANK & ASSOCIATED LINES AND VALVES. (ALTERNATE NO. 1)

9. REMOVE NITROGEN LINE & CAP AT WALL PENETRATION, (ALTERNATE NO. 1)

10. REMOVE & CAP NITROGEN FILL STATION, (ALTERNATE NO. 1)

11. SITE SURVEY PROVIDED BY NOWAK & FAULS DATED 6-25-2014 IS USED AS A BASES FOR SITE DEMOLITION, DESIGN & RESTORATION
2. New ATS-1,2 Support Slab, See Structural.
3. Reinstall New Concrete Sidewalk to the Nearest Joint.
4. Replace Landscaping to Match Existing Grass.
5. Owner to Reinstall Gas Train at Grade North to Boiler Building Wall.
7. Restore Concrete Paving.
8. Extend Existing Raceway Trench to Establish New Drains at Top of Generation Slab & in Raceway Trench. Slope Concrete 1/8"/Foot to New Drains.

Plan Notes:
1. Site Survey Provided by Nowak & Frazee Dated 6-25-2014 Is Used as a Basis for Site Demolition, Design & Restoration. No Topography or Benchmark Available.
2. Uncharted Utilities May Exist. The Utilities Noted On Plans May Vary From Locations Shown on the Survey or From the Condition In Situ. Site Surveyor Assumes No Responsibility for Neighborhood, Utility Depth, Hand Dig as Necessary to Avoid Damage to Existing Utilities.
SEE DWG. ES-1 FOR CONDUIT ROUTING

EXISTING PIT WALL

EXISTING PAVEMENT

4 - #5 BARS

CONT.

GALVANIZED STEEL PIPE

INSIDE DIAMETER 1" GREATER THAN CONDUIT OD.

PACKED WITH FIRE STOP COMPOUND (IF REQUIRED)

NON-SHRINKING EPOXY GROUT

2" ½ PL. COLLAR WELD TO SLEEVE.

SET IN MASTIC EXPANSION BOLT TO WALL CENTER CONDUIT IN SLEEVE

STANDARD WEIGHT STEEL PIPE

TAR COMPOUND

CHECKED PLATE

EXISTING PIT WALL

CONDUIT THROUGH EXISTING EXTERIOR WALL

SCALE: NTS

CONDUIT PENETRATION THRU EXISTING FLOOR

SCALE: NTS

CONDUIT PENETRATION THRU INTERIOR WALL

SCALE: NTS

TERMINATE SLEEVE FLUSH WITH FINISHED WALL SURFACE

SEAL OR CAULK SLEEVE TO WALL SURFACE

CONDUIT TO BE CENTERED IN SLEEVE

SUPPORT CONDUIT FROM SLEEVE

FINISHED WALL SURFACE

CONCEALED CONDUIT

CONDUIT EXPOSED TO VIEW

PRE-FABRICATED STANDARD WEIGHT STEEL PIPE

TRENCO FIRE SHIELD

CONDUIT TO BE CENTERED IN SLEEVE - DO NOT SUPPORT CONDUIT FROM SLEEVE

FINISHED WALL SURFACE

CONCEALED CONDUIT

CONDUIT EXPOSED TO VIEW

PRE-FABRICATED STANDARD WEIGHT STEEL PIPE

TRENCO FIRE SHIELD
NEW CIRCUIT UPS-RP-1 ROUTED HORIZONTALLY TO ELECT. ROOM 013, THEN VERTICALLY THROUGH ELECT. ROOM 104, 204, 304, AND THEN HORIZONTALLY TO ROOM 301.

