UNITED STATES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

LANGLEY RESEARCH CENTER

HAMPTON, VIRGINIA

SPECIFICATIONS

FOR

DESIGN FOR POTABLE WATER SUPPLY-

PHASE 2 FY'16 MINOR CoF

LOCATED IN

WEST AREA

LANGLEY RESEARCH CENTER, HAMPTON, VIRGINIA

SPECIFICATION NO. CTN000188 DATE: 8-4-15

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02/14

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SUMMARY OF WORK
02/14

PART 1 GENERAL

The Contractor shall furnish all services and material for the effort specified herein. Throughout all sections, paragraphs and statements of this specification document, the Contractor shall be considered the subject of all declarative statements and shall be responsible for the stated action unless it is explicitly stated otherwise.

1.1 TERMINOLOGY CLARIFICATIONS

All references to the Contracting Officer contained in this specification, or any severable part thereof, shall be determined to mean the Contracting Officer or the Contracting Officer's Representative (COR). If any question arises concerning the "authorization" status of a Contracting Officer Representative, the Contractor shall immediately refer the question, in writing, to the Contracting Officer. Any references to "as directed", "approved by", "witnessed by", or "submitted to", shall be determined to mean the Contracting Officer.

Where "as indicated" and "as specified" are written it shall refer to "as indicated on the drawings," and "as specified in the specifications". The specifications shall always take precedence over the drawings.

Where "day" or "days" are written, it shall mean calendar day or days, unless otherwise stated in the specification.

Where "hour" or "hours" are written, it shall mean clock hours, unless otherwise stated in the specification.

Where "must" is written, it has the same meaning as "shall".

"LPR" refers to Langley Procedural Requirement.

"NPR" refers to NASA Procedural Requirement.

"LF" refers to Langley Form.

"RFI" refers to Request for Information.

1.2 SUMMARY

The Contractor shall provide all labor, services, equipment and material required to complete this Construction project as indicated on the drawings and as specified herein. The work is on the West Side NASA Langley Research Center, Hampton, Virginia.

The work shall be split into the following work packages:

Work Package 1:

Replace 157 water valves (139 underground, 14 in tunnels, and 4 above ground or in buildings) as shown in the attached drawings.

Eight new underground valves shall be added to the distribution system as shown on the attached drawings.

See valve grouping list, Attachment 1, to this section to see which valves are to be replaced at the same time.

Work Package 2:

Replacement of cast iron piping with Polyvinyl Chloride (PVC) piping. This includes replacement of two sections of the distribution main: the 8" line crossing West Taylor north of Building 1147 and the 8" line from valve 266 to hydrant 67 in front of Building 1170 and Building 1171. This also includes replacement of lines to the following facilities: 4" line to Building 1208 Blower House (upsize to 6"), 4" line to Building 1214 from PIV 0051 (upsize to 6"), 6" line to Building 1268 from PIV 0034, 8" line to Building 1247B in steam tunnel 1 after valve T122, 6" line to be 1247C cooling tower, 3" line to Building 1195A, 6" lines to Building 1148 (2 lines), 6" line to Building 1237A from PIV 0020, 4" line to Building 1173 (upsize to 6"), 6" line to Building 1230B, 6" line to Building 1237C from PIV 0023, and 8" line to Building 1288.

Replace steel pipe at Building 1146 with 2" copper pipe.

Install new 4" PVC domestic water line from main in tunnel 1 to existing line at Building 1230B.

Valves 083, 259, 291, 302, 334, 350, 551, 589, and T124 will be replaced as part of this work package. Post Indicator Valves (PIV), P0008, P0013, P0020, P0023, P0034, P0049, P0051, and P0078 will be replaced as part of this work package. PIV's P0008, P0013, and P0051 will be upsized to 6" to match the new pipe size.

Outside Building 1250 cut, cap and remove line downstream of valve 111.

At Building 1228 cut and cap water line after tie-in to building (valve 350) and at valve (unnumbered) from main near hydrant 75.

Work Package 3:

Replacement of the cast iron 14" main along Langley Boulevard with Polyvinyl Chloride (PVC) piping.

Valve 108 will be replaced as part of this work package.

Work Package 4:

Install flow meters in 47 locations as shown in the attached drawings. This includes two flow meters on the 14" line that were designed but not installed under the Phase 1 project.

Valves 317 and 372 will be replaced as part of this work package. Valve 275 at Building 1237B shall be removed and replaced with a water meter under this work package.

The Contractor shall cause the fewest number of outages possible at each building or building complex (facility) per work package. Normally this will be one, but in the case of several complexes multiple outages may be

required. If possible, the Contractor shall schedule so that multiple work packages affecting an individual facility will only cause one outage.

1.3 SPECIAL PROJECT CONSIDERATIONS

The Contractor shall be aware of the following special considerations required by this project:

1.4 CONTRACT DOCUMENTS

The Contracting Officer will provide the Contractor the following documents:

1. Two hard copies of full size drawings and drawings in electronic (PDF) format on a Compact Disc (CD).

2. Two hardbound copies of Specifications and Specifications in electronic PDF format on a CD.

3. Two hard copies of the proposed project schedule and the proposed Project Schedule in electronic PDF format on a CD.

4. Electronic copy of NASA Langley's Technical Submittal Form 317 in PDF format on a CD.

5. Electronic copy of NASA Langley's Request for Information (R.F.I.) form 253 in PDF format on a CD.

6. Electronic copy of NASA Langley's Facility Systems Engineering Request for Change form 337 in PDF format on a CD.

7. Electronic copy of the Computerized Maintenance Management System (CMMS) Software/Maintenance/Equipment Change Request Form LF 491.

8. Electronic copies of NASA Langley Procedural Requirements (LPRs) and other documents in PDF format on a CD.

LPR 1710.6	Langley Research Center Electrical Safety
LPR 1710.10	Langley Research Center Energy Control Program (Lockout/Tagout)
LPR 1710.17	Respiratory Protection Program
LPR 1710.40	Langley Research Center Pressure Systems Handbook
LPR 1740.2	Facility Safety Requirements
	Facilities Engineering Standards Manual Piping Systems and Pressure Vessels
	Facilities Engineering Standards Manual Facility Mechanical Systems (HVAC, Plumbing, and Fire Protection)
LPR 1710.11	Fire Protection Program
LAPD 1700.7	Traffic Management
LPR 1740.6	Personnel Safety Certification
LPR 8500.1	Environmental and Energy Program Manual

9. One hard copy and one electronic copy in PDF format of the Preliminary Site Acceptance Test Plan.

The Contractor shall immediately check furnished drawings and specifications, and notify the Contracting Officer of any discrepancies within 14 calendar days of receipt of the documentation.

1.4.1 Langley Documents

The Contractor shall adhere to LPRs and other Langley specific documents that specify requirements particular to work at NASA Langley. These LPRs parallel or exceed standard codes. It is the responsibility of the Contractor to become familiar with and follow the associated LPRs. Refer to paragraph 1.4 for a listing of these documents.

1.4.2 Contract Drawings

The work shall conform to these specifications and the drawings listed below:

DRAWING NO.	SHEET NO.	TITLE
WORK PACKAGE 1		
1296747	1-G001	TITLE SHEET
1296748	1-G101	KEY PLAN A
1296749	1-G102	KEY PLAN B
1296750	1-G103	KEY PLAN C
1296751	1-C001	GENERAL AND CIVIL NOTES, LEGEND, AND ABBREVIATIONS
1296752	1-C101	VALVE REPLACEMENT SITE PLANS
1296753	1-C102	VALVE REPLACEMENT SITE PLANS
1296754	1-C103	VALVE REPLACEMENT SITE PLANS
1296755	1-C104	VALVE REPLACEMENT SITE PLANS
1296756	1-C105	VALVE REPLACEMENT SITE PLANS
1296757	1-C106	VALVE REPLACEMENT SITE PLANS
1296758	1-C107	VALVE REPLACEMENT SITE PLANS
1296759	1-C108	VALVE REPLACEMENT SITE PLANS
1296760	1-C109	VALVE REPLACEMENT SITE PLANS
1296761	1-C110	VALVE REPLACEMENT SITE PLANS
1296762	1-C111	VALVE REPLACEMENT SITE PLANS
1296763	1-C112	VALVE REPLACEMENT SITE PLANS
1296764	1-C113	VALVE REPLACEMENT SITE PLANS
1296765	1-C114	VALVE REPLACEMENT SITE PLANS
1296766	1-C115	VALVE REPLACEMENT SITE PLANS
1296767	1-C116	VALVE REPLACEMENT SITE PLANS
1296768	1-C117	VALVE REPLACEMENT SITE PLANS
1296769	1-C501	PAVEMENT REPAIR DETAILS
1296770	1-M501	PIPING AND VALVE DETAILS AND GENERAL NOTES
1296771	1-M601	VALVE SCHEDULES
1296772	1-M602	VALVE SCHEDULES
WORK PACKAGE 2		
1296775	2-G001	TITLE SHEET
1296776	2-G101	KEY PLAN A
1296777	2-G102	KEY PLAN B
1296778	2-C001	GENERAL AND CIVIL NOTES, LEGEND, AND ABBREVIATIONS
1296779	2-C101	DOMESTIC WATER PIPING AND VALVE REPLACEMENT SITE
1296780	2-C102	DOMESTIC WATER PIPING AND VALVE REPLACEMENT SITE
1296781	2-C103	DOMESTIC WATER PIPING AND VALVE REPLACEMENT SITE
1296782	2-C104	DOMESTIC WATER PIPING AND VALVE REPLACEMENT SITE

DRAWING NO.	SHEET NO.	TITLE
1296783	2-C105	DOMESTIC WATER PIPING AND VALVE REPLACEMENT SITE
1296784	2-C501	PAVEMENT REPAIR DETAILS
1296785	2-M501	PIPING AND VALVE DETAILS AND GENERAL NOTES
1296786	2-M601	VALVE SCHEDULES
WORK PACKAGE 3		
1296788	3-G001	TITLE SHEET
1296789	3-G101	KEY PLAN
1296790	3-C001	GENERAL AND CIVIL NOTES, LEGEND, AND ABBREVIATIONS
1296791	3-C101	14" WATER MAIN REPLACEMENT SITE PLANS
1296792	3-C102	14" WATER MAIN REPLACEMENT SITE PLANS
1296793	3-C103	14" WATER MAIN REPLACEMENT SITE PLANS
1296794	3-C104	14" WATER MAIN REPLACEMENT SITE PLANS
1296795	3-C105	14" WATER MAIN REPLACEMENT SITE PLANS
1296796	3-C106	14" WATER MAIN REPLACEMENT SITE PLANS
1296797	3-C107	14" WATER MAIN REPLACEMENT SITE PLANS
1296798	3-C108	14" WATER MAIN REPLACEMENT SITE PLANS
1296799	3-C109	14" WATER MAIN REPLACEMENT SITE PLANS
1296800	3-C501	PAVEMENT REPAIR DETAILS
1296801	3-M501	PIPING AND VALVE DETAILS AND VALVE SCHEDULE
WORK PACKAGE 4		
1296804	4-G001	TITLE SHEET
1296805	4-G101	KEY PLAN
1296806	4-C001	GENERAL AND CIVIL NOTES, LEGEND, AND ABBREVIATIONS
1296807	4-C101	METER INSTALLATION SITE PLANS
1296808	4-C102	METER INSTALLATION SITE PLANS
1296809	4-C501	PAVEMENT REPAIR DETAILS
1296810	4-M001	MECHANICAL GENERAL AND HAZARDOUS MATERIALS NOTES, LEGEND,
1296811	4-M101	BUILDINGS 1148, 1195A AND 1205 WATER METER
1296812	4-M102	BUILDINGS 1205 AND 1208 WATER METER INSTALLATION
1296813	4-M103	BUILDINGS 1212 AND 1216 WATER METER INSTALLATION
1296814	4-M104	BUILDINGS 1219, 1222B AND 1225 WATER METER
1296815	4-M105	BUILDINGS 1230, 1231C AND 1232 WATER METER
1296816	4-M106	BUILDINGS 1232A AND 1236 WATER METER INSTALLATION
1296817	4-M107	BUILDINGS 1236A AND 1237A WATER METER INSTALLATION
1296818	4-M108	BUILDINGS 1244, 1247B, 1247D AND 1250 WATER
1296819	4-M109	BUILDINGS 1268A, 1268B AND 1268C WATER METER
1296820	4-M110	BUILDINGS 1293A AND 1293B WATER METER INSTALLATION
1296821	4-M501	WATER METER INSTALLATION DETAILS AND SCHEDULE
1296822	4-E101	BUILDING 1232A POTABLE WATER & SANITARY

DRAWING NO.	SHEET NO.	TITLE
		SEWER
1296823	4-E102	BUILDING 1232A POTABLE WATER & SANITARY SEWER
1296824	4-E103	BUILDING 1232A POTABLE WATER & SANITARY SEWER
1296825	4-E104	BUILDING 1232A POTABLE WATER & SANITARY SEWER
1296826	4-E501	GENERAL NOTES AND TYPICAL DETAILS
1296827	4-E601	BUILDING 1146 ROOM 117 OVERVIEW
1296828	4-E602	BUILDING 1148 ROOM 134 AND BUILDING 1205
1296829	4-E603	BUILDING 1148 ROOM 122 OVERVIEW
1296830	4-E604	BUILDING 1189 ROOM 106 OVERVIEW
1296831	4-E605	BUILDING 1195A ROOM 112 OVERVIEW
1296832	4-E606	BUILDING 1199 ROOMS 101A AND 119 OVERVIEW
1296833	4-E607	BUILDING 1205 ROOMS 119 AND 156 OVERVIEW
1296834	4-E608	BUILDING 1208 ROOM 7 OVERVIEW
1296835	4-E609	BUILDING 1212 ROOMS 137 AND 154 OVERVIEW
1296836	4-E610	BUILDING 1212C ROOM 112 OVERVIEW
1296837	4-E611	BUILDING 1216 ROOM 121 OVERVIEW
1296838	4-E612	BUILDING 1219 ROOM 125 OVERVIEW
1296839	4-E613	BUILDING 1222B ROOM 103 OVERVIEW
1296840	4-E614	BUILDING 1225 ROOM 102A OVERVIEW
1296841	4-E615	BUILDING 1230 ROOMS 10 AND 191 OVERVIEW
1296842	4-E616	BUILDING 1231C ROOM 107 OVERVIEW
1296843	4-E617	BUILDING 1232 ROOMS 112 AND 144 OVERVIEW
1296844	4-E618	BUILDING 1232A ROOMS 104A AND 140E OVERVIEW
1296845	4-E619	BUILDING 1236 ROOM 16 OVERVIEW
1296846	4-E620	BUILDING 1236A ROOM 100 OVERVIEW
1296847	4-E621	BUILDING 1237 ROOMS 100 AND 112 LOFT
1296848	4-E622	BUILDING 1244 ROOM 10 OVERVIEW
1296849	4-E623	BUILDING 1247B ROOM 14 OVERVIEW
1296850	4-E624	BUILDING 1247D ROOM 12 OVERVIEW
1296851	4-E625	BUILDING 1250 ROOM 109 OVERVIEW
1296852	4-E626	BUILDING 1265 ROOMS 109 AND 130 OVERVIEW
1296853	4-E627	BUILDING 1268A & 1268C ROOMS 50
1296854	4-E628	BUILDING 1268B ROOM 1205 OVERVIEW
1296855	4-E629	BUILDING 1293 ROOMS 9 AND 106 OVERVIEW

1.5 PERFORMANCE PERIOD AND SCHEDULE

The performance period for this project is 725 calendar days. The anticipated start date will be as specified in the solicitation.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

-- End of Section --

ATTACHMENT 1

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
119	1159	3"	PVC	232, 139, 176, 159, 181, 191, 550, 197, 391, 188, 115	1	60, 135		Will also impact AFB
139	1159	3"	PVC	119, 232, 176, 159, 181, 191, 550, 197, 391, 188, 115	1	60, 135		Will also impact AFB
181	1122	2"	PVC	232, 139, 176, 159, 119, 191, 550, 197, 115, 188, 391	1	60, 135		Will also impact AFB
191	1122	2"	PVC	232, 139, 176, 159, 119, 181, 550, 197, 115, 188, 391	1	60, 135		Will also impact AFB
391	1159	3"	PVC	119, 232, 176, 159, 181, 191, 550, 197, 139, 188, 115	1	60, 135		Will also impact AFB
115	1166	1-1/2"	PVC	119, 232, 176, 159, 181, 191, 550, 197, 139, 391, 188	1	60, 135		Will also impact AFB
159	1285	2"	PVC	119, 232, 176, 181, 191, 550, 197, 139, 391, 188, 115	1	60, 135		Will also impact AFB

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
176	1286	3"	PVC	119, 232, 159, 181, 191, 550, 197, 139, 391, 188, 115	1	60, 135		Will also impact AFB
188	1166	4"	PVC	119, 232, 176, 159, 181, 191, 550, 197, 139, 391, 115	1	60, 135		Will also impact AFB
197	1181	4"	PVC	119, 232, 176, 159, 181, 191, 550, 139, 391, 188, 115	1	60, 135		Will also impact AFB
232	1286	2"	PVC	119, 176, 159, 181, 191, 550, 197, 139, 391, 188, 115	1	60, 135		Will also impact AFB
550 (JE1)	1122	2"	PVC	232, 139, 176, 159, 119, 181, 191, 197, 115, 188, 391	1	60, 135		Will also impact AFB
55	1297	2"	CU	051, 209, 210, 107, 552	2	76, 106, 135, 252		
051	1262	4"	PVC	209, 210, 55, 107, 552	2	76, 106, 135, 252		
063	1154	6"	PVC	051, 209, 210, 55, 107, 552, 069	2	76, 106, 135, 252		

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
069	1154	1-1/2"	CU	051, 209, 210, 55, 107, 552, 063	2	76, 106, 135, 252		
107	1297G	3"	PVC	051, 209, 210, 55, 552	2	76, 106, 135, 252		
209	1196	1-1/2"	PVC	051, 210, 55, 107, 552	2	76, 106, 135, 252		
210	1196	1-1/2"	PVC	051, 209, 55, 107, 552	2	76, 106, 135, 252		
552 (JE3)	1297G	3/8"	CU	051, 209, 210, 107, 55	2	76, 106, 135, 252		
389	1101	2"	PVC	390, 47, 551, 81, 395, 254	3	15, 48, 50, 80, 252, 408, 1026		Will also impact B1202A
390	1101	2"	PVC	389, 47, 551, 81, 395, 254	3	15, 48, 50, 80, 252, 408, 1026		Will also impact B1202A
047	1288	8"	PVC	389, 390, 551, 81, 395, 254	3	15, 48, 50, 80, 252, 408, 1026		Will also impact B1202A
081	1211	6"	PVC	389, 390, 551, 47, 395, 254	3	15, 48, 50, 80, 252, 408, 1026		Will also impact B1202A
254	1288A	3/4"	PVC	389, 390, 47, 81, 395, 551	3	15, 48, 50, 80, 252, 408, 1026		Will also impact B1202A
395	1208	3"	cast iron	389, 390, 551, 81, 47, 254	3	15, 48, 50, 80, 252, 408, 1026		Will also impact B1202A
551 (JE2)	1288	8"	DI	389, 390, 47, 81, 395, 254	3	15, 48, 50, 80, 252, 408, 1026		Will also impact B1202A

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
059	1214	4"	PVC	71, 230, 553, 73, 207, 281, 343, 230, 218, 223, 221, 228, 70, A070, 554, 206	4	9, 17, 74, 78		Will also impact AFB
070	1197	1-1/2"	PVC	71, 230, 553, 73, 207, 281, 343, 230, 218, 223, 221, 228, 554, A070, 59, 206	4	9, 17, 74, 78		Will also impact AFB
071	1187	1-1/2"	PVC	554, 230, 553, 73, 207, 281, 343, 230, 218, 223, 221, 228, 70, A070, 59, 206	4	9, 17, 74, 78		Will also impact AFB
073	1199	4"	PVC	71, 230, 553, 554, 207, 281, 343, 230, 218, 223, 221, 228, 70, A070, 59, 206	4	9, 17, 74, 78		Will also impact AFB
206	1214	1"	CU	71, 230, 553, 73, 207, 281, 343, 230, 218, 223, 221, 228, 70, A070, 59, 554	4	9, 17, 74, 78		Will also impact AFB

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
207	1199	6"	cast iron	71, 230, 553, 73, 554, 281, 343, 230, 218, 223, 221, 228, 70, A070, 59, 206	4	9, 17, 74, 78		Will also impact AFB
218	1189	4"	PVC	71, 230, 553, 73, 207, 281, 343, 230, 554, 223, 221, 228, 70, A070, 59, 206	4	9, 17, 74, 78		Will also impact AFB
221	1190	2"	PVC	71, 230, 553, 73, 207, 281, 343, 230, 218, 223, 554, 228, 70, A070, 59, 206	4	9, 17, 74, 78		Will also impact AFB
223	1189	2"	PVC	71, 230, 553, 73, 207, 281, 343, 230, 218, 554, 221, 228, 70, A070, 59, 206	4	9, 17, 74, 78		Will also impact AFB
228	1191	2"	PVC	71, 230, 553, 73, 207, 281, 343, 230, 218, 223, 221, 554, 70, A070, 59, 206	4	9, 17, 74, 78		Will also impact AFB

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
230	1188	2"	PVC	71, 554, 553, 73, 207, 281, 343, 230, 218, 223, 221, 228, 70, A070, 59, 206	4	9, 17, 74, 78		Will also impact AFB
281	1199	2"	CU	71, 230, 553, 73, 207, 554, 343, 230, 218, 223, 221, 228, 70, A070, 59, 206	4	9, 17, 74, 78		Will also impact AFB
343	1199	1-1/2"	CU	71, 230, 553, 73, 207, 281, 554, 230, 218, 223, 221, 228, 70, A070, 59, 206	4	9, 17, 74, 78		Will also impact AFB
553 (JE4)	1198	1-1/2"	CU	71, 230, 554, 73, 207, 281, 343, 230, 218, 223, 221, 228, 70, A070, 59, 206	4	9, 17, 74, 78		Will also impact AFB
554 (JE5)	1214	1"	CU	71, 230, 553, 73, 207, 281, 343, 230, 218, 223, 221, 228, 70, A070, 59, 206	4	9, 17, 74, 78		Will also impact AFB

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
A070	1197	1-1/2"	CU	71, 230, 553, 73, 207, 281, 343, 230, 218, 223, 221, 228, 70, 554, 59, 206	4	9, 17, 74, 78		Will also impact AFB
053	1295	2"	CU	99, 110, 555, 556, 557, 558, 559	5	21, 34, 50, 52		
099	1250	3"	PVC	559, 110, 555, 556, 557, 558, 53	5	21, 34, 50, 52		
110	1250	4"	PVC	99, 559, 555, 556, 557, 558, 53	5	21, 34, 50, 52		
555 (JE6)	1250	8"	PVC	99, 110, 559, 556, 557, 558, 53	5	21, 34, 50, 52		
556 (JE7)	1250	6"	PVC	99, 110, 555, 559, 557, 558, 53	5	21, 34, 50, 52		
557 (JE8)	1295C	3/4"	PVC	99, 110, 555, 556, 53, 558, 559	5	21, 34, 50, 52		
558 (JE9)	1295C	3/4"	PVC	99, 110, 555, 556, 557, 53, 559	5	21, 34, 50, 52		
559 (JE10)	1295E	3/4"	PVC	99, 110, 555, 556, 557, 558, 53	5	21, 34, 50, 52		
013	1216	3"	PVC	560, 35, 41, 25	6	23, 26, 28, 66		Will also impact B1200, B1222,

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
025	1233	2"	CU	560, 35, 41, 13	6	23, 26, 28, 66		Will also impact B1200, B1222,
035	1222B	4"	PVC	560, 13, 41, 25	6	23, 26, 28, 66		Will also impact B1200, B1222,
041	1222B	4"	PVC	560, 35, 13, 25	6	23, 26, 28, 66		Will also impact B1200, B1222,
560 (JE11)	1216	6"	PVC	13, 35, 41, 25	6	23, 26, 28, 66		Will also impact B1200, B1222,
363	1201	6"	PVC	563, 362, 561, 311	7	29, 335, T311		
362	1212C	6"	PVC	363, 563, 561, 311	7	29, 335, T311		
561 (JE12)	1212C	2"	CU	363, 362, 563, 311	7	29, 335, T311		
563 (JE14)	1201	2-1/2"	CU	363, 362, 561, 311	7	29, 335, T311		
201	1236	6"	PVC	322, T238, 323, 338, 373, 405, 587	8	T234, 360		
322	1236	2"	CU	201, T238, 323, 338, 373, 405, 587	8	T234, 360		
323	1236A	1/2"	CU	322, T238, 201, 338, 332, 373, 405, 587	8	T234, 360		
338	1236A (1235	2"	PVC	322, T238, 323, 201, 373, 405, 587	8	T234, 360		
T238	1236	8"	PVC	322, 201, 323, 338, 373, 405, 587	8	T234, 360		

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
311	1146	2"	PVC	334, 293, 299, 298, 567, 317, 312, 332, 373, 405, 587, T210, T208, T224	9	121, 144, 146, 1007, T204, T226		Also affects Hydrant 48
334	1148	6"	CI	293, 299, 298, 567, 317, 312, 332, 311, 373, 405, 587, T210, T208, T224	9	121, 144, 146, 1007, T204, T226		Also affects Hydrant 48
293	1205	4"	PVC	334, 299, 298, 567, 317, 312, 332, 311, 373, 405, 587, T210, T208, T224	9	121, 144, 146, 1007, T204, T226		Also affects Hydrant 48
298	1148	8"	PVC	334, 293, 299, 567, 317, 312, 332, 311, 373, 405, 587, T210, T208, T224	9	121, 144, 146, 1007, T204, T226		Also affects Hydrant 48

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
299	1205	3"	PVC	334, 293, 298, 567, 317, 312, 332, 311, 373, 405, 587, T210, T208, T224	9	121, 144, 146, 1007, T204, T226		Also affects Hydrant 48
312	1205	6"	PVC	334, 293, 299, 298, 567, 317, 332, 311, 373, 405, 587, T210, T208, T224	9	121, 144, 146, 1007, T204, T226		Also affects Hydrant 48
317	1205	1"	CU	334, 293, 299, 298, 567, 312, 332, 311, 373, 405, 587, T210, T208, T224	9	121, 144, 146, 1007, T204, T226		Also affects Hydrant 48
332	1241	4"	PVC	334, 293, 299, 298, 567, 317, 312, 311, 373, 405, 587, T210, T208, T224	9	121, 144, 146, 1007, T204, T226		Also affects Hydrant 48

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
373	1241	4"	PVC	334, 293, 299, 298, 567, 317, 312, 332, 311, 405, 587, T210, T208, T224	9	121, 144, 146, 1007, T204, T226		Also affects Hydrant 48
405	1242	2-1/2"	CU	334, 293, 299, 298, 567, 317, 312, 332, 311, 373, 587, T210, T208, T224	9	121, 144, 146, 1007, T204, T226		Also affects Hydrant 48
567 (JE18)	1205	1-1/2"	CU	334, 293, 299, 298, 317, 312, 332, 311, 373, 405, 587, T210, T208, T224	9	121, 144, 146, 1007, T204, T226		Also affects Hydrant 48
587 (JE38)	1242	1-1/4"	CU	334, 293, 299, 298, 567, 317, 312, 332, 311, 373, 405, T210, T208, T224	9	121, 144, 146, 1007, T204, T226		Also affects Hydrant 48

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
T208	1205	4"	PVC	334, 293, 299, 298, 567, 317, 312, 332, 311, 373, 405, 587, T210, T224	9	121, 144, 146, 1007, T204, T226		Also affects Hydrant 48
T210	1205	2"	PVC	334, 293, 299, 298, 567, 317, 312, 332, 311, 373, 405, 587, T208, T224	9	121, 144, 146, 1007, T204, T226		Also affects Hydrant 48
T224	1293A	3"	PVC	334, 293, 299, 298, 567, 317, 312, 332, 311, 373, 405, 587, T210, T208,	9	121, 144, 146, 1007, T204, T226		Also affects Hydrant 48
109	1247B	4"	PVC	84, 86, 217, 571, 572, 581	10	58, 96, 1084		
084	1265	6"	PVC	86, 109, 217, 571, 572, 581	10	58, 96, 1084		
086	1265	2"	CU	84, 109, 217, 571, 572, 581	10	58, 96, 1084		
217	1247D	6"	PVC	84, 86, 109, 571, 572, 581	10	58, 96, 1084		
571 (JE22)	1248	4"	PVC	84, 86, 109, 217, 572, 581	10	58, 96, 1084		
572 (JE23)	1247D	6"	PVC	84, 86, 109, 217, 571, 581	10	58, 96, 1084		

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
581 (JE32)	1247E	6"	PVC	84, 86, 109, 217, 571, 572	10	58, 96, 1084		
237	1292	3"	PVC	241, 243, 265, 573, 574, 296, 290 , 291, 382, T174, 371	11	104, 248, 262, 264, T172, East		Also affects Hydrant 33 and 36
241	1206	2"	PVC	237, 243, 265, 573, 574, 296, 290 , 291, 381, 382, T174, 371	11	104, 248, 262, 264, T172, East		Also affects Hydrant 33 and 36
243	1206A	2-1/2"	PVC	237, 241, 265, 573, 574, 296, 290 , 291, 382, T174, 371	11	104, 248, 262, 264, T172, East		Also affects Hydrant 33 and 36
265	1169	2"	PVC	237, 241, 243, 573, 574, 296, 290 , 291, 382, T174, 371	11	104, 248, 262, 264, T172, East		Also affects Hydrant 33 and 36
290	1172	4"	PVC	237, 241, 243, 265, 573, 574, 296, 291, 381, 382, T174, 371	11	104, 248, 262, 264, T172, East		Also affects Hydrant 33 and 36
291	1173	4"	CI	237, 241, 243, 265, 573, 574, 296, 290 , 381, 382, T174, 371	11	104, 248, 262, 264, T172, East		Also affects Hydrant 33 and 36

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
296	1245	3/4"	CU	237, 241, 243, 265, 573, 574, 290 , 291, 382, T174, 371	11	104, 248, 262, 264, T172, East		Also affects Hydrant 33 and 36
371	1237A	6"	PVC	237, 241, 243, 265, 573, 574, 296, 290 , 291, 382, T174	11	104, 248, 262, 264, T172, East		Also affects Hydrant 33 and 36
382	1237A	2"	CU	237, 241, 243, 265, 573, 574, 296, 290 , 291, 371, T174	11	104, 248, 262, 264, T172, East		Also affects Hydrant 33 and 36
573 (JE24)	1245	3/4"	CU	237, 241, 243, 265, 574, 296, 290 , 291, 371, *382* , T174	11	104, 248, 262, 264, T172, East		Also affects Hydrant 33 and 36
574 (JE25)	1245	3/4"	CU	237, 241, 243, 265, 573, 574, 296, 290 , 291, 371, *382* , T174	11	104, 248, 262, 264, T172, East		Also affects Hydrant 33 and 36
T174	1232A	3"	PVC	237, 241, 243, 265, 573, 574, 296, 290 , 291, 371, *382* 4	11	104, 248, 262, 264, T172, East		Also affects Hydrant 33 and 36
247	1232	6"	PVC	274, 351, 372, 374, 377, 380, 568, 569, 570, 257	12	96, 103, 116, 378		

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
257	1248	4"	PVC	247, 274, 351, 372, 374, 377, 380, 568, 569, 570	12	96, 103, 116, 378		
274	1232	2"	CU	247, 351, 372, 374, 377, 380, 568, 569, 570, 257	12	96, 103, 116, 378		
351	1237C	1-1/4"	CU	247, 274, 372, 374, 377, 380, 568, 569, 570, 257	12	96, 103, 116, 378		
372	1232	6"	PVC	247, 274, 351, 374, 377, 380, 568, 569, 570, 257	12	96, 103, 116, 378		
374	1296	3"	PVC	247, 274, 351, 372, 377, 380, 568, 569, 570, 257	12	96, 103, 116, 378		
377	1296	2"	PVC	247, 274, 351, 372, 374, 380, 568, 569, 570, 257	12	96, 103, 116, 378		
380	1232	2"	PVC	247, 274, 351, 372, 374, 377, 568, 569, 257, 570	12	96, 103, 116, 378		
568 (JE19)	1237C	1-1/4"	CU	247, 274, 351, 372, 374, 377, 380, 569, 570, 257	12	96, 103, 116, 378		

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
569 (JE20)	1237B	2"	PVC/CU	247, 274, 351, 372, 374, 377, 380, 568, 570, 257	12	96, 103, 116, 378		
570 (JE21)	1237B	2"	CU	247, 274, 351, 372, 374, 377, 380, 568, 569, 257	12	96, 103, 116, 378		
105	1186	8" or 10"	PVC	1, 9, 11, 14, 18, 101, 105, 202, 268, 269, 582, 583, 586	13	37, 42, 54, 66, 93, 249, T112, T114		Will require sitewide outage
001	1186	10"	PVC	1, 9, 11, 14, 18, 101, 105, 202, 268, 269, 582, 583, 586	13	37, 42, 54, 66, 93, 249, T112, T114		Will require sitewide outage
009	1186	8"	PVC	1, 9, 11, 14, 18, 101, 105, 202, 268, 269, 582, 583, 586	13	37, 42, 54, 66, 93, 249, T112, T114		Will require sitewide outage
011	1186	10"	PVC	1, 9, 11, 14, 18, 101, 105, 202, 268, 269, 582, 583, 586	13	37, 42, 54, 66, 93, 249, T112, T114		Will require sitewide outage
014	1186	10"	PVC	1, 9, 11, 14, 18, 101, 105, 202, 268, 269, 582, 583, 586	13	37, 42, 54, 66, 93, 249, T112, T114		Will require sitewide outage

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
018	1268B	2"	PVC	1, 9, 11, 14, 18, 101, 105, 202, 268, 269, 582, 583, 586	13	37, 42, 54, 66, 93, 249, T112, T114		Will require sitewide outage
101	1223B	4"	PVC	1, 9, 11, 14, 18, 101, 105, 202, 268, 269, 582, 583, 586	13	37, 42, 54, 66, 93, 249, T112, T114		Will require sitewide outage
202	1268D	4"	PVC	1, 9, 11, 14, 18, 101, 105, 202, 268, 269, 582, 583, 586	13	37, 42, 54, 66, 93, 249, T112, T114		Will require sitewide outage
268	1268D	4"	PVC	1, 9, 11, 14, 18, 101, 105, 202, 268, 269, 582, 583, 586	13	37, 42, 54, 66, 93, 249, T112, T114		Will require sitewide outage
269	1268D	4"	PVC	1, 9, 11, 14, 18, 101, 105, 202, 268, 269, 582, 583, 586	13	37, 42, 54, 66, 93, 249, T112, T114		Will require sitewide outage
582 (JE33)	1256C	2"	CU	1, 9, 11, 14, 18, 101, 105, 202, 268, 269, 582, 583, 586	13	37, 42, 54, 66, 93, 249, T112, T114		Will require sitewide outage
583 (JE34)	1223B	3/4"	CU	1, 9, 11, 14, 18, 101, 105, 202, 268, 269, 582, 583, 586	13	37, 42, 54, 66, 93, 249, T112, T114		Will require sitewide outage

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
586 (JE37)	1268C	2-1/2"	PVC	1, 9, 11, 14, 18, 101, 105, 202, 268, 269, 582, 583, 586	13	37, 42, 54, 66, 93, 249, T112, T114		Will require sitewide outage
259	1195A	3"	CI	267, 272, 273, 375, T140, T140A, T144, T146, T160B	14	116, 121, T142, T162		
267	1195B	4"	PVC	259, 272, 273, 375, T140, T140A, T144, T146, T160B	14	116, 121, T142, T162		
272	1195C	1-1/2"	PVC	259, 267, 273, 375, T140, T140A, T144, T146, T160B	14	116, 121, T142, T162		
273	1195C	1-1/2"	CU	259, 267, 272, 375, T140, T140A, T144, T146, T160B	14	116, 121, T142, T162		
375	1195	2"	PVC	259, 267, 272, 273, T140, T140A, T144, T146, T160B	14	116, 121, T142, T162		

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
T140	1219	3"	PVC	259, 267, 272, 273, 375, T140A, T144, T146, T160B	14	116, 121, T142, T162		
T140A	1219	3"	PVC	259, 267, 272, 273, 375, T140, T144, T146, T160B	14	116, 121, T142, T162		
T144	1194	8"	PVC	259, 267, 272, 273, 375, T140, T140A, T146, T160B	14	116, 121, T142, T162		
T146	1194	8"	PVC	259, 267, 272, 273, 375, T140, T140A, T144, T160B	14	116, 121, T142, T162		
T160B	1225	3"	PVC	259, 267, 272, 273, 375, T140, T140A, T144, T146	14	116, 121, T142, T162		
108	1231C	8" - 14"	?	113, 133, 168, 279, 302, 352, 564, T256, T262	15	10, 124, 130, 1005, T260, T262, T264		

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
113	1231C	3"	PVC	108, 133, 168, 279, 302, 352, 564, T256, T262	15	10, 124, 130, 1005, T260, T262, T264		
133	1230	6"	PVC	108, 113, 168, 279, 302, 352, 564, T256, T262	15	10, 124, 130, 1005, T260, T262, T264		
168	1231C	8"	PVC	108, 113, 133, 279, 302, 352, 564, T256, T262	15	10, 124, 130, 1005, T260, T262, T264		
279	1310	4"	PVC	108, 113, 133, 168, 302, 352, 564, T256, T262	15	10, 124, 130, 1005, T260, T262, T264		
302	1230B	4"	PVC	108, 113, 133, 168, 279, 352, 564, T256, T262	15	10, 124, 130, 1005, T260, T262, T264		
352	1310	2"	PVC	108, 113, 133, 168, 279, 302, 564, T256, T262	15	10, 124, 130, 1005, T260, T262, T264		
564 (JE15)	1231C	3"	PVC	108, 113, 133, 168, 279, 302, 352, T256, T262	15	10, 124, 130, 1005, T260, T262, T264		

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
T256	1230	6"	PVC	108, 113, 133, 168, 279, 302, 352, 564, T262	15	10, 124, 130, 1005, T260, T262, T264		
T262	1230B	8"	PVC	108, 113, 133, 168, 279, 302, 352, 564, T256,	15	10, 124, 130, 1005, T260, T262, T264		
165	1244A	8"	PVC	349, 350, 565, 566, T244, T262B	16	130, 1001, T242, T246, T258		Also affects 1230B
349	1308	2"	PVC	165, 350, 565, 566, T244, T262B	16	130, 1001, T242, T246, T258		Also affects 1230B
350	1228	2"	CU	165, 349, 565, 566, T244, T262B	16	130, 1001, T242, T246, T258		Also affects 1230B
565 (JE16)	1244A	8"	PVC	165, 349, 350, 566, T244, T262B	16	130, 1001, T242, T246, T258		Also affects 1230B
566 (JE17)	1308	6"	PVC	165, 349, 350, 565, T244, T262B	16	130, 1001, T242, T246, T258		Also affects 1230B
T244	1228	3"	CI	165, 349, 350, 565, 566, T262B	16	130, 1001, T242, T246, T258		Also affects 1230B
T262B	1244	6"	PVC	165, 349, 350, 565, 566, T244,	16	130, 1001, T242, T246, T258		Also affects 1230B
040	1268	4"	PVC	325, 327, 329	17	26, 37, 282, T311		Requires outage of
325/10	1215	6"	PVC	40, 327, 329	17	26, 37, 282, T311		Requires outage of

Valve Number (based on GIS)	Building	Line size	Material	Group with	Group No.	Valves to be closed	Date	Notes
327	1215	6"	PVC	40, 325, 329	17	26, 37, 282, T311		Requires outage of
329	1215	4"	PVC	40, 325, 327	17	26, 37, 282, T311		Requires outage of
044	1247C	8"	PVC	205, 575, 83, T124	18	T122, 72, 85		Also affects 1221 complex
083	1247C	6"	CI	205, 44, 575, T124	18	T122, 72, 85		Also affects 1221 complex
205	1256	3"	PVC	575, 44, 83, T124	18	T122, 72, 85		Also affects 1221 complex
575 (JE26)	1256C	8"	PVC	205, 44, 83, T124	18	T122, 72, 85		Also affects 1221 complex
T124	1247B	8"	PVC	205, 44, 83, 575	18	T122, 72, 85		Also affects 1221 complex
075	Small Bldg next to 1199	1/2"	CU					Can be added to ANY group.
249	1186	8"	PVC			9, 54		to ANY group. Will also affect AFB, 1214,

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ADMINISTRATIVE REQUIREMENTS
02/14

PART 1 GENERAL

1.1 REFERENCE PUBLICATIONS

The publications listed below form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only.

The listed versions of the following references were used during the development of this design and are the Government approved versions to be used herein. There may be newer versions of certain references that have been released since the commencement and/or approval of the design effort. However, in order to comply with the Government technical requirements, not all of the latest versions of the listed references were adopted and the versions listed herein shall be utilized.

LAPD 1600.4	(May 2012) Firearms and Dangerous Weapons Policy
LAPD 1600.5	(November 2010) Workplace Violence and Threatening Behavior
LAPD 1700.7	(March 2011) Traffic Management
LAPD 1700.8	(May 2013) Parking Regulations
LPR 1710.40	(August 2011) Langley Research Center Pressure Systems Handbook
NPD 1600.2E	(April 2009) NASA Security Policy
NPR 1600.1	(August 2013) NASA Security Program Procedural Requirements with Change 2
NFPA 70E	Standard for Electrical Safety in the Workplace

1.2 SUBMITTALS

The Contractor shall provide the following Submittals in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Prior to the issuance of the Notice to Proceed (NTP), the Contractor shall submit the following documents to the Contracting Officer:

List of Contact Personnel of the Contractor and Subcontractors

Resumes for the Project Manager, Superintendent, and QC Representative

Quality Control Plan

Project Management Plan

After issuance of Notice to Proceed (NTP) and prior to start of any work, the Contractor shall submit the following:

Plumbing Workers' Qualifications

Mechanical Workers' Qualifications

Electrical Workers' Qualifications

Brazing Qualifications: These shall be submitted under Section 43 02 00.00 41 WELDING PRESSURE/MECHANICAL PIPING/VESSELS.

Project Schedule

The Contractor shall file for the following Requests and Permits prior to starting any of the work. The Contractor shall follow all instructions in the Specification Package pertaining to each.

Utility Outage Requests

Utility Connection Requests

Excavation Permits

Hot Work (Welding) Permits

During the project, the Contractor shall provide the following Submittals at the intervals specified:

Digital Photographs
Meeting Minutes
Progress Report
Project Schedule

Upon completion of the Construction phase, the Contractor shall provide the following submittals:

SD-03 Product Data

Computerized Maintenance Management System (CMMS)

SD-10 Operation and Maintenance Data

Operation and Maintenance Manual

SD-11 Closeout Submittals

Quality Control Binder

As-Built Contract Drawings

1.3 PROJECT SIGN

The Contractor shall furnish and install a project sign, at the location designated by the Contracting Officer, immediately upon beginning site work. The sign shall conform to the details shown in Attachment No. 1, Project Sign, of this section. The sign shall be mounted on a treated wood framework of at least 2-inch by 4-inch material. The sign shall be 4-foot by 8-foot exterior grade plywood and constructed of nominal free alkyd primer and two coats of exterior type white enamel. The border shall be 3/4-inch wide and shall be black. The Contractor shall erect no other display sign at the site.

1.4 DISPLAY OF WORKERS DOCUMENTATION BULLETINS

Immediately upon beginning site work, the Contractor shall display the fair employment poster, wage rates, and safety bulletins and posters. The information shall be located at the job site, in a conspicuous place, easily accessible to all employees. Legible copies of the aforementioned data shall be displayed until on-site work is complete.

1.5 PROJECT PHOTOGRAPHS

The Contractor shall provide color digital photographs of the project weekly in various stages of completion.

The photographs shall be in JPEG format and submitted on a CD.

1.6 ON-SITE PERMITS

1.6.1 Utility Outage Requests and Utility Connection Requests

The Contractor shall notify the Contracting Officer at least 24 hours prior to starting excavation work. The Contractor is responsible for marking and verifying all utilities not marked.

The Contractor shall verify the elevations of existing piping, utilities, and any type of underground obstruction not indicated or specified to be removed, but indicated in locations to be transversed by piping, ducts, and other work to be installed. Verify elevations before installing new work.

Work shall be scheduled to hold outages to a minimum.

The Contractor shall arrange for utility outages at the convenience of the Contracting Officer. The Contractor shall schedule outages outside of the regular working hours.

Contracting Officer may permit utility outages at his discretion.

Contractor shall not be entitled to additional payment for utility outages and connections required to be performed outside the regular work hours.

Requests for utility outages and connections shall be made, by the Contractor, in writing to the Contracting Officer at least 7 calendar days in advance of the time required. Each request shall state the system involved, area involved, approximate duration of outage, and the nature of work involved.

1.6.2 Borrow, Excavation, Welding, and Burning Permits

ACTIVITY	SUBMISSION DATE	SUBMISSION FORM
Excavation Permits	24 hours notice	
Hot Work (Welding) Permits	Request on day of work	

Permits shall be posted, by the Contractor, at a conspicuous location in the construction area.

Burning of trash or rubbish is not permitted.

1.6.3 Application for Connecting to Government Electrical Utilities

Prior to making connection to any part of the Government's electrical power distribution system, the Contractor shall make an application to the Contracting Officer stating the date, time, location, and the service required. The Contractor shall also state when such connection is desired.

The Contractor shall perform the initial energizing of all new electrical equipment in the presence of an authorized representative of the Contracting Officer.

Prior to connecting into any existing Government electrical utility, the Contractor shall conform to the requirements of Section 01 35 26.00 41 NASA LANGLEY SAFETY REQUIREMENTS.

1.7 PROJECT MANAGEMENT PLAN

The Contractor shall maintain an updated Project Management Plan which describes the Contractor's management approach to fulfilling the requirements of this contract and shall include the following:

a. A complete description of the work in sufficient detail to demonstrate a full understanding of the project requirements.

b. Plans to manage changes that result in significant variations to the total proposed cost including changes to scope, schedule, or critical specifications.

c. Metrics on how the Contractor proposes that the adherence to the project description of work shall be measured. This plan shall also describe how the Contractor will determine that the tasked project work has been completed and has been accepted by the Contracting Officer.

d. All contract documents.

e. Contractor's documentation control plan.

f. Submittal register as defined in Section 01 33 00 SUBMITTAL PROCEDURE.

1.8 QUALITY CONTROL

1.8.1 Quality Control Plan

The Contractor shall submit a written Quality Control Plan to the Contracting Officer for approval. The Plan shall explain the Contractor's

internal quality assurance programs, procedures, and methods. The plan shall include a description of their process for vetting and selecting subcontractors, vendors and suppliers. The plan shall also include methods of controlling procurement sources and those of subcontractors to ensure that each purchase meets the specified quality requirements. The plan shall explain how quality is maintained throughout their process for purchasing, shipping/receiving inspection, inventory control, material storage, and material handling.

1.8.2 Inspections and Tests

The Contractor shall be responsible for their own internal inspections to ensure quality and adherence to the contract documents. The Contractor shall be responsible for all inspections and tests, and the accompanying documentation for each inspection and test specified in the contract documents. The Contractor shall utilize independent inspection and testing laboratories or services where specified and as approved by the Contracting Officer.

The Government reserves the right to procure the services of a third party Inspector to represent the Government's interests in the project. The inspector's responsibility will be to determine if the Contractor has adhered to the contract documents including all drawings and specifications.

The Contractor shall coordinate all work to incorporate third party and other inspections.

The Contractor shall:

Notify the Contracting Officer at least 7 calendar days prior to scheduled inspections and tests.

Notify the Contracting Officer when the Contractor suspends work for 5 calendar days or longer. If the Contractor suspends work for 5 or more calendar days, they shall not resume work without notifying the Contracting Officer of the work suspension, the reason for it, and providing justification for why the suspension should be lifted and work can resume.

Correct identified discrepancies within 5 calendar days (sooner if directed by the Contracting Officer), when notified in writing of any noncompliance based on the Contracting Officer's continuous evaluation, review, and verification of the Contractor's program.

1.8.3 Quality Control Documentation

The Contractor shall maintain a Quality Control Binder that shall be kept onsite and available for review by the Contracting Officer. The Quality Control Binder shall contain the following:

1. Table of Contents

2. Approved Quality Control Plan

3. Approved Submittals including the Technical Submittal Form (LF 317) and associated hard copies.

4. Factory Tests Reports

5. Field Test Reports

6. Inspection Reports

7. Bacteriological Test Reports

8. Equipment Calibration Sheets

9. Non-destructive test records

10. Hydrostatic test records

11. Completed Commissioning Reports

12. Special Certifications

13. Non-conformity reports

The binder shall be standard three ring type and shall be submitted to the Contracting Officer at the completion of the project. (Multiple binders shall be used as necessary.)

1.9 CONTRACTOR PERSONNEL REQUIREMENTS

1.9.1 Contractor, Subcontractors and Personnel

The Contractor shall furnish a list of contact personnel of the Contractor and subcontractors including addresses and telephone numbers to the Contracting Officer for use in the event of an emergency. As changes occur and additional information becomes available, correct and change the information contained in previous lists.

All Contractor on site workers and visitors to Langley Research Center shall be United States citizens.

The Contractor shall submit the Resumes for the Project Manager, Superintendent, and QC Representative to the Contracting Officer prior to commencement of work.

1.9.2 Project Management

This project requires the Contractor to assign a dedicated Project Manager (PM) to actively and aggressively manage the project from award thru completion. The PM shall be responsible for administrative matters associated with the project including but not limited to initial submittal log development, submittal development and submission, attendance at all required project meetings, development and maintenance of project schedules, monthly project status reports, Request for Information (RFI), email correspondence, scheduling of utility outages, verification of all materials which have been ordered and/or distributed to the site Superintendent. The PM shall be readily available to respond to the Contracting Officer's questions and/or concerns. The PM shall be onsite no less than 20 hours per regular work week when actual work is to be performed. **It is not acceptable for the field Superintendent to also serve as the Project Manager.** The Contractor's Project Manager shall have a minimum of five (5) years experience as a Project Manager on projects of similar size and complexity.

1.9.3 Project Superintendent

A competent Superintendent shall directly supervise all work performed on the contract. The Superintendent shall have the authority to act on the Contractor's behalf. The Superintendent is required to be on-site, except for incidental absences, at all times when actual work is to be performed. The Contractor shall provide the name of the Superintendent, in writing, to the Contracting Officer. All Superintendents shall have a minimum of five (5) years experience as a Superintendent on similar type projects.

1.9.4 Project Quality Control Representative

The Contractor shall assign a Quality Control (QC) Representative to the project. The QC Representative can be the Project Manager, the Project Superintendent or another specified individual as long as they meet the required qualifications. This individual shall have a minimum of 5 years past experience as a QC representative and training/education related to process system quality control. Responsibilities shall include but not be limited to material and component verification and control, system means and methods of installation, system verification, employee audits during material receipt, fabrication, and installation verifying company QC processes and procedures are followed, developing employee training and development of quality improvement initiatives.

1.9.5 Plumbing Workers' Qualifications

All plumbing work shall be performed by plumbing tradesmen who have in their possession a current Apprentice, Journeyman, or Master's plumbing license card, as issued by the Commonwealth of Virginia.

1.9.6 Mechanical Workers' Qualifications

All mechanical work shall be performed by mechanical tradesmen who have in their possession a current Apprentice, Journeyman, or Master's mechanical license card, as issued by the Commonwealth of Virginia.

1.9.7 Electrical Workers' Qualifications

All electrical work shall be performed by electrical tradesmen who have in their possession a current Apprentice, Journeyman, or Master's Electrical License Card, as issued by the Commonwealth of Virginia.

1.9.8 Identification Badges

Identification badges will be furnished, to the Contractor, without charge. The Contractor shall immediately report instances of lost or stolen badges to the Contracting Officer.

At all times while on LaRC property, the Contractor shall require its employees, subcontractor(s) and agents to wear badges which will be issued by the NASA Contract Badge and Pass Office, located at 1 Langley Boulevard (Building No. 1308). Badges will be issued only between the hours of 6:30 a.m. and 3:00 p.m., Monday through Friday. Temporary ID badges will be issued upon submission of a completed Langley Form 227, "Construction/Contractor Badge and/or Vehicle Permit Request". The Contractor will be held accountable for these badges and may be required to validate outstanding badges with the NASA LaRC Security Office. Immediately after employee termination or contract completion, badges shall be returned to the NASA Contract Badge and Pass Office.

1.10 WORK HOURS

The established hours of work at Langley Research Center are 7:00 a.m. to 4:30 p.m. Monday through Friday, excluding U.S. Government holidays and closings declared by Administrative or Executive Order.

The Contractor shall give at least three calendar days notice to the Contracting Officer and the Safety and Facility Assurance Branch of the date when the contract work will begin at the site.

No work shall be performed during other hours without prior authorization of the Contracting Officer.

All requests for authorized work outside of LaRC's established hours of work shall be submitted to the Contracting Officer or the Contracting Officer's authorized representative for approval a minimum of two calendar days prior to the commencement of work.

1.11 CORRESPONDENCE, SUBMITTALS AND INVOICES

All correspondence, submittals and invoices shall be clearly marked with the assigned contract number.

All correspondence to the Contracting Officer or Contract Administrator shall be addressed as follows:

Contracting Officer/Contract Administrator, Mail Stop 012
Contract NASA Contract No. To Be Determined (TBD)
NASA, Langley Research Center
Hampton, Virginia 23681-2199

All correspondence to the Contracting Officer Representative (COR) shall be addressed as follows:

COR, Mail Stop 141
Contract NASA Contract No. To Be Determined (TBD)
NASA, Langley Research Center
Hampton, Virginia 23681-2199

Certified payrolls shall be addressed as follows:

COD Contract Specialist, Mail Stop 142
Contract NASA Contract TBD
NASA, Langley Research Center
Hampton, Virginia 23681-2199

Submittals to the Safety and Facility Assurance Branch shall be addressed as follows:

Safety and Facility Assurance Branch, Mail Stop 305
Contract NASA Contract TBD
NASA, Langley Research Center
Hampton, Virginia 23681-2199

Submittals to the Environmental Management Branch shall be addressed as follows:

Standards Practice and Environmental Engineering Branch, Mail Stop 133

Contract NASA Contract TBD
NASA, Langley Research Center
Hampton, Virginia 23681-2199

The Contractor shall address all Technical Submittals as follows:

Contracting Officer, Mail Stop 012
Contract: NASA Contract No. TBD
NASA Langley Research Center
Hampton, Virginia, 23681-2199

The Contractor shall deliver all Technical Submittals to the following location:

Submittal Processing Team (SPT), Mail Stop 138
Contract: NASA Contract No. TBD
Building 1195B, Room 223
NASA Langley Research Center
Hampton, Virginia, 23681-2199

1.12 ELECTRONIC MAIL (E-MAIL) ADDRESS

The Contractor shall establish and maintain electronic mail (e-mail) capability along with the capability to open various electronic attachments in Microsoft and Adobe Acrobat. Within 10 days after contract award, the Contractor shall provide the Contracting Officer a single e-mail address for electronic communications related to this contract. The Contracting Officer may also use e-mail to notify the Contractor of base access conditions when emergency conditions warrant.

The Contractor shall promptly notify the Contracting Officer, in writing, of any changes to this e-mail address.

1.13 CLOSEOUT DOCUMENTS

1.13.1 As-Built Contract Drawings

The Contractor shall maintain a red-lined set of contract construction drawings that reflect current "As-Built" conditions in accordance with specification Section 01 33 00 SUBMITTAL PROCEDURES.

At the end of construction, the Contractor shall consolidate all changes to the drawings. The Contractor shall field verify that the drawings reflect actual conditions. The Contractor shall make all changes to the electronic drawing files using the electronic format of the original drawings. The Contractor shall then submit one full size set of as built drawings, one electronic set of the as built drawing files, and the complete set of the redlined drawing to the Contracting Officer.

1.13.2 Computerized Maintenance Management System (CMMS)

For each piece of new equipment, removed equipment, or replaced equipment; the Contractor shall complete the Computerized Maintenance Management System (CMMS) Software/Maintenance/Equipment Change Request Form, LF 491 (a PDF of LF 491 will be provided electronically at time of Contract Award). The Contractor shall submit the completed forms to the Contracting Officer.

1.13.3 Operation and Maintenance Documents

The Contractor shall consolidate and bind all of the Operation and Maintenance (O&M) documentation for all components stated within this specification to require O&M data. The Contractor shall refer to the individual technical sections for specific information. The documentation shall be installed in a three (3) ring binder for standard 8 ½ x 11 inch paper. Drawings shall be half size in 11 by 17 inch format and folded to fit in the binder. Each binder shall have a Table of Content and sections divided by component. The Contractor shall submit the completed hard copy binders as well as PDF files of Operation and Maintenance Manual as part of the closeout submittal at the end of the project. The Contractor shall provide multiple binders if needed.

The following is a list of typical documentation for components that require O & M information submitted. The Contractor shall provide all of the applicable information along with any other particular requirements stated in the individual technical sections. Not all of the documentation proposed below will apply to all of the components. The Contractor shall clearly mark information pertaining to the actual component used in the project when the Manufacture's information covers more than one component. The Contractor shall cross out or remove all extraneous information.

List of O & M Documentation:

1. Table of Contents

2. Catalog cut of equipment

3. Manufacturer's installation recommendations

4. Safety precautions

5. Environmental precautions

6. Material Safety Data Sheets (MSDS) associated with the equipment, material, and consumables.

7. Operating Procedures

8. Preventative and predictive maintenance instructions

9. Recommended maintenance procedures

10. Trouble shooting guidelines

11. Shop fabrication drawings

12. Software and logic information

13. Controls sequence

14. System P&ID

15. Recommended spare parts list

16. Warranty information with date of period commencement clearly stated

17. Points of contact for the vendor, supplier and manufacturer. Information shall include mailing address, email address, phone number and website address when available.

1.14 HANDLING/PROTECTION OF CONTRACTOR MATERIAL AND EQUIPMENT

All shipments shall be addressed to the Contractor and the Contractor shall be responsible for their receipt, unloading, handling, and storage at the site. The Contracting Officer will not accept deliveries on behalf of the Contractor or its subcontractors, nor assume any responsibility for security of materials, equipment or supplies delivered to the site.

The Contractor shall at all times protect and preserve all contractually required materials, supplies and equipment of every description (including property which may be Government-furnished or owned) and all work performed. If, as determined by the Contracting Officer, material, equipment, supplies and work performed are not adequately protected by the Contractor, such property may be protected by the Contracting Officer and the cost thereof will be charged to the Contractor.

When Government-owned equipment is to be utilized by the Contractor at the construction site, the Contractor shall jointly inventory such equipment with the assigned Inspector, mutually agreeing as to condition and quantities. Upon completion of the inventory, the Contractor shall accept the equipment and give the Contracting Officer a signed receipt. The Contractor shall be responsible for the equipment, its protection from damage, and availability for installation. The Contractor assumes full responsibility for such Government-owned equipment when it comes into its possession. The Contractor shall submit a record of existing conditions prior to use of Government-owned equipment.

1.15 UTILITY OUTAGES AND POWER CONNECTIONS

1.15.1 Utility Outages

Work shall be scheduled to hold outages to a minimum.

Utility outages required during the execution of work that affect existing systems shall be scheduled at the convenience of the Government. Any utilities or service connections made at other than normal working hours shall be at no additional cost to the Government.

Requests for utility outages and connections impacting Center Facilities shall be made, by the Contractor, in writing to the Contracting Officer at least 7 calendar days in advance of the time required.

The Contractor shall schedule all work necessitating utility shutdowns or outages with the Contracting Officer by submitting a written request for utility outage stating the date and time the desired interruption will commence, the anticipated period of interruption, and feeders and circuits to be interrupted. No interruption shall be made without authorization from the Contracting Officer. If a scheduled ongoing utility interruption looks like it will extend beyond the scheduled time frame and will extend into the regular working hours, the Contractor shall notify the Contracting Officer as soon as it appears the utility interruption may have to be extended into regular work hours.

1.16 ON-SITE GOVERNMENT/CONTRACTOR/SUBCONTRACTOR COORDINATION

The Prime Contractor shall be responsible for the coordination of work between its on-site Subcontractors.

The Contractor shall be responsible for familiarizing each of its subcontractors with all requirements (this includes administrative as well as technical) of the contract affecting each subcontractor, respectively. The Contractor shall be responsible for coordinating the work of its subcontractors or suppliers to prevent any interference or omission. The divisions or sections of the specifications shall not be interpreted as limiting or defining the work for purposes of dividing the work among subcontractors, or to limit the work performed by any trade.

The Contractor shall be responsible to the Contracting Officer for acts and omissions of its own employees and of subcontractors and their employees. The Contracting Officer will not undertake to settle any differences between the Contractor and its subcontractors, or between subcontractors. All business pertaining to the contract shall be conducted through the Contracting Officer.

The Contractor shall afford other contractor(s) reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work. The Contractor shall conduct its work so as not to impede or interfere with the work of such other contractors or persons engaged in or about the site. Whenever any work performed by the Contractor adjoins or affects any work by any other contractor(s), the Contracting Officer will decide any disputes between the Contractor and such other contractor. The Contracting Officer's decision, in writing, shall be final and conclusive upon both parties.

If the Contractor causes damage to the work or property of any other contractor on the project, the Contractor shall, upon due notice, repair such damage or pay for such repair as directed by the Contracting Officer.

The Contractor shall not endanger any work of any other contractors by cutting, excavating or otherwise altering any work of any other contractor, except with the written consent of the Contracting Officer.

The Contractor shall refer all disputes with other on-site contractors that cannot be resolved to the Contracting Officer for resolution.

1.17 PROJECT SCHEDULE

Within 14 calendar days of Notice to Proceed, the Contractor shall submit a Project Schedule in Microsoft Project. The schedule shall include each task, duration, start date, and completion date.

At a minimum the Contractor shall track the following items:

Planned Procurement Start
Planned Construction Start
Planned Construction Complete
Outages
Site Acceptance Test
Planned Complete
Scheduled Project Status Meetings

The Contractor shall update the schedule every 30 days and after a Change

Order approved by the Contracting Officer. All modifications made by the Contractor shall be accompanied by an explanation. The Contractor shall submit the updated schedule to the Contracting Officer for approval.

1.18 MEETINGS

1.18.1 Meeting Prior to Notice to Proceed (NTP)

The Contractor shall attend a meeting with the Contracting Officer to review the contract specifics and receive the Notice to Proceed.

1.18.2 Project Kick-Off Meeting

The Contractor shall prepare and present a Kick-Off Meeting after the official Notice to Proceed and before any work is started. The Kick-Off Meeting shall include all of the Stakeholders associated with the project.

Participants in the meeting shall include, at a minimum, the Contractor, all second and third tier subcontractors, design engineers, third party inspectors, Safety representative, Procurement representative, the Contracting Officer and the Customer representatives.

1.18.2.1 Kick-Off Meeting Agenda

The following shall be covered in a typical Kick-Off Meeting:

1. Introduction of the Stakeholders

2. Review of the Scope of Work

3. Brief review of the Design Documents

4. Discussion about any special issues pertaining to Safety, Environmental, Facility specific procedures, system shut down requirements, long lead items, special scheduling, critical lifts and any security concerns.

5. Discussion of how these issues will be addressed during the project

6. Presentation of the Construction Schedule

7. Review of action Items

1.18.3 Meeting Minutes

The Contractor shall compile Meeting Minutes for all formal meetings and for informal meetings where changes to the existing project are agreed to, documenting the meeting attendees, major points of discussions, action items, responsible parties for each action and agreed dates for addressing the issues. The Contractor shall email the Meeting Minutes to the Contracting Officer and attendees within 7 calendar days after the meeting. The Contractor shall allow 7 calendar days for comments or corrections from attendees.

1.18.4 Project Status Meetings

The Contractor shall attend weekly project meetings scheduled by the Contracting Officer. The Contractor's Project Manager (PM) and Superintendent shall attend scheduled project meetings.

1.18.5 Progress Reports

The Contractor shall submit a progress report every 30 days. The Report shall address potential factors of delay, deficiencies, material, delivery schedules, submittals, and safety issues. The Contractor shall email the Progress Reports to the COR within 7 calendar days after the end of month.

The Progress Report shall include the following information:

1. Summary of the Project Scope of Work
2. Schedule update
3. Summary of Work completed in the period since the last report
4. Description of work to be performed during the upcoming period
5. Progress evaluation comparing status vs. planned
6. Description of any problem areas
7. Corrective actions and mitigation plans
8. New and outstanding Action Items
9. Summary of major Milestones with associated dates

1.19 WARRANTY

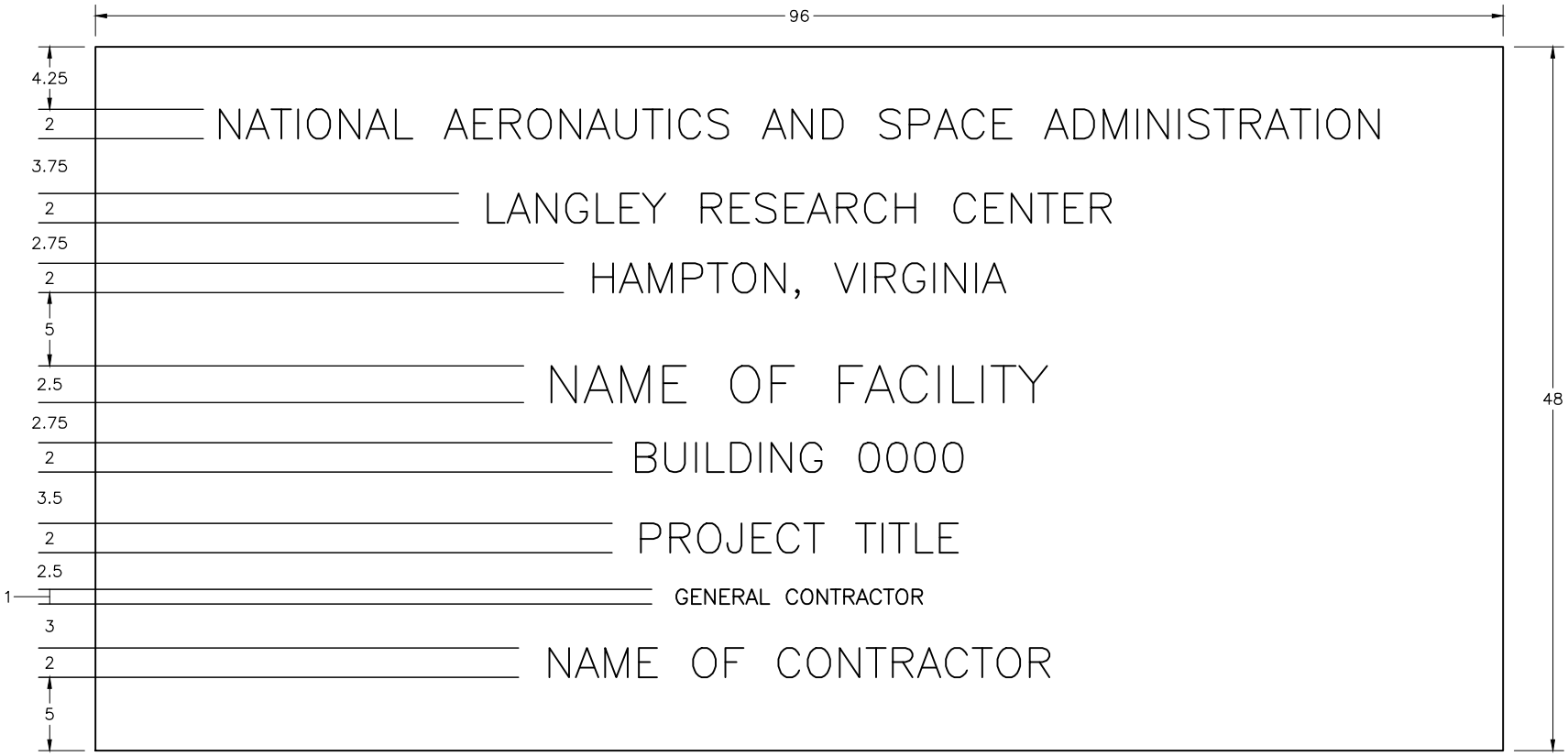
The Contractor shall furnish workmanship and performance warranty for the work performed for a period not less than 1 year from the date of Contracting Officer's acceptance of the work.

The Contractor shall perform corrective action that becomes necessary because of defective materials and workmanship while system is under warranty within 7 days after notification, unless additional time is approved by the Contracting Officer. Failure to perform repairs within the specified period of time constitutes grounds for having the corrective action and repairs performed by others and the cost billed to the Contractor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

-- End of Section --



ALL DIMENSIONS IN INCHES

ATTACHMENT 1 – PROJECT SIGN

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SECTION 01 33 00

SUBMITTAL PROCEDURES
01/14

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 Government Approval of Specifications with a "G" Designation

The Contractor shall forward all submittals required by this Specification to the Contracting Officer. The Contracting Officer will assign the review and approval authority for each submittal. Submittals with a "G" designation will require additional Government review.

1.1.2 Submittal Descriptions (SD)

Submittals requirements are specified in the technical and administrative sections. Submittals are identified by SD numbers and titles as follows.

SD-01 Preconstruction Submittals

Submittals which are required prior to a notice to proceed on a new contract. Submittals required prior to the start of the next major phase of the construction on a multi-phase contract. The submittals required prior to the commencement of the construction phase. This includes, but is not limited to Insurance Documents, Surety Bonds, Permits, Quality Plans, Personnel Lists, Worker's Qualifications, Safety Plans, Schedule of Values, and Work Plans.

SD-02 Shop Drawings

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-05 Design Data

Design calculations, mix designs, analyses or other data pertaining to a part of work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a product has been tested in accordance with specified requirements.

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports.

Final acceptance test and operational test procedure.

SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that the product meets specification requirements. Must be dated after award of project contract and clearly name the project.

SD-08 Manufacturer's Instructions

Documentation provided by the Manufacturer of the equipment that explains the recommended way to handle, and install the equipment. This includes special care instructions, safety considerations, and best practices.

If the design states that the installer shall follow the Manufacturer's recommendations, then the specific instructions requirements need to be listed.

SD-10 Operation and Maintenance Data

Data furnished by the Manufacturer or, their representative that provides instruction to the user on the operation and maintenance of the equipment. This includes consumables required, recommended spare parts lists, operation instructions, operation limits, equipment drawings, preventative maintenance schedules, special tools needed, and safety warnings.

Each section shall list the requirements for the O & M data specific to the equipment addressed in that section. When developing the design documents, it is good practice to review the requested information and format of the O & M data with the actual individuals who will be responsible for the equipment.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements. Special requirements necessary to properly close out a construction contract. This includes as-built drawings, spare parts lists, configuration and control documents, completed submittal register, lessons learned documentation, completed test reports, and completed Acceptance Tests.

1.2 USE OF SUBMITTAL REGISTER

At the end of this section is a submittal register showing items, equipment

and materials for which submittals are required by the specifications; this list may not be all inclusive and additional submittals may be required.

The Contractor shall update, maintain and ensure the accuracy of the submittal register throughout the duration of the Project.

Register will have the following fields completed.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-02 Shop Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

Column (f): Government approval is required for submittals with a "G" designation.

Prepare and maintain submittal register, as the work progresses. Do not change data which is output in columns (c), (d), (e), and (f) as delivered by Government; retain data which is output in columns (a), (g), (h), and (i) as approved.

1.2.1 Contractor Action Code

Entries used shall be as follows (others may be prescribed by Transmittal Form):

AC - Approved with corrections

A - Approved

R - Returned for Corrections

1.3 PROCEDURES FOR SUBMITTALS

1.3.1 Reviewing, Certifying, Approving Authority

Contracting Officer shall be responsible for reviewing and certifying that submittals are in compliance with contract requirements. Approving authority on submittals is the Contracting Officer unless otherwise specified.

1.3.2 Constraints

a. When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, submittal will be returned without review.

b. Approval of a separate material, product, or component does not imply approval of assembly in which item functions.

1.3.3 Scheduling

a. Coordinate scheduling, sequencing, preparing and processing of

submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential requirements to resubmit.

b. Except as specified otherwise, allow review period, beginning with receipt by approving authority, that includes at least 21 calendar days. Period of review for submittals with Contracting Officer approval begins when Government receives submittal from QC organization. Period of review for each resubmittal is the same as for initial submittal.

1.3.4 Variations

Variations from contract requirements require approval from the Contracting Officer pursuant to contract Clause entitled "FAR 52.236-21, Specifications and Drawings for Construction" and will be considered where advantageous to Government.

1.3.4.1 Considering Variations

When contemplating a variation which results in lower cost, consider submission of the variation as stipulated in FAR 52.248-3 - Value Engineering Construction.

1.3.4.2 Proposing Variations

When proposing variation, deliver written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government. If lower cost is a benefit, also include an estimate of the cost saving. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

1.3.4.3 Warranting That Variations Are Compatible

When delivering a variation for approval, Contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.3.5 Contractor's Responsibilities

a. Determine and verify field measurements, materials, field construction criteria; review each submittal; and check and coordinate each submittal with requirements of the work and contract documents.

b. Transmit submittals to Contracting Officer in accordance with schedule on approved Submittal Register.

c. Advise Contracting Officer of variation, as required by paragraph entitled "Variations."

d. Correct and resubmit submittal as directed by approving authority. When resubmitting disapproved transmittals or transmittals noted for resubmittal, the Contractor shall provide copy of that previously submitted transmittal including all reviewer comments for use by approving authority.

e. Ensure no work has begun until submittals for that work have been

returned as "approved," or "approved as noted", except to the extent that a portion of work must be accomplished as basis of submittal.

1.3.6 Contracting Officer's Responsibilities

a. Note date on which submittal was received.

b. Review submittals within scheduling period specified.

c. Identify returned submittals with one of the actions defined in paragraph entitled "Actions Possible".

1.3.7 Actions Possible

Submittals will be returned with one of the following notations:

a. Submittals marked "approved" authorize Contractor to proceed with work covered.

b. Submittals marked "approved with corrections" authorize Contractor to proceed with work as noted provided Contractor takes no exception to the notations.

c. Submittals marked "returned for corrections" indicate submittal is incomplete or does not comply with design concept or requirements of the contract documents and shall be resubmitted with appropriate changes. No work shall proceed for this item until resubmittal is approved.

1.4 SUBMITTAL PREPARATION

The Contractor shall address all Technical Submittals as follows:

Contracting Officer, Mail Stop 012
Contract: NASA Contract No. TBD
NASA Langley Research Center
Hampton, Virginia, 23681-2199

The Contractor shall deliver all Technical Submittals to the following location:

Submittal Processing Team (SPT), Mail Stop 138
Contract: NASA Contract No. TBD
Building 1195B, Room 223
NASA Langley Research Center
Hampton, Virginia, 23681-2199

1.4.1 Transmittal Form

The Contractor shall turn in all required submittals with the NASA Langley Form 317, "Technical Submittal Form" as a cover sheet. The Contracting Officer will provide the latest version of the Form to the Contractor prior to the Notice to Proceed. The Contractor shall follow all instructions accompanying the form.

1.4.2 Submittal Format

Submittals SD-01, 03, 05, 06, 07, 08, 09, 10, and 11 shall be in 8 1/2" by

11" Format.

Drawings for Submittals SD-02, and any other drawings as part of other submittals, shall be in 11" X 17" format or as indicated. Include on each drawing the drawing title, number, date, and revision numbers and dates. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Shop drawing dimensions shall be the same unit of measure as indicated on the contract drawings.

Submittals shall be bound by sections and clearly labeled.

Product Model shall be clearly indicated on all copies. Product data shall include the manufacturer's name, trade name, and place of manufacture. Submittals shall also include applicable federal, military, industry and technical society publication references. Submit proof of requested compliance with industry and technical society reference standards, of the organizations such as American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), and Association of Edison Illuminating Companies (AEIC). The label or listing by the specified organization will be acceptable evidence of compliance.