NOTES:
1. CONDUITS ARE SHOWN DIAGRAMMATICALLY. EXACT ROUTING AND PIERCING THROUGH WALLS AND CEILINGS ARE TO BE COORDINATED WITH THE OWNERS REPRESENTATIVE.
2. COORDINATE WITH OWNERS REPRESENTATIVE FOR EXACT LOCATION TO MOUNT DEVICE FOR CONNECTING TO OWNERS EQUIPMENT PROVIDE ALLOWANCE FOR CABLE/CONDUIT OF 20'-0" FOR EACH CIRCUIT.
3. SHADED ROOMS / AREAS INDICATE NEW UPS CIRCUIT LOCATIONS TO SERVE EQUIPMENT LOADS.
4. REFER TO E-101 FOR CIRCUIT AND PANEL SCHEDULES.
5. NEW UPS SYSTEM LOCATED IN ROOM 301, THIRD FLOOR.
6. NEW CIRCUITS EXTEND FROM UPS PANEL UPS-RP TO NEW UPS EQUIPMENT LOAD LOCATION.
7. INSTALL APPROPRIATE RECEPTACLES OR HARD WIRE CONNECTION @ EACH LOCATION WITH CLEARLY IDENTIFIABLE LABELS INDICATING SOURCE.
8. REFER TO E-103 CONDUIT/CABLE SIZES.
NOTES:

1. CONDUITS ARE SHOWN DIAGRAMMATICALLY. EXACT ROUTING AND PENETRATIONS THROUGH WALLS AND CEILINGS ARE TO BE COORDINATED WITH THE OWNERS REPRESENTATIVE.

2. COORDINATE WITH OWNERS REPRESENTATIVE FOR EXACT LOCATION TO MOUNT DEVICE FOR CONNECTING TO OWNERS EQUIPMENT PROVIDE ALLOWANCE FOR CABLE/CONDUIT OF 20'-0" FOR EACH CIRCUIT.

3. SHADED ROOMS / AREAS INDICATE NEW UPS CIRCUIT LOCATIONS TO SERVE EQUIPMENT LOADS.

4. REFER TO E101 FOR CIRCUIT AND PANEL SCHEDULES.

5. NEW UPS SYSTEM LOCATED IN ROOM 301. THIRD FLOOR.

6. NEW CIRCUITS EXTEND FROM UPS PANEL UPS-RP TO NEW UPS EQUIPMENT LOAD LOCATION.
NOTES:

1. CONDUITS ARE SHOWN DIAGRAMMATICAL. EXACT ROUTING AND PENETRATIONS THROUGH WALLS AND CEILINGS ARE TO BE COORDINATED WITH THE OWNERS REPRESENTATIVE.

2. COORDINATE WITH OWNERS REPRESENTATIVE FOR EXACT LOCATION TO MOUNT DEVICE FOR CONNECTING TO OWNERS EQUIPMENT. PROVIDE ALLOWANCE FOR CABLE/CONDUIT OF 20'-0" FOR EACH CIRCUIT.

3. SHADED ROOMS / AREAS INDICATE NEW UPS CIRCUIT LOCATIONS TO SERVE EQUIPMENT LOADS.

4. REFER TO E101 FOR CIRCUIT AND PANEL SCHEDULES.

5. NEW UPS SYSTEM LOCATED IN ROOM 301. THIRD FLOOR.

6. NEW CIRCUITS EXTEND FROM UPS PANEL, UPS-15 TO NEW UPS EQUIPMENT LOAD LOCATION.

7. INSTALL APPROPRIATE RECEPTACLE, OR HARD WIRED CONNECTION AT EACH LOCATION WITH CLEARLY IDENTIFIABLE LABELS INDICATING SOURCE.

8. REFER TO E-103 CONDUIT/CABLE SIZES.
NOTES:

1. CONDUITS ARE SHOWN DIAGRAMMATICALLY. EXACT ROUTING AND PENETRATIONS THROUGH WALLS AND CEILINGS ARE TO BE COORDINATED WITH THE OWNERS REPRESENTATIVE.

2. COORDINATE WITH OWNERS REPRESENTATIVE FOR EXACT LOCATION TO MOUNT DEVICE FOR CONNECTING TO OWNERS EQUIPMENT. PROVIDE ALLOWANCE FOR CABLE/CONDUIT OF 20'-0" FOR EACH CIRCUIT.