All options shall be clearly marked.

Submittals shall include all graphs, charts and calculations required to show that it meets the specifications.

Submit installation instructions provided by the manufacturer.

1.4.3 Quantity

Unless otherwise stated, the Contractor shall submit 6 sets of the required submittal to the Contracting Officer.

1.4.4 Electronic Submittals

The Contractor shall provide submittals electronically in Portable Document Format (PDF) unless otherwise specified.

At the initial Kick Off Meeting, the Contracting Officer and the Contractor's Representative shall determine what submittals can be delivered electronically and what submittals need to be in hardcopy format. Instructions for electronic submittals:

The Contractor shall compile an email and send it to the Submittal Processing Team (SPT). It shall include the following information:

1. Project Number
2. Project Name (also include in the email subject line)
3. Description of the submittal (s)
4. Name of the responsible individual / Contractor's point of contact for the submittal
5. Date when the submittal is expected to be returned to the Contractor
6. Electronic attachment of the submittal documents
7. Electronic copy of the completed Technical Submittal form, NASA Langley Form 317

The data size of the attachments shall be no greater than 5 Mb per email.

Larger attachment sizes can be provided by Large File Transfer (LFT).

When the submittals are made in electronic format, multiple hard copies are not required unless specifically requested by the Contracting Officer.

1.5 APPROVED SUBMITTALS

Upon completion of review of submittals, the submittals will be identified as having received approval by being so stamped and dated. Five copies of the submittal will be retained by the Contracting Officer and one copy of the submittal will be returned to the Contractor.

The Contracting Officer's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted proposal. After submittals have been approved by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.6 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

1.7 SCHEDULING

Adequate time (a minimum of 21 calendar days exclusive of mailing time) shall be allowed and shown on the register for review and approval. No delay damages or time extensions will be allowed for time lost in late submittals.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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CONTRACT NO.
CTN000188

TITLE AND LOCATION
DESIGN FOR POTABLE WATER SUPPLY-PHASE 2 FY'16 MINOR CoF

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
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		01 30 00.00 41	SD-01 Preconstruction Submittals															
			List of Contact Personnel of the	1.9.1														
			Contractor and Subcontractors															
			Resumes for the Project	1.9.1														
			Manager, Superintendent, and QC															
			Representative															
			Quality Control Plan	1.8.1														
			Project Management Plan	1.7														
			Plumbing Workers' Qualifications	1.9.5														
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			Qualifications															
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			Project Schedule	1.17														
			Project Schedule	1.17														
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			Utility Connection Requests	1.6.1														
			Excavation Permits	1.6.2														
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			Digital Photographs	1.5														
			Meeting Minutes	1.18.3														
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			SD-10 Operation and Maintenance															
			Data															

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		01 30 00.00 41	Operation and Maintenance	1.13.3														
			Manual															
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			Quality Control Binder	1.8.3														
			As-Built Contract Drawings	1.13.1														
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			Safety Plan	1.5.1														
			Application for Work on	1.7.1														
			Energized Electrical Circuits Below															
			600 Volts															
			Electrical Safety Workers'	1.7.2														
			Qualifications															
			Asbestos Operational Procedure	1.15.3														
			Application for Making	1.7.1														
			Connections to Government															
			Electrical Utilities															
			Energized Substation Work Plan	1.7.1														
			Power Utility Outage Request	1.7.1														
			LaRC Energized Electrical Work	1.7.1														
			Permit Form LF 416															
			List of Riggers	1.18.1														
			List of Trained Confined Space	1.9														
			Workers															
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			LF 461, Environmental Project	3.1.1	G													
			Planning Form															

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		01 35 40.00 41	Erosion and Sediment Control	3.3.3	G													
			Plan (ESC Plan)															
			Disposal of Chlorinated Water	3.3.8	G													
			Plan															
			SD-07 Certificates															
			Asbestos Manifest	3.6	G													
			Asbestos Return Manifest	3.6	G													
			Shipping Document	3.8.2	G													
			SD-11 Closeout Submittals															
			Project Materials Usage	3.4.3	G													
			Spreadsheet and MSDS's															
			Construction and Demolition	3.9.2	G													
			Debris Recycling/Diversion Report															
		03 30 00.00 41	SD-03 Product Data															
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			SD-06 Test Reports															
			Compressive strength tests	3.9.2.3														
			Slump	2.7.4														
			Air Entrainment	2.7.1														
		26 05 00.00 41	SD-01 Preconstruction Submittals															
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		26 05 00.00 41	Wire and Cable	2.2														
			Splices and Connectors	2.3														
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			Outlets, Outlet Boxes, and Pull	2.5														
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		31 23 00.00 41	SD-01 Preconstruction Submittals															
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			Dewatering work plan	1.6.2														
			SD-06 Test Reports															
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			Select material	3.12.2.2														
		33 11 00	SD-03 Product Data															
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			Valves	2.2														

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		33 11 00	Valve boxes	2.6.1.1														
			SD-06 Test Reports															
			Disinfection	2.6.1.2	G													
			SD-08 Manufacturer's Instructions															
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			Performance Verification Test	3.5.2														
			(PVT)															
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			RS-485 To Ethernet Converter	2.5														
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04/15

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SECTION 01 35 26.00 41

NASA LANGLEY SAFETY REQUIREMENTS
04/15

PART 1 GENERAL

1.1 LARC SAFETY INFORMATION

1.1.1 Safety and Health Information

1.1.1.1 Commitment to Safety and Health

The Contractor shall comply with all rules and regulations established for individuals working on Center.

1.1.1.2 Safety and Health Culture

Safety at LaRC is of paramount concern. We assure a commitment to safety by employing systems and processes that ensure the safety of the public, the employees, and assets. We ensure safety in all aspects of personal endeavors and we are committed to ensuring the safety of others. We take ownership for safety. We know every accident is preventable.

The Contractor shall instruct all of its employees and all of its subcontractor employees of the hazards and the precautions to be taken in the performance of this construction contract. The Contractor shall provide and maintain work environments and procedures, which shall safeguard your employees, subcontractor employees, the public, Government personnel, and Government property, materials, supplies, and equipment exposed to Contractor operations and activities.

1.1.1.3 Construction Safety and Health Goals

The provisions of this section shall be implemented by the Contractor to ensure:

a. Everyone involved in this project goes home as healthy as they arrived.

b. The construction worksite is free of recognizable hazards.

c. No lost-time or other recordable injuries or illnesses occur on the worksite.

1.1.1.4 Construction Safety Strategy

In order to meet the goals stated above, every individual working at the worksite, including primary contractor and subcontractor personnel and vendors, shall:

a. Be involved in making this project a safe one.

b. Know how to identify hazards and the steps to take to have them corrected.

c. Know their safety and health training needs, obtain the training, and

put the concepts of what they have learned to work while working on this project.

1.1.1.5 Compliance

The Contractor shall comply with all applicable state, federal (including OSHA 29 CFR 1910 and 29 CFR 1926), Agency, and LaRC occupational safety and health rules, regulations, and standards to ensure the safety and health of all persons in or near the worksite, and to prevent damage to property, materials, supplies, and equipment.

1.1.1.6 LaRC Definition of Construction Work

- o Chemical, paint or solvent usage
- o Pressure/vacuum systems/vessels and compressed air
- o Cryogenic, nitrogen, oxygen systems, and other gas distribution systems
- o Exhaust or ventilation systems, spray booths, fire/smoke dampers, and fume hoods
- o Eyewash stations
- o Walls/ceilings, partitions, stairs or doors
- o Pipe/duct insulation, HVAC systems or galvanized steel
- o Tile and carpet
- o Elevators, cranes or other lifting devices
- o Plumbing
- o Electrical wiring/systems, transformers, and switchgear equipment, and power transmission lines/systems
- o Sanding, cutting, or welding, including hot work
- o Roofing work
- o Confined spaces
- o Exit signs, emergency lighting, gas monitoring systems, smoke detection, fire suppression, fire hydrants, water mains or other piping that supplies fire
- o Roadways, sidewalks, curbs, airfields, and gutters/sewers
- o Irrigation or drainage systems
- o Dirt (earth) digging, shoring, and trenching
- o Pyrotechnics/explosives
- o Any aero or space flight labs/assembly, test facility associated equipment (e.g., simulators, clean rooms, lasers, anechoic chambers)
- o Surveying
- o Clearing of land by cutting, removing, burning or other disposition of trees/shrubbery
- o Environmental, waste profiling, and/or air and water permit testing via sample collections.

Any individual involved in any of the activities listed above shall be considered a construction worker and shall attend the Safety Briefing prior to beginning work on LaRC. This includes employees of all prime contracts and their subcontractors.

This does not apply to individuals performing the following:

- o Office work
- o Maintenance to office equipment, such as copiers, fax machines, computers
- o Aircraft and vehicle repairs
- o Job estimates/bid proposals
- o Off-site assembly/manufacturer of structures/systems for delivery to LaRC
- o Maintenance personnel currently working on-site under a support

service contract requiring them to perform daily work on the Center.
- o The quick delivery or pickup of machinery and equipment where as the driver will not be tasked to perform the duties of an equipment operator on the jobsite.

Any scheduled work not falling into either of the above classifications shall be brought to the attention of the LaRC Safety Manager for a decision on classification.

1.2 SUMMARY

The requirements of this Section apply to, and are a component part of, each section of the specifications.

1.3 REFERENCES

The publications listed below form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only.

The listed versions of the following references were used during the development of this design and are the Government approved versions to be used herein. There may be newer versions of certain references that have been released since the commencement and/or approval of the design effort. However, in order to comply with the Government technical requirements, not all of the latest versions of the listed references were adopted and the versions listed herein shall be utilized.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO MUTCD-1	(2009) Manual on Uniform Traffic Control Devices

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

ANSI ASC A14.1	(2007) American National Standards for Ladders - Wood Safety Requirements
ANSI ASC A14.2	(2007) American National Standards for Ladders - Portable Metal - Safety Requirements
ANSI ASC A14.5	(2007) American National Standards for Ladders - Portable Reinforced Plastic - Safety Requirements

ASME INTERNATIONAL (ASME)

ASME B15.1	(2000; R 2008) Safety Standard for Mechanical Power Transmission Apparatus
ASME BPVC SEC I	(2010) BPVC Section I-Rules for Construction of Power Boilers
ASME BPVC SEC VIII	(2010) Boiler and Pressure Vessel Codes: Section VIII Rules for Construction of Pressure Vessel

ASTM INTERNATIONAL (ASTM)

ASTM E1368	(2014) Visual Inspection of Asbestos Abatement Projects

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

LANGLEY RESEARCH CENTER (LaRC)

LAPD 1700.7	(March 2011) Traffic Management
LPR 1710.10	(August 2013) Langley Research Center Energy Control Program (Lockout/Tagout)
LPR 1710.11	(July 2010) Fire Protection Program
LPR 1710.17	(July 2010) Respiratory Protection Program
CID (LPR) 1740.2	(February 2014) Facility Safety Requirements
LPR 1740.6	(January 2014) Personnel Safety Certification
LPR 8500.1	(May 2014) Environmental and Energy Program Manual

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

NASA-STD-8719.9	(2012) Standard for Lifting Devices and Equipment
NASA-STD-8719.11	(2008) NASA Safety Standard for Fire Protection

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2013) Standard for Portable Fire Extinguishers
NFPA 30	(2015) Flammable and Combustible Liquids Code
NFPA 31	(2011) Standard for the Installation of Oil-Burning Equipment
NFPA 51	(2013) Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes
NFPA 51B	(2014) Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 54	(2015) National Fuel Gas Code
NFPA 58	(2014; TIA 13-1; TIA 13-2; Errata 13-1; TIA 13-3; Errata 14-2) Liquefied Petroleum Gas Code

NFPA 101	(2015) Life Safety Code
NFPA 211	(2013) Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances

STATE OF VIRGINIA ADMINISTRATIVE CODE (VAC)

13 VAC-5-51	Virginia Statewide Fire Prevention Code

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1904	Recording and Reporting Occupational Injuries and Illnesses
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.1200	Hazard Communication
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR Subpart P	Appendixes A through F
40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 763	Asbestos

1.4 SUBMITTALS

The Contractor shall submit the following to the Contracting Officer in accordance with the requirements of Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Safety Plan

Application for Work on Energized Electrical Circuits Below 600 Volts

Electrical Safety Workers' Qualifications

Asbestos Operational Procedure

Application for Making Connections to Government Electrical Utilities

Energized Substation Work Plan

Power Utility Outage Request

LaRC Energized Electrical Work Permit Form LF 416 (Submit only if work will be performed on energized electrical systems)

List of Riggers

List of Trained Confined Space Workers

1.5 GENERAL SAFETY REQUIREMENTS

1.5.1 Safety Plan

On-site work shall not commence prior to the Contracting Officer's and Safety approval of the Safety Plan.

The Contractor safety plan is a written plan prepared by the Contractor summarizing the overall safety program that will cover the employees and equipment used to fulfill the contract. The safety plan shall address all aspects of the contract performance to include manufacturing, construction, transportation, and testing. It is not intended that the Contractor's normal industrial home-plant safety rules and directives be subject to NASA approval; however, it is intended to ensure that the Contractor has an adequate safety program for on-site work. Attachment 1, Safety Program Guide, to this section provides a list of items required to be addressed in the safety plan; however, additional safety procedures may be required, depending on the scope of work, environmental conditions or area of operation.

The safety plan shall contain a brief summary and scope of the work to be performed.

The Contractor's safety representative, responsible for ensuring compliance with all applicable rules and regulations, shall be identified in the safety plan.

1.5.2 Recordkeeping

The Contractor shall maintain a log and summary of all recordable occupational injuries and illnesses for their company, on an OSHA Form 300, "Log of Work-Related Injuries and Illnesses," and OSHA Form 300A, "Summary of Work-Related Injuries and Illnesses," or their equivalent at a central place. The on-site Contractor shall have the address and telephone number of the central place where the OSHA 300 and 300A logs are maintained and shall have personnel available at the central place during normal business hours to provide information from the records maintained there, by telephone or mail. (OSHA 29 CFR 1904)

The Contractor shall maintain a Contractor Safety and Health Log. Attachment 3, Contractor Safety and Health Log, to this section shall be used to submit the required information. The Contractor Safety and Health Log shall be submitted 30 calendar days after notice to proceed and monthly thereafter in accordance with Section 01 33 00.

1.5.3 Safety Briefing

All Contractor and Subcontractor employees shall attend a Safety Briefing conducted by the Safety and Mission Assurance Office (SMAO) in Building 1308, the Badge and Pass Office Conference Room, or other area designated by the SMAO, Langley Research Center (LaRC), prior to any on-site activity. Briefings are conducted daily at 7:30 a.m. This effort will be coordinated with the required badging activity. The prime contractor shall provide a list of all prime and subcontractor personnel to the LaRC Badge and Pass Office to acquire badges.

1.5.4 Inspections

In accordance with Section 107 of the Contract Work Hours and Safety

Standards Act, a representative of the NASA Langley Research Center shall have the right of entry to any on-site area of contract performance to ensure compliance with all applicable rules and regulations (OSHA 29 CFR 1926.3).

Any condition that threatens the safety or security of: (1) personnel, (2) Government property or equipment, or (3) information, or any conditions that affect LaRC's environmental compliance may be subject to immediate work stoppage by the Contracting Officer(CO), the Contracting Officer(CO)'s Representative (COR), or the CO's designated inspection representative, and shall not resume until directed by the Contracting Officer.

1.5.5 Housekeeping

During the course of construction, alteration, or repairs, the Contractor shall keep form and scrap lumber with protruding nails, and all other debris cleared from work areas, passageways, and stairs, in and around buildings or other structures.

The Contractor shall remove combustible scrap and debris shall be removed at regular intervals during the course of construction. Safe means shall be provided to facilitate such removal.

1.5.6 Illumination

The Contractor shall light construction areas, aisles, stairs, ramps, runways, corridors, offices, shops, and storage areas where work is in progress with either natural or artificial illumination (OSHA 29 CFR 1926.26).

1.5.7 Ladders

The Contractor shall provide ladders compliant with ANSI A14: wood ladders (ANSI ASC A14.1), metal ladders (ANSI ASC A14.2), fiberglass ladders (ANSI ASC A14.5), and OSHA 29 CFR 1926.1050, 29 CFR 1926.1051, and 29 CFR 1926.1053.

1.5.8 Motor Vehicles and Mechanized Equipment

All contractor-owned vehicles shall abide by LaRC traffic regulations in accordance with LAPD 1700.7, "Traffic Management," and OSHA regulations in accordance with OSHA 29 CFR 1926.600 through 1926.606.

1.5.9 Hazardous Materials

In accordance with OSHA 29 CFR 1910.1200, the Contractor shall have a hazardous communications program, when applicable, available for each chemical, oil, lubricant, or solvent used on the job-site.

1.5.10 Inclement Weather Conditions

In the event of a severe storm warning, or indications of impending severe weather (e.g., damaging wind, heavy rains, floods, tornados, hail, lightning or snow), the Contractor shall monitor weather conditions and take appropriate precautions including but not limited to:

a. Secure outside equipment and materials that should not be exposed to or contaminated with dirt, water, etc., including mechanical, electrical, and electronic equipment.

b. Check the worksite, including roofs, if applicable, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities or structures.

No construction activities shall be conducted if the Center has been closed to on-site employees. The Contractor shall call the LaRC Emergency Announcement System at 757-864-2111 or 1-888-664-2111 (toll free number) to check on Center status during inclement weather conditions.

1.6 SAFETY CLEARANCE PROCEDURES/LOCKOUT/TAGOUT

All contractors performing work at Langley Research Center (LaRC) shall comply with the safety clearance procedures described in LPR 1710.10, "Langley Research Center Energy Control Program (Lockout/Tagout)." Failure to comply with LPR 1710.10 will result in the exclusion of the individual responsible for violating LPR 1710.10 from LaRC. The LaRC Lockout/Tagout procedures involve the use of red tags, red locks, associated locking hardware, LaRC issued personal locks, and LaRC issued lock boxes.

Lockout/Tagout Overview

(Terminology: "Protected Person" refers to any person who after placing a personal lock on the lockout/tagout where required becomes protected by a lockout/tagout; "Responsible Person" refers to a person who has lockout/tagout responsibility for a group of protected persons; and "Requester" refers to the individual who requests the lockout/tagout. The requester may be an individual who only has lockout/tagout responsibility for him/herself or may be the responsible person who has lockout/tagout responsibility for a group of workers.)

When lockout/tagout is required, the requester contacts the Facility Coordinator who is responsible for the system/item requiring lockout/tagout. The Facility Coordinator then contacts a qualified Safety Operator who performs the required lockout/tagout. At LaRC, the only persons authorized to perform lockout/tagout are Safety Operators who have in their possession a current NASA Langley Form 453, "NASA Langley Safety Operator Permit." Once the lockout/tagout has been completed, the Safety Operator contacts the requester, communicates the limits of the lockout/tagout, demonstrates the effectiveness of the lockout/tagout, and delivers red tag stub(s), lock box when required, and personal lock(s) to the requester. When the requester no longer requires the protection of the lockout/tagout, he/she signs the red tag stub(s) and delivers the signed red tag stub(s), the lock box if used, and personal lock(s) to the Facility Coordinator. The Facility Coordinator contacts the Safety Operator who clears the lockout/tagout.

1.7 ELECTRICAL SAFETY

The Contractor shall comply with LPR 1710.6 Electrical Safety.

1.7.1 Submittals

The Contractor shall submit an Application for Work on Energized Electrical Circuits Below 600 Volts 72 hours prior to each instance of working on energized circuits.

The Contractor shall submit an Application for Making Connections to Government Electrical Utilities 72 hours prior to each instance of connecting to government electrical utilities.

The Contractor shall submit an Energized Substation Work Plan 72 hours prior to each instance of work in a substation.

The Contractor shall submit a Power Utility Outage Request 72 hours prior to each requested power outage.

The Contractor shall submit an LaRC Energized Electrical Work Permit Form LF 416 prior to each instance of working on energized circuits.

1.7.2 Electrical Safety Workers' Qualifications and Duties

o The Contractor shall ensure that all appointed safety workers be electrical tradesmen who have in their possession a current Apprentice, Journeyman, or Master's Electrical License Card, as issued by the Commonwealth of Virginia.

o The Contractor shall appoint a Safety Supervisor knowledgeable of contract safety requirements specified herein. The Safety Supervisor shall be available at the worksite during all work and shall be responsible for the safety of each of the Contractor's work teams.

o The Contractor shall appoint an Assistant Safety Supervisor who shall take over the responsibilities and perform all duties of the Safety Supervisor if the Safety Supervisor is not present.

o The Contractor shall furnish to the Contracting Officer, in writing, the names and qualifications of the Safety Supervisor and Assistant Safety Supervisor prior to commencement of work. This submittal is in addition to the Safety Plan required above.

o When working in energized substations, manholes, and cable tunnels, the Contractor shall:

- Assign an employee knowledgeable of the safety required, and without other duties, to assist the Safety Supervisor to assure the safety of the work area whenever the work involves the handling of lengths of conduit, bus, steel or large equipment.

- Assign additional employees, knowledgeable of the safety required and without other duties, for the protection of the workers when the work is so divided and extensive that one safety employee cannot effectively maintain the safety surveillance over the workers and their operations.

- Ensure no work is performed without a minimum of two (2) employees present in any one-work team, one of which shall be a safety team leader.

1.8 UNDERGROUND UTILITIES AND OPERATIONS

1.8.1 General

Mylar detectable tape or its equivalent shall be used in all installations and maintenance tasks for buried underground utilities at LaRC; this includes the laying of detectable tape approximately 6 inches below the surface of the ground directly above the buried utility line.

1.9 EXCAVATION OPERATIONS

All excavation, trench-work, bedding, testing and backfilling shall be done in the presence of the Contracting Officer or designated representative, who shall be notified by the Contractor two working days in advance of the work.

The methods of excavation, the means of earth support, and the manner of backfill shall be conducted with primary consideration for the safety of the personnel and the work. Minimum requirements for excavations/ trenching/shoring/bracing activities shall be in accordance with OSHA 29 CFR 1926.650 through 1926.652 and OSHA 29 CFR Subpart P, Appendixes A through F. Excavation shall be performed in a manner to prevent surface water and subsurface or groundwater from flowing into the excavations and to prevent water from flooding the conduit trench and any adjacent or surrounding area.

The Contractor shall provide a List of Trained Confined Space Workers to the Contracting Officer prior to any work being performed in an excavation.

1.10 ROADWAY EXCAVATION PROTECTION

The Contractor shall ensure steel plates used to cover excavations up to 6 feet wide in roadways shall be sufficient to safely support a 32,000-pound wheel load. For example: A 6-foot-wide opening at the road surface requires a reinforced steel plate, one-inch-thick, with 18 inches of bearing on each side, with 3/4-inch-diameter steel pins anchoring the plate to the pavement in the four corners. The excavation shall be shored and braced from within 4 inches of the steel plate to the bottom of the excavation.

The Contractor shall continuously barricade excavations and openings within 20 feet of the edge of the roads, parking lots and pedestrian routes. The Contractor shall furnish and install battery powered flasher type warning lights on a maximum spacing of 15 feet, but not less than one flasher every 8 feet on each side of any road excavation or opening.

1.11 DIGGING PERMITS

For personnel safety, to prevent the possible interruption of major utility services and to avoid impacts to archaeological resources encountered during excavation, the following procedures and practices shall be followed:

> Prior to the Contractor performing any excavation or making any penetrations into the ground 6 inches or deeper (such as driving stakes or probes) in either the East or West Area of Langley Research Center, the Contractor shall first notify the cognizant Inspector of its intentions two working days in advance of starting the work.

The Inspector will initiate the work for staking out the subsurface utilities known to exist within 10 feet of the designated work area.

Any delays brought about because of late notification by the Contractor shall be the responsibility of the Contractor.

No work shall start until the Contractor receives a digging permit and sign to be posted at the work site and the facility coordinator has made up-to-date subsurface drawings available and discussed specific details of the work with the Contractor and Inspector at the work site. The sign and

permit shall be displayed at the site during the excavation or penetration operations.

The Contractor shall not proceed with any machine excavation within 10 feet of the staked out area until it has exposed the utility or utilities in question by hand excavation. After such exposure the Contractor shall obtain approval from the Inspector for any additional machine excavation within the ten-foot area.

No excavations will be allowed for any purpose other than those for which the original digging permit was issued, nor will any excavations outside the original planned and marked areas be allowed until a new or revised digging permit has been issued by the Government. In marked areas where sufficient time has elapsed such that ground markings have disappeared or deteriorated, they shall be remarked and the digging permit reissued by the Government prior to any excavations.

Warning tape, color-coded with the words "CAUTION ELECTRIC LINE BELOW", "CAUTION WATER LINE BELOW", "CAUTION SEWER LINE BELOW", shall be installed six inches below grade over the direct buried line. Tape shall be detectable when used over PVC water or sewer lines. Non-detectable tape shall be used over power or communication cables, duct banks, and metal piping.

The Contractor shall notify the Inspector after installation of each segment of underground utilities and before any backfilling has started. The Inspector will notify the cognizant NASA personnel and arrange to have a survey performed to determine the "as-built" location and elevation of each utility line. This survey will be performed within one working day after the Inspector is notified. Immediately after the survey is performed, the Contractor, with the Inspector's concurrence, may proceed with the backfilling operation.

1.12 PILE DRIVING OPERATIONS

The Contractor shall execute pile-driving operations to ensure safety of persons in accordance with 29 CFR 1926.550.

Structures, underground utilities, and other construction, which are indicated within 15 feet of any pile, shall be protected against settlement, lateral movement, and undermining. Such piles shall be driven in pre-augured holes.

In the case of adjacent structures, the Contractor shall provide benchmarks on such structures at the locations designated by the Contracting Officer, before pile driving is begun.

Record and report the elevation of each benchmark before and after driving each pile, and at least twice a day while pile driving is in progress.

If benchmark readings indicate any displacement of adjacent structures, the Contractor shall immediately stop driving operations and notify the Contracting Officer. Pile driving shall be resumed only when corrective action, as approved by the Contracting Officer, has been provided.

Pile driving equipment shall meet the requirements of safety codes (OSHA 29 CFR 1926.603; ASME BPVC SEC I, American Society of Mechanical Engineers - Sections I (Power Boilers); and ASME BPVC SEC VIII, Section VIII (Pressure Vessels).

1.13 PAINTING AND COATING OPERATIONS

The Contractor shall protect all adjacent materials and equipment against damage from spillage, dripping and spatter of coating materials. All building materials and equipment shall be left clean, with all damaged surfaces corrected. Provide "WET PAINT" signs to indicate newly painted surfaces.

The Contractor shall provide adequate ventilation for all interior spaces during application and drying of coatings, to prevent the build-up of toxic or explosive concentrations of solvent vapors.

1.14 FIRE PREVENTION AND PROTECTION

1.14.1 General Requirements

Fire prevention and protection shall be in accordance with NASA-STD-8719.11, "NASA Safety Standard for Fire Protection".

All hot work, as defined in LPR 1710.11, shall have a "Hot Work Permit" issued by the Fire Department. Hot Work shall not be permitted until a Hot Work Permit has been issued and posted. Deviations or waivers from this and the following requirements shall be presented to the LaRC Fire Chief, in writing, for review and consideration. Only the LaRC Fire Chief can grant deviation or waiver approval.

1.14.2 Welding, Flame Cutting and Melting

All welding and cutting operations including, but not limited to, the use of acetylene and propane torches, propane heat guns, grinders, electric arc welders, and activities such as brazing, shall be done in accordance with the publications of the American Welding Society, the National Fire Protection Association NFPA 51 and NFPA 51B, and Chapter 22 of the "Virginia Statewide Fire Prevention Code" (13 VAC-5-51).

1.14.3 Prohibitions

Hot work activities shall not be performed on the following:

- Combustible walls or ceilings or those containing combustible insulation.
- Tanks or pipes that have held flammable liquids, (unless they have been thoroughly purged and tested for residual vapors).
- Pipes or other metal in contact with combustible materials if ignition of material is possible due to conduction.
- Items that have coatings of paint that contain lead/chromium until coatings have been removed and contained.
- Metal partitions, walls, ceilings, or roofs having a combustible covering.
- Walls or partitions of combustible sandwich-type panel construction.
- Automatic sprinkler systems after initial installation of systems have been completed.

1.14.4 Safeguards

- o Contractor shall remove flammable liquids, oily deposits, and combustible materials within 35-feet of the hot work area.
- o Contractor shall cover or shield combustible materials that cannot be removed with flameproof covers, fire resistant guards, or fire resistant curtains.
- o Contractor shall cover cracks in walls, floors, ducts, or other concealed spaces within 35-feet of the hot work area to prevent the passage of sparks or slag to adjacent areas.
- o Prior to beginning hot work, Contractor shall remove combustible materials from the opposite side of walls, partitions, ceilings or roofs.
- o Nearby personnel shall be protected from heat, sparks, and/or slag, through the use of fire resistive screens or shields.

Special precautions, as recommended by the LaRC Fire Chief and approved by the Contracting Officer, shall be taken to avoid unwanted activation of automatic detection or suppression systems due to the use of hot work equipment.

1.14.5 Firewatch

The Contractor shall assign a firewatch for every job involving hot work. The firewatch personnel shall not have any other collateral duties to distract or occupy them.

The firewatch personnel shall know the location of fire alarm pull stations in the work area and shall have two fully charged, 10-pound, ABC multi-purpose, dry chemical fire extinguishers available at all times. Facility fire extinguishers shall not be used to satisfy this requirement. The firewatch personnel shall be qualified in the proper use of fire extinguishers for controlling or extinguishing incipient fires.

The firewatch personnel shall continuously monitor the work area for any smoldering fires or hot spots during the period the hot work is being conducted, and for a period of 30 minutes following the termination of the hot work operation. The firewatch personnel shall immediately notify other workers if any dangerous conditions develop, and call the LaRC Fire Department, at 911 from any Center telephones or 864-2222 on cellular telephones.

1.14.6 Means of Egress

An unobstructed means of egress in accordance with NFPA 101, "Life Safety Code," shall be maintained at all times, for use by construction workers and LaRC employees.

1.14.7 Fire Protection and Detection Systems

During building alterations and modifications, where the building is protected by fire detection and/or protection systems, such systems shall be maintained in an operable condition at all times. Shut down for any reason shall be pre-approved and coordinated with the LaRC Fire Chief or designee.

If it is necessary to place any existing fire detection or protection system out of service, temporary protection measures such as the termination of all hazardous operations, or frequent inspections of the area involved with a 24-hour per day firewatch may be required by the LaRC Fire Chief or designee.

The Contractor shall make regular checks on the fire sprinkler, and standpipe control valves shall be regularly checked at the end of each work period to ascertain that such systems are in service.

If fire sprinkler heads are located within a demolition area, all heads subject to physical damage shall be fitted with guards.

If smoke detectors are located such that dust and/or gases resulting from the construction may adversely affect them, the following procedures shall be adhered to:

- Place sequentially numbered plastic bags around each smoke detector in the affected area each day before renovation begins.
- Post manual instructions and inform all Contractor personnel on how to manually signal a fire condition.
- If the area in question contains a special hazard, an employee of the Contractor shall be dedicated as a firewatch for the period that detectors are bagged.
- Remove all bags at the end of each work day until renovation work is completed. Bags shall be removed sequentially and recorded, to ensure that every bag is removed.

1.14.8 Portable Fire Extinguishers

The suitability, distribution, and maintenance of portable fire extinguishers shall be in accordance with NFPA 10, "Standard for Portable Fire Extinguishers." The Contractor shall provide and maintain at least one 10-pound, multipurpose dry chemical fire extinguisher in a visible location on each floor of the construction area and at each usable stairway, at all times. The Contractor shall provide and maintain two 4-A, 60-B:C rated fire extinguishers within 25 feet of each asphalt (tar) kettle, during the period such kettle is being utilized, and one additional 4-A, 60-B:C fire extinguisher on the roof being covered. Contractor employees shall be instructed in the proper use of extinguishers.

1.14.9 Temporary Heaters

When open-flame heating devices or other temporary heating equipment are used, the Contractor shall obtain written permission from the Fire Chief for each use. The Contractor shall contact the Fire Chief for instructions on obtaining the permit.

- A list of temporary heating equipment, to be used on-site, shall be provided to the LaRC Fire Chief.
- The temporary heating equipment shall be installed, used, and maintained in accordance with the manufacturer's instructions, including clearance to combustible material, equipment and/or construction areas.

- Chimney or vent connectors, where required by direct-fired heaters, shall be maintained at least 18-inches from combustibles and shall be installed in accordance with NFPA 211, "Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances."

- Oil-fired heaters shall be designed and installed with features in accordance with NFPA 31, "Standard for the Installation of Oil-Burning Equipment."

- Fuel supplies for liquefied petroleum gas-fired heaters shall be in accordance with NFPA 54, "National Fuel Gas Code," and NFPA 58, "Standard for the Storage and Handling of Liquefied Petroleum Gases."

- Refueling operations shall be conducted in accordance with NFPA 58.

- Temporary heating equipment, where utilized, shall be monitored for safe operation and maintained by properly trained personnel.

- All heating equipment approved by the Contracting Officer shall be provided with safeguards, such that when tilted or tipped over, their power source will be automatically shut off.

- Temporary burner-type heaters that are in use during other than normal working hours shall have an hourly firewatch provided.

- Burner-type heaters are not permitted in areas where painting or similar operations may create an explosive atmosphere.

1.14.10 Removal of Combustible Waste Material

The Contractor shall remove accumulations of combustible waste material, including paper/plastic packing and wrappings, scrap lumber, dust, and other construction rubbish from the structure and its immediate vicinity at the end of each work shift or more frequently as necessary for safe operations.

The Contractor shall promptly dispose of materials subject to spontaneous ignition, such as oily waste and rags used with paint, linseed oil or other flammable or combustible liquids. Such materials shall only be placed in noncombustible receptacles with tight-fitting lids that are physically located away from any building or structure.

1.14.11 Disposal of Rubbish

The burning or incineration of rubbish, such as construction debris, brush, or trees is prohibited on LaRC. The Contracting Officer will provide direction as to the appropriate method of disposal.

1.14.12 Flammable and Combustible Liquids

Flammable and combustible liquids shall be stored and handled in accordance with NFPA 30, "Flammable and Combustible Liquids Code."

Open flames and smoking shall not be permitted in flammable and combustible liquid storage areas. Such areas shall be appropriately posted as "NO SMOKING" areas.

Flammable liquids, including Class I and Class II liquids, shall be kept

and transported in the appropriate safety containers as defined in 29 CFR 1926.152.

Class I liquids shall be dispensed only where there are no open flames or other sources of ignition within the possible path of vapor travel.

Bulk storage of flammable liquids is prohibited unless the LaRC Fire Chief or designee has granted prior approval.

1.14.13 Smoking

Smoking shall only be permitted in areas designated by the LaRC Fire Chief or designee. The Contractor shall provide receptacles of non-combustible construction designed for collection of waste smoking material.

1.14.14 Non-Emergency Use of Fire Hydrants

Requests for the non-emergency use of fire hydrants shall be made to the LaRC Fire Chief or designee prior to use. Requests may be approved with the following restrictions:

- The hydrant user shall install one valve on the 4-1/2-inch port on each hydrant to be used. (This 4-1/2-inch port with the valve installed is reserved for LaRC Fire Department use only.)

- One or both of the 2-1/2-inch fire hydrant ports shall be reserved for non-emergency use. The hydrant user shall provide an approved 2-1/2-inch gate valve on one or both of the 2-1/2-inch fire hydrant ports, reduced down to 1-1/2-inches.

1.14.15 Fire Department Access

Main access roadways shall not be obstructed in any manner.

The Contractor shall provide unobstructed access from the street to fire hydrants and to outside connections for standpipes, sprinklers, or other fire extinguishing equipment, whether permanent or temporary, shall be provided and maintained at all times.

Unobstructed access to the main fire alarm control panel, permanent, temporary, or portable first-aid fire equipment shall be provided and maintained at all times.

1.15 ASBESTOS ABATEMENT

1.15.1 General Requirements

These specifications present criteria for operations involving removal, repair, or other work with asbestos. Asbestos is defined as any material containing more than one- percent asbestos by weight. All asbestos operations shall be conducted in accordance with Federal, State, and Local regulations applicable to asbestos and including provisions of 40 CFR 61 Subpart M, National Emissions Standard for Hazardous Air Pollution; 29 CFR 1926.1101 Asbestos; Part 54.1-500 through 1-517 of the Code of Virginia; CID (LPR) 1740.2, Chapter IV, Asbestos; and LPR 8500.1, Chapter 8, Section 8.3.5 (Environmental and Energy Program Manual).

It is the responsibility of the Contractor to ensure that all asbestos removal work is performed thoroughly and conducted properly. The Contractor

shall sequence and coordinate asbestos removal operations and other work to ensure that other trades performing renovation work are not exposed to asbestos.

The Contractor shall comply with the Commonwealth of Virginia asbestos handling licensing requirements for contractors, supervisors and workers. The Contractor shall provide a copy of its current asbestos-handling license to the Contracting Officer, prior to beginning on-site operations.

1.15.2 Notification Requirements

Notification of Federal and State regulatory agencies is the responsibility of the contractor involved with the removal/abatement activity.

In work involving friable asbestos material of more than 10 linear feet and/or 10 square feet of insulating surfacing material, Contractor notification to the Commonwealth of Virginia is required. Additionally, the Contractor shall notify the Environmental Protection Agency of removal projects involving at least 260 linear feet or 160 square feet respectively. Contractor shall submit proof via mail receipt/slip that Environmental Protection Agency Region III has received the notification prior to beginning work on-site.

1.15.3 Operational Procedure

The Contractor shall submit an Asbestos Operational Procedure (AOP) to the Contracting Officer for approval. A Virginia Licensed Asbestos Project Designer shall prepare the AOP, a work plan for asbestos abatement operations. The procedure shall specify how the Contractor will assure compliance with applicable regulations. It shall identify specific control measures and work procedures to be employed in the performance of work. The procedure shall include attention to the following elements as appropriate to the specific job:

- o A work schedule including start and anticipated finish dates
- o Work area control procedures
- o Personal protective equipment and clothing to be worn
- o Description and placement of engineering controls and physical containment elements.
- o Work practices to be observed
- o An air monitoring plan
- o Personal hygiene procedures
- o Labeling
- o Asbestos waste handling and disposal procedures, including a description of the waste and an estimate of volume to be generated
- o For asbestos mastic removal, a citrus based solvent that does not create a hazardous waste stream shall be used.
- o For occupied buildings, mastic removal is to be done after

normal working hours.

- o Adequate ventilation is to be provided to reduce odor and worker exposure. This is to be accomplished by using HEPA filtered negative air machines.

1.15.4 Additional Requirements for Removal of Friable Asbestos

All HEPA vacuums and negative air machines shall be dioctyl phthalate tested within 90 calendar days prior to the start of work. Equipment is to be labeled and certification shall be submitted to the Contracting Officer prior to the start of work.

Negative pressure shall be monitored and recorded by a manometer with a strip chart printout. Printout shall be submitted to the Safety and Mission Assurance Office (SMAO) Industrial Hygienist at the end of each phase of the project.

The decontamination unit shall be constructed to provide adequate room for workers to store their street clothes in the clean room. Shower shall provide hot and cold running water. Water from the shower shall pass through a two-stage canister style filtration system prior to discharge. It is mandatory that all workers shower prior to exiting the asbestos work area.

All flex duct for negative air exhaust that is to be run through occupied areas shall be new duct material not previously exposed to asbestos contamination.

Asbestos removal contractor shall submit written notification to equipment rental companies (e.g., scaffolding, personnel-lifts, and all other rental equipment), concerning the intended use of rental equipment and the possibility of asbestos contamination of the equipment. Copies of the notification shall be provided to the Prime Contractor (if a subcontractor is used) and to the Contracting Officer.

Prior to the establishment of containment and commencement of removal operations, all surfaces within the work area are to be pre-cleaned by wet wiping and HEPA vacuuming.

To the extent it is practicable, the asbestos removal contractor and prime contractor shall coordinate/combine asbestos removal and mechanical demolition.

All equipment (e.g., ladders, staging) brought on-site by the asbestos removal contractor shall be clean with no dirt, dust, or debris present. The equipment shall be completely decontaminated prior to being removed from the asbestos work area.

When removal work is conducted in occupied areas, the asbestos removal contractor shall not perform bag-out during the hours of 7:00 a.m. to 5:00 p.m.

1.15.5 Removal and/or Reinstallation of Transite Panels

When work involves removal and/or reinstallation of transite panels, the Contractor's operational procedure shall include the following precautions:

- o The area behind the panels shall be sealed off with polyethylene

(poly) sheeting.

- o Disposable drop cloths shall be placed where the panels are to be removed and at the storage area.
- o Employees performing the work shall be certified asbestos workers wearing Tyvek coveralls and half face negative pressure respirators with High Efficiency Particulate Air (HEPA) filters.
- o Screw heads, nail heads or other fasteners shall be cut and panels removed intact.
- o All surfaces shall be vacuumed with a HEPA filtered vacuum.
- o All poly and coveralls shall be disposed of as asbestos waste.

1.15.6 Submittals

The Contractor shall provide to the Contracting Officer, the following submittals as required by Section 01 33 00 SUBMITTAL PROCEDURES of these specifications, and by applicable law and regulations as cited above:

- o Asbestos Operational Procedure (AOP)
- o A copy of the Contractor's current asbestos handling license issued by the Commonwealth of Virginia.
- o Written proof of required notifications to the Commonwealth of Virginia and the EPA as may be appropriate.
- o Written asbestos waste handling and disposal procedure.
- o Signed certification statement from off-site transporter of asbestos.
- o A copy of the waste shipment record signed by the owner of the disposal facility indicating receipt of asbestos waste by the initial transporter. This copy shall be received by the generator within 35 calendar days of the date the RACM was accepted by the transporter.

1.15.7 Monitoring Requirements

1.15.7.1 Licensed Asbestos Project Monitor (LAPM)

The Contractor shall provide a Virginia Licensed Asbestos Project Monitor having a minimum of two years experience to serve as the on-site Project Monitor for all asbestos related activities. The Project Monitor shall function as an independent third party and shall have no employer-employee relationship or other financial relationship with the asbestos removal contractor (i.e., Project Monitor shall be contracted directly by the prime contractor, not by the asbestos removal contractor).

The Contractor shall submit to the Contracting Officer a Project Monitoring Plan that describes the air sampling procedures and monitoring methods to be employed to ensure compliance of asbestos operations. The plan shall include documentation of the licenses and professional qualifications for the Project Monitor and written certification from the Project Monitor that no conflict of interest exists in performing as an independent third party

monitoring the operations of the asbestos removal contractor.

A licensed Project Monitor is not required for removal of non-friable exterior asbestos materials including roofing material, exterior Transite paneling (where panels are removed intact), and window glazing/caulk.

1.15.7.2 Duties of the Project Monitor

The Project Monitor shall ensure that the asbestos removal work is being conducted in compliance with all applicable State and Federal statutes, regulations and standards pertaining to asbestos removal and disposal. The monitor shall be respirator qualified and enter the containment on a regular basis (at least two times per work-shift) to ensure that the contractor work practices and control methods are appropriate. Problems and deficiencies noted shall be brought to the attention of the asbestos removal contractor and, if immediate corrective action is not taken, shall be documented and reported directly to the Contractor's on-site Superintendent.

The Project Monitor shall be on-site and observe all phases of the asbestos removal work including pre-cleaning, removal, bag-out, final cleaning, and teardown of containment following final clearance. The monitor shall ensure that each phase of the work is conducted properly and adequately.

The Project Monitor shall maintain a daily written log describing all contractor activities and work practices. This log shall be available to the Contracting Officer and his/her representatives for review at any time during the progress of the work. A copy of the log shall be submitted to the Contracting Officer for record at the conclusion of the asbestos removal work.

The Project Monitor shall perform air sampling and report test results as specified.

The Project Monitor shall perform a visual inspection in accordance with ASTM E1368, Standard for Visual Inspection Following Asbestos Abatement Projects, after the asbestos removal contractor completes fine cleaning in each containment or work area. A written inspection report shall be submitted for review by Safety and Mission Assurance Office (SMAO) Industrial Hygienist prior to encapsulation of the work area and final clearance air sampling. The Contracting Officer may elect to have SMAO Industrial Hygienist accompany the Project Monitor during final visual inspection.

1.15.7.3 Air Sampling

The Contractor shall perform personal (worker breathing zone) air sampling and shall submit the test results promptly (within 2 days of collection) to Safety and Mission Assurance Office (SMAO) Industrial Hygienist for review. Results shall be faxed to 757-864-9449 or hand delivered to Building 1232.

Air samples shall be analyzed by Phase Contrast Microscopy by a Virginia Licensed Asbestos Analytical Lab that has successfully participated in the Proficiency Analytical Testing (PAT) Program. Results shall be posted at the job site within 24 hours of sample collection (legible handwritten reports are acceptable). Safety and Mission Assurance Office (SMAO) Industrial Hygienist shall be notified immediately by the Contractor if any outside work area sample result is >0.01 f/cc. The following air samples

shall be collected by a Virginia Licensed Asbestos Project Manager:

- o Inside work area
- o Negative air exhaust
- o Clean room
- o Outside work area environmental
- o 2 samples to be placed at the discretion of the Project Monitor
- o Personal air sampling in accordance with 29 CFR 1926.1101

1.15.8 Final Clearance

The Safety and Mission Assurance Office (SMAO) Industrial Hygienist will conduct air sampling for final clearance for work areas under full negative pressure enclosure where friable asbestos has been removed. Aggressive sampling techniques (as defined in 40 CFR 763) will be performed in accordance with EPA AHERA Protocols. At the discretion of the SMAO Industrial Hygienist, the air samples will be analyzed by Phase Contrast Microscopy or Transmission Electron Microscopy by a Virginia Licensed Asbestos Analytical Laboratory.

Prior to re-occupancy, Transmission Electron Microscopy samples shall average <70 structures/mm2 or each Phase Contrast Microscopy sample shall contain <0.01 fibers/cc.

The first series of samplings and analysis for final clearance will be provided by the Government. If these samples do not meet the specified criteria for re-occupancy, the entire work area shall be re-cleaned and encapsulated by the Contractor at no additional cost to the Government. The work area will then be re-sampled and the cost of retesting additional samples to verify compliance with the specified criteria for re-occupancy shall be paid by the Contractor.

1.16 USE OF EXPLOSIVES

The use of explosives is not permitted.

1.17 FALL PROTECTION (OSHA 29 CFR 1926.501 THROUGH 1926.503)

Fall protection devices and systems shall be in accordance with OSHA 29 CFR 1926 Subpart M - Fall Protection.

The Contractor shall provide fall protection devices and systems for employees in accordance with OSHA 29 CFR 1926.501, when working at a height greater than 6 feet.

Body belts are not acceptable as part of a personal fall arrest system. Personnel shall use a full body harness with shock absorbing lanyard.

1.18 LIFTING OPERATIONS

1.18.1 General

Only capable and experienced riggers and equipment operators shall be engaged in on-site lifting operations. In establishing the qualification of such riggers and equipment operators, it is essential that such personnel be knowledgeable about and capable of: determining center of gravity (C.G.) of items to be lifted; determining load weights; calculating lifting line strengths and the margins of safety; calculating sling tension loads; using common slings and hitches; selecting proper sizes and the use

of chocks; using hydra-sets; using proof loading specifications; use of hand signals; using and determining strength of knots; using and determining strength of shackles/hooks; and the factors causing distortion of loads (blocking). Personnel involved in these operations shall have at least four years of experience in such efforts. The Contractor shall provide to the Contracting Officer a List of Riggers prior to performing any lifting operations.

Certification Letter for Operators of Non-Government Owned Lifting Equipment
The Contractor shall provide a certification letter to the Contracting Officer listing all qualified riggers and equipment operators who will be working on-site stating: (1) their years of experience, (2) specialized training, and (3) medical qualifications, (i.e., any visual, hearing, or other physical limitations). This letter shall be submitted to the Contracting Officer prior to on-site lifting operations.

If lifting operations are being conducted in an unskillful manner, the Contracting Officer may, in accordance with FAR Clause 52.236-5, Material and Workmanship, require the Contractor to remove from the work any employee failing to follow appropriate procedures.

1.18.2 Lifting Devices

All Contractor-furnished lifting devices used on-site shall conform to NASA-STD-8719.9, "Standard for Lifting Devices and Equipment", and meet the minimum requirements of the applicable ANSI specifications incorporated in OSHA 29 CFR 1910, Occupational Safety and Health Standards, Subpart N, Materials Handling and Storage, and OSHA 29 CFR 1926, Safety and Health Regulations for Construction, Subpart N, Cranes, Derricks, Hoists, Elevators, and Conveyors.

All mobile/truck-mounted cranes shall have a current annual inspection and "Certification of Load Test". The Certification shall be kept on the crane and be made available for inspection by the NASA Inspector or the Safety and Mission Assurance Office Representative upon request. The Safety and Mission Assurance Office shall be notified prior to any mobile/truck mounted crane being brought onto LaRC, at 864-6496 or 864-7233. The SMAO Representative shall inspect the crane set-up prior to the lift.

The Contracting Officer may inspect at any time, any or all of the Contractor-furnished lifting devices used on-site. If any of the devices do not meet the above requirements, they will be barred from further use until all necessary repairs have been made and they have been reinspected.

Where cranes and derricks are used in or around high-voltage substations, overhead lines, or exposed energized parts, the operations and equipment shall be in accordance with OSHA Subpart N.

All lifting equipment shall be effectively grounded when being moved or operated in proximity to energized lines or equipment. Consideration shall also be given to grounding the load, particularly if insulated lifting straps are in use.

Lifting equipment shall be operated with a dedicated observer to warn the equipment operator of potentially hazardous situations and/or movements.

1.18.3 Guidelines for Proper Use of A-Frame Type Lifting Devices

A-frames shall be positioned directly over the object to be lifted with the

lifting line vertical, the hoist-to-object attachment vertical, or the sling vertical.

Lifts shall be performed through the center of gravity of the object to be lifted or lateral movement restraints shall be imposed to maintain the lifting line vertical.

If the lifted object is to be transported by the A-frame, the center of gravity of the object shall be as low as practical and lateral restraints imposed to maintain the lifting line vertical during transport.

At no time during the use of A-frames shall the lifting line be allowed to get outside of the A-frame base dimensions.

- o A-frames shall be marked with their load capacity rating.
- o A-frames shall be constrained to a 2.5 to 1 height-to-base ratio, to allow the lifting line to be approximately 11 degrees from vertical before an unsafe condition could occur.
- o A-frame base support devices shall be provided for A-frames with wheels, to preclude overturn due to the loss of a wheel when lifting its rated load.

1.18.4 Certification of Qualified Operators of Government Owned Lifting Equipment

Prior to using Government owned lifting equipment, all qualified operators shall be certified in accordance with LPR 1740.6, Chapter 8 (Hardware Handler). The Contractor shall submit a list of qualified operators as defined in this section to the Safety and Mission Assurance Office (SMAO) by calling 864-6496 or 864-7233 to be scheduled for NASA safety training and examination in the use of lifting equipment.

Following the 2-hour training session and successful completion of a written exam, the qualified operators shall be scheduled for a visual and hearing acuity examination by the Contractor, and checked out on the specific equipment to be used, by a NASA Facility Safety Head or designee.

Certification Letter for Operators of Government Owned Lifting Equipment
The Contractor shall provide a certification letter to the Contracting Officer stating: (1) the names of the qualified operators, (2) the date of their NASA safety training, and (3) confirmation of their passing the written examination, visual and hearing acuity examination, and having been checked-out on the specific equipment. This letter shall be submitted to the Contracting Officer prior to on-site lifting operations.

1.19 ACCIDENTS AND SAFETY RELATED INCIDENTS

1.19.1 Emergency Response and First Aid Facilities

Contractor employees working onsite may use the Occupational Medical Center for emergency first aid. This facility is located in Building 1216 at 17 Langley Boulevard. The telephone number is 864-3193.

To facilitate the rapid notification of emergency responders in the event of a fire, injury or other hazardous conditions, it is recommended the Contractor have a telephone available at the job site.

Emergency response may be obtained by dialing 911 from any Center telephone or by dialing 864-2222 from cellular telephones.

The Contractor shall assure that its personnel are aware of these emergency first aid and emergency response services and shall post the above information conspicuously at the job site.

1.19.2 Accident Reporting

Accidents shall be reported to the Safety and Mission Assurance Office at 864-7233 as soon as possible. A written report of the accident shall be filed with the Safety and Mission Assurance Office within 3 working days after the accident.

All near miss/close call accidents occurring on the Center involving NASA property or equipment shall immediately be reported to the Safety and Mission Assurance Office at 864-7233.

A near miss/close call accident is defined as a work-related accident that could have caused an injury or property/equipment damage.

1.19.3 Hazard Identification and Tracking

Contractor shall have a system for initiating and tracking hazard identification and corrective action. The system shall: (1) track all hazards identified through inspections, investigations, employee reports/notification, surveys, near misses/close calls, etc.; (2) interim measures to protect employees and the environment from the identified hazard until permanent action is completed; and (3) the final corrective action taken to eliminate the identified hazard.

The records shall include as a minimum a description of the identified hazard; date, time, and location the hazard was identified; hazard abatement plan/interim measures if unable to eliminate the hazard immediately; and the final corrective action taken to eliminate the identified hazard, including the date. Upon imminent danger conditions, personnel shall be removed from exposure and the supervisor shall be immediately contacted. Corrective actions shall be taken to ensure safe conditions are in place prior to continuing operations.

1.20 PERSONAL PROTECTIVE EQUIPMENT

Protective equipment, including personal protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers, shall be provided, used, and maintained in accordance with OSHA 29 CFR 1926, Safety and Health Regulations for Construction, Subpart E, Personal Protective and Life Saving Equipment, wherever it is necessary by reason of hazards, processes, environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact. See Paragraph 1.7.3.2 of this Section for additional information about Personal Protective Equipment (PPE) for electrical work.

1.21 SIGNS, SIGNALS AND BARRICADES

1.21.1 Accident Prevention Signs

Contractor shall place signs at locations where hazards exist, as described

below. These signs shall be visible at all times when work is being performed and shall be removed or covered promptly when the hazard(s) no longer exists. (OSHA 29 CFR 1926.200)

Danger signs shall be used where an immediate hazard exists. Caution signs shall be used to warn against potential hazards or to caution against unsafe practices.

Safety instruction signs shall be used to identify safety requirements relating to the work (e.g., Hard Hats Area, Eye and Hearing Protection Required). Contractor shall post construction areas with legible traffic signs at points of hazard. All traffic control signs or devices used for protection of construction workers shall conform to AASHTO MUTCD-1, Manual on Uniform Traffic Control Devices.

1.21.2 Signaling

When operations are such that signs, signals, and barricades do not provide the necessary protection on or adjacent to a roadway, flagmen or another appropriate traffic control shall be provided. Signaling directions by flagmen shall conform to AASHTO MUTCD-1, Manual on Uniform Traffic Control Devices.

1.21.3 Barricades

Barricades shall be used to deter the passage of persons or vehicles from a hazard, such as openings in walls, floors and roof edges. Barricades shall conform to the portions of AASHTO MUTCD-1, Manual on Uniform Traffic Control Devices, relating to barricades. (OSHA 29 CFR 1926.202)

1.22 HAND AND POWER TOOLS

All hand and power tools and similar equipment shall be maintained in a safe condition. When power operated tools are designed to accommodate guards, they shall be equipped with such guards when in use.

Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating or moving parts of equipment shall be guarded if such parts are exposed to contact by employees or otherwise create a hazard. Guarding shall meet the requirements as set forth in ASME B15.1, Safety Standard for Mechanical Power Transmission.

The use of hand and power tools shall be in accordance with OSHA 29 CFR 1926 Subpart I - Tools - Hand and Power.

1.23 STEEL ERECTION

All steel erection activities shall be in accordance with OSHA 29 CFR 1926 Subpart R - Steel Erection.

1.24 CONCRETE AND MASONRY CONSTRUCTION

All concrete and masonry construction shall be in accordance with OSHA 29 CFR 1926 Subpart Q - Concrete and Masonry Construction.

1.25 RESPIRATOR USAGE PROGRAM

The Contractor shall prepare and follow a respirator usage program that meets the requirements of LPR 1710.17, RESPIRATORY PROTECTION PROGRAM,

and 29 CFR 1910 OSHA 1910.134, RESPIRATORY PROTECTION.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

-- End of Section --

Safety Program Guide
Items That Shall Be Addressed
(Unless Totally Inapplicable) On All Safety Plans
(11/14)

Contract Identification - Job title and contract number and a brief summary and scope of the work. The safety representative shall be identified.

Policy - Provide Company's safety policy statement with the plan. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)")

Goals and Objectives - Describe specific goals and objectives to be met. Describe the contractor's approach (including milestone schedule) to achieve and maintain level 5 of the NASA Performance Evaluation Profile in all areas. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)")

Management Leadership - Describe management's procedures for implementing its commitment to safety and health through visible management activities and initiatives including a commitment to the exercise of management control to ensure work place safety and health. Describe processes and procedures for making this visible in all contract and subcontract activities and products. Include a statement from the project manager or designated safety official indicating that the plan will be implemented as approved and that the project manager will take personal responsibility for its implementation. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13")

Employee Involvement - Describe procedures to promote and implement employee (e.g., non-supervisory) involvement in safety and health program development, implementation, and decision-making. Describe the scope and breadth of employee participation to be achieved so that approximate safety and health risk areas of the contract are equitably represented. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)")

Assignment of Responsibility - Describe line and staff responsibilities for safety and health program implementation. Identify any other personnel or organization that provides safety services or exercises any form of control or assurance in these areas. State the means of communication and interface concerning related issues used by line, staff, and others (such as documentation, concurrence requirements, committee structure, sharing of the work site with NASA and other contractors, or other special responsibilities and support). As a minimum, the Contractor will identify the following, as required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)":

a. Safety Representative - Identify by title the individual who will be responsible for the Contractor's adherence to Center-wide safety, health, environmental and fire protection concerns and goals, and who will participate in meetings and other activities related to the Center's safety and Health program.

b. Company Physician - The Contractor shall identify its company physician, including name, address and telephone number.

Notice of Violations - The Contractor shall respond to any Notice of Violation (NOV) issued to it or its subcontractors within 3 working days from issuance. This response shall be provided to the issuer of the NOV.

Accountability - Describe procedures for ensuring that management and employees will be held accountable for implementing their tasks in a safe and healthful manner. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)")

Voluntary Protection Program (VPP) - The Contractor shall explain its approach to comply with the elements of the VPP while working on LaRC, which is a designated VPP Star site. This approach shall include, but is not limited to logs, records, minutes, procedures, checklists, statistics, reports, analyses, notes, or other written or electronic documentation that contains in whole or in part any subject matter pertinent to safety, health, environmental protection, or emergency preparedness. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)")

Workplace Analysis - Describe the method by which hazards, within the Contractor's workplace, shall be systematically identified. The identified method shall explain the information collection process through a combination of survey analyses, inspections of the workplace, investigations of mishaps and close calls, and the collection and trend analysis of safety and health data including but not limited to: records of occupational injuries and illnesses; reports of spills and inadvertent releases to the environment, facility related incidents, employee reports of hazards. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)")

Hazard Identification - Describe the procedures and techniques to be used to compile an inventory of hazards associated with the work to be performed on the contract. This inventory of hazards shall address the work specified in the contract, as well as operations and work environments, which are performed in the vicinity or in close proximity to contract operations.

(Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)")

Employee Reports of Hazards - Identification of methods to encourage employee reports of hazardous conditions (e.g., close calls) and analyze/abate hazards. The Contractor shall describe steps it will take to create reprisal-free employee reporting with emphasis on management support for employees and describe methods to be used to incorporate employee insights into hazard abatement and motivation/awareness activities. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)")

Inspections - The contract shall include requirements for assignments, procedures and frequency for regular inspections and evaluation of work areas for hazards and accountability for implementation of corrective measures. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)")

Accident Reporting - All serious accidents shall be reported (as soon as possible) to the Safety and Facility Assurance Office at 864-7233. A written report of the accident shall be filed with the Safety and Facility Assurance Office within 3 working days after the accident. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)")

Recordkeeping - The Contractor shall maintain the appropriate records concerning accidents and injuries, in accordance with OSHA 29 CFR 1904. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)")

Mishap Investigation - Identification of methods to assure the reporting and investigation of mishaps including corrective actions implemented to prevent recurrence. The Contractor shall describe the methods to be used to report and investigate mishaps on NASA property and on contractor or third party property. The Contractor shall discuss its procedures for immediate notification requirements for fires, hazardous materials spills and releases and other emergencies. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)")

Hazard Prevention and Control - Describe approach to identify, control and/or eliminate hazards in the work place. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)"

Hazardous Operations - Identify hazardous operations to be performed and written procedures developed to ensure the safety and health of employees while performing them. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)"

Flammable Liquid Storage Containers - Flammable liquids shall only be stored in "approved" flammable liquid safety cans that have self-closing spouts.

NASA LaRC Lockout/Tagout System - All contractors/subcontractors shall comply with the NASA LaRC Lockout/Tagout system when performing work on-site, as described in LPR 1710.10, "Safety Clearance Procedures (Lockout/Tagout). Under no circumstances shall a NASA LaRC Lockout/Tagout device be violated.

Safety Regulations - In addition to OSHA and Federal Regulations, the Contractor shall adhere to all applicable State, Local and Langley Research Center Safety Regulations. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)")

Confined Space Entry - Confined spaces shall not be entered until a Confined Space Entry Permit has been obtained. The Contractor shall have personnel trained in confined space entry, shall provide the permit and conduct initial and hourly readings as required by OSHA 29 CFR 1910.146.

Crane Certification - All mobile/truck-mounted cranes shall have a current "Annual Certification of Load Test". The Certification shall be kept on the crane and be made available for inspection by the NASA Inspector or the Safety and Facility Assurance Office Representative upon request. The Safety and Facility Assurance Office shall be notified immediately when any mobile/truck mounted crane is brought onto the Center, at 864-5594 or 864-7233.

Scaffolding - When scaffolding is required, it shall be designed, constructed and assembled in accordance with OSHA 29 CFR 1926.450 through 454.

Excavations and Trenching - Surface penetrations of 6 inches or more require a "Digging Permit" and shall follow all applicable standards under OSHA 1926.650-652.

Material Safety Data Sheets (MSDS) - A MSDS shall be available for each chemical, oil, lubricant, solvent, or other materials, used on the job-site. (Required per Appendix E of NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)")

Fall Protection - When fall protection is required, the Contractor shall comply with OSHA 29 CFR 1926.500 through 1926.503, which defines the types of fall protection devices and systems. Personnel shall use a full body harness with shock absorbing lanyard.

Extension Cords and Ground Fault Protection - All extension cords shall be the three wire grounded type and be in good working order (No broken or missing pins). Extension cords or other temporary wiring shall be protected by a Ground Fault Interrupt (GFI) device.

Subcontractor Compliance - All subcontractors shall comply with the Prime Contractor's Safety Plan.

Safety Meetings - The Contractor shall hold weekly safety meetings.

Hazardous Communications Program - The Contractor shall furnish a copy of his hazardous communications program as defined in CFR 29 Part 1910.1200.

Floors, Openings, Etc. - Unprotected openings in walls, floors or roof edges shall be guarded using standard handrails, barricades, or equivalent protection.

Steel Erection - When steel erection is required, it shall be performed in accordance with OSHA 29 CFR 1926.750 through 1926.752.

Personal Protective Equipment - When required, the appropriate PPE shall be used in accordance with OSHA 29 CFR 1926 Subpart E.

Hot Work Permit - Hot Work will not be permitted until a Hot Work Permit has been issued by the Fire Department, approved and posted. Deviations or waivers from this and shall be presented to the LaRC Fire Chief, in writing, for review and consideration. Only the LaRC Fire Chief can grant deviation or waiver approval.

Appendix E, NPR 8715.3C, "NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)" may be viewed at:
http://nodis3.gsfc.nasa.gov/displayDir.cfm?Internal_ID=N_PR_8715_003C_&page_name=Chapter2

Attachment 2

(RESERVED)

Contractor Safety and Health Log

Reporting for Fiscal Year _____	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	FY Totals
Hours Worked													
Recordable Injuries or Illnesses													
Days Away from Work Cases													

Project: _____

Contract Number: _____

Contractor: _____

Data recorded on this form applies to onsite work performed by employees of the contractor and subcontractors associated with the above contract number.

Days Away from Work Cases = Number of Recordable Injuries or Illnesses Involving Days Away from Work, Restricted Work Activity, and/or Job Transfer.

See the following OSHA Regulation for criteria of Recordable Injury or Illness and Days Away from Work.

OSHA Regulations (Standards - 29 CFR)

PART 1904 Recording and Reporting Occupational Injuries and Illness

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NASA LANGLEY ENVIRONMENTAL REQUIREMENTS

02/15

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NASA LANGLEY ENVIRONMENTAL REQUIREMENTS
02/15

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only.

The listed versions of the following references were used during the development of this design and are the Government approved versions to be used herein. There may be newer versions of certain references that have been released since the commencement and/or approval of the design effort. However, in order to comply with the Government technical requirements, not all of the latest versions of the listed references were adopted and the versions listed herein shall be utilized.

AMERICAN NURSERY & LANDSCAPE ASSOCIATION (ANLA)

ANSI/ANLA Z60.1	(2004) American Standard for Nursery Stock

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C651	(2005; Errata 2005) Standard for Disinfecting Water Mains

LANGLEY RESEARCH CENTER (LaRC)

LPR 8500.1	(May 2014) Environmental and Energy Program Manual
VSMP Program Summary	(2014) VSMP Annual Standards and Specifications for Erosion and Sediment Control and Stormwater Management

STATE OF VIRGINIA ADMINISTRATIVE CODE (VAC)

9 VAC 5-40-90	Standard for Fugitive Dust/Emissions
9 VAC 25-840	Title 9, Agency 25, Chapter 840: Erosion And Sediment Control Regulations

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 112	Oil Pollution Prevention
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 279	Standards for the Management of Used Oil
40 CFR 61	National Emission Standards for Hazardous Air Pollutants

40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 173	Shippers - General Requirements for Shipments and Packagings

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

DEQ-VSWCB-013	(2011) Virginia Erosion and Sediment Control Handbook, Third Edition

1.2 SUBMITTALS

The Contractor shall submit documents to LaRC Environmental as required in the Section(s) of these specifications that are applicable to the project. The following provides a complete list of document submittals included in these specifications with a reference to the applicable Section(s):

SD-01 Preconstruction Submittals

LF 461, Environmental Project Planning Form ; G (Submitted by Program Manager/Project Initiator prior to project initiation)

Erosion and Sediment Control Plan (ESC Plan); G

Disposal of Chlorinated Water Plan; G

SD-07 Certificates

Asbestos Manifest; G

Asbestos Return Manifest; G

Shipping Document; G

SD-11 Closeout Submittals

Project Materials Usage Spreadsheet and MSDS's; G

Construction and Demolition Debris Recycling/Diversion Report; G

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 PROJECT REVIEWS AND AUDITS

3.1.1 Environmental Project Planning Form - LF 461

LaRC Environmental requires the completion of a LF 461, Environmental Project Planning Form, for all projects except for those activities listed on the "LF 461 Excluded Activities List". This list is available on the LaRC Environmental website. The Project Manager/Project Initiator is responsible for completing and submitting the LF 461 to LaRC Environmental at the earliest planning stages of the project. No on-site work shall begin until there is confirmation that a LF 461 has been submitted and the Program Manager/Project Initiator has received comments and project

requirements from LaRC Environmental.

The Project Manager/Project Initiator is responsible for ensuring that the Contractor is provided, in writing, all comments and environmental requirements associated with the LF 461, and any updates, and the Contractor is responsible for complying with such, as well as the requirements included in these specifications.

3.1.2 Environmental Audits

LaRC Environmental will perform periodic audits of project sites to ensure that the Contractor is complying with all environmental requirements throughout the duration of the project.

3.2 AIR QUALITY

3.2.1 Emissions Controls

Fugitive Dust Emissions - The Contractor shall control fugitive dust emissions in accordance with Virginia Regulation 9 VAC 5-40-90 (Standard for Fugitive Dust/Emissions). The Contractor shall take reasonable precautions to prevent particulate matter from becoming airborne during the project. Examples of such reasonable precautions include:

- Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads, or the clearing of land;

- Application of asphalt, oil, water, or suitable chemicals on dirt roads, materials stockpiles, and other surfaces which may create airborne dust; the paving of roadways and the maintaining of them in a clean condition;

- Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials. Adequate containment methods shall be employed during sandblasting or other similar operations;

- Open equipment for conveying or transporting materials likely to create objectionable air pollution when airborne shall be covered or treated in an equally effective manner at all times when in motion; and

- The prompt removal of spilled or tracked dirt or other materials from paved streets and of dried sediments resulting from soil erosion.

Volatile Organic Compounds (VOCs) - The Contractor shall store volatile organic liquids, including fuels and solvents, in closed, labeled containers. Volatile organic liquids shall not be stored with materials that have a high capacity to adsorb VOC emissions or in occupied spaces.

3.3 WATER QUALITY

3.3.1 Basic Erosion and Sediment Control (ESC)

Regardless of project size or amount of land disturbance, the Contractor is responsible for ensuring that adequate erosion and sediment controls are utilized on site to prevent sediment from leaving the activity at all times. ESC practices selected for use shall be designed, installed and maintained in accordance with the DEQ-VSWCB-013, Virginia Erosion and Sediment Control Handbook, 3rd Edition (as amended).

3.3.2 NASA Stormwater Management Program Authority

NASA LaRC has the necessary authorization from VA DEQ to review and approve stormwater-related Plans in house. NASA is the program authority for Sections 3.3.3, 3.3.4, and 3.3.5 of this Specification. NASA's Stormwater Management Program, including government oversight procedures, Plan review procedures, enforcement procedures, and Contractor expectations are summarized in a document titled VSMP Program Summary, 2014 VSMP Annual Standards and Specifications for Erosion and Sediment Control and Stormwater Management. This is a VA DEQ reviewed and approved program summary. A copy of this document can be obtained through the Contracting Officer.

3.3.3 Erosion and Sediment Control Plan (ESC Plan)

Land Disturbing Activities (LDAs) greater than or equal to 2,500 square feet require the Contractor to develop a site specific Erosion and Sediment Control Plan that complies with Virginia Erosion and Sediment Control Law and Regulations (9 VAC 25-840) and meets the state's 19 minimum standards outlined in 9 VAC 25-840-40 (as applicable. ESC practices selected for use shall be designed, installed and maintained in accordance with the Virginia Erosion and Sediment Control Handbook, 3rd Edition (as amended). The ESC Plan shall include site plan(s)/detailed maps for the work site that clearly show the siting of the ESC practices and best management practices. The Virginia Uniform Coding System for ESC Practices shall be used on all site plan submittals. The ESC Plan shall include a statement describing the Contractor's maintenance responsibilities required for the ESC controls. The Contractor shall submit the ESC Plan to the Contracting Officer for review and approval.

The Contractor shall have a certified Virginia Responsible Land Disturber (RLD) on staff and associated with any project over 2,500 square feet. A copy of the certification shall be submitted in the ESC Plan.

3.3.4 Stormwater Management Plan (SWM Plan)

Not applicable.

3.3.5 Stormwater Pollution Prevention Plan (SWPPP)

Not applicable.

3.3.6 Construction General Permit (CGP) Coverage

Not applicable.

3.3.7 Prohibited Illicit Discharges

The Contractor shall ensure no illicit discharges occur at the project site. An "illicit discharge" is any non stormwater discharge to the storm drain system, except as expressly allowed by LaRC's VPDES permits, the project-specific VSMP General Permit for Discharges of Stormwater from Construction Activities, and/or a discharge approved in writing by NASA. Water from firefighting, hydrant flushing, and A/C condensate are not considered illicit discharges. Examples of illicit discharges include the following:

- Dumping of trash or debris

- Disposing of vehicle/equipment maintenance fluids into a storm drain
- Leaking dumpsters flowing into a storm drain inlet
- Pouring paints, stains, hazardous materials into a storm drain
- Cleaning paint brushes/applicators in or near a storm drain
- Allowing wash waters with soaps, detergents, or paint debris into a storm drain inlet
- Washing silt, sediment, concrete, cement or gravel into a storm drain
- Allowing uncontrolled release of sediment into a storm drain inlet
- A measurable flow during dry weather that contains any other pollutants

3.3.8 Draining of Disinfected Water Mains

Drains shall be properly disinfected in accordance with AWWA C651-05. Drainage and discharge of chlorinated water is prohibited without approval and must be done in accordance with all applicable laws and regulations. Chlorinated water (above standard drinking water levels) may not be discharged to the storm sewer system. The Contractor shall develop a Disposal of Chlorinated Water Plan for Contracting Officer (CO) review and approval. Options for disposal include capturing the water for treatment/neutralization prior to discharge, discharge to HRSD/sanitary sewer (if approved by HRSD through sampling), or capture and disposal off-site.

Note: The CO (through NASA Environmental) will coordinate with HRSD on behalf of the Contractor if that option is desired.

3.4 PROJECT MATERIAL AND CHEMICAL STORAGE, USE, AND REPORTING REQUIREMENTS

3.4.1 Storage Requirements

The Contractor shall ensure that all project materials and chemicals required to perform work are:

- Stored in an isolated and secure area at the project site to prevent release to the environment.

- Labeled properly and used according to the manufacturer's guidelines, and that containers are kept closed except for when in use.

- Removed from NASA LaRC after project completion, unless prior approval is granted by LaRC Environmental for materials to remain.

3.4.2 Use and Tracking Requirements

The Contractor shall track the usage of certain project materials/chemicals brought on the Center. Project materials the Contractor shall track include, but are not limited to:

1. Metals. Metals used in construction, rehab, or other project activities shall be tracked in pounds by alloy such as stainless steel, copper, brass, lead, carbon steel, etc.

2. Asphalt. Paving material shall be tracked in total tons of new asphalt laid and total tons of old asphalt removed. Exception: asphalt material used for or removed from parking lots.

3. Paints, which shall be tracked by total amount used.

4. Other chemicals and products (solvents, cleaners, lubricants, degreasers, adhesives, acids, etc.), which shall be tracked by type of material and amount used.

Tracking shall not be required if the materials are being used for simple building maintenance and basic administrative, housekeeping, and janitorial services. A pre-prepared Project Materials Usage Spreadsheet will be provided from LaRC Environmental as an option for the Contractor to use for tracking purposes.

3.4.3 Reporting Requirements

The Contractor shall submit the project materials usage spreadsheet and MSDS's to LaRC Environmental upon completion of the project. If the project extends into a new calendar year, the Contractor shall provide the data for all materials used in the preceding year by January 31st of the new calendar year.

3.5 WASTE MANAGEMENT AND DISPOSAL

3.5.1 General

Hazardous Waste Management Requirements:

Hazardous waste will be collected in Satellite Accumulation Area (SAA). SAA's shall be located at or near the point of waste generation and be under the control of the operator of the process generating the waste. Each hazardous waste container located at an SAA shall be marked with the words "Hazardous Waste" and the identity of the waste. Each container at an SAA shall be closed at all times (unless adding waste), and shall be maintained in good condition (non-leaking). No more than 55 gallons TOTAL of hazardous waste or 1 quart of acute hazardous waste can be accumulated at an SAA. In addition, the Contractor shall inspect all SAAs on a weekly basis and document the inspection. An example inspection sheet can be obtained from SPEEB. The management and handling of hazardous waste will be accordance with 40 CFR 262 and State regulations.

Other waste listed below shall be managed in accordance using the following requirements in the noted sections:

Asbestos - Managed according to section 3.6 titled "ASBESTOS WASTE DISPOSAL REQUIREMENTS".

Oil (non-transformer) and Oily Debris - Manage according to Section 3.8 titled "FUEL AND OIL MANAGEMENT REQUIREMENTS".

Wastewater - Manage according to Section 3.3 titled "WATER QUALITY".