3. SHADED ROOMS / AREAS INDICATE NEW UPS CIRCUIT LOCATIONS TO SERVE EQUIPMENT LOADS.

4. REFER TO E101 FOR CIRCUIT AND PANEL SCHEDULES.

5. NEW UPS SYSTEM LOCATED IN ROOM 301, THIRD FLOOR.

6. NEW CIRCUITS EXTEND FROM UPS PANEL, UPS-RP, TO NEW UPS EQUIPMENT LOAD LOCATION.

7. INSTALL APPROPRIATE RECEPTACLE OR HARD WIRE CONNECTION @ EACH LOCATION WITH CLEARLY IDENTIFIABLE LABELS INDICATING SOURCE.

8. REFER TO E-103 FOR CABLE/CONDUIT SIZES.
EXIST. RAMP
EXISTING LOADING DOCK
EXISTING CYLINDER STORAGE TO BE CONFIGURED FOR NEW 1000KW GEN SET

EXIST. RAMP
EXISTING CONDUIT

CIRCUIT 2-5 NEW FEED TO UPS MCB NO.2 SCH 40 RM 301 SEE DWG. E-102
EXISTING 208V 3000A MCB #2
EXISTING 480V 1600A MCB #1

REWORK BUS BY REMOVING FEEDER BUS AT ELBOW AND FEED TO ATS-1 & ATS-2

480V ATS-1 @ GRADE SEE DWG. E-101
208V ATS-2 @ GRADE SEE DWG. E-101

CDTS 1,2,3 SEE DWG. ES-1
CDTS 1,2,3 SEE DWG. ES-1

REWORK BUS TO FEED AUTOMATIC TRANSFER SWITCH #1 SEE DWG. ES-1
REWORK BUS TO FEED AUTOMATIC TRANSFER SWITCH #2 SEE DWG. ES-1

480V MAIN BRKR. 3000A UTILITY FEED TO ATS-1 SEE DWG. ES-1
208V MAIN BRKR. 1600A UTILITY TO ATS-2 SEE DWG. ES-1

FROM ATS-2 TO MCB #2 SEE DWG. ES-1
REWORK BUS TO FEED AUTOMATIC TRANSFER SWITCH #2 SEE DWG. ES-1
FEED TO UPS ROOM 301. CT 2-3 SEE DWG. E-102

MAIN BUS DUCT 100A
BASEMENT ELECTRICAL RM. CEILING
BASEMENT ELECTRICAL RM. FL.

NOTES:
1. CIRCUITS DP-A & DP-C TO BE CONSIDERED FOR FUTURE LOAD SHED VIA SHUNT TRIP BREAKERS.
1. All work shall be in accordance with NEC, especially grounding sections 250.112.
2. Tie existing 208 & 480V BLDG. grounds to new 200A FR/100A TR. breaker to feed new 80 KVA UPS.
3. Run grounds in buried PVC conduit as well as in duct bank concrete as shown on drawings.

**NOTES:**

1. Scope of work for electrical reliability upgrades is identified by clouded areas and denoted with box notes.

2. Communication cables routed from ATS-1 & ATS-2 to 1000 KW GENSET will be field routed and connected to the BMS.

3. Owners review:
   - 8-1-2014
   - Out for bids: 8-26-2014

4. Future consideration for load shed at the time of commissioning.

- ATS-1
  - Feeds MDB-1
  - Outdoor
  - 1600A
  - 480V

- ATS-2
  - Feeds MDB-2
  - Outdoor
  - 3000A
  - 208V

**GROUNDING BLOCK DIAGRAM**

1. All work shall be in accordance with NEC, especially grounding sections 250.112.
2. Tie existing 208 & 480V BLDG. grounds to new 200A FR/100A TR. breaker to feed new 80 KVA UPS.
3. Run grounds in buried PVC conduit as well as in duct bank concrete as shown on drawings.

**INSTALL BREAKER WITH 200A FR/100A TR.**

**GROUNDING NOTES:**

1. All work shall be in accordance with NEC, especially grounding sections 250.112.
2. Tie existing 208 & 480V BLDG. grounds to new 200A FR/100A TR. breaker to feed new 80 KVA UPS.
3. Run grounds in buried PVC conduit as well as in duct bank concrete as shown on drawings.
NOTE 2 (TYP.)

#4 AWG OVERSIZED WIRE FOR VOLTAGE DROP

J-BOX WITH COVER PLATE (SIZE FOR APPLICATION)

POWER BLOCK WITH WIRE RANGE OF #2 - #4 FOR LINE AND LOAD

#10 AWG FOR 20A & 30A BREAKER & LOADS

#8 AWG FOR 50A BREAKERS & LOADS

TYPICAL DETAIL (IF REQ’D)

NOTE:
1. RISER DIAGRAM IS DIAGRAMATIC REPRESENTATION ONLY. SEE PLAN DRAWINGS E-0, E-1, E-2 AND E-3 FOR GENERAL CONDUIT ROUTING. EXACT INSTALLATION TO BE DETERMINED BY CONTRACTOR AND OWNERS REPRESENTATIVE.

2. MOUNTING CHANNEL AND FITTINGS LOCATED AND SIZED AS REQUIRED FOR COMPLETE CONDUIT INSTALLATION SUPPORT FOR CONDUIT BETWEEN SUPPORTS AND NOT TO EXCEED MORE THAN 3' FROM CONDUIT TERMINATION POINTS SUCH AS DEVICE BOXES, J-BOXES, ETC. (TYPICAL)

3. CONDUIT RUN HORIZONTAL TO BE SUPPORTED NO GREATER THAN 10'-0" BETWEEN SUPPORTS.

PROVIDE AND INSTALL NEAR DEVICE REQUIRING SPLICED TERMINATIONS AND CONNECT AS REQUIRED. COMPLY WITH ALL APPLICABLE CODE REQUIREMENTS.
Site Survey

NOWAK & FRAUS
ENGINEERS
46777 WOODWARD AVENUE
PONTIAC, MI 48342
Tel. (248) 332-7931
Fax. (248) 332-8257
email: rfraus@nowakfraus.com

Si}
One-Line Drawing

TOSHIBA INTERNATIONAL CORPORATION
Houston Texas, USA

Title: 4200FA UPS, 80kVA Capacity
Single Input Model, 208/120V Output,

NOTES
1) This drawing is for illustration purposes only and is subject to change without notice. TIC is not responsible for any errors or omissions.

AC Input
208/120V
3Ph/4W
50/60Hz

AC Output
208/120V,
3Ph/4W,
50/60Hz,
80kVA,
0.8 PF

Customer Utility Supply

Jumper Provided for Single Input

Contactor

MCCB

DC Chopper/Charger

Inverter

Converter

Static Switch Bypass

SYNC

High Freq. Filter

High Freq. Filter

Contactor

Contactor

Customer supplied wiring

Customer supplied wiring

Jumper Provided for Single Input

Toshiba

INTERNATIONAL CORPORATION
Houston Texas, USA

THIS MATERIAL IS THE EXCLUSIVE PROPERTY OF TOSHIBA INTERNATIONAL CORPORATION AND SHALL NOT BE REPRODUCED, USED, OR DISCLOSED TO OTHERS UNLESS PRIOR WRITTEN AUTHORIZATION IS OBTAINED.

Drawn by
JE
DATE 08/22/05
Approved by
JIS
DATE 08/22/05

DRAWING NO.
T42F3F800FAMXN

REV.
1.0
1) This drawing is for illustration purposes only and is subject to change without notice. TIC is not responsible for any errors or omissions.

2) UPS enclosure type: NEMA 1 Free-standing.