Soil - Manage according to section 3.10.2 titled "EXCAVATION OPERATIONS".

Construction and Demolition Debris - Manage according to Section 3.9 titled "Construction and Demolition Debris".

Typical Waste Streams: Listed below are examples of typical waste streams that can be expected during the Demolition or Renovation of facilities. The list is not all inclusive and it's ultimately the Contractors

responsibility to identify and ensure proper management and disposal of all waste streams generated by the Demolition or Renovation of facilities.

a. Aerosol Cans: All aerosol cans generated shall be collected in containers labeled and managed as Hazardous Waste. SAA requirements will apply.

3.5.1.1 Waste Management Requirements (Government Requirements)

This section includes the requirements for waste generating projects whereby the Government will be responsible for providing labeled waste containers, analytical testing and the proper disposal of the waste.

The Contractor shall be cognizant of all waste streams that will be generated during the project.

The Contractor will be audited by LaRC Environmental to ensure that all applicable waste regulations and proper waste practices are being followed. The Contractor shall take appropriate actions to ensure compliance with all federal, state and local regulations. Disposal of hazardous waste into the storm or sanitary sewer is prohibited at all times.

In the event of a spill, the Contractor shall call 911 (using on center phones) or 757-864-2222 and provide the necessary information requested. All possible means to contain and/or prevent entry to storm drains or waterways shall be initiated. The Contractor shall provide spill response materials including, but not limited to, containers, absorbent, shovels, and personal protective equipment. Spill response materials shall be available at all times in which hazardous materials/wastes are being handled or transported. Spill response materials shall be compatible with the type of material being handled. Spill cleanup resulting from Contractor actions shall be the responsibility of the Contractor.

3.5.1.2 Waste Management Requirements (Contractor Responsible)

Not applicable.

3.5.2 Lead and Chromium Waste Reporting Requirements

Not applicable.

3.6 ASBESTOS WASTE DISPOSAL REQUIREMENTS

The Contractor shall dispose of asbestos waste in accordance with 40 CFR 61 and Chapter 9, Asbestos, in LPR 8500.1, Environmental and Energy Program Manual. Transportation of asbestos material off-site shall be in accordance with DOT Regulations, 49 CFR 173.1090.

Upon request to and approval by LaRC Environmental, the Contractor may use an on-site staging area for the asbestos. The Contractor shall be responsible for transporting the properly packaged asbestos waste to the staging area. Containers in staging area used for AB storage shall be labeled with visible AB warning labels on all sides.

At least two (2) days prior to asbestos waste shipment, the Contractor shall provide LaRC Environmental with the asbestos manifest for review and signature. The asbestos manifest must include the following information:

1. Generator: Identifies NASA Langley Research Center as owner and waste

generator. Address of waste generator shall be:

NASA Langley Research Center
Attn: Mason Proctor
Standard Practice and Environmental Engineering Branch
Mail Stop 133
Hampton, VA 23681
Telephone: (757) 864-4232

2. The name and address of the local, State or EPA Regional Office responsible for administering the asbestos NESHAP program. Address of responsible agency shall be:

Department of Labor and Industry, Occupational Health
13 South 13th Street
Richmond, VA 23219

3. The name and telephone number of the contractor responsible for the removal of asbestos at the building site.

4. The approximate quantity in cubic meters and in cubic yards.

5. The name and physical site location of the State-approved landfill disposal site.

6. The name, address, and telephone number of the transporter(s).

7. The date transported.

Submit a copy of the asbestos return manifest, signed by the owner or operator of the designated disposal site, to the LaRC Environmental Office within 35 days of the date it was transported off-site. If a copy of the waste shipment record is not received within 45 days, the State or EPA regional office will be contacted in accordance with 40 CFR 61.150(d) (3).

3.7 PCB REMOVAL AND DISPOSAL REQUIREMENTS

Not applicable.

3.8 FUEL AND OIL MANAGEMENT REQUIREMENTS

3.8.1 Portable/Temporary Fuel Storage Tanks

For projects requiring the use of portable/temporary fuel storage tanks, the Contractor shall ensure that the storage and refilling practices comply with 40 CFR 112. It is preferred that fuel storage tanks be of double-walled design. Tanks shall be equipped with a functioning liquid level gauge and with the required normal and emergency vents. If so equipped, the dispenser and dispensing hose shall be in good condition. Drip pans or absorbent pads must be used in fueling areas in the event that there are drips during fueling.

If a double-walled tank is not available, a single-walled tank with a secondary containment dike or berm can be used. The dike or berm shall be impervious to oil and be constructed so that any discharge will not permeate, drain, infiltrate, or otherwise escape before cleanup occurs. The secondary containment capacity shall be no less than 110 percent of the maximum tank volume plus 5 inches of freeboard. If the dike or berm is equipped with a drain valve, the valve must be of manual, open-and-closed

design and must be kept in the closed position. Any rainwater collected in the containment dike/berm shall not be drained until the Contractor performs a visual inspection and verifies that there is no oil contamination of the water (ex: no oil sheen). Only then shall the rainwater be drained.

3.8.2 Fuel and Oil Containing Equipment/Tanks (Non PCB)

For projects involving removal and disposal of fuel or oil containing equipment/tanks, the Contractor shall ensure that the equipment is completely drained prior to removal/disposal (an exemption to this requirement may be granted by LaRC Environmental in a case-by-case basis). The Contractor shall notify LaRC Environmental prior to draining equipment/tanks to ensure proper accumulation containers are used and to verify if the fuel/oil requires any testing. Removed fluids shall be managed in accordance with 40 CFR 279.

Oil containing less than 50 ppm PCB is considered non-PCB and is excluded from federal regulation with the exception of disposal requirements. Oil containing between 2-50 ppm shall be marketed to incinerators or burners defined in 40 CFR 761 or an EPA approved chemical treatment facility. The Contractor shall submit a shipping document to LaRC Environmental for signature prior to removing the oil from the center.

3.8.3 Oily Debris

Any oily debris generated at the project site shall be accumulated at locations convenient to generation sites and stored in containers labeled as "Non-Hazardous Waste" and the identity of the substance. The Contractor shall be responsible for coordinating accumulation and disposal of oily debris with LaRC Environmental.

3.9 CONSTRUCTION AND DEMOLITION DEBRIS REQUIREMENTS

Construction and demolition debris is any solid waste generated from the alteration, construction, destruction, rehabilitation, or repair of any manmade physical structure including buildings, utilities, roadways, parking lots, sidewalks and other general infrastructure. Examples include: brick, concrete, and other masonry materials, stone, glass, wall coverings, drywall, framing and finishing lumber/metals, roofing materials, plumbing fixtures (toilets, sinks, water heaters, pipes, heating equipment, furnaces, duct work), electrical wiring and components containing no hazardous fluids or refrigerants, non-asbestos insulation, and wall-to-wall carpeting. Prior to land filling, the Contractor shall be responsible for composite building debris sampling. The Contractor shall ensure that the samples are representative of the building debris. One sample per building will be required to be analyzed using the Toxicity Characteristic Leaching Procedure (TCLP) Metals, using EPA protocol 1311.

3.9.1 Debris/Recycling Management

The Contractor shall separate recyclable and salvageable materials from non-recyclable materials at the project site. The Contractor shall store, protect, and recycle to the maximum extent possible, but at a minimum, 50 percent of construction and demolition debris generated at the project site. The Contractor shall provide the necessary containers, bins and storage areas to facilitate effective segregation and identification of all waste materials. Recyclable materials shall be handled to prevent contamination of materials from incompatible products and materials.

3.9.2 Reporting Requirements

The Contractor shall be responsible for tracking the disposition of construction and demolition debris. Tracking shall include total weight of all materials disposed in a landfill and the weight of materials diverted from a landfill. Diversion includes, but is not limited to: incinerated for energy recovery, recycled, composted or reused. Potential materials for recycling and the recycling process shall be identified in the Waste Management Plan provided by the Contractor.

At the completion of the project, the Contractor shall submit a construction and demolition debris recycling/diversion report to LaRC Environmental identifying the diversion method and weight of each material. Weight tickets, shipping documents and manifests can be used to confirm diversion/recycling.

3.10 EXCAVATION OPERATIONS

3.10.1 Unexpected Discovery

In the event that excavation activities result in the unexpected discovery of historic artifacts, archaeological resources, petroleum contaminated soil, or hazardous waste, the Contractor shall immediately stop work and notify LaRC Environmental. Work shall not resume until LaRC Environmental provides clearance at the job site.

3.10.2 Soil Management and Disposal

3.10.2.1 Soil Sampling

The Contractor shall be responsible for sampling excavated soil prior to removal from LaRC property. The soil shall be analyzed for TCLP (metals only), BTEX, TPH (DRO and GRO ranges), TOX and PCB. The Contractor shall be responsible for any additional sampling and analysis that may be required by the disposal facility. The Contractor shall submit analytical reports to LaRC Environmental prior to removal from the Center.

Soil sampling done before site work begins is the preferred method as this practice allows the Contractor to remove the soil from the site as it is generated without storing the soil while waiting for sample results.

3.10.2.2 Soil Storage

Upon approval from LaRC Environmental, the Contractor shall be allowed to store soil at the project site or at another approved site pending results of soil analysis or for the purpose of reusing for fill or grading. The Contractor shall secure and control the area to ensure erosion and sediment controls are in place to prevent loose soil from entering the storm sewer. The Contractor shall include the soil storage area in the SWPPP and ESC Plans and perform inspections as required by the Erosion and Sediment Control regulations.

3.10.2.3 Soil Disposal

Soil that reveals levels below the regulatory limits of required tests shall be properly disposed off LaRC property. The Contractor shall not dispose of excess soil on-site unless approved by LaRC Environmental. Soil that is above any regulatory limits shall be disposed at an appropriately

permitted landfill and/or an approved treatment facility. The Contractor shall submit the name, address, and permit number of the permitted landfill used for disposal to LaRC Environmental prior to removal of the soil from LaRC. The Contractor shall be responsible for any disposal permits and fees associated with off-site disposal.

3.11 NATURAL RESOURCE MANAGEMENT

3.11.1 General Requirements

The Contractor shall manage and control activities at the project site to minimize interference with and damage to vegetation and wildlife.

The Contractor shall immediately notify the Contracting Officer in the event that it is determined that project activities may adversely impact wildlife (e.g., damage to or removal of nests or other animal dwellings). LaRC Environmental shall be notified of the event.

3.11.2 Tree Protection

The Contractor shall protect trees within their project sites that are indicated to be left in place from mechanical or other injury. The Contractor shall install tree protection in accordance with Virginia Erosion and Sediment Control Handbook, DEQ-VSWCB-013. In general, tree protection should be sufficient to eliminate trunk damage, root zone impacts, surface impacts, and limb impacts. Stockpiles or other heavy material storage under the drip line of a tree is prohibited. Trees shall be protected with adequate fencing, to the drip line, if the project site allows. At a minimum the limits of clearing shall be located inside the drip line of the tree and in no case closer than 5 feet to the trunk. If tree protection does not extend to the dripline, the Contractor shall be responsible for aeration and fertilization of the tree after construction is complete.

If a tree designated to be protected is damaged or killed during work the Contractor shall coordinate with LaRC Environmental to develop a replacement strategy at the Contractor's expense.

3.11.3 Tree Damage Mitigation

If the roots of a tree are exposed during the course of the work, the Contractor shall be responsible for ensuring roots are properly cared for to prevent unnecessary drying or damage. Any roots larger than 3 inches in diameter shall be clean cut prior to reburial.

If a tree designated to be protected is damaged or killed during work, the Contractor shall inform and coordinate with LaRC Environmental in developing a replacement strategy at the Contractor's expense.

3.11.4 Replacement Tree and Shrub Strategy

For each removed, a combination of trees totaling the DBH (diameter at breast height) of the tree removed shall be planted. Location of the replacement trees shall be coordinated with the Contracting Officer and approved by LaRC Environmental. Replacement trees shall be warrantied for a period of one (1) year.

Depending on location, the following tree and shrub species are acceptable for planting at LaRC:

Acceptable Trees Species: Street/Parking Area Trees	
Littleleaf Linden	Tilia Cordata
Red Maple	Acre Rubrum
Shumard Oak	Quercus Shumardii
Willow Oak	Quercus Phellos
White Oak	Quercus Alba
Lacebark Elm	Ulmus Parvifolia
**Trees shall be a minimum 2.5" caliper B&B specimens	

Acceptable Trees Species: Landscape/Building Area	
Shumard Oak	Quercus Shumardii
Southern Red Oak	Quercus Falcata
Tulip Popular	Liriodendron Tulipifera
American Sycamore	Platanus Occidentalis
American Beech	Fagus Grandifolia
Holly spp.	Ilex Opaca'
Thornless Honeylocust	Gleditsia Triacanthos Inermis
Sweetbay Magnolia	Magnolia Virginiana
**Trees shall be a minimum 2.5" caliper B&B specimens	

Acceptable Trees Species: Specimen/Ornamental	
Eastern Redbud	Cercis Canadensis
Whitebud	Cercis Canadensis
Fringe Tree	Chionanthus spp

Acceptable Trees Species: Specimen/Ornamental	
Serviceberry	Amelanchier Arborea
Ironwood	Carpinus Carolinia
**Trees shall be a minimum of 5 gallon container size or comparable B&B	

Acceptable Native Trees Species - Shrubs	
American Beautyberry	Baccharis Halimifolia
Artic Fire Dogwood	Cornus Sericea 'ARTIC FIRE'
Winterberry	Ilex Verticillata
Blue Wood	Aster Cordifolius
Inkberry	ILEX GLABRA
Arrowwood	Viburnum Dentatum
**Shrubs shall be a minimum of 3 gallon container size	

3.11.5 Tree/Vegetation Planting

Prior to installation, the Contractor shall notify the Contracting Officer to allow for inspection of the plant material. To be considered acceptable, plants shall be free of dead or dying branches and branch tips and shall bear foliage of normal density, size, and color. The Contractor shall not install any plant material without notifying the Contracting Officer and approval by LaRC Environmental.

The Contractor shall ensure that plants are selected and planted in accordance with nursery standards prepared by the American Nursery and Landscape Association (ANSI/ANLA Z60.1), including fertilization, mulching, and watering. Any container-type material, including burlap and wire baskets, is to be completely removed prior to planting. Mulch is to be applied to a depth of 3-4 inches and extending a minimum of 18 inches from the trunk. Mulch shall be pulled 1-2 inches from the trunk. When necessary for stability, trees shall be staked and guyed in at least two directions. Guy wires, with protective tubing, or staking straps may be used.

The Contractor shall guarantee plant material for one year following completion of the project. All plants determined to be dead or in an unacceptable condition during and at the end of the guarantee period shall be replaced by the Contractor at no cost to NASA LaRC. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this specification. The guarantee of all replacement plants shall extend for an additional period of one year from the date of their acceptance after replacement.

3.11.6 Seeding

All areas to be seeded shall be tilled or disked to a depth of 3-4 inches and raked or smoothed to remove debris, clods, surface stone 2 inches in diameter or larger and weeds. Grades on the areas to be seeded shall be maintained in true, even and compacted conditions to prevent the formations of depressions. Areas to be seeded that have washed or eroded shall be brought to grade and compacted thoroughly by the Contractor prior to seeding.

Permanent seeding of disturbed areas shall be done in accordance with the Virginia Erosion and Sediment Control Handbook, DEQ-VSWCB-013.

-- End of Section --

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SOURCES FOR REFERENCE PUBLICATIONS
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PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization, (e.g., ASTM B 564 Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided. Documents listed in the specifications with numbers which were not assigned by the standards producing organization should be ordered from the source by title rather than by number.

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)
38800 Country Club Drive
Farmington Hills, MI 48331
Ph: 248-848-3700
Fax: 248-848-3701
E-mail: bkstore@concrete.org
Internet: http://www.concrete.org

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
444 North Capital Street, NW, Suite 249
Washington, DC 20001
Ph: 202-624-5800
Fax: 202-624-5806
E-Mail: info@aashto.org
Internet: http://www.aashto.org

AMERICAN HARDBOARD ASSOCIATION (AHA)
c/o Composite Panel Association
19465 Deerfield Ave., Suite 306
Leesburg, VA 20176
Ph: 703-724-1128
Fax: 703-724-1588
Internet: http://www.pbmdf.org

AMERICAN NURSERY & LANDSCAPE ASSOCIATION (ANLA)
1200 G Street NW, Suite 800
Washington, DC 20005
Ph: 202-789-2900

Fax: 202-789-1893
E-mail: info@anla.org
Internet:

AMERICAN WATER WORKS ASSOCIATION (AWWA)
6666 West Quincy Avenue
Denver, CO 80235
Ph: 800-926-7337
Fax: 303-347-0804
E-mail: smorrison@awwa.org
Internet: http://www.awwa.org

AMERICAN WELDING SOCIETY (AWS)
550 N.W. LeJeune Road
Miami, FL 33126
Ph: 800-443-9353 - 305-443-9353
Fax: 305-443-7559
E-mail: info@aws.org or customerservice@awspubs.com
Internet: http://www.aws.org

ASME INTERNATIONAL (ASME)
Three Park Avenue, M/S 10E
New York, NY 10016-5990
Ph: 800-854-7179 or 800-843-2763
Fax: 212-591-7674
E-mail: infocentral@asme.org
Internet: http://www.asme.org

ASTM INTERNATIONAL (ASTM)
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959
Ph: 610-832-9500
Fax: 610-832-9555
E-mail: service@astm.org
Internet: http://www.astm.org

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
933 North Plum Grove Road
Schaumburg, IL 60173-4758
Ph: 847-517-1200 or 800-328-6306
Fax: 847-517-1206
Internet: http://www.crsi.org/

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)
1901 North Moore Street
Arlington, VA 22209-1762
Ph: 703-525-1695
Fax: 703-528-2148
E-mail: isea@safety equipment.org
Internet: http://www.safetyequipment.org/

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
445 Hoes Lane or 2001 L Street, NW. Suite 700
Piscataway, NJ 08855-1331 or Washington, DC 20036-4910 USA
Ph: 732-981-0060 or 800-701-4333
Fax: 732-562-6380
E-mail: onlinesupport@ieee.org or ieeeusa@ieee.org
Internet: http://www.ieee.org

INTERNATIONAL CODE COUNCIL (ICC)
5360 Workman Mill Road
Whittier, CA 90601
Ph: 562-699-0541
Fax: 562-699-8031
E-mail: webmaster@iccsafe.org
Internet: www.iccsafe.org

LANGLEY RESEARCH CENTER (LaRC)
100 Nasa Road
Hampton, VA 23681-2199
Ph: 757-864-1000

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)
127 Park Street, NE
Vienna, VA 22180
Ph: 703-281-6613
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Fax: 617-770-0700
E-mail: webmaster@nfpa.org
Internet: http://www.nfpa.org

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)
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Gaithersburg, MD 20899-1070
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Internet: http://www.nist.gov

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Richmond, VA 23218
Ph: 804-698-4000
Internet: /

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not used

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CAST-IN-PLACE CONCRETE
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PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

The listed versions of the following references were used during the development of this design and are the Government approved versions to be used herein. There may be newer versions of certain references that have been released since the commencement and/or approval of the design effort. However, in order to comply with the Government technical requirements, not all of the latest versions of the listed references were adopted and the versions listed herein shall be utilized.

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI/MCP-1	(2013) Manual of Concrete Practice Part 1
ACI/MCP-2	(2014) Manual of Concrete Practice Part 2
ACI/MCP-3	(2014) Manual of Concrete Practice Part 3
ACI/MCP-4	(2014) Manual of Concrete Practice Part 4

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1995; R 2004) Basic Hardboard

ASTM INTERNATIONAL (ASTM)

ASTM A185/A185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A496/A496M	(2007) Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement
ASTM A497/A497M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
ASTM A615/A615M	(2014) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A82/A82M	(2007) Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
ASTM A934/A934M	(2013) Standard Specification for

	Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM C1017/C1017M	(2013) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1107/C1107M	(2013) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C143/C143M	(2012) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150/C150M	(2012) Standard Specification for Portland Cement
ASTM C156	(2011) Standard Test Method for Water Retention by Concrete Curing Materials
ASTM C171	(2007) Standard Specification for Sheet Materials for Curing Concrete
ASTM C172/C172M	(2014) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C192/C192M	(2013a) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM C260/C260M	(2010a) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	(2011) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C31/C31M	(2012) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C311	(2011b) Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete
ASTM C33/C33M	(2013) Standard Specification for Concrete Aggregates
ASTM C39/C39M	(2014) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C42/C42M	(2013) Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C494/C494M	(2013) Standard Specification for Chemical Admixtures for Concrete
ASTM C618	(2012a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural

	Pozzolan for Use in Concrete
ASTM C932	(2006; R 2013) Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering
ASTM C989/C989M	(2013) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM D1751	(2004; E 2013; R 2013) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	(2004a; R 2013) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion
ASTM D5759	(2012) Characterization of Coal Fly Ash and Clean Coal Combustion Fly Ash for Potential Uses
ASTM D6690	(2012) Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM E1745	(2011) Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
ASTM E329	(2014) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP	(2009; 28th Ed) Manual of Standard Practice

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 1	(2009) DOC Voluntary Product Standard PS 1-07, Structural Plywood

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 572	(1974) Corps of Engineers Specifications for Polyvinylchloride Waterstops

U.S. DEPARTMENT OF COMMERCE (DOC)

DOC/NIST PS1	(1995) Construction and Industrial Plywood with Typical APA Trademarks

1.2 DEFINITIONS

a. "Cementitious material" as used herein shall include all portland cement, pozzolan, fly ash, ground granulated blast-furnace slag, and silica fume.

b. "Exposed to public view" means situated so that it can be seen from eye level from a public location after completion of the building. A public location is accessible to persons not responsible for operation or maintenance of the building.

c. "Chemical admixtures" are materials in the form of powder or fluids that are added to the concrete to give it certain characteristics not obtainable with plain concrete mixes.

d. "Workability (or consistence)" is the ability of a fresh (plastic) concrete mix to fill the form/mould properly with the desired work (vibration) and without reducing the concrete's quality. Workability depends on water content, chemical admixtures, aggregate (shape and size distribution), cementitious content and age (level of hydration).

1.3 SUBMITTALS

The Contractor shall submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Vapor retarder
Reinforcement

SD-05 Design Data

Concrete mix design; G

Prior to concrete placement, the Contractor shall submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, pozzolans, silica fume, ground slag and admixtures. The Contractor shall submit mix proportion data using at least three different water cement ratios for each type of mixture, which produce a range of strength encompassing these required for each class and type of concrete required. Indicate clearly in the submittal where each mix design is used when more than one mix design is submitted.

SD-06 Test Reports

Compressive strength tests

Slump

Air Entrainment

1.4 MODIFICATION OF REFERENCES

Accomplish work in accordance with American Concrete Institute (ACI) publications except as modified herein. Consider the advisory or recommended ACI provisions to be mandatory. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Contracting Officer.

1.5 DELIVERY, STORAGE, AND HANDLING

The Contractor shall provide materials in conformance with the following:

Do not deliver concrete until vapor retarder, forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement. ACI/MCP-2 for job site storage of materials. Protect materials from contaminants such as grease, oil, and dirt. Ensure materials can be accurately identified after bundles are broken and tags removed. Do not store concrete curing compounds or sealers with materials that have a high capacity to adsorb volatile organic compound (VOC) emissions. Do not store concrete curing compounds or sealers in occupied spaces.

1.5.1 Reinforcement

The Contractor shall provide reinforcement in conformance with the following:

Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground. Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed.

1.6 QUALITY ASSURANCE

1.6.1 Test Reports

The Contractor shall submit test reports as indicated under FIELD QUALITY CONTROL of this section.

1.7 QUALIFICATIONS FOR CONCRETE TESTING SERVICE

The Contractor shall perform concrete testing by laboratory and inspection service experienced in sampling and testing concrete. Testing agency shall meet the requirements of ASTM E329.

1.8 CONCRETE SAMPLING AND TESTING

The Contractor shall perform quality control testing during construction.

Testing shall be performed by a Grade I Testing Technician.

PART 2 PRODUCTS

2.1 MATERIALS FOR FORMS

The Contractor shall provide wood, plywood, or steel. The Contractor shall use plywood or steel forms where a smooth form finish is required.

2.1.1 Wood Forms

The Contractor shall provide lumber that is square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. The Contractor shall provide plywood that complies with DOC/NIST PS1, B-B concrete form panels or better or AHA A135.4, hardboard for smooth form lining.

2.1.1.1 Concrete Form Plywood (Standard Rough)

The Contractor shall provide plywood that conforms to NIST PS 1, B-B, concrete form, not less than 5/8-inch thick.

2.1.1.2 Overlaid Concrete Form Plywood (Standard Smooth)

The Contractor shall provide plywood that conforms to NIST PS 1, B-B, high density form overlay, not less than 5/8-inch thick.

2.1.2 Steel Forms

The Contractor shall provide steel form surfaces that do not contain irregularities, dents, or sags.

2.2 FORM TIES AND ACCESSORIES

The use of wire alone is prohibited. The Contractor shall provide form ties and accessories that do not reduce the effective cover of the reinforcement.

2.2.1 Polyvinylchloride Waterstops

The Contractor shall provide polyvinylchloride waterstops in conformance with COE CRD-C 572.

2.2.2 Dovetail Anchor Slot

The Contractor shall provide preformed metal slot approximately 1 by 1 inch of not less than 22 gage galvanized steel cast in concrete. The Contractor shall coordinate actual size and throat opening with dovetail anchors and provide with removable filler material.

2.3 CONCRETE

2.3.1 Mix Proportions for Normal Weight Concrete

Trial design batches, mixture proportioning studies, and testing requirements for various classes and types of concrete specified are the responsibility of the Contractor. Base mixture proportions on compressive strength as determined by test specimens fabricated in accordance with ASTM C192/C192M and tested in accordance with ASTM C39/C39M. Samples of all materials used in mixture proportioning studies must be representative of those proposed for use in the project and must be accompanied by the manufacturer's or producer's test report indicating compliance with these specifications. Base trial mixtures having proportions, consistencies, and air content suitable for the work on methodology described in ACI/MCP-1. In the trial mixture, use at least three different water cement ratios for each type of mixture, which must produce a range of strength encompassing those required for each class and type of concrete required on the project. The maximum water cement ratio required must be based on equivalent water cement ratio calculations as determined by the conversion from the weight ratio of water to cement plus pozzolan, silica fume, and ground granulated blast furnace slag by weight equivalency method. Design laboratory trial mixture for maximum permitted slump and air content. Each combination of material proposed for use must have separate trial mixture, except for accelerator or retarder use can be provided without separate trial mixture. Report the temperature of concrete in each trial batch. For each water cement ratio, at least three test cylinders for each test

age must be made and cured in accordance with ASTM C192/C192M and tested in accordance with ASTM C39/C39M for 7 and 28 days. From these results, plot a curve showing the relationship between water cement ratio and strength for each set of trial mix studies. In addition, plot a curve showing the relationship between 7 and 28 day strength.

2.3.2 Concrete Curing Materials

2.3.2.1 Moisture-Retaining Cover

The Contractor shall provide waterproof paper cover for curing concrete conforming to ASTM C171, regular or white, or polyethylene sheeting conforming to ASTM C171, or polyethylene-coated burlap consisting of a laminate of burlap and a white opaque polyethylene film permanently bonded to the burlap; burlap shall conform to ASTM C171, Class 3, and polyethylene film shall conform to ASTM C171. When tested for water retention in accordance with ASTM C156, weight of water lost 72 hours after application of moisture retaining covering material shall not exceed 0.039 gram per square centimeter of the mortar specimen surface.

2.3.2.2 Membrane-Forming Curing Compound

The Contractor shall provide liquid type compound conforming to ASTM C309, Type 1, clear, Type 1D with fugitive dye for interior work and Type 2, white, pigmented for exterior work.

2.4 MATERIALS

2.4.1 Cement

ASTM C150/C150M, Type I or II. Or provide blended cement that consists of a mixture of ASTM C150/C150M, Type II, cement and one of the following materials: ASTM C618 pozzolan or fly ash, ASTM C989/C989M ground granulated blast-furnace slag. For exposed concrete, use the same manufacturer for each type of cement, ground slag, fly ash, and pozzolan.

2.4.1.1 Fly Ash and Pozzolan

The Contractor shall provide fly ash and pozzolan in conformance with the following:

ASTM C618, Type N, F, or C, except that the maximum allowable loss on ignition shall be 6 percent for Types N and F. Add with cement. Fly ash content shall be a minimum of 20 percent by weight of cementitious material, provided the fly ash does not reduce the amount of cement in the concrete mix below the minimum requirements of local building codes. Where the use of fly ash cannot meet the minimum level, provide the maximum amount of fly ash permittable that meets the code requirements for cement content. Report the chemical analysis of the fly ash in accordance with ASTM C311. Evaluate and classify fly ash in accordance with ASTM D5759.

High contents of supplementary cementitious materials can have some detrimental effects on the concrete properties, such as slowing excessively the strength gain rate, and delaying and increasing the difficulty of finishing. The maximum content shall be 25 percent by weight of the total cementitious material.

2.4.1.2 Portland Cement

The Contractor shall provide cement that conforms to ASTM C150/C150M, Type I, IA, II, or IIA. Use one brand and type of cement for formed concrete having exposed-to-view finished surfaces.

2.4.2 Water

The Contractor shall minimize the amount of water in the mix. The amount of water shall not exceed 45 percent by weight of cementitious materials (cement plus pozzolans), and in general, improve workability by adjusting the grading rather than by adding water. Water shall be fresh, clean, and potable free from oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete.

2.4.3 Aggregates

The Contractor shall provide aggregates conforming to the following:

ASTM C33/C33M, except as modified herein. Furnish aggregates for exposed concrete surfaces from one source. Provide aggregates that do not contain any substance which may be deleteriously reactive with the alkalies in the cement.

2.4.4 Nonshrink Grout

The Contractor shall provide grout conforming to ASTM C1107/C1107M.

2.4.5 Admixtures

The Contractor shall provide admixtures conforming to ASTM C494/C494M: Type A, water reducing; Type B, retarding; Type C, accelerating; Type D, water-reducing and retarding; and Type E, water-reducing and accelerating admixture. The Contractor shall not use calcium chloride admixtures.

2.4.5.1 Air-Entraining

The Contractor shall provide air-entraining conforming to ASTM C260/C260M.

2.4.5.2 High Range Water Reducer (HRWR) (Superplasticizers)

The Contractor shall provide grout conforming to ASTM C494/C494M, Type F and ASTM C1017/C1017M.

2.4.6 Vapor Retarder

The Contractor shall provide vapor barrier conforming to ASTM E1745 Class A polyethylene sheeting, minimum 10 mil thickness or other equivalent material.

2.4.7 Materials for Curing Concrete

The Contractor shall use water-based curing compounds, sealers, and coatings with zero volatile organic compound (VOC) content.

2.4.7.1 Impervious Sheeting

The Contractor shall provide impervious sheeting conforming to ASTM C171; waterproof paper, clear or white polyethylene sheeting, or

polyethylene-coated burlap.

2.4.8 Expansion/Contraction Joint Filler

The Contractor shall provide joint filler conforming to ASTM D1751, ASTM D1752, cork or 100 percent post-consumer paper meeting ASTM D1752 (subparagraphs 5.1 to 5.4). Material shall be 1/2 inch thick.

2.4.8.1 Preformed Joint Filler Strips

The Contractor shall provide nonextruding and resilient bituminous type filler strips conforming to ASTM D1751.

2.4.9 Joint Sealants

2.4.9.1 Joint Sealant Compound

The Contractor shall provide hot-poured, elastic type compound conforming to ASTM D6690.

2.5 REINFORCEMENT

2.5.1 Reinforcing Bars

The Contractor shall provide reinforcing bars conforming to ACI/MCP-2 unless otherwise specified. The Contractor shall use deformed steel conforming to ASTM A615/A615M with the bars marked A, S, W, Grade 60.

2.5.2 Wire

The Contractor shall provide wire conforming to ASTM A82/A82M or ASTM A496/A496M.

2.5.2.1 Welded Wire Fabric

The Contractor shall provide welded wire fabric conforming to ASTM A185/A185M or ASTM A497/A497M. Provide flat sheets of welded wire fabric for slabs and toppings.

2.5.2.2 Steel Wire

The Contractor shall provide steel wire conforming to ASTM A82/A82M.

2.5.3 Reinforcing Bar Supports

The Contractor shall provide bar ties and supports of coated or non corrodible material.

2.5.4 Supports for Reinforcement

Supports include bolsters, chairs, spacers, and other devices necessary for proper spacing, supporting, and fastening reinforcing bars and wire fabric in place.

The Contractor shall provide wire bar type supports conforming to ACI/MCP-3, ACI/MCP-4 and CRSI 10MSP.

Legs of supports in contact with formwork shall be hot-dip galvanized, or plastic coated after fabrication, or stainless-steel bar supports.

2.6 BONDING MATERIALS

2.6.1 Concrete Bonding Agent

The Contractor shall provide aqueous-phase, film-forming, nonoxidizing, freeze and thaw-resistant compound agent suitable for brush or spray application conforming to ASTM C932.

2.7 CLASSIFICATION AND QUALITY OF CONCRETE

2.7.1 Concrete Classes and Usage

The Contractor shall provide concrete classes, compressive strength, requirements for air entrainment, and usage as follows:

CONCRETE CLASS	MIN. 28-DAY COMPRESSIVE STRENGTH POUNDS PER SQ. IN.	REQUIREMENT FOR AIR ENTRAINMENT	USAGE
4A	4000	Air-entrained	For structural concrete work exposed to freezing and thawing, unless otherwise indicated or specified, such as sidewalks, roads, and curbs.

2.7.2 Limits for Concrete Proportions

The Contractor shall provide limits for maximum water/cement ratio and minimum cement content for each concrete class as follows:

CONCRETE CLASS	MAX. WATER/CEMENT RATIO BY WEIGHT*	MIN. CEMENT FOR 3- TO 4-INCH SLUMP, (NO. OF 94-POUND SACKS) PER CU. YD.
4A	0.46	6.0
* Weight of water to weight of cement in pounds in one cubic yard of concrete.		

2.7.3 Maximum Size of Aggregate

Size of aggregate, designated by the sieve size on which maximum amount of retained coarse aggregate is 5 to 10 percent by weight, shall be as follows:

MAXIMUM SIZE OF AGGREGATE	ASTM C33/C33M SIZE NUMBER	TYPE OF CONSTRUCTION

3/4 inch	67	Monolithic concrete slabs and other flatwork having a depth of not less than 2-1/2 inches and a clear distance between reinforcing bars of not less than 1 inch

Maximum size of aggregate may be that required for most critical type of construction using that concrete class.

2.7.4 Slump

The Contractor shall provide slump for concrete at time and in location of placement as follows:

TYPE OF CONSTRUCTION	SLUMP
Monolithic slabs	Not less than 1 inch nor more than 4 inches
Ramps and other sloping surfaces	0 nor more than 3 inches

2.7.5 Total Air Content

The Contractor shall provide air content of exposed concrete and interior concrete in accordance with ASTM C260/C260M and/or as follows:

LIMITS OF CONCRETE EXPOSURE	REQUIREMENT FOR AIR ENTRAINMENT	MAXIMUM SIZE OF AGGREGATE	TOTAL AIR CONTENT BY VOLUME
Exposed to freezing and thawing or subjected to hydraulic pressure	Air-entrained	3/4 inch	5 to 7 percent

The Contractor shall provide concrete exposed to freezing and thawing or subjected to hydraulic pressure that is air-entrained by addition air-entraining admixture to concrete mix.

PART 3 EXECUTION

3.1 EXAMINATION

The Contractor shall not begin installation until substrates have been properly constructed; verify that substrates are plumb and true.

3.2 PREPARATION

The Contractor shall determine quantity of concrete needed and minimize the production of excess concrete. The Contractor shall designate locations or uses for potential excess concrete before the concrete is poured.

3.2.1 General

Surfaces against which concrete is to be placed shall be free of debris, loose material, standing water, snow, ice, and other deleterious substances before start of concrete placing.

The Contractor shall remove standing water without washing over freshly deposited concrete. The Contractor shall divert flow of water through side drains provided for such purpose.

3.2.2 Formwork

Completed formwork shall be approved by the Contracting Officer. The Contractor shall remove debris and foreign material from interior of forms before start of concrete placing.

3.2.3 Edge Forms and Screed Strips for Slabs

The Contractor shall set edge forms or bulkheads and intermediate screed strips for slabs to obtain indicated elevations and contours in finished slab surface and shall be strong enough to support vibrating bridge screeds or roller pipe screeds if nature of specified slab finish requires use of such equipment. The Contractor shall align concrete surface to elevation of screed strips by use of strike-off templates or compacting-type screeds.

3.2.4 Reinforcement and Other Embedded Items

The Contractor shall secure reinforcement, joint materials, and other embedded materials in position, inspected, and approved, by the Contracting Officer, before start of concrete placing.

3.3 FORMS

The Contractor shall provide forms in conformance with the following:

ACI/MCP-2. Provide forms, shoring, and scaffolding for concrete placement. Set forms mortar-tight and true to line and grade. Chamfer above grade exposed joints, edges, and external corners of concrete 0.75 inch unless otherwise indicated. Provide formwork with clean-out openings to permit inspection and removal of debris. Forms submerged in water shall be watertight.

3.3.1 General

The Contractor shall construct forms to conform, within the tolerances specified, to shapes dimensions, lines, elevations, and positions of cast-in-place concrete members as indicated. Forms shall be supported, braced, and maintained sufficiently rigid to prevent deformation under load.

3.3.2 Design and Construction of Formwork

The Contractor shall provide formwork design and construction that conforms to ACI/MCP-2, Chapter 4.

The Contractor shall provide forms that are tight to prevent leakage of cement paste during concrete placing.

The Contractor shall support form facing materials by structural members spaced close to prevent deflection of form facing material. Fit forms placed in successive units for continuous surfaces to accurate alignment to ensure a smooth completed surface within the tolerances specified. Where necessary to maintain the tolerances specified, such as long spans where immediate supports are not possible, camber formwork for anticipated deflections in formwork due to weight and pressure of fresh concrete and to construction loads.

The Contractor shall chamfer exposed joints, edges, and external corners a minimum of 3/4 inch by moldings placed in corners of column, beam, and wall forms.

The Contractor shall provide shores and struts with a positive means of adjustment capable of taking up formwork settlement during concrete placing operations. Obtain adjustment with wedges or jacks or a combination thereof. When adequate foundations for shores and struts cannot be secured, provide trussed supports.

The Contractor shall provide temporary openings in wall forms, column forms, and at other points where necessary to permit inspection and to facilitate cleaning.

The Contractor shall provide forms that are readily removable without impact, shock, or damage to concrete.

3.3.3 Coating

Before concrete placement, the Contractor shall coat the contact surfaces of forms with a nonstaining mineral oil, nonstaining form coating compound, or two coats of nitrocellulose lacquer. Do not use mineral oil on forms for surfaces to which adhesive, paint, or other finish material is to be applied.

3.3.4 Reuse

The Contractor may reuse forms providing the structural integrity of concrete and the aesthetics of exposed concrete are not compromised.

3.3.5 Forms for Standard Rough Form Finish

The Contractor shall give rough form finish concrete formed surfaces that are to be concealed by other construction, unless otherwise specified.

Form facing material for standard rough form finish shall be the specified concrete form plywood or other form facing material that produces concrete surfaces equivalent in smoothness and appearance to that produced by new concrete form plywood panels.

For concrete surfaces exposed only to the ground, undressed, square-edge, 1-inch nominal thickness lumber may be used. The Contractor shall provide horizontal joints that are level and vertical joints that are plumb.

3.3.6 Form Ties

The Contractor shall provide ties that are factory fabricated metal, adjustable in length, removable or snap-off type that do allow form deflection or do not spall concrete upon removal. Portion of form ties remaining within concrete after removal of exterior parts shall be at least 1-1/2 inches back from concrete surface. The Contractor shall provide form ties that are free of devices that leave a hole larger than 7/8 inch or less than 1/2 inch in diameter in concrete surface. Form ties fabricated at the project site or wire ties of any type are not acceptable.

3.3.7 Tolerances for Form Construction

The Contractor shall construct formwork to ensure that after removal of forms and prior to patching and finishing of formed surfaces, provide concrete surfaces in accordance with tolerances specified in ACI/MCP-1 and ACI/MCP-2.

3.3.8 Removal of Forms and Supports

After placing concrete, forms shall remain in place for the time periods specified in ACI/MCP-4. The Contractor shall not remove forms and shores (except those used for slabs on grade and slip forms) until the Contracting Officer determines that the concrete has gained sufficient strength to support its weight and superimposed loads. Base such determination on compliance with one of the following:

a. The plans and specifications stipulate conditions for removal of forms and shores, and such conditions have been followed, or

b. The concrete has been properly tested with an appropriate ASTM standard test method designed to indicate the concrete compressive strength, and the test results indicate that the concrete has gained sufficient strength to support its weight and superimposed loads.

The Contractor shall prevent concrete damage during form removal and shall clean all forms immediately after removal.

3.4 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

The Contractor shall install reinforcement in conformance with ACI/MCP-2. The Contractor shall provide bars, wire fabric, wire ties, supports, and other devices necessary to install and secure reinforcement. Reinforcement shall not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. The Contractor shall remove loose rust prior to placing steel. Tack welding is prohibited.

3.4.1 General

The Contractor shall provide details of reinforcement that are in accordance with ACI/MCP-3 and ACI/MCP-4 and as specified.

3.4.2 Vapor Retarder

The Contractor shall provide beneath the on-grade concrete floor slab. Use the greatest widths and lengths practicable to eliminate joints wherever possible. The Contractor shall lap joints a minimum of 12 inches. The Contractor shall remove torn, punctured, or damaged vapor retarder material and provide with new vapor retarder prior to placing concrete. Concrete placement shall not damage vapor retarder.

3.4.3 Reinforcement Supports

The Contractor shall place reinforcement and secure with galvanized or non corrodible chairs, spacers, or metal hangers. For supporting reinforcement on the ground, the Contractor shall use concrete or other non corrodible material, having a compressive strength equal to or greater than the concrete being placed.

Reinforcement supports shall conform to ASTM A934/A934M.

3.4.4 Splicing

The Contractor shall provide splicing as indicated. For splices not indicated, splices shall conform to ACI/MCP-2. The Contractor shall not splice at points of maximum stress. The Contractor shall overlap welded wire fabric the spacing of the cross wires, plus 2 inches.

3.4.5 Cover

The Contractor shall provide covers in conformance with ACI/MCP-2 for minimum coverage, unless otherwise indicated.

3.4.6 Setting Miscellaneous Material

The Contractor shall place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement. The Contractor shall place anchor bolts and check location and elevation. The Contractor shall temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

3.4.7 Construction Joints

The Contractor shall locate joints to least impair strength and continue reinforcement across joints unless otherwise indicated.

3.4.8 Expansion Joints and Contraction Joints

The Contractor shall provide joints in conformance with the following:

Provide expansion joint at edges of interior floor slabs on grade abutting vertical surfaces, and as indicated. Make expansion joints 1/2 inch wide unless indicated otherwise. Fill expansion joints not exposed to weather with preformed joint filler material. Completely fill joints exposed to weather with joint filler material and joint sealant. Do not extend reinforcement or other embedded metal items bonded to the concrete through

any expansion joint unless an expansion sleeve is used. Provide contraction joints, either formed or saw cut or cut with a jointing tool, to the indicated depth after the surface has been finished. Complete saw joints within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

3.4.9 Fabrication

The Contractor shall shop fabricate reinforcing bars to conform to shapes and dimensions indicated for reinforcement, and as follows:

Provide fabrication tolerances that are in accordance with ACI/MCP-1, ACI/MCP-2 and ACI/MCP-3.

Provide hooks and bends that are in accordance with ACI/MCP-3 and ACI/MCP-4.

Reinforcement shall be bent cold to shapes as indicated. Bending shall be done in the shop. Rebending of a reinforcing bar that has been bent incorrectly is not be permitted. Bending shall be in accordance with standard practice and by machine methods.

Tolerance on nominally square-cut, reinforcing bar ends shall be in accordance with ACI/MCP-3.

The Contractor shall deliver reinforcing bars bundled, tagged, and marked. Tags shall be metal with bar size, length, mark, and other information pressed in by machine. Marks shall correspond with those used on the placing drawings.

The Contractor shall not use reinforcement that has any of the following defects:

a. Bar lengths, depths, and bends beyond specified fabrication tolerances

b. Bends or kinks not indicated on drawings or approved shop drawings

c. Bars with reduced cross-section due to rusting or other cause

The Contractor shall replace defective reinforcement with new reinforcement having required shape, form, and cross-section area.

3.4.10 Placing Reinforcement

The Contractor shall place reinforcement in accordance with ACI/MCP-3 and ACI/MCP-4.

For slabs on grade (over earth or over capillary water barrier) and for footing reinforcement, the Contractor shall support bars or welded wire fabric on precast concrete blocks, spaced at intervals required by size of reinforcement, to keep reinforcement the minimum height specified above the underside of slab or footing.

Contractor shall cooperate with other trades in setting of anchor bolts, inserts, and other embedded items. Where conflicts occur between locating reinforcing and embedded items, the Contractor shall notify the Contracting Officer so that conflicts may be reconciled before placing concrete. Anchors and embedded items shall be positioned and supported with

appropriate accessories.

The Contractor shall provide reinforcement that is supported and secured together to prevent displacement by construction loads or by placing of wet concrete, and as follows:

Provide supports for reinforcing bars that are sufficient in number and sufficiently heavy to carry the reinforcement they support, and in accordance with ACI/MCP-3, ACI/MCP-4 and CRSI 10MSP. Do not use supports to support runways for concrete conveying equipment and similar construction loads.

Equip supports on ground and similar surfaces with sand-plates.

Support welded wire fabric as required for reinforcing bars.

Secure reinforcements to supports by means of tie wire. Wire shall be black, soft iron wire, not less than 16 gage.

With the exception of temperature reinforcement, tied to main steel approximately 24 inches on center, reinforcement shall be accurately placed, securely tied at intersections with 18-gage annealed wire, and held in position during placing of concrete by spacers, chairs, or other supports. Point wire-tie ends away from the form. Unless otherwise indicated, numbers, type, and spacing of supports shall conform to ACI/MCP-3.

Bending of reinforcing bars partially embedded in concrete is permitted only as specified in ACI/MCP-3 and ACI/MCP-4.

3.4.11 Spacing of Reinforcing Bars

The Contractor shall provide spacing as indicated. If not indicated, spacing shall be in accordance with the ACI/MCP-3 and ACI/MCP-4.

Reinforcing bars may be relocated to avoid interference with other reinforcement, or with conduit, pipe, or other embedded items. If any reinforcing bar is moved a distance exceeding one bar diameter or specified placing tolerance, resulting rearrangement of reinforcement is subject to approval by the Contracting Officer.

3.5 PLACING CONCRETE

The Contractor shall place concrete in conformance with the following:

Place concrete as soon as practicable after the forms and the reinforcement have been inspected and approved by the Contracting Officer. Do not place concrete when weather conditions prevent proper placement and consolidation; in uncovered areas during periods of precipitation; or in standing water. Prior to placing concrete, remove dirt, construction debris, water, snow, and ice from within the forms. Deposit concrete as close as practicable to the final position in the forms. Do not exceed a free vertical drop of 3 feet from the point of discharge. Place concrete in one continuous operation from one end of the structure towards the other. Position grade stakes on 10 foot centers maximum in each direction when pouring interior slabs and on 20 foot centers maximum for exterior slabs.

3.5.1 General Placing Requirements

The Contractor shall place concrete in conformance with the following:

Deposit concrete continuously or in layers of such thickness that no concrete is placed on concrete which has hardened sufficiently to cause formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as specified. Perform concrete placing at such a rate that concrete which is being integrated with fresh concrete is still plastic. Deposit concrete as nearly as practical in its final position to avoid segregation due to rehandling or flowing. Do not subject concrete to procedures which cause segregation.

Concrete to receive other construction shall be screeded to proper level to avoid excessive skimming or grouting.

Do not use concrete which becomes nonplastic and unworkable or does not meet quality control limits as specified or has been contaminated by foreign materials. Remove rejected concrete from the site.

3.5.2 Vibration

The Contractor shall provide vibration in conformance with the following:

ACI/MCP-2. Furnish a spare, working, vibrator on the job site whenever concrete is placed. Consolidate concrete slabs greater than 4 inches in depth with high frequency mechanical vibrating equipment supplemented by hand spading and tamping. Consolidate concrete slabs 4 inches or less in depth by wood tampers, spading, and settling with a heavy leveling straightedge. Operate internal vibrators with vibratory element submerged in the concrete, with a minimum frequency of not less than 6000 impulses per minute when submerged. Do not use vibrators to transport the concrete in the forms. Penetrate the previously placed lift with the vibrator when more than one lift is required. Use external vibrators on the exterior surface of the forms when internal vibrators do not provide adequate consolidation of the concrete.

3.5.3 Pumping

The Contractor shall provide pumping in conformance with the following:

ACI/MCP-2. Pumping shall not result in separation or loss of materials nor cause interruptions sufficient to permit loss of plasticity between successive increments. Loss of slump in pumping equipment shall not exceed 2 inches. Do not convey concrete through pipe made of aluminum or aluminum alloy. Avoid rapid changes in pipe sizes. Limit maximum size of course aggregate to 33 percent of the diameter of the pipe. Limit maximum size of well rounded aggregate to 40 percent of the pipe diameter. Take samples for testing at both the point of delivery to the pump and at the discharge end.

3.5.4 Cold Weather

The Contractor shall place concrete in cold weather in conformance with the following:

ACI/MCP-2. Do not allow concrete temperature to decrease below 50 degrees F. Obtain approval prior to placing concrete when the ambient

temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain 50 degrees F minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to 37 degrees F in any 1 hour and 50 degrees F per 24 hours after heat application.

3.5.5 Hot Weather

The Contractor shall place concrete in hot weather in conformance with the following:

Maintain required concrete temperature using Figure 2.1.5 in ACI/MCP-2 to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets.

3.5.6 Follow-up

The Contractor shall check concrete within 24 hours of placement for flatness, levelness, and other specified tolerances. The Contractor shall adjust formwork and placement techniques on subsequent pours to achieve specified tolerances.

3.5.7 Placing Concrete in Forms

The Contractor shall place concrete in conformance with the following:

Deposit concrete placed in forms in horizontal layers not exceeding 24 inches.

Consolidate concrete placed in forms by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. Provide vibrating equipment adequate in number of units and power of each unit to properly consolidate concrete. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced points not farther apart than visible effectiveness of machine. Do not insert vibrator into lower courses of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of concrete mix.

3.6 SURFACE FINISHES EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES

3.6.1 Defects

The Contractor shall repair defects in conformance with the following:

Repair formed surfaces by removing minor honeycombs, pits greater than 1 square inch surface area or 0.25 inch maximum depth, or otherwise defective

areas. Provide edges perpendicular to the surface and patch with nonshrink grout. Patch tie holes and defects when the forms are removed. Concrete with extensive honeycomb including exposed steel reinforcement, cold joints, entrapped debris, separated aggregate, or other defects which affect the serviceability or structural strength will be rejected, unless correction of defects is approved by the Contracting Officer. Obtain approval from the Contracting Officer of corrective action prior to repair. The surface of the concrete shall not vary more than the allowable tolerances of ACI/MCP-4. Exposed surfaces shall be uniform in appearance and finished to a smooth form finish unless otherwise specified.

3.6.2 Not Against Forms

Surfaces not otherwise specified shall be finished with wood floats to even surfaces. Finish shall match adjacent finishes.

3.6.3 Formed Surfaces

3.6.3.1 Tolerances

The Contractor shall provide tolerances in conformance with ACI/MCP-1 and as indicated.

3.6.3.2 As-Cast Rough Form

The Contractor may use as-cast rough forms for surfaces not exposed to public view. The Contractor shall patch these holes and defects and level abrupt irregularities. The Contractor shall remove or rub off fins and other projections exceeding 0.25 inch in height.

3.6.3.3 Standard Smooth Finish

Finish shall be as-cast concrete surface as obtained with form facing material for standard smooth finish. The Contractor shall repair and patch defective areas as specified; and remove all fins and other projections on surface.

3.7 FLOOR, SLAB, AND PAVEMENT FINISHES AND MISCELLANEOUS CONSTRUCTION

The Contractor shall provide finish in conformance with the following:

ACI/MCP-2, unless otherwise specified. Slope top of concrete uniformly to drains where drains are provided.

3.7.1 Finish

The Contractor shall provide finish in conformance with the following:

Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater.

3.7.1.1 Floated

The Contractor shall provide a floated finish for exterior slabs where not otherwise specified in conformance with the following: After the concrete

has been placed, consolidated, struck off, and leveled, do not work the concrete further, until ready for floating. Whether floating with a wood, magnesium, or composite hand float, with a bladed power trowel equipped with float shoes, or with a powered disc, float shall begin when the surface has stiffened sufficiently to permit the operation. During or after the first floating, check surface with a 10 foot straightedge applied at no less than two different angles, one of which is perpendicular to the direction of strike off. Cut down high spots and fill low spots during this procedure to produce a surface level within 1/4 inch in 10 feet.

3.7.1.2 Steel Troweled

The Contractor shall provide a steel troweled finish for floors intended as walking surfaces in conformance with the following: First, provide a floated finish. Next, the finish shall be power troweled two times, and finally hand troweled. The first troweling after floating needs to produce a smooth surface which is relatively free of defects but which may still show some trowel marks. Perform additional trowelings done by hand after the surface has hardened sufficiently. The final troweling is done when a ringing sound is produced as the trowel is moved over the surface. Thoroughly consolidate the surface by the hand troweling operations. The finished surface shall be essentially free of trowel marks and uniform in texture and appearance. The finished surface shall produce a surface level to within 1/4 inch in 10 feet. On surfaces intended to support floor coverings, remove any defects of sufficient magnitude to show through the floor covering by grinding.

3.7.1.3 Broomed

The Contractor shall provide a broom finish on surfaces of exterior walks, platforms, patios, and ramps, unless otherwise indicated in conformance with the following: Perform a floated finish, then draw a broom or burlap belt across the surface to produce a coarse scored texture. Permit surface to harden sufficiently to retain the scoring or ridges. Broom transverse to traffic or at right angles to the slope of the slab.

3.7.1.4 Pavement

The Contractor shall finish pavement in conformance with the following:

Screed the concrete with a template advanced with a combined longitudinal and crosswise motion. Maintain a slight surplus of concrete ahead of the template. After screeding, float the concrete longitudinally. Use a straightedge to check slope and flatness; correct and refloat as necessary. Obtain final finish by belting. Lay belt flat on the concrete surface and advance with a sawing motion; continue until a uniform but gritty nonslip surface is obtained. Round edges and joints with an edger having a radius of 1/8 inch.

3.7.2 Concrete Walks

The Contractor shall provide concrete walks in conformance with the following:

Provide 4 inches thick minimum. Provide contraction joints spaced every 5 linear feet unless otherwise indicated. Cut contraction joints one inch deep with a jointing tool after the surface has been finished. Provide 0.5 inch thick transverse expansion joints at changes in direction where sidewalk abuts curb, steps, rigid pavement, or other similar structures;

space expansion joints every 50 feet maximum. Give walks a broomed finish. Unless indicated otherwise, provide a transverse slope of 1/48. Limit variation in cross section to 1/4 inch in 5 feet.

3.7.3 Curbs

The Contractor shall provide curbs in conformance with the following:

Provide contraction joints spaced every 10 feet maximum unless otherwise indicated. Cut contraction joints 3/4 inch deep with a jointing tool after the surface has been finished. Provide expansion joints 1/2 inch thick and spaced every 100 feet maximum unless otherwise indicated. Perform pavement finish.

3.8 CURING AND PROTECTION

The Contractor shall provide concrete curing in conformance with the following;

ACI/MCP-2 unless otherwise specified. Begin curing immediately following form removal. Avoid damage to concrete from vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, and any other activity resulting in ground vibrations. Protect concrete from sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period.

3.8.1 General

The Contractor shall provide concrete curing in conformance with the following:

Protect freshly placed concrete from premature drying and cold or hot temperature and maintain without drying at a relatively constant temperature for the period of time necessary for hydration of cement and proper hardening of concrete.

Start initial curing as soon as free water has disappeared from surface of concrete after placing and finishing. Keep concrete moist for minimum 72 hours.

Final curing shall immediately follow initial curing and before concrete has dried. Continue final curing until cumulative number of hours or fraction thereof (not necessarily consecutive) during which temperature of air in contact with the concrete is above 50 degrees F has totaled 168 hours. Prevent rapid drying at end of final curing period.

3.8.2 Moist Curing

The Contractor shall remove water without erosion or damage to the structure and prevent water run-off.

3.8.2.1 Ponding or Immersion

The Contractor shall continually immerse the concrete throughout the curing period. Water shall not be more than 50 degrees F less than the temperature of the concrete. For temperatures between 40 and 50 degrees F, the Contractor shall increase the curing period by 50 percent.

3.8.2.2 Fog Spraying or Sprinkling

The Contractor shall apply water uniformly and continuously throughout the curing period. For temperatures between 40 and 50 degrees F, the Contractor shall increase the curing period by 50 percent.

3.8.2.3 Impervious Sheeting

The Contractor shall provide sheeting in conformance with the following:

Wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 12 inches minimum. Provide sheeting not less than 18 inches wider than the concrete surface to be cured. Secure edges and transverse laps to form closed joints. Repair torn or damaged sheeting or provide new sheeting.; overlap and continuously tape sheeting joints; and introduce sufficient water to soak the entire surface prior to completely enclosing.

3.8.3 Curing Periods

The Contractor shall provide curing in conformance with the following:

ACI/MCP-2 except 10 days for, pavement, 21 days for concrete that is in full-time or intermittent contact with alkali soil or waters. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing are subject to approval by the Contracting Officer.

3.8.4 Curing Methods

The Contractor shall accomplish curing by moist curing, by moisture-retaining cover curing, by membrane curing, and by combinations thereof, as specified.

Moist curing:

Accomplish moisture curing by any of the following methods:

Keeping surface of concrete wet by covering with water

Continuous water spraying

Covering concrete surface with specified absorptive cover for curing concrete saturated with water and keeping absorptive cover wet by water spraying or intermittent hosing. Place absorptive cover to provide coverage of concrete surfaces and edges with a slight overlap over adjacent absorptive covers.

Moisture-cover curing:

Accomplish moisture-retaining cover curing by covering concrete surfaces with specified moisture-retaining cover for curing concrete. Place cover directly on concrete in widest practical width, with sides and ends lapped at least 3 inches. Weight cover to prevent displacement; immediately repair tears or holes appearing during curing period by patching with pressure-sensitive, or waterproof tape.

Membrane curing:

Accomplish membrane curing by applying specified membrane-forming curing compound to damp concrete surfaces as soon as moisture film has disappeared. Apply curing compound uniformly in a two-coat operation by power-spraying equipment using a spray nozzle equipped with a wind guard. Apply second coat in a direction at right angles to direction of first coat. Total coverage for two coats shall be not more than 200 square feet per gallon of curing compound. Respray concrete surfaces which are subjected to heavy rainfall within 3 hours after curing compound has been applied by method and at rate specified. Maintain continuity of coating for entire curing period and immediately repair damage to coating during this period.

3.8.5 Curing Formed Surfaces

The Contractor shall accomplish curing of formed surfaces, including undersurfaces of girders, beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed before end of curing period, accomplish final curing of formed surfaces by any of the curing methods specified above, as applicable.

3.8.6 Curing Unformed Surfaces

The Contractor shall provide curing in conformance with the following:

Accomplish initial curing of unformed surfaces, such as monolithic slabs, floor topping, and other flat surfaces, by membrane curing.

Unless otherwise specified, accomplish final curing of unformed surfaces by any of curing methods specified above, as applicable.

3.8.7 Temperature of Concrete During Curing

The Contractor shall provide curing in conformance with the following:

When temperature of atmosphere is 41 degrees F and below, maintain temperature of concrete at not less than 50 degrees F throughout concrete curing period or 45 degrees F when the curing period is measured by maturity. When necessary, make arrangements before start of concrete placing for heating, covering, insulation, or housing as required to maintain specified temperature and moisture conditions for concrete during curing period.

When the temperature of atmosphere is 80 degrees F and above or during other climatic conditions which cause too rapid drying of concrete, make arrangements before start of concrete placing for installation of wind breaks, of shading, and for fog spraying, wet sprinkling, or moisture-retaining covering of light color as required to protect concrete during curing period.

Changes in temperature of concrete shall be uniform and not exceed 37 degrees F in any 1 hour nor 50 degrees F in any 24-hour period.

3.8.8 Protection from Mechanical Injury

During curing period, the Contractor shall protect concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration and from damage caused by rain or running water.

3.8.9 Protection After Curing

The Contractor shall protect finished concrete surfaces from damage by construction operations.

3.9 FIELD QUALITY CONTROL

3.9.1 Sampling

The Contractor shall provide sampling in conformance with the following:

ASTM C172/C172M. Collect samples of fresh concrete to perform tests specified. ASTM C31/C31M for making test specimens.

3.9.2 Testing

3.9.2.1 Slump Tests

The Contractor shall provide tests in conformance with the following:

ASTM C143/C143M. Take concrete samples during concrete placement. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cement ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 20 cubic yards (maximum) of concrete.

3.9.2.2 Temperature Tests

The Contractor shall provide tests in conformance with the following:

Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

3.9.2.3 Compressive Strength Tests

The Contractor shall provide tests in conformance with the following:

ASTM C39/C39M. Make five test cylinders for each set of tests in accordance with ASTM C31/C31M. Take precautions to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold one cylinder in reserve. Take samples for strength tests of each mix design of concrete placed each day not less than once a day, nor less than once for each 160 cubic yards of concrete, nor less than once for each 5400 square feet of surface area for slabs or walls. For the entire project, take no less than five sets of samples and

perform strength tests for each mix design of concrete placed. Each strength test result shall be the average of two cylinders from the same concrete sample tested at 28 days. If the average of any three consecutive strength test results is less than f'c or if any strength test result falls below f'c by more than 450 psi, take a minimum of three ASTM C42/C42M core samples from the in-place work represented by the low test cylinder results and test. Concrete represented by core test is considered structurally adequate if the average of three cores is equal to at least 85 percent of f'c and if no single core is less than 75 percent of f'c. Retest locations represented by erratic core strengths. Remove concrete not meeting strength criteria and provide new acceptable concrete. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

3.10 WASTE MANAGEMENT

The Contractor shall remove all waste generated in accordance with Section 01 35 40.00 41 NASA LANGLEY ENVIRONMENTAL REQUIREMENTS.

3.11 JOINTS

3.11.1 Construction Joints

The Contractor shall provide joints in conformance with the following:

Make and locate joints not indicated so as not to impair strength and appearance of the structure. Locate construction joints as follows:

a. In slabs on ground, so as to divide slab into areas not in excess of 1,200 square feet

Provide keyways at least 1-1/2-inches deep in construction joints in walls and slabs and between walls and footings; bulkheads may be used for slabs.

Joints shall be perpendicular to main reinforcement. Reinforcement shall be continued across construction joints.

3.11.2 Isolation Joints in Slabs on Ground

The Contractor shall provide joints in conformance with the following:

Provide joints at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.

Fill joints with premolded joint filler strips 1/2 inch thick, extending full slab depth. Install filler strips at proper level below finish floor elevation with a slightly tapered, dress-and-oiled wood strip temporarily secured to top of filler strip to form a groove not less than 3/4 inch in depth where joint is sealed with sealing compound and not less than 1/4 inch in depth where joint sealing is not required. Remove wood strip after concrete has set. Contractor shall clean groove of foreign matter and loose particles after surface has dried.

3.11.3 Control Joints in Slabs on Ground

The Contractor shall provide joints in conformance with the following:

Provide joints to form panels as indicated.

Under and on exact line of each control joint, cut 50 percent of welded wire fabric reinforcement before placing concrete.

Joints shall be 1/8-inch wide by 1/5 to 1/4 of slab depth and formed by inserting hand-pressed fiberboard strip into fresh concrete until top surface of strip is flush with slab surface or by cutting the concrete with a saw after the concrete has set. After concrete has cured for at least 7 days, the Contractor shall remove inserts and clean groove of foreign matter and loose particles.

3.11.4 Sealing Joints in Slabs on Ground

Isolation and control joints which are to receive finish flooring material shall be sealed with joint sealing compound after concrete curing period. Slightly underfill groove with joint sealing compound to prevent extrusion of compound. Remove excess material as soon after sealing as possible.

Sealing is not required for isolation and control joints to be covered with finish flooring material. Groove shall be left ready to receive filling material that is provided as part of finish floor covering work.

3.12 INSTALLATION OF ANCHORAGE DEVICES

3.12.1 General

Anchorage devices and embedded items required for other work that is attached to, or supported by, set and build in cast-in-place concrete as part of the work of this section, using setting drawings, instructions, and directions for work to be attached thereto.

3.12.2 Placing Anchorage Devices

The Contractor shall provide anchorage devices in conformance with the following:

Anchorage devices and embedded items shall be positioned accurately and supported against displacement. Fill openings in anchorage devices such as slots and threaded holes with removable material to prevent entry of concrete into openings.

3.13 CONCRETE CONVEYING

3.13.1 Transfer of Concrete At Project Site

The Contractor shall handle concrete from point of delivery and transfer to concrete conveying equipment and to locations of final deposit as rapidly as practical by methods which prevent segregation and loss of concrete mix materials.

3.13.2 Mechanical Equipment for Conveying Concrete

Equipment shall ensure a continuous flow of concrete at delivery end. The Contractor shall provide runways for wheeled concrete-conveying equipment from concrete delivery point to locations of final deposit. Interior surfaces of concrete conveying equipment shall be free of hardened concrete, debris, water, snow, ice, and other deleterious substances.

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07/06

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BASIC ELECTRICAL MATERIALS AND METHODS
07/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

The listed versions of the following references were used during the development of this design and are the Government approved versions to be used herein. There may be newer versions of certain references that have been released since the commencement and/or approval of the design effort. However, in order to comply with the Government technical requirements, not all of the latest versions of the listed references were adopted and the versions listed herein shall be utilized.

ASTM INTERNATIONAL (ASTM)

ASTM D709	(2013) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100	(2000; Archived) The Authoritative Dictionary of IEEE Standards Terms
IEEE C2	(2012; Errata 2012; INT 1-4 2012; INT 5-7 2013; INT 8 2014) National Electrical Safety Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2008) Enclosures for Electrical Equipment (1000 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code

1.2 RELATED REQUIREMENTS

This section applies to all sections of Division 26, ELECTRICAL, of this project specification unless specified otherwise in the individual sections.

1.3 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE 100.

b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.

c. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures, equipment, and test methods.

1.4 ADDITIONAL SUBMITTALS INFORMATION

Submittals required in other sections that refer to this section must conform to the following additional requirements as applicable.

1.4.1 Shop Drawings (SD-02)

Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

1.4.2 Product Data (SD-03)

Submittal shall include performance and characteristic curves.

1.5 QUALITY ASSURANCE

1.5.1 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.5.2 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.

1.5.2.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.5.2.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.6 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.7 POSTED OPERATING INSTRUCTIONS

Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:

a. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

b. Start up, proper adjustment, operating, lubrication, and shutdown procedures.

c. Safety precautions.

d. The procedure in the event of equipment failure.

e. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

1.8 MANUFACTURER'S NAMEPLATE

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.9 FIELD FABRICATED NAMEPLATES

ASTM D709. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

1.10 ELECTRICAL REQUIREMENTS

Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

1.11 INSTRUCTION TO GOVERNMENT PERSONNEL

Where specified in the technical sections, furnish the services of competent instructors to give full instruction to designated Government personnel in the adjustment, operation, and maintenance of the specified systems and equipment, including pertinent safety requirements as required. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Contracting Officer for regular operation. The number of training-days (8 hours per day) of instruction furnished shall be as specified in the individual section. When more than 4 training-days of instruction are specified, use approximately half of the time for classroom instruction. Use other time for instruction with equipment or system. When significant changes or modifications in the equipment or system are made under the terms of the contract, provide additional instructions to acquaint the operating personnel with the changes or modifications.

PART 2 PRODUCTS

2.1 FACTORY APPLIED FINISH

Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test.

PART 3 EXECUTION

3.1 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria.

3.2 FIELD FABRICATED NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.3 WARNING SIGN MOUNTING

Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

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COMMON WORK RESULTS FOR ELECTRICAL
08/13

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

The listed versions of the following references were used during the development of this design and are the Government approved versions to be used herein. There may be newer versions of certain references that have been released since the commencement and/or approval of the design effort. However, in order to comply with the Government technical requirements, not all of the latest versions of the listed references were adopted and the versions listed herein shall be utilized.

ASTM INTERNATIONAL (ASTM)

ASTM D709	(2013) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE Stds Dictionary	(2009) IEEE Standards Dictionary: Glossary of Terms & Definitions

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

RCBEA GUIDE	(2004) NASA Reliability Centered Building and Equipment Acceptance Guide

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA OS 1	(2008; Amd 2010) Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
NEMA FB 1	(2012) Standard for Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable
NEMA RN 1	(2005; R 2013) Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA TC 2	(2013) Standard for Electrical Polyvinyl Chloride (PVC) Conduit
NEMA TC 3	(2013) Standard for Polyvinyl Chloride (PVC) Fittings for Use With Rigid PVC Conduit and Tubing
NEMA WD 6	(2012) Wiring Devices Dimensions

Specifications

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1	(2005; Reprint Jul 2012) Standard for Flexible Metal Conduit
UL 6	(2007; Reprint Nov 2014) Electrical Rigid Metal Conduit-Steel
UL 797	(2007; Reprint Dec 2012) Electrical Metallic Tubing -- Steel

1.2 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE Stds Dictionary.

b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Submit Material, Equipment, and Fixture Lists for the following:

Conduits, Raceways and Fittings

Wire and Cable

Splices and Connectors

Receptacles

Outlets, Outlet Boxes, and Pull Boxes

SD-03 Product Data

Submit manufacturer's catalog data for the following items:

Conduits, Raceways and Fittings

Wire and Cable

Splices and Connectors

Receptacles

Outlets, Outlet Boxes, and Pull Boxes

Certification

Submittal for vertical assemblies will be reviewed by a licensed Mechanical, Civil or Structural Engineer to determine that the entire assembly will withstand 135 mph wind loading.

SD-06 Test Reports

Continuity Test

SD-08 Manufacturer's Instructions

Submit Manufacturer's Instructions.

1.4 PREDICTIVE TESTING AND INSPECTION TECHNOLOGY REQUIREMENTS

This section contains systems and/or equipment components regulated by NASA's Reliability Centered Building and Equipment Acceptance Program. This program requires the use of Predictive Testing and Inspection (PT&I) technologies in conformance with RCBEA GUIDE to ensure building equipment and systems installed by the Contractor have been installed properly and contain no identifiable defects that shorten the design life of a system and/or its components. Satisfactory completion of all acceptance requirements is required to obtain Government approval and acceptance of the Contractor's work.

1.5 PREVENTION OF CORROSION

Protect metallic materials against corrosion. Provide equipment enclosures with the standard finish by the manufacturer when used for most indoor installations. Do not use aluminum when in contact with earth or concrete and, where connected to dissimilar metal, protect by approved fittings and treatment. Ferrous metals such as, but not limited to, anchors, bolts, braces, boxes, bodies, clamps, fittings, guards, nuts, pins, rods, shims, thimbles, washers, and miscellaneous spare parts not of corrosion-resistant steel shall be hot-dip galvanized except where other equivalent protective treatment is specifically approved in writing.

1.6 GENERAL REQUIREMENTS

Submit material, equipment, and fixture lists for the following items showing manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site.

Submit manufacturer's instructions including special provisions required to install equipment components and system packages. Special notices shall detail impedances, hazards and safety precautions.

Submit certification required to install equipment components and system packages.

1.7 MANUFACTURER'S NAMEPLATE

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.8 FIELD FABRICATED NAMEPLATES

ASTM D709. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

PART 2 PRODUCTS

2.1 MATERIALS

Materials and equipment to be provided shall be the standard cataloged products of manufacturers regularly engaged in the manufacture of the products.

2.1.1 Rigid Steel Conduit

Rigid steel conduit shall comply with UL 6 and be galvanized by the hot-dip process. Rigid steel conduit shall be polyvinylchloride (PVC) coated in accordance with NEMA RN 1, where underground and in corrosive areas, or must be painted with bitumastic.

Fittings for rigid steel conduit shall be threaded.

Gaskets shall be solid. Conduit fittings with blank covers shall have gaskets, except in clean, dry areas or at the lowest point of a conduit run where drainage is required.

Covers shall have captive screws and be accessible after the work has been completed.

Rigid steel conduit shall be used on all outside location above ground. The ridge conduit shall extend below ground at least 6 inches when connected to ridge nonmetallic conduit.

2.1.2 Electrical Metallic Tubing (EMT)

EMT shall be in accordance with UL 797 and be zinc coated steel. Couplings and connectors shall be zinc-coated, raintight, gland compression with insulation throat. Crimp, spring, or setscrew type fittings are not acceptable.

2.1.3 Flexible Metallic Conduit

Flexible metallic conduit shall comply with UL 1 and be galvanized steel.

Fittings for flexible metallic conduit shall be specifically designed for

such conduit.

Provide liquidtight flexible metallic conduit with a protective jacket of PVC extruded over a flexible interlocked galvanized steel core to protect wiring against moisture, oil, chemicals, and corrosive fumes.

Specifically design fittings for liquidtight flexible metallic conduit for such conduit.

2.1.4 Rigid Nonmetallic Conduit

Rigid nonmetallic conduit shall comply with NEMA TC 2 and NEMA TC 3 with wall thickness not less than Schedule 40.

When installed below ground the conduit must be buried at least 18 inches deep.

2.2 WIRE AND CABLE

Conductors installed in conduit shall be copper 600-volt type THHN. All conductors AWG No. 8 and larger, shall be stranded. All conductors smaller than AWG No. 8 shall be solid.

Flexible cable shall be Type SO and contain a grounding conductor with green insulation.

Conductors installed in plenums shall be marked plenum rated.

2.3 SPLICES AND CONNECTORS

Make all splices in AWG No. 8 and smaller with approved indentor crimp-type connectors and compression tools.

2.4 RECEPTACLES

Receptacles shall be commercial grade, 20A, 125 VAC, 2-pole, 3-wire duplex conforming to NEMA WD 6, NEMA 5-20R or as specified on the drawings.

2.5 OUTLETS, OUTLET BOXES, AND PULL BOXES

Outlet boxes for use with conduit systems shall be in accordance with NEMA FB 1 and ANSI/NEMA OS 1 and be not less than 1-1/2 inches deep. Furnish all pull and junction boxes with screw-fastened covers.

PART 3 EXECUTION

3.1 CONDUITS, RACEWAYS AND FITTINGS

Conduit runs between outlet and outlet, between fitting and fitting, or between outlet and fitting shall not contain more than the equivalent of three 90-degree bends, including those bends located immediately at the outlet or fitting.

Do not install crushed or deformed conduit. Avoid trapped conduit runs where possible. Take care to prevent the lodgment of foreign material in the conduit, boxes, fittings, and equipment during the course of construction. Clear any clogged conduit of obstructions or be replaced.

Conduit and raceway runs concealed in or behind walls, above ceilings, or

exposed on walls and ceilings 5 feet or more above finished floors and not subject to mechanical damage may be electrical metallic tubing (EMT).

3.1.1 Rigid Steel Conduit

Make field-made bends and offsets with approved hickey or conduit bending machine. Conduit elbows larger than 2-1/2 inches shall be long radius.

Provide all conduit stubbed-up through concrete floors for connections to free-standing equipment with the exception of motor-control centers, cubicles, and other such items of equipment, with a flush coupling when the floor slab is of sufficient thickness. Otherwise,provide a floor box set flush with the finished floor. Conduits installed for future use shall be terminated with a coupling and plug set flush with the floor.

3.1.2 Electrical Metallic Tubing (EMT)

EMT shall be grounded in accordance with NFPA 70, using pressure grounding connectors especially designed for EMT.

3.1.3 Flexible Metallic Conduit

Use flexible metallic conduit to connect recessed fixtures from outlet boxes in ceilings, transformers, and other approved assemblies.

Bonding wires shall be used in flexible conduit as specified in NFPA 70, for all circuits. Flexible conduit shall not be considered a ground conductor.

Electrical connections to vibration-isolated equipment shall be made with flexible metallic conduit.

Liquidtight flexible metallic conduit shall be used in wet and oily locations and to complete the connection to motor-driven equipment.

3.1.4 Rigid Nonmetallic Conduit

Rigid PVC conduit shall be direct buried.

A green insulated copper grounding conductor shall be in conduit with conductors and be solidly connected to ground at each end. Grounding wires shall be sized in accordance with NFPA 70.

3.2 WIRING

Feeder and branch circuit conductors shall be color coded as follows:

CONDUCTOR	COLOR AC
Line	Black
Neutral	White
Equipment Grounds	Green

Conductors up to and including AWG No. 2 shall be manufactured with colored insulating materials.

Splice in accordance with the NFPA 70. Provide conductor identification

within each enclosure where a tap, splice, or termination is made and at the equipment terminal of each conductor. Terminal and conductor identification shall match as indicated.

Where several feeders pass through a common pullbox, the feeders shall be tagged to clearly indicate the electrical characteristics, circuit number, and panel designation.

3.3 WIRING DEVICES

3.3.1 Receptacles

Install receptacles as shown on drawings.

Ground terminal of each flush-mounted receptacle shall be bonded to the outlet box with an approved green bonding jumper when used with dry wall type construction.

3.3.2 Device Plates

Device plates for switches that are not within sight of the loads controlled shall be suitably engraved with a description of the loads.

Device plates and receptacle cover plates for receptacles other than 125-volt, single-phase, duplex, convenience outlets shall be suitably marked, showing the circuit number, voltage, frequency, phasing, and amperage available at the receptacle. Required marking shall consist of a self-adhesive label having 1/4 inch embossed letters.

Device plates for convenience outlets shall be similarly marked indicating the supply panel and circuit number.

3.4 BOXES AND FITTINGS

Furnish and install pullboxes where necessary in the conduit system to facilitate conductor installation. Conduit runs longer than 100 feet or with more than three right-angle bends shall have a pullbox installed at a convenient intermediate location.

Securely mount boxes and enclosures to the building structure with supporting facilities independent of the conduit entering or leaving the boxes.

3.5 IDENTIFICATION PLATES AND WARNINGS

Furnish and install identification plates for lighting and power panelboards, motor control centers, all line voltage heating and ventilating control panels, fire detector and sprinkler alarms, door bells, pilot lights, disconnect switches, manual starting switches, and magnetic starters. Process control devices and pilot lights shall have identification plates.

Furnish identification plates for all line voltage enclosed circuit breakers, identifying the equipment served, voltage, phase(s) and power source. Circuits 480 volts and above shall have conspicuously located warning signs in accordance with OSHA requirements.

3.6 FIELD TESTING

Submit Test Reports in accordance with referenced standards in this section to the Contracting Officer.

After completion of the installation and splicing, and prior to energizing the conductors, perform wire and cable continuity and insulation tests as herein specified before the conductors are energized.

Contractor shall provide all necessary test equipment, labor, and personnel to perform the tests, as herein specified.

Isolate completely all wire and cable from all extraneous electrical connections at cable terminations and joints. Substation and switchboard feeder breakers, disconnects in combination motor starters, circuit breakers in panel boards, and other disconnecting devices shall be used to isolate the circuits under test.

Perform continuity test to insure correct cable connection (i.e correct phase conductor, grounded conductor, and grounding conductor wiring) end-to end. Any damages to existing or new electrical equipment resulting from contractor mis-wiring will be repaired and re-verified at contractor's expense. All repairs shall be approved by the Contracting Officer prior to acceptance of the repair.

Final acceptance will depend upon the successful performance of wire and cable under test. Do not energize any conductor until the final test reports are reviewed and approved by the Contracting Officer.

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EXCAVATION AND FILL
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PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

The listed versions of the following references were used during the development of this design and are the Government approved versions to be used herein. There may be newer versions of certain references that have been released since the commencement and/or approval of the design effort. However, in order to comply with the Government technical requirements, not all of the latest versions of the listed references were adopted and the versions listed herein shall be utilized.

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C600	(2010) Installation of Ductile-Iron Water Mains and Their Appurtenances

ASTM INTERNATIONAL (ASTM)

ASTM A139/A139M	(2004; R 2010) Standard Specification for Electric-Fusion (ARC)-Welded Steel Pipe (NPS 4 and over)
ASTM A252	(2010) Standard Specification for Welded and Seamless Steel Pipe Piles
ASTM C136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C33/C33M	(2013) Standard Specification for Concrete Aggregates
ASTM D1140	(2000; R 2006) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D1557	(2012) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D2321	(2011) Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D2487	(2011) Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D4318	(2010; E 2014) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D698	(2012; E 2014) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2008; Errata 1-2010; Changes 1-3 2010; Changes 4-6 2011; Change 7 2012) Safety and Health Requirements Manual

1.2 DEFINITIONS

1.2.1 Capillary Water Barrier

A layer of clean, poorly graded crushed rock, stone, or natural sand or gravel having a high porosity which is placed beneath a building slab with or without a vapor barrier to cut off the capillary flow of pore water to the area immediately below a slab.

1.2.2 Degree of Compaction

Degree of compaction is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D698, for general soil types, abbreviated as percent laboratory maximum density.

1.2.3 Hard Materials

Weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" but which usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.2.4 Pile Supported Structure

As used herein, a structure where both the foundation and floor slab are pile supported.

1.3 SUBMITTALS

The Contractor shall submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Shoring and Sheeting Plan

Dewatering work plan

Submit 15 days prior to starting work.

SD-06 Test Reports

Fill and backfill test

Select material test

The Contractor shall submit copies of all laboratory and field test reports within 24 hours of the completion of the test.

1.4 DELIVERY, STORAGE, AND HANDLING

The Contractor shall perform in a manner to prevent contamination or segregation of materials.

1.5 REQUIREMENTS FOR OFF SITE SOIL

See Section 01 35 40.00 41 NASA LANGLEY ENVIRONMENTAL REQUIREMENTS for soil testing requirements.

1.6 QUALITY ASSURANCE

1.6.1 Shoring and Sheeting Plan

The Contractor shall submit drawings and calculations, certified by a registered professional engineer, describing the methods for shoring and sheeting of excavations. Drawings shall include material sizes and types, arrangement of members, and the sequence and method of installation and removal. Calculations shall include data and references used.

1.6.2 Dewatering Work Plan

The Contractor shall submit procedures for accomplishing dewatering work.

1.6.3 Utilities

Movement of construction machinery and equipment over pipes and utilities during construction shall be at the Contractor's risk. Excavation made with power-driven equipment is not permitted within two feet of known Government-owned utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, the Contractor shall excavate by hand. The Contractor shall start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. The Contractor shall support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Contracting Officer. The Contractor shall report damage to utility lines or subsurface construction immediately to the Contracting Officer.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

2.1.1 Satisfactory Materials

Any materials classified by ASTM D2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP, free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, and frozen, deleterious, or objectionable materials. Unless specified otherwise, the maximum particle diameter shall be one-half the lift thickness at the intended location.

2.1.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials. Unsatisfactory materials also include man-made fills, trash, refuse, or backfills from previous construction. Unsatisfactory material also includes material classified as satisfactory which contains root and other organic matter, frozen material, and stones larger than 3 inches. The Contracting Officer shall be notified of any contaminated materials.

2.1.3 Common Fill

Approved, unclassified soil material with the characteristics required to compact to the soil density specified for the intended location.

2.1.4 Backfill and Fill Material

ASTM D2487, classification GW, GP, GM, GC, SW, SP, SM, SC with a maximum ASTM D4318 liquid limit of 35, maximum ASTM D4318 plasticity index of 12, and a maximum of 25 percent by weight passing ASTM D1140, No. 200 sieve.

2.1.5 Select Material

The Contractor shall provide materials classified as GW, GP, SW, SP, or by ASTM D2487 where indicated. The liquid limit of such material shall not exceed 35 percent when tested in accordance with ASTM D4318. The plasticity index shall not be greater than 12 percent when tested in accordance with ASTM D4318, and not more than 35 percent by weight shall be finer than No. 200 sieve when tested in accordance with ASTM D1140.

2.1.6 Topsoil

Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than one inch diameter, brush, weeds, toxic substances, and other material detrimental to plant growth. The Contractor shall amend topsoil pH range to obtain a pH of 5.5 to 7.

2.2 POROUS FILL FOR CAPILLARY WATER BARRIER

ASTM C33/C33M fine aggregate grading with a maximum of 3 percent by weight passing ASTM D1140, No. 200 sieve, 1-1/2 inches and no more than 2 percent by weight passing the No. 4 size sieve or coarse aggregate Size 57 and conforming to the general soil material requirements specified in paragraph entitled "Satisfactory Materials."

2.3 UTILITY BEDDING MATERIAL

Except as specified otherwise in the individual piping section, the Contractor shall provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. The Contractor shall backfill to top of pipe shall be compacted to 95 percent of ASTM D698 maximum density. Plastic piping shall have bedding to spring line of pipe. The Contractor shall provide ASTM D2321 materials as follows:

a. Class I: Angular, 0.25 to 1.5 inches, graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shells.

b. Class II: Coarse sands and gravels with maximum particle size of 1.5

inches, including various graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D2487.

2.3.1 Sand

Clean, coarse-grained sand classified as SW or SP by ASTM D2487 for bedding and backfill.

2.3.2 Gravel

Clean, coarsely graded natural gravel, crushed stone or a combination thereof having a classification of GW or GP in accordance with ASTM D2487 for bedding and backfill as indicated. Maximum particle size shall not exceed 3 inches.

2.4 MATERIAL FOR PIPE CASING

2.4.1 Casing Pipe

ASTM A139/A139M, Grade B, or ASTM A252, Grade 2, smooth wall pipe. Casing size shall be of the outside diameter and wall thickness as indicated. Protective coating is not required on casing pipe.

2.5 BURIED WARNING AND IDENTIFICATION TAPE

See Section 01 35 26.00 41 NASA LANGLEY SAFETY REQUIREMENTS for requirements.

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Shoring and Sheeting

The Contractor shall provide shoring, bracing, cribbing, trench boxes, and sheeting where required. In addition to Section 25 A and B of EM 385-1-1, the Contractor shall include provisions in the shoring and sheeting plan that will accomplish the following:

a. Prevent undermining of pavements, foundations and slabs.

b. Prevent slippage or movement in banks or slopes adjacent to the excavation.

3.1.2 Drainage and Dewatering

The Contractor shall provide for the collection and disposal of surface and subsurface water encountered during construction.

3.1.2.1 Drainage

So that construction operations progress successfully, the Contractor shall completely drain construction site during periods of construction to keep soil materials sufficiently dry. The Contractor shall establish/construct storm drainage features at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and/or provide

drainage features and equipment as required to maintain dry soils, prevent erosion and undermining of foundations. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, the Contractor shall remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed. The Contractor shall protect excavated slopes and backfill surfaces to prevent erosion and sloughing. The Contractor shall perform excavation so that the site, the area immediately surrounding the site, and the area affecting operations at the site shall be continually and effectively drained.

3.1.2.2 Dewatering

The Contractor shall control groundwater flowing toward or into excavations to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 3 feet of the foundation of any structure, except with specific written approval of the Contracting Officer, and after specific contractual provisions for restoration of the foundation area have been made. The Contractor shall take control measures by the time the excavation reaches the water level in order to maintain the integrity of the in situ material.

3.1.3 Underground Utilities

See Section 01 35 26.00 41 NASA LANGLEY SAFETY REQUIREMENTS for digging permit requirements.

3.1.4 Machinery and Equipment

Movement of construction machinery and equipment over pipes during construction shall be at the Contractor's risk. The Contractor shall repair, or remove and provide new pipe for existing or newly installed pipe that has been displaced or damaged.

3.2 SURFACE PREPARATION

3.2.1 Clearing and Grubbing

Contracting Officer approval is required prior to removal of trees, stumps, logs, shrubs, brush and vegetation and other items that would interfere with construction operations within the clearing limits. The Contractor shall remove stumps entirely. The Contractor shall grub out matted roots and roots over 2 inches in diameter to at least 18 inches below existing surface.

3.2.2 Stripping

The Contractor shall strip suitable soil from the site where excavation or grading is indicated and stockpile separately from other excavated material. Material unsuitable for use as topsoil shall be stockpiled and used for backfilling. The Contractor shall locate topsoil so that the material can be used readily for the finished grading. Where sufficient existing topsoil conforming to the material requirements is not available on site, the Contractor shall provide borrow materials suitable for use as topsoil. The Contractor shall protect topsoil and keep in segregated piles

until needed.

3.2.3 Unsuitable Material

The Contractor shall remove vegetation, debris, decayed vegetable matter, sod, mulch, and rubbish underneath paved areas or concrete slabs.

3.3 EXCAVATION

The Contractor shall provide excavations in conformance with the following:

Excavate to elevation and dimensions indicated. Reuse excavated materials that meet the specified requirements for the material type required at the intended location. Keep excavations free from water. Excavate soil disturbed or weakened by Contractor's operations, soils softened or made unsuitable for subsequent construction due to exposure to weather. Excavations below indicated depths will not be permitted except to remove unsatisfactory material. Unsatisfactory material encountered below the grades shown shall be removed as directed. Refill with backfill and fill material and compact to 95 percent of ASTM D698 maximum density. Unless specified otherwise, refill excavations cut below indicated depth with select material and compact to 95 percent of ASTM D698 maximum density. Satisfactory material removed below the depths indicated, without specific direction of the Contracting Officer, shall be replaced with satisfactory materials to the indicated excavation grade; except as specified for spread footings. Determination of elevations and measurements of approved overdepth excavation of unsatisfactory material below grades indicated shall be done under the direction of the Contracting Officer.

3.3.1 Pipe Trenches

The Contractor shall provide pipe trenches in conformance with the following:

Excavate to the dimension indicated. Grade bottom of trenches to provide uniform support for each section of pipe after pipe bedding placement. Tamp if necessary to provide a firm pipe bed. Recesses shall be excavated to accommodate bells and joints so that pipe will be uniformly supported for the entire length. Rock, where encountered, shall be excavated to a depth of at least 6 inches below the bottom of the pipe.

3.3.2 Excavated Materials

The Contractor shall place satisfactory excavated material required for fill or backfill in the proper section of the permanent work required or shall separately stockpile if it cannot be readily placed. The Contractor shall dispose of satisfactory material in excess of that required for the permanent work and all unsatisfactory material of as specified in Paragraph "DISPOSITION OF SURPLUS MATERIAL."

3.3.3 Final Grade of Surfaces to Support Concrete

The Contractor shall not make excavation to final grade until just before concrete is to be placed. The Contractor shall use only excavation methods that will leave the foundation rock in a solid and unshattered condition. The Contractor shall roughen approximately level surfaces, and shall cut sloped surfaces as indicated into rough steps or benches to provide a satisfactory bond. The Contractor shall protect shales from slaking and all surfaces shall be protected from erosion resulting from ponding or flow

of water.

3.4 SUBGRADE PREPARATION

The Contractor shall provide subgrade preparation in conformance with the following:

Unsatisfactory material in surfaces to receive fill or in excavated areas shall be removed and replaced with satisfactory materials as directed by the Contracting Officer. The surface shall be scarified to a depth of 6 inches before the fill is started. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When subgrades are less than the specified density, the ground surface shall be broken up to a minimum depth of 6 inches, pulverized, and compacted to the specified density. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by sheepsfoot rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Material shall be moistened or aerated as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used. Minimum subgrade density shall be as specified herein.

3.5 FILLING AND BACKFILLING

The Contractor shall fill and backfill to contours, elevations, and dimensions indicated. Compact each lift before placing overlaying lift.

3.5.1 Backfill and Fill Material Placement

The Contractor shall provide placement in conformance with the following:

Provide for paved areas and under concrete slabs, except where select material is provided. Place in 6 inch lifts. Do not place over wet or frozen areas. Place backfill material adjacent to structures as the structural elements are completed and accepted. Backfill against concrete only when approved. Place and compact material to avoid loading upon or against the structure.

3.5.2 Select Material Placement

The Contractor shall provide placement in conformance with the following:

Provide under structures not pile supported. Place in 6 inch lifts. Do not place over wet or frozen areas. Backfill adjacent to structures shall be placed as structural elements are completed and accepted. Backfill against concrete only when approved. Place and compact material to avoid loading upon or against structure.

3.5.3 Backfill and Fill Material Placement Over Pipes

The Contractor shall provide placement in conformance with the following:

Backfilling shall not begin until construction below finish grade has been approved, underground utilities systems have been inspected, tested and approved, forms removed, and the excavation cleaned of trash and debris.

Backfill shall be brought to indicated finish grade. Where pipe is coated or wrapped for protection against corrosion, the backfill material up to an elevation 2 feet above sewer lines and 1 foot above other utility lines shall be free from stones larger than 1 inch in any dimension. Heavy equipment for spreading and compacting backfill shall not be operated closer to foundation or retaining walls than a distance equal to the height of backfill above the top of footing; the area remaining shall be compacted in layers not more than 4 inches in compacted thickness with power-driven hand tampers suitable for the material being compacted. Backfill shall be placed carefully around pipes to avoid damage to coatings or wrappings. As far as practicable, backfill shall be brought up evenly on each side of the wall and sloped to drain away from the wall.

3.5.4 Porous Fill Placement

The Contractor shall provide placement in conformance with the following: Provide under floor and area-way slabs on a compacted subgrade. Place in 4 inch lifts with a minimum of two passes of a hand-operated plate-type vibratory compactor.

3.5.5 Trench Backfilling

The Contractor shall provide placement in conformance with the following:

Backfill as rapidly as construction, testing, and acceptance of work permits. Place and compact backfill under structures and paved areas in 6 inch lifts to top of trench and in 6 inch lifts to one foot over pipe outside structures and paved areas.

3.6 BORROW

Where satisfactory materials are not available in sufficient quantity from required excavations, the Contractor shall obtain Contracting Officer approved borrow materials as specified herein.

3.7 BURIED WARNING AND IDENTIFICATION TAPE

The Contractor shall provide buried utility lines with utility identification tape. See Section 01 35 26.00 41 NASA LANGLEY SAFETY REQUIREMENTS for requirements.

3.8 BURIED DETECTION WIRE

See Section 01 35 26.00 41 NASA LANGLEY SAFETY REQUIREMENTS for requirements.

3.9 COMPACTION

The Contractor shall determine in-place density of existing subgrade; if required density exists, no compaction of existing subgrade will be required.

3.9.1 General Site

The Contractor shall compact underneath areas designated for vegetation and areas outside the 5 foot line of the paved area or structure to 90 percent of ASTM D1557.

3.9.2 Adjacent Area

The Contractor shall compact areas within 5 feet of structures to 90 percent of ASTM D698.

3.9.3 Paved Areas

The Contractor shall compact top 12 inches of subgrades to 95 percent of ASTM D698. The Contractor shall compact fill and backfill materials to 95 percent of ASTM D698.

3.10 FINISH OPERATIONS

3.10.1 Topsoil and Seed

The Contractor shall provide topsoil and seeding in conformance with the following:

Scarify existing subgrade. Provide 4 inches of topsoil for newly graded finish earth surfaces and areas disturbed by the Contractor. Topsoil shall not be placed when the subgrade is frozen, excessively wet, extremely dry, or in a condition otherwise detrimental to seeding, planting, or proper grading. If there is insufficient on-site topsoil meeting specified requirements for topsoil, provide topsoil required in excess of that available. Seed shall match existing vegetation. Provide seed at 5 pounds per 1000 square feet. Provide mulch and water to establish an acceptable stand of grass.

3.10.2 Protection of Surfaces

The Contractor shall protect newly backfilled, graded, and topsoiled areas from traffic, erosion, and settlements that may occur. The Contractor shall repair or reestablish damaged grades, elevations, or slopes.

3.11 DISPOSITION OF SURPLUS MATERIAL

The Contractor shall remove from Government property surplus or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and timber. See Section 01 35 40.00 41 NASA LANGLEY ENVIRONMENTAL REQUIREMENTS for requirements for testing soil removed off site.

3.12 FIELD QUALITY CONTROL

3.12.1 Sampling

The Contractor shall take the number and size of samples required to perform the following tests.

3.12.2 Testing

The Contractor shall perform one of each of the following tests for each material used. The Contractor shall provide additional tests for each source change.

3.12.2.1 Fill and Backfill Material Testing

The Contractor shall test fill and backfill material in accordance with ASTM C136 for conformance to ASTM D2487 gradation limits; ASTM D1140 for

material finer than the No. 200 sieve; ASTM D4318 for liquid limit and for plastic limit; ASTM D698 or ASTM D1557 for moisture density relations, as applicable.

3.12.2.2 Select Material Testing

The Contractor shall test select material in accordance with ASTM C136 for conformance to ASTM D2487 gradation limits; ASTM D1140 for material finer than the No. 200 sieve; ASTM D698 or ASTM D1557 for moisture density relations, as applicable.

-- End of Section --

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SECTION 33 11 00

WATER DISTRIBUTION
02/11

PART 1 GENERAL

1.1 REFERENCES

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AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA B300	(2010; Addenda 2011) Hypochlorites
AWWA B301	(2010) Liquid Chlorine
AWWA C110/A21.10	(2012) Ductile-Iron and Gray-Iron Fittings for Water
AWWA C111/A21.11	(2012) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C153/A21.53	(2011) Ductile-Iron Compact Fittings for Water Service
AWWA C509	(2009) Resilient-Seated Gate Valves for Water Supply Service
AWWA C550	(2013) Protective Epoxy Interior Coatings for Valves and Hydrants
AWWA C605	(2013) Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
AWWA C651	(2005; Errata 2005) Standard for Disinfecting Water Mains
AWWA C900	(2007; Errata 2008) Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Distribution
AWWA C901	(2008) Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13mm) Through 3 In. (76 mm), for Water Service

AWWA C905	(2010; Errata 2012; Errata 2013) Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 14 In. Through 48 In. (350 mm through 1,200 mm) for Water Transmission and Distribution
AWWA C906	(2007) Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) through 63 In., (1,575 mm) for Water Distribution and Transmission
AWWA M23	(2002; 2nd Ed) Manual: PVC Pipe - Design and Installation
AWWA M55 PE	(2006) Design and Installation, First Edition

ASME INTERNATIONAL (ASME)

ASME B16.18	(2012) Cast Copper Alloy Solder Joint Pressure Fittings
ASME B16.22	(2013) Standard for Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ASME B16.26	(2013) Standard for Cast Copper Alloy Fittings for Flared Copper Tubes
ASME B16.5	(2013) Pipe Flanges and Flanged Fittings: NPS 1/2 Through NPS 24 Metric/Inch Standard
ASME B31.3	(2012) Process Piping

ASTM INTERNATIONAL (ASTM)

ASTM A105/A105M	(2014) Standard Specification for Carbon Steel Forgings for Piping Applications
ASTM A536	(1984; R 2009) Standard Specification for Ductile Iron Castings
ASTM B584	(2014) Standard Specification for Copper Alloy Sand Castings for General Applications
ASTM B88	(2009) Standard Specification for Seamless Copper Water Tube
ASTM C534/C534M	(2014) Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
ASTM D1785	(2012) Standard Specification for Poly(Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120
ASTM D2241	(2009) Standard Specification for

	Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM F1674	(2011) Standard Test Method for Joint Restraint Products for Use with PVC Pipe

INTERNATIONAL CODE COUNCIL (ICC)

ICC IPC	(2012) International Plumbing Code

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-139	(2014) Copper Alloy Gate, Globe, Angle, and Check Valves for Low Pressure/Low Temperature Plumbing Applications

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 24	(2013) Standard for the Installation of Private Fire Service Mains and Their Appurtenances
NFPA 704	(2012) Standard System for the Identification of the Hazards of Materials for Emergency Response

NSF INTERNATIONAL (NSF)

NSF 372	(2011) Drinking Water System Components - Lead Content
NSF/ANSI 61	(2014) Drinking Water System Components - Health Effects

1.2 SUBMITTALS

The Contractor shall submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Piping Materials

Valves

Valve boxes

Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on joints. Include information concerning gaskets with submittal for joints and couplings.

SD-06 Test Reports

Bacteriological Disinfection; G

Test results from commercial laboratory verifying disinfection

SD-08 Manufacturer's Instructions

Delivery, storage, and handling

Installation procedures for water piping

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, and valves free of dirt and debris.

1.3.2 Handling

Handle pipe, fittings, valves, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Carry, do not drag pipe to the trench. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, the pipe shall be inspected for defects. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Government. Store rubber gaskets that are not to be installed immediately, under cover out of direct sunlight.

1.3.2.1 Polyethylene (PE) Pipe, Fittings, and Accessories

Handle PE pipe, fittings, and accessories in accordance with AWWA C901.

1.3.2.2 Polyvinyl Chloride Pipe and Fittings

Handle Polyvinyl Chloride (PVC), pipe and fittings in accordance with the manufacturer's recommendations. Store plastic piping and jointing materials that are not to be installed immediately under cover out of direct sunlight.

Storage facilities shall be classified and marked in accordance with NFPA 704.

PART 2 PRODUCTS

2.1 PIPING MATERIALS

2.1.1 Polyvinyl Chloride (PVC) Plastic Piping

2.1.1.1 Pipe Sizes 4" to 8"

For service underground or in utility tunnels: Pipe and fittings shall be AWWA C900 pipe with plain end or gasket bell end, Pressure Class 235 (DR 18), with cast iron pipe equivalent OD.

For service above ground: Pipe and fittings shall be Schedule 80 Polyvinyl Chloride (PVC) Plastic Piping with Solvent Cement Joints. Pipe shall

conform to dimensional requirements of ASTM D1785 or ASTM D2241 with joints meeting the requirements of 150 psi working pressure and 200 psi hydrostatic test pressure.

2.1.1.2 Pipe Size 14"

For service underground: Pipe and fittings shall be AWWA C905 pipe with plain end or gasket bell end, Pressure Class 235 (DR 18), with cast iron pipe equivalent OD.

2.1.1.3 Ductile Iron Fittings

Mechanical joint watermain fittings with accessories, 4" through 14" shall be produced of ductile iron in accordance with and meet all applicable terms and provisions of standards AWWA C110/A21.10 and AWWA C111/A21.11. Ductile iron mechanical joint fittings 4" through 14" shall be rated for 350 PSI working pressure.

2.1.1.4 Pipe Sizes 3" and Smaller

For all service: Pipe and fittings shall be Schedule 80 Polyvinyl Chloride (PVC) Plastic Piping with Solvent Cement Joints. Pipe shall conform to dimensional requirements of ASTM D1785 or ASTM D2241 with joints meeting the requirements of 150 psi working pressure and 200 psi hydrostatic test pressure.

2.1.2 Copper Tubing and Associated Fittings

Tubing shall be ASTM B88, Type K. Fittings for solder-type joint shall be ASME B16.18 or ASME B16.22; fittings for compression-type joint shall be ASME B16.26, flared tube type.

Tubing inside buildings shall be supported in accordance with ASME B31.3 Process Piping and the IPC.

2.1.3 Copper Companion Flange Adapter Sizes 1-1/2" thru 6"

Flanges shall be drilled to ASME B16.5 150 standard powder coated with a EPDM insulator adhered to the plate steel flange protruding inside of the steel flange to prevent contact with the Copper Companion Flange Adapter. The Copper component of the flange adapter shall be manufactured to ASME B16.22 - 1995.

2.1.4 Polyethylene (PE) Plastic Piping

Pipe, tubing, and heat-fusion fittings shall conform to AWWA C906. PE piping shall only be used in locations where Horizontal Directional Drilling methods are used. It shall not be used in open trenches.

2.2 VALVES

2.2.1 Gate Valves 3" and Larger

2.2.1.1 General

Valves shall be in compliance with AWWA C509 and certified to NSF 61. Valves shall be non-rising stem, resilient wedge type. Valves shall be iron body with epoxy coating on exterior. Epoxy coating shall be in compliance with AWWA C550 and be certified to NSF 61. End connections

shall be mechanical joint. Valve shall be complete with 2" square wrench nut for operation. Valves shall be rated to 235 PSIG (minimum) to conform to pipe rating.

The Contractor shall use Mueller A-2360 type gate valve or equal.

2.2.1.2 Post Indicator Valves

Those valves indicated on the drawings as being Post Indicator Valves (PIV) shall include an indicator post with a minimum 20" adjustment and be capable of being adjusted in the field without disassembly. The upper barrel shall be constructed of carbon steel and the lower barrel of schedule 40 PVC. The indicator post shall be designed to fit valves from 4 to 14 inches. The indicator post shall be complete with tamper switches. See Section 40 95 00.00 41 PROCESS CONTROL for tamper switch specification.

The Contractor shall use Mueller A-20806 or equal indicator post.

2.2.2 Gate Valves 2 1/2" and Smaller

Valves shall conform to MSS SP-139, NSF/ANSI 61-8, and NSF 372. Valves shall have screw-in bonnet, non-rising stem, and solid wedge. Valves shall have threaded end connections. Bonnet, body and wedge shall be Silicon Bronze ASTM B584 Alloy C7850. Packing shall be Aramid fibers with graphite.

The Contractor shall use NIBCO T-113-LF or equal lead free bronze gate valves.

2.3 INSULATION

2.3.1 Flexible Elastomeric Cellular Insulation

Closed-cell, foam- or expanded-rubber materials containing anti-microbial additive, complying with ASTM C534/C534M, Grade 1, Type I, Grade 1 for tubular materials. Type I shall have vapor barrier skin on one or both sides of the insulation. Insulation thickness shall be 1 inch.

2.3.2 Polyvinyl Chloride (PVC) Jackets

Polyvinyl chloride (PVC) jacket and fitting covers shall have high impact strength, ultraviolet (UV) resistant rating or treatment and moderate chemical resistance with minimum thickness 0.030 inch.

2.4 PIPE RESTRAINTS

PVC AWWA C900 and AWWA C905 pipe and ductile iron mechanical joint fittings shall be restrained. Restraint devices for mechanical joint fittings and appurtenances shall conform to either AWWA C111/A21.11 or AWWA C153/A21.53. Restraint devices for nominal pipe sizes 4 inch through 14 inch shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of AWWA C110/A21.10. Gland body, wedges and wedge actuating components shall be cast from grade 65- 45-12 ductile iron material in accordance with ASTM A536. Ductile iron gripping wedges shall be heat treated within a range of 370 to 470 Brinnell Hardness Number (BHN). An identification number consisting of year, day, plant and shift (YYDDD) (plant designation) (shift number), shall be cast into each gland body. Mechanical joint restraints shall be listed by Underwriters Laboratories in the 4 inch through 12 inch sizes. Mechanical joint restraints shall be Factory Mutual approved in the 4 inch through 12 inch

sizes. Mechanical joint restraints, 4 inch through 14 inch, shall meet or exceed the requirements of the latest revision of ASTM F1674. All components shall be manufactured and assembled in the United States. Tighten all restraint device bolts according to manufacturer's torque values.

2.5 CARBON STEEL PIPE FLANGES (FOR METER INSTALLATION ONLY)

Flanges: 3 through 6 inches: 150-pound class, forged carbon steel, slip-on, with raised face and concentric serrated finish, conforming to ASTM A105/A105M and ASME B16.5.

2.6 WATER SERVICE LINE MATERIALS

2.6.1 Water Service Line Appurtenances

2.6.1.1 Valve Boxes

Provide a valve box for each gate valve on buried piping. Valve boxes shall be of cast iron of a size suitable for the valve on which it is to be used and shall have a minimum 5" adjustment range. Provide a round head. Cast the word "WATER" on the lid. Cast-iron box shall have a heavy coat of bituminous paint.

The Contractor shall use Castings Inc. 6855 Series valve box or equal.

2.6.1.2 Disinfection

Chlorinating materials shall conform to the following:

Chlorine, Liquid: AWWA B301.

Hypochlorite, Calcium and Sodium: AWWA B300.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES

3.1.1 General Requirements for Installation of Pipelines

These requirements shall apply to all pipeline installation except where specific exception is made in the "Special Requirements..." paragraphs.

3.1.1.1 Location of Water Lines

Water lines shall be located as shown on the attached drawings. Unless otherwise noted on the drawings, the work shall be terminated at a point approximately 3 feet from the building.

3.1.1.2 Earthwork

Perform earthwork operations in accordance with Section 31 23 00.00 41 EXCAVATION AND FILL.

3.1.1.3 Pipe Laying and Jointing

The Contractor shall lay C900, C905 and Schedule 80 PVC Pipe in accordance with the requirements of AWWA M23 PVC Pipe - Design and Installation,

AWWA C605, and the ICC IPC.

The Contractor shall lay and join copper pipe in accordance with the requirements of the ICC IPC.

3.1.1.4 Installation of Tracer Wire

Install a continuous length of tracer wire (minimum 12 gauge copper) for the full length of each run of nonmetallic pipe installed underground. Attach wire to top of pipe in such manner that it will not be displaced during construction operations.

3.1.1.5 Connections to Existing Water Lines

Make connections to existing water lines after approval is obtained and with a minimum interruption of service on the existing line. Make connections to existing lines under pressure in accordance with the recommended procedures of the manufacturer of the "hot tap" device.

3.1.1.6 Penetrations

Pipe passing through walls of valve pits and steam tunnels shall be provided with ductile-iron wall sleeves. Annular space between walls and sleeves shall be filled with rich cement mortar.

The Contractor shall provide a seal for the annular space between the pipe and the sleeve. The seal elements shall be EPDM, nitrile rubber or silicone. The pressure plates holding the seal elements shall be reinforced nylon polymer or galvanized carbon steel. Nuts and bolts shall be galvanized carbon steel. Seal shall be designed for a temperature range of 20 degrees F to 100 degrees F. The Contractor shall use Link-seal or equal.

3.1.1.7 Flanged Pipe

Flanged pipe shall only be installed above ground or with the flanges in valve pits.

3.1.2 Special Requirements for Installation of Water Mains

3.1.2.1 Installation of PVC Plastic Water Main Pipe

Installation of PVC Plastic Water Main Pipe and Associated Fittings: The Contractor shall install pipe and fittings in accordance with AWWA M23 PVC Pipe - Design and Installation, AWWA C605, and the ICC IPC.

a. Offset: Maximum offset in alignment between adjacent pipe joints shall be as recommended by the manufacturer and approved by the Contracting Officer, but shall not exceed 5 degrees.

b. Pipe Anchorage: The Contractor shall provide concrete thrust blocks (reaction backing) or metal harness for pipe anchorage. Thrust blocks shall be used at downstream of the first direction change after all new pipe to existing pipe connection. Thrust blocks shall be in accordance with the requirements of AWWA C605 for reaction or thrust blocking and plugging of dead ends, except that size and positioning of thrust blocks shall be as indicated. Use concrete as specified in Section 03 30 00.00 41 CAST-IN-PLACE CONCRETE. Metal harness shall be as indicated.

d. Fittings: Install in accordance with AWWA C605.

3.1.2.2 Installation of Polyethylene (PE) Plastic Piping

a. General Installation:

PE pipes shall be installed in accordance with AWWA M55 PE Pipe - Design and Installation.

b. Jointing:

Jointing shall comply with AWWA M55 PE Pipe - Design and Installation.

c. Offsets:

Maximum offset in alignment between adjacent pipe joints shall be as recommended by the manufacturer and approved by the Contracting Officer, but shall not exceed 5 degrees.

3.1.3 Special Requirements for Installation of Water Service Piping

3.1.3.1 Location of Meters

Meters shall be installed at the locations shown on the drawings. The meters shall be installed so as to allow for reading and ease of removal or maintenance.

3.1.4 Disinfection

Prior to disinfection, the Contractor shall obtain Contracting Officer approval of the proposed method for disposal of waste water from disinfection procedures. The Contractor shall disinfect new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit the results prior to the new water piping being placed into service.

3.1.4.1 Special Requirements for 14" Main

The Contractor shall perform disinfection of the 14" main in accordance with AWWA C651 Section 4.4, Continuous Feed Method of Chlorination. The Contractor shall perform all filling and flushing of the 14" main from the area of the Child Care Center, Building 1231B, towards the water tower Building 1186. Water for flushing and disinfection shall come from a temporary connection to the LaRC potable water system at valve 108. The Contractor shall provide an 8" backflow preventer on the temporary connection. The backflow preventer must be compliant with Table 608.1 in the 1215 IPC.

The Contractor shall provide sufficient hose to transfer the flush and disinfection water to the chromate tanks located approximately 220 feet from the end of the 14" line. SPEEB will be responsible for disposal of water from the chromate tanks.

3.2 INSULATION APPLICATION

3.2.1 General

Insulation shall be installed where noted on the attached drawings.

3.2.2 Installation

The Contractor shall install material in accordance with the manufacturer's written instructions. Insulation materials shall not be applied until hydrostatic tests are completed. The Contractor shall remove material such as rust, scale, dirt, and moisture from surfaces to receive insulation. Insulation shall be kept clean and dry. The Contractor shall not remove insulation from its shipping containers until the day it is ready to use and shall be returned to like containers or equally protected from dirt and moisture at the end of each workday. Insulation that becomes dirty shall be thoroughly cleaned prior to use. If insulation becomes wet or if cleaning does not restore the surfaces to like new condition, the insulation will be rejected, and shall be immediately removed from the jobsite. Insulation, jacketing, and accessories shall be installed in accordance with MICA Insulation Stds plates except where modified herein or on the drawings.

3.2.3 Pipe Insulation

3.2.3.1 Flexible Elastomeric Cellular Pipe Insulation

Flexible elastomeric cellular pipe insulation shall be tubular form for pipe sizes 6 inches and less. Screwed fittings shall be insulated with sleeved fitting covers fabricated from miter-cut pieces and shall be overlapped and sealed to the adjacent pipe insulation.

The Contractor shall install by slitting the tubular sections and applying them onto the piping or tubing. Alternately, whenever possible slide un-slit sections over the open ends of piping or tubing. The Contractor shall secure all seams and butt joints and seal with adhesive. When using self seal products only the butt joints shall be secured with adhesive. The Contractor shall push insulation on the pipe, never pull. Stretching of insulation may result in open seams and joints. Clean cut all edges. Rough or jagged edges of the insulation are not be permitted. Use proper tools such as sharp knives. The Contractor shall not use cut pieces or scraps abutting each other.

3.2.3.2 PVC Jacket

PVC jacket shall be ultraviolet resistant and adhesive welded weather tight with manufacturer's recommended adhesive. Installation shall include provision for thermal expansion.

3.3 FIELD QUALITY CONTROL

3.3.1 Field Tests and Inspections

Prior to hydrostatic testing, the Contractor shall obtain Contracting Officer approval of the proposed method for disposal of waste water from hydrostatic testing. The Contracting Officer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing. The Contractor shall produce evidence,

when required, that any item of work has been constructed in accordance with the drawings and specifications. The Contractor shall not begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least 7 days after placing of the concrete.

3.3.2 Testing Procedure

3.3.2.1 Hydrostatic Testing

Test water mains and water service lines in accordance with the applicable specified standard. Where water mains and water service lines provide fire service, test in accordance with the special testing requirements given in paragraph entitled "Special Testing Requirements for Fire Service." Test PVC plastic water mains and water service lines made with PVC plastic water main pipe in accordance with the requirements of AWWA C605 for pressure and leakage tests. The amount of leakage on pipelines made of PVC plastic water main pipe shall not exceed the amounts given in AWWA C605, except that at joints made with sleeve-type mechanical couplings, no leakage will be allowed. No leakage will be allowed at copper tubing joints or solvent welded plastic pipe joints.

3.3.2.2 Leakage Testing

The Contractor shall, for leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at the same time and at the same test pressure as the pressure test.

3.3.3 Special Testing Requirements for Fire Service

Test water mains and water service lines providing fire service or water and fire service in accordance with NFPA 24. The additional water added to the system must not exceed the limits given in NFPA 24

3.4 CLEANUP

The Contractor shall remove all debris and surplus materials upon completion of the work.

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PROCESS CONTROL
03/13

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

The listed versions of the following references were used during the development of this design and are the Government approved versions to be used herein. There may be newer versions of certain references that have been released since the commencement and/or approval of the design effort. However, in order to comply with the Government technical requirements, not all of the latest versions of the listed references were adopted and the versions listed herein shall be utilized.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE Stds Dictionary	(2009) IEEE Standards Dictionary: Glossary of Terms & Definitions

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C12.1	(2008) Electric Meters Code for Electricity Metering

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST SP 250	(1991) Calibration Services Users Guide

1.2 DEFINITIONS

Definitions, Symbols, and engineering unit abbreviations shall conform to IEEE Stds Dictionary, as applicable.

1.3 SYSTEM DESCRIPTION

The process instrumentation shall be used to monitor potable water flow in various buildings at LaRC as shown on drawings. Provide hardware configured and sized to support expansion as specified and shown on the drawings.

1.3.1 General Requirements

1.3.2 Operation

The process instrumentation must be capable of sending flow meter data to NASA PI Interface Server located in Building 1215 in Modbus protocol. (A table is attached in Attachment 1 for calculating flow rates in the PI Interface Server.)

1.3.3 Operation and Maintenance Data Requirements

Include in the Operations and Maintenance manual for each device instructions, layout, wiring and control diagrams of the system as installed, the manufacturer's name, model number, service manual, parts list and a brief description of all equipment and their basic operating features.

List routine maintenance procedures, possible breakdowns and repairs and trouble shooting guides.

1.4 SUBMITTALS

The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation
Wiring; G

SD-03 Product Data

Submit in booklet form, indexed to the unique identifiers, consisting of data sheets that document compliance with the specification. Where multiple components are shown on a catalog cut, mark the application specific component.

Ultrasonic Flow Meters
Electromagnetic Flow Meters
RS-485 To Ethernet Converter
Power Supply
Tamper Switches
Performance Verification Test (PVT)

SD-06 Test Reports

Ultrasonic Flow Meters
Electromagnetic Flow Meters
RS-485 To Ethernet Converter

SD-07 Certificates

Ultrasonic Flow Meters
Electromagnetic Flow Meters

SD-10 Operation and Maintenance Data

Training Manual
Instrumentation

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 Standard Products

Materials and equipment shall be standard unmodified products of a manufacturer regularly engaged in the manufacturing of such products. Units of the same type of equipment shall be products of a single manufacturer. Items of the same type and purpose shall be identical and supplied by the same manufacturer, unless replaced by a new version approved by the Contracting Officer.

2.1.2 Nameplates

Each major component of equipment shall have the manufacturer's name and address, and the model and serial number in a conspicuous place. Laminated plastic nameplates shall be provided for equipment devices and panels furnished. Each nameplate shall identify the device, such as pump "P-1" or valve "VLV-402". Labels shall be coordinate with the schedules and the process and instrumentation drawings. Laminated plastic shall be 1/8 inch thick, white with black center core. Nameplates shall be a minimum of 1 by 3 inches with minimum 1/4 inch high engraved block lettering. Nameplates for devices smaller than 1 by 3 inches shall be attached by a nonferrous metal chain. All other nameplates shall be attached to the device.

2.2 GENERAL REQUIREMENTS

Equipment located outdoors, not provided with climate controlled enclosure, shall be capable of operating in the ambient temperature range indicated in paragraph ENVIRONMENTAL CONDITIONS, unless otherwise specified. Equipment and wiring must be in accordance with NFPA 70, with proper consideration given to environmental conditions such as moisture, dirt, corrosive agents, and hazardous area classification.

2.3 INSTRUMENTATION MONITORING PARAMETERS

Each piece of instrumentation shall be complete including sensors, field preamplifiers, signal conditioners, offset and span adjustments, amplifiers, transducers, transmitters, control devices, engineering units conversions and algorithms for the applications; and shall maintain the specified end-to-end process control loop accuracy from sensor to display and final control element. Instrumentation equipment shall be powered as indicated on drawings.

2.3.1 Potable Water Flow Meter Instrumentation

2.3.1.1 Ultrasonic Flow Meters for Various Buildings

The ultrasonic flow meters shall be microprocessor based and shall provide continuous, non-contact flow in gpm potable water flowing in various size piping. The flow meter sensors shall be suitable for underground burial by direct attachment to the pipe. The sensors shall be enclosed in a stainless steel housing. When the Ultrasonic sensors are required for underground burial, see Attachment 2 for installation instructions. The sensor housing shall be backfilled with sand per section 3.1.1. The ultrasonic flow meter shall have the following salient features:

Measurement principle: Transit time difference correlation principle
Flow velocity: 0.03 to 82 ft/s
Resolution: 8.2 . 10-4 ft/s
Repeatability: 0.25 % of reading ±0.03 ft/s
Volumetric flow rate: ±2 % of reading ±0.03 ft/s
Input power: 100 to 240 V/50 to 60 Hz or 12 to 32 V DC
Power consumption: < 10 W
Output 4 to 20ma and RS-485 (Modbus)
Enclosure: NEMA 4X (IP65)

2.4 ELECTROMAGNETIC FLOW METERS

Electromagnetic Flow Meter shall have the following salient features:

Measurement Principle: Electromagnetic sensing
Flow Velocity: 0.1 to 33 ft/s
Resolution: 8.2 . 10-4 ft/s
Repeatability: 0.25 % of reading ±0.03 ft/s
Volumetric Flow Rate: ±2 % of reading ±0.03 ft/s
Input Power: 100 to 240 V/50 to 60 Hz or 12 to 32 V DC
Power Consumption: < 10 W
Outputs : 4 to 20ma and RS-485(Modbus)
Enclosure: NEMA 4X (IP65)

2.5 RS-485 TO ETHERNET CONVERTER

The RS-485 to Ethernet Converter shall have the following salient features:

Number of Ports: 1
Speed: 10/100 Mbps, auto MDI/MDIX
Connector: 8-pin RJ45

Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2
Parity: None, Even, Odd, Space, Mark
Flow Control: RTS/CTS, DTR/DSR, XON/XOFF
Baudrate: 50 bps to 921.6 Kbps
RS-485-4w: Tx+, Tx-, Rx+, Rx-, GND
Input Voltage: 12 to 48 VDC
Power Consumption: 285 mA @ 12 V

2.6 INSTRUMENTATION POWER SUPPLY

Power supply shall have the following salient features:

Input Power: 100 to 240 VAC input
Output Power: 12 VDC/1.5 A output
Operating Temperature: -40 to 75°C

2.7 TAMPER SWITCHES

Tamper Switch shall have the following Salient Features:

Enclosure: Die-cast
Cover: Tamper Resistant Screws
Mounting: 1/2 inch NPT
Contract Rating: Two sets of SPDT (Form C)
15 Amps at 125/250VAC
2.5 Amps at 30VDC resistive

Temperature Rating: -40F to +140F

PART 3 EXECUTION

3.1 EQUIPMENT INSTALLATION REQUIREMENTS

3.1.1 Installation

Install potable water monitoring system components and appurtenances in accordance with the manufacturer's instructions and provide necessary interconnections, services, and adjustments required for a complete and operable potable water monitoring system. Adjust or replace devices not conforming to the required accuracies. Replace factory sealed devices, rather than adjusting.

a. Install instrumentation and communication equipment and cable grounding as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.

b. Install wiring in exposed areas, including low voltage wiring, in metallic raceways or EMT conduit as specified on the drawings.

c. Submit detail drawings containing complete piping, wiring, schematic, flow diagrams and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Piping and Instrumentation (P&ID) drawings (prepared using industry recognized device symbols, clearly defined and describing piping designations to define the service and materials of individual pipe segments and instrument tags employing Instrument Society of America suggested identifiers). Include in the Drawings, as appropriate: product specific catalog cuts; a drawing index; a list of symbols; a series of drawings for each control system using abbreviations, symbols, nomenclature and identifiers as shown; valve schedules; compressed instrument air station schematics and ASME air storage tank certificates for each type and make of compressed instrument air station.

3.1.1.1 Isolation, Penetrations and Clearance from Equipment

Dielectric isolation shall be provided where dissimilar metals are used for connection and support. Penetrations through and mounting holes in the building exteriors shall be made watertight. Holes in concrete, brick, steel and wood walls shall be drilled or core drilled with proper equipment; conduits installed through openings shall be sealed with materials which are compatible with existing materials. Openings shall be sealed with materials which meet the requirements of NFPA 70. Installation shall provide clearance for control-system maintenance. System installation shall not interfere with the clearance requirements for mechanical and electrical system maintenance.

3.1.1.2 Device Mounting

Devices shall be installed in accordance with manufacturers' recommendations and as shown. Control devices to be installed in piping shall be provided with required gaskets, flanges, thermal compounds, insulation, piping, fittings, and manual valves for shutoff, equalization, purging, and calibration. Any deviations shall be documented and submitted to the Contracting Officer for approval prior to mounting. Damaged insulation shall be replaced or repaired after devices are installed to

match existing work. Damaged galvanized surfaces shall be repaired by touching up with zinc paint.

3.2 INSTALLATION OF EQUIPMENT

The Contractor shall give the Contracting Officer 5 working days notice before equipment installation begins in the various buildings.

Install equipment as specified, as shown and as required in the manufacturer's instructions for a complete and fully operational control system.

3.2.1 Instrumentation

Instrumentation shall be located as indicated on the drawings.

3.3 WIRE, CABLE AND CONNECTING HARDWARE

3.3.1 Metering and Sensor Wiring

Metering and sensor wiring shall be installed in accordance with the requirements of ANSI C12.1 and NFPA 70.

3.4 INSTRUMENTATION DRAWINGS

Instrumentation drawings, with corresponding CAD files, shall be provided, to the Contracting Officer, for equipment furnished and for interfaces to equipment at each respective equipment location.

3.5 FIELD TESTING AND ADJUSTING EQUIPMENT

Provide personnel, equipment, instrumentation, and supplies necessary to perform site testing. The Contracting Officer will witness the PVT, and written permission shall be obtained from the Contracting Officer before proceeding with the testing. Original copies of data produced, including results of each test procedure, during PVT shall be turned over to the Contracting Officer at the conclusion of each phase of testing prior to Contracting Officer approval of the test. The test procedures shall cover actual equipment and functions specified for the project.

3.5.1 Testing, Adjusting and Commissioning

Once the installation has been completed, test, adjust, and commission each system in accordance with NIST SP 250 and shall verify proper operation of each item in the sequences of operation, including hardware and software to the Contracting Officer. Calibrate flow meters and verify data communications before the system is placed online. Calibrate each instrumentation device connected to the potable water flow monitoring system network by making a comparison between the reading at the device and the display at the PI server, using a standard at least twice as accurate as the device to be calibrated. Deliver a report describing results of functional tests, diagnostics, calibrations and commissioning procedures including written certification to the Contracting Officer that the installed complete system has been calibrated, tested, adjusted and commissioned and is ready to begin the PVT. The report shall also include a copy of the approved PVT procedure.

3.5.2 Performance Verification Test (PVT)

The Contractor shall submit test procedures for the PVT. The test procedure shall describe all tests to be performed and other pertinent information such as specialized test equipment required and the length of the PVT. The test procedures shall explain, in detail, step-by-step actions and the expected results, to demonstrate compliance with all the requirements of the drawings and this specification. The test procedure shall be site specific and based on the inputs and outputs, required calculated points and the sequence of control. Refer to the actions and expected results to demonstrate that the control system performs in accordance with the sequence of control. Include a list of the equipment to be used during the testing plus manufacturer's name, model number, equipment function, the date of the latest calibration and the results of the latest calibration.

The Contractor shall demonstrate that the completed potable water flow monitoring system complies with the contract requirements. All physical and functional requirements of the project including communication requirements shall be demonstrated and shown to the Contracting Officer. Demonstrate that each system operates as required in the sequence of operation. The PVT as specified shall not be started until after receipt of written permission by the Contracting Officer, based on the written report including certification of successful completion of testing, adjusting and commissioning as specified, and upon successful completion of training as specified. Upon successful completion of the PVT, furnish test reports and other documentation to the Contracting Officer.

3.6 MANUFACTURERS' FIELD SERVICES

The Contractor shall obtain the services of a manufacturer's representative, for flow meters, experienced in the installation, adjustment, and operation of the equipment specified. The representative shall supervise the installing, adjusting, and testing of the equipment.

3.7 FIELD TRAINING

3.7.1 Preliminary Operator Training

Prior to the start of field testing, preliminary operator training shall be taught at the project site for one consecutive training day. Upon completion of this course, each student, using a Training Manual, should be able to perform elementary operations with guidance and describe the general hardware architecture and functionality of the system. This course shall include: general system architecture; functional operation of the system, including workstations; operator commands; application programs, control sequences, and control loops; database entry and modification; reports generation; alarm reporting; diagnostics; and historical files.

3.7.2 Additional Operator Training

Following the field testing, additional classroom training for operators shall be taught for two consecutive training days. Classroom training shall include instruction on the specific hardware configuration of the installed potable water flow monitoring system and specific instructions for operating the installed system. Schedule activities during this period so that the specified amount of time on the equipment will be available for each student. The final session will address specific topics that the students need to discuss and to answer questions concerning the operation

of the system. Upon completion of the course, the students should be fully proficient in system operation and have no unanswered questions regarding operation of the installed potable water flow monitoring system. Each student should be able to start the system, operate the system, recover the system after a failure and describe the specific hardware architecture and operation of the system and be fully proficient in all system operations.

-- End of Section --

Attachment 1

Formulas for Calculating Building Flow

Building	Formula	Assumptions
		General - Cooling Tower Flows are metered
Building 1146	FM-1146	
building 1148	FM-1148-1 + FM-1148-2 + FM-1148-3	FM-1148-3 line only supports 1148.
Building 1189	FM-1189	
1195 Complex	FM-1195-1 + FM-1195-2	
Building 1199	FM-1199-1 + FM-1189-2	
Building 1205	FM-1205-1 + FM-1205-2 - Cooling Tower CLT00059 - Cooling tower CLT00058	
Building 1208	FM-1208 - Cooling Tower CLT00010 - Cooling Tower CLT00011	
1212 Complex	FM-1212-1 + FM-1212-1 + FM-1212C	
Building 1216	FM-1216	
Building 1219	FM-1219	
Building 1222B	FM-122B	
Building 1225	FM-1225	
1230 Complex	FM-1230-1 + FM-1230-2 - Cooling Tower CLT00061	
Building 1231C	FM-1231C	
1232 Complex	FM-1232-1 + FM-1232-2 + FM-1232A-1 + FM-1232A-2 - Cooling Tower CLT00026	Cooling Tower CLT00026 makeup is from 1232A
1236 Complex	FM-1236 + FM-1236A-2 - FM-1236A-1 - Cooling Tower CLT00027	
1237 Complex	FM-1237A + FM-1237B	
Building 1244	FM-1244	
		All 1247E non fire water comes from 1247D
1247 Complex	FM-1247B + FM-1247D - Cooling Tower CLT00018 - Cooling Tower CLT00019	Cooling Tower CLT00019 makeup is from 1247D
Building 1250	FM-1250	
1265 Complex	FM-1265-1 + FM-1265-2	
1268 Complex	FM-1268A + FM-1268B-1 + FM-1268B-2 + FM-1268C - Cooling Tower CLT00040 - Cooling Tower CLT00041	
1293 Complex	FM-1293A + FM-1293B - Cooling Tower CLT00030 - Cooling Tower CLT00032	

Underground Installation of Transducers

Minimum Material & Device Requirements

- Only IP68/NEMA 6P transducers should be used.
- PermaLok mounting rail should be used.
- Only stainless steel 1.4571 (SS316) tension straps are used.
- Water Utility pipes – suitable for steel or plastic pipes at all pressures.
- Gas Utility pipes – plastics (e.g. PE, PP, HDPE, MDPE, etc) suitable from atmospheric pressure
- Gas Utility pipes – steel from ~>5 bar (LP suitability subject to site verification test); PE coated or fusion bonded epoxy coated pipes are preferred.
- Sunshield or instrument enclosure for the electronics.

Installation Procedure

Preparation of Construction Site

- The construction site should be prepared by a qualified civil contracting company and must fulfil all national and local safety regulations.
- Sufficient workspace must be provided around the pipe diameter to allow installation.
- FLEXIM commissioning engineers will seek expert guidance from the civil groundwork contractor; develop RAMS (Risk Assessment & Method Statement) and work under their expert guidance within all stipulated regulatory requirements

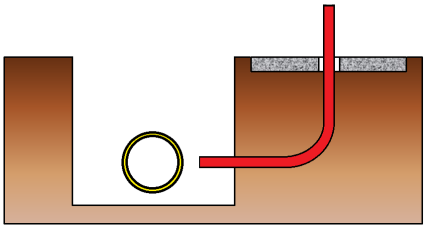

Fig. 1: Preparation of commissioning site

Fig. 2: Preparation of excavation site

The civil groundwork contracting company will excavate a hole around the pipe allowing unrestricted access for flow transducer mounting hardware. The civil contractor will prepare the pipe so that it is in good clean condition ready for damping mat and transducer installation by FLEXIM commissioning engineers. The civil contractor will also install a suitable surface concrete pad for installation of ancillary electronic components and a flexible electrical conduit between pad and flowmeter location near the installation point.

Fig. 3 & 4: Preparation of deep excavation pit

When necessary, especially in deep pit excavations, the civil groundwork contractor may need to take all legally required precautions to make the worksite safe. This may include the erection of temporary or permanent pit shoring.

Preparation of Pipe Surface

- Remove dirt (and rust if metal pipe) from the pipe around the transducer mounting location.
- Measure actual pipe wall thickness using an ultrasonic wall thickness gauge.
- Use damping mats for ultrasonic signal damping and isolation of galvanic corrosion from 316ss tension straps on steel pipes.
- It is not always necessary to remove the protective paint layers on steel pipes. If possible, a quick measurement test using a portable meter should be performed.

Fig. 4: Damping mats & Variofix C mounting rails

Installation of the Transducers

- The transducer mounting fixture PermaLok will be used for protection of the transducers.
- Permapad coupling foils type VT will be used as the coupling material between transducer and pipe. This eliminates the need for any maintenance.
- Follow the standard installation procedure of transducers (see User Manual).
- Sealforlife putty and tape will be applied above and around the transducer and the PermaLok mounting fixture to provide additional protection from sand or soil ingress during back-filling operations. The use of Stopaq products is not mandatory and other equivalent watertight material can be used instead.

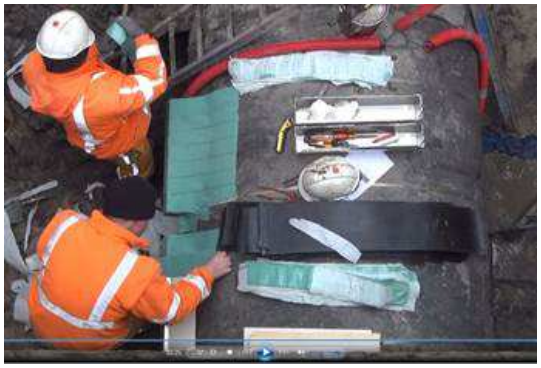

Fig. 5 & 6: Installation of the transducers

Laying the Transducer Cables

- The transducer cables need to be fixed and protected after exiting the PermaLok mounting fixture to minimize risks of displacement during backfilling.
- The transducer cables have to be laid in a strong, flexible protection conduit.
- Standard electrical conduits provided and installed by the civil groundworks contractor will be used for protection and must fulfil all national/local electrical installation codes.
- Label the protection conduit (e.g. "flow transducer cable").
- The protection conduit has to be sufficiently long to enable connection to the control cabinet or junction box, allow free movement for expansion/contraction and be free of pinch-points.
- The protection conduit needs to be sealed, so that neither water nor insects can enter it.
- The location where the protection conduit emerges from the ground has to be protected against physical damage.

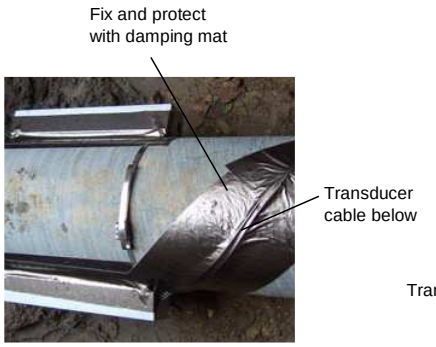

Fig. 7, 8 and 9: Positioning of the transducers

Backfilling of Excavated Pit

- The civil groundwork contractor must follow all national/local backfilling procedures for laying pipe.
- The backfilling around the transducers has to be conducted manually and carefully.
- FLEXIM commissioning engineers should be present and observe backfilling operations at all times. The transducer signal shall be live and watched continuously for uninterrupted measurement performance. If flow measurement is interrupted at any time, backfilling operations shall be halted and the source of interrupted measurement investigated and remedial action taken before recommencement of backfilling operations.
- A min. of 20 inches around the transducers will be filled with fine sand. The type of the sand will be according to national/local pipe laying requirements or regulations but must not include rocks or course stones that could damage the transducer assembly. Fine sand can also be more easily removed for maintenance activities by vacuum extraction, should the need ever arise.
- Water should be used to compact the backfilled material underneath the transducers with the aim of creating a solid supporting platform of sand underneath the transducer assemblies.

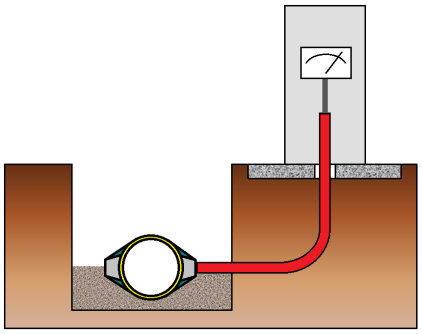

Fig.10 & 11: Wetted sand supporting transducers

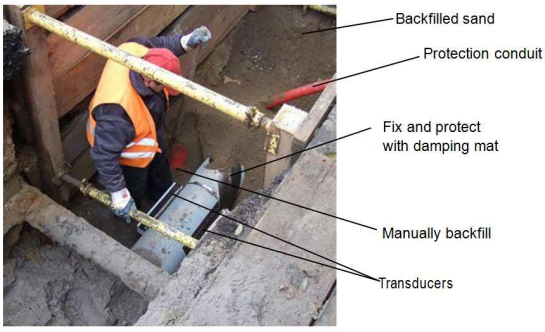

Fig 12: Careful manual backfilling

- The civil groundwork contracting company will gently fill the pit with sand, working it under the pipe and particularly under the transducer rails.
- The sand should be compacted by hand and this can be further aided by watering the sand. The object is to create a firm platform under the transducers to protect them from misalignment due to the weight of sand/soil above once back filled.
- Any misalignment of the transducers from the horizontal could result in flow measurement malfunction.
- Once a suitably supportive sand prop has been created under the pipe and transducer rails, further careful backfilling with sand can take place.

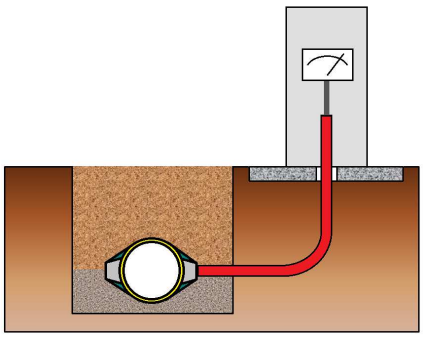

Fig. 13 & 14: Backfilling of excavated pit

- Throughout the backfilling process, FLEXIM commissioning engineers should be on site and will continue measurement evaluation and diagnostic tests. This will ensure the transducer installation was not subject to displacement during the backfilling process.
- **No soil compacting machinery should be used around the transducers or to complete compacting of back fill.** Vibrating soil compactors could be a source of transducer misalignment.

Documentation

- Use FluxInfo/FluxData or FluxDiag software for all essential information, e.g. transducer distance, number of sound paths, location etc. and always complete a backup of installed condition diagnostics.

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02/15

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SECTION 43 02 00.00 41

WELDING PRESSURE/MECHANICAL PIPING/VESSELS
02/15

PART 1 GENERAL

1.1 SUMMARY

This specification contains the minimum requirement, for qualifying welding and brazing procedures, welders, brazers, and welding operators and for effecting and inspecting welds and brazed joints, in mechanical fabrications of carbon steel, low alloy steel, extra-high-strength quenched and tempered steels, austenitic stainless steel, copper and other metals, used in pressure containing systems and the associated ancillary support systems at NASA, Langley Research Center.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

The listed versions of the following references were used during the development of this design and are the Government approved versions to be used herein. There may be newer versions of certain references that have been released since the commencement and/or approval of the design effort. However, in order to comply with the Government technical requirements, not all of the latest versions of the listed references were adopted and the versions listed herein shall be utilized.

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(2012) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS A3.0M/A3.0	(2010) Standard Welding Terms and Definitions
AWS D1.1/D1.1M	(2010; Errata 2011) Structural Welding Code - Steel
AWS Z49.1	(2012) Safety in Welding and Cutting and Allied Processes

ASME INTERNATIONAL (ASME)

ASME B31.3	(2012) Process Piping
ASME BPVC SEC V	(2010) BPVC Section V-Nondestructive Examination

LANGLEY RESEARCH CENTER (LaRC)

LPR 1710.40	(August 2011) Langley Research Center Pressure Systems Handbook

LPR 1710.41 (July 2011) Langley Research Center Standard for the Evaluation of Socket and Branch Connection Welds

1.3 WELDING DEFINITIONS

Definitions shall be in accordance with AWS A3.0M/A3.0.

1.4 WELDING SYMBOLS

Symbols shall be in accordance with AWS A2.4.

1.5 SAFETY

Safety precautions shall conform to AWS Z49.1.

1.6 SUBMITTALS

The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-07 Certificates

The Contractor shall submit to the Contracting Officer, the relevant certificates, within fifteen days after receipt of Notice to Proceed, for review and approval of the following items:

1. INSPECTOR QUALIFICATIONS

2. National Board, or ASME Certificate of Authorization, for use of any of the following stamps: "R", "U", "U2", "N", or "PP".

1.7 QUALIFICATIONS

1.7.1 General

The Contractor shall qualify the welding procedures and welders and brazers by mechanical tests prescribed in the applicable code or specification, notwithstanding the fact that the Code or Specification may allow Pre-qualified Weld Procedures or Standard Weld Procedures. All Welders and Weld Procedures shall be qualified for complete joint penetration (CJP) groove welds. Stand alone Welder Performance Qualifications (WPQ's), Pre-qualified Weld Procedures or Standard Weld Procedures are unacceptable.

The Contractor shall perform testing for weld procedures by an approved testing laboratory or approved technical consultant or by the Contractor's approved quality assurance organization. The Contracting Officer will approve the testing organization.

1.7.2 Welding and Brazing Procedure Qualifications

Welding/Brazing procedures, welders/brazers, and welding operators previously qualified by test may be accepted for the work without re-qualification, provided that all the requirement of the applicable Code(s) and this Specification are met. Qualification of welders and brazers is the responsibility of the Contractor performing the work.

1.8 GENERAL REQUIREMENTS

High Pressure is defined as 125 psig and above.

This section covers the welding/brazing of pressure piping systems. Deviations from applicable Codes, approved procedures, policies, and approved detail drawings and specifications will not be permitted without prior written approval. The approval method is by way of "Request for Information" (RFI) process. Verbal contract changes are unacceptable. As-built drawings shall be submitted. Materials or components with welds made off-site shall not be accepted if the welding/brazing does not conform to the requirement of this Specification, unless otherwise specified. The Contractor shall develop Welding Code procedures and qualifications for welding and brazing all metals included in this work.

Qualification testing shall be performed by an approved testing laboratory, or by a qualified testing organization approved by the Contracting Officer. Costs of such testing and the development of the pertinent WPS/BPS, PQR's and WPQ's/BPQ's shall be borne by the Contractor.

The procedures for making transition welds between different materials or between plates or pipes of different wall thicknesses shall be in accordance with the applicable Code(s). Unless otherwise specified on drawings, the choice of welding and brazing process shall be the responsibility of the Contractor.

The Contractor shall conform the design and fabrication of welded and braze connections to the specified Welding Code(s). Material with welds will not be accepted unless the welding is specified or indicated on the drawings or otherwise approved.

The Contractor shall perform welding and brazing as specified in this section, except where additional requirement is shown on the drawings or are specified in other sections. The Contractor shall not commence welding and brazing until these procedures, inspectors, nondestructive testing personnel, welders, brazers, welding and brazing operators, and tackers have been qualified and the required submittal documentation is reviewed and approved by the Contracting Officer.

The Contractor shall maintain current records of the results obtained in the welding and brazing qualifications, and nondestructive examination (NDE) procedures readily available at the construction site for examination by the Contracting Officer.

1) For welding:

   a) Weld Procedure Specifications (WPS)
   b) Certified Weld Procedure Qualifications Record (PQR)
   c) Certified Welder, Welding Operator, and Tacker Performance Qualifications (WPQ's)

2) For Brazing:

   a) Braze Procedure Specification (BPS)
   b) Certified Braze Procedure Qualification Record (PQR)
   c) Certified Brazer Performance Qualifications (BPQ's)

3) For inspection:

All NDE reports and inspector qualifications.

1.9 DELIVERY, STORAGE, AND HANDLING

The Contractor shall deliver all filler metals, electrodes, fluxes, and other welding materials to the site in manufacturers' original packages and stored in a dry space until used. Packages shall be properly labeled and designed to give maximum protection from moisture and to insure safe handling. Low hydrogen electrodes shall be handled in accordance with the manufacturer and welding codes recommendations.

1.9.1 Damaged Materials

The Contractor shall discard materials which are damaged. The Contractor shall discard covered electrodes which are oil or water-soaked, dirty, or on which the flux has separated from the wire.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 CONSTRUCTION

3.1.1 Other Piping

A - Plumbing: The Contractor shall fabricate, assemble and solder in accordance with the ICC IPC Plumbing Code requirement. Brazers and Welders and Procedures shall be qualified according to this Specification Section.

B - Other Low Pressure Piping: The Contractor shall fabricate, assemble, and weld and braze in accordance with the ASME B31.3, Process Piping Code and this Specification. Brazers and Welders and Procedures shall be qualified according to this Specification. The Contractor shall use only compatible components in these piping systems and metals specified on the drawings. Weld joints in the piping systems shall utilize either consumable inserts or open butt welding techniques. Backing rings shall be avoided.

C - All socket and branch connections shall meet the requirement of LPR 1710.41.

3.1.2 Ancillary Fabrication

Welded ancillary components such as pipe hangers, brackets, supports, etc., associated with the piping system and vessels shall be fabricated in accordance with the applicable pressure system Code and the construction of it. Structural steel fabrication other than pressure system and vessel supports shall conform to AWS D1.1/D1.1M Structural Steel Welding Code.

3.2 ENVIRONMENTAL AND HEAT CONTROLS

3.2.1 Preheat

3.2.1.1 Materials For Which No Preheat Is Specified By Code

The Contractor shall not weld when rain or snow is falling on surfaces of the parts in the area to be welded, or when they are wet from rain, snow or ice. When adverse conditions exist, the welder and work area shall be properly shielded and the material to be welded shall be above above 50

degrees F. When the material is below 50 degrees F and/or the thickness is in excess of one inch, the Contractor shall heat the joint to a temperature of 100 degrees F. Welding shall not be done when the ambient temperature is lower than 0 degree F. Preheat techniques shall be such as to ensure that the full thickness of the weld joint preparation and adjacent base material, at least 3 inches in all directions, is at the specified temperature. Preheating by induction or resistance methods is preferred, but when flame heating is used, only a neutral flame shall be employed.

The Contractor shall preheat all joints displaying moisture until the moisture is evaporated.

3.3 INSPECTION/NONDESTRUCTIVE EXAMINATION (NDE)

Nondestructive Examination Requirements - The Contractor shall radiographically inspect welded joints in pressure vessels, tubes, pipes, and fittings as specified herein. All welded joints, being structural or pressure retaining, shall have, as a minimum, 100 percent visual inspection (VT) of the final weld configuration in accordance with the specified Code.

3.3.1 General

The required extent of nondestructive examination for pressure systems shall be in accordance with LPR 1710.40, Pressure Systems Handbook.

The Contractor shall perform the necessary fabrication/erection inspection prior to assembly, during assembly, during welding, and after welding, to ensure that materials and workmanship meet the minimum requirements of the contract documents.

Inspector's qualifications shall be in accordance with AWS and ASME welding codes.

Identification of weld joints, on the base metal, by electric etchers and impact stamps shall be avoided. For seam welds, the Contractor shall place identification marks adjacent to the welds at 3 foot intervals. Appropriate documentation shall be filed, which includes the information required in items A through F below. All inspection reports shall be submitted for retention by the Government, within 7 days of the inspection.

The Contracting Officer will perform the final acceptance of all welded and brazed joints.

Prior to the Contracting Officer's inspection, the Contractor shall remove all slag, scale and spatter from all welds. The procedure employed shall not produce notches or grooves in either the weld metal or adjacent base metal.

The Contractor shall repair and reinspect all unacceptable welds at no additional cost to the Government.

After weld joints have been satisfactorily completed by the Contractor and accepted by the Contracting Officer, the Contractor shall clean the joint area to a bright, unpitted, and unscarred surface. The base metal and weld thicknesses shall not be reduced below applicable code allowable limits. The surface shall then be protected in accordance with the applicable contract documents specifying coatings or specific surface conditions.

3.3.2 Piping and Ancillary Fabrication

3.3.2.1 General

All Nondestructive Examination (NDE) shall be performed in accordance with the requirements of Section V of the ASME Boiler and Pressure Vessel Code (ASME BPVC SEC V), for all new and repaired piping, and structural fabrication pertaining to pipe, except for branch connection and socket welds.

All branch connections and socket welds shall be inspected in accordance with LPR 1710.41, Langley Research Center Standard for the Evaluation of Socket and Branch Connection Welds.

All welds shall be 100 percent visually inspected (VT) to the specified construction Code.

3.3.3 Acceptance Requirements - Piping

(1) - All socket and branch connection welds shall meet the acceptance requirements of LPR 1710.41, "Langley Research Center Standard for the Evaluation of Socket and Branch Connection Welds".

(2) - Plumbing piping systems shall meet the acceptance requirements of the International Plumbing Code.

3.3.4 Acceptance Requirements - Ancillary and Supports Fabrication

All ancillary fabrication welds shall have 100 percent (VT) inspection of the final weld configuration and satisfy the acceptance criteria of the applicable pressure vessel and Piping Codes.

3.4 PROTECTION OF ADJACENT MATERIALS

The Contractor shall sufficiently protect machinery, materials, floor, and surfaces adjacent to the welding/brazing/soldering operations, to prevent any damage from these operations.

-- End of Section --

SECTION 8 – Drawings (Half Size)

POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF
(WORK PACKAGE 1)

VALVE REPLACEMENT

LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA

DRAWING INDEX – WORK PACKAGE 1

DRAWING No.	SHEET No.	REV.	TITLE
GENERAL			
1296747	1–G001	–	TITLE SHEET
1296748	1–G101	–	KEY PLAN A
1296749	1–G102	–	KEY PLAN B
1296750	1–G103	–	KEY PLAN C
CIVIL			
1296751	1–C001	–	GENERAL AND CIVIL NOTES, LEGEND, AND ABBREVIATIONS
1296752	1–C101	–	VALVE REPLACEMENT SITE PLANS
1296753	1–C102	–	VALVE REPLACEMENT SITE PLANS
1296754	1–C103	–	VALVE REPLACEMENT SITE PLANS
1296755	1–C104	–	VALVE REPLACEMENT SITE PLANS
1296756	1–C105	–	VALVE REPLACEMENT SITE PLANS
1296757	1–C106	–	VALVE REPLACEMENT SITE PLANS
1296758	1–C107	–	VALVE REPLACEMENT SITE PLANS
1296759	1–C108	–	VALVE REPLACEMENT SITE PLANS
1296760	1–C109	–	VALVE REPLACEMENT SITE PLANS
1296761	1–C110	–	VALVE REPLACEMENT SITE PLANS
1296762	1–C111	–	VALVE REPLACEMENT SITE PLANS
1296763	1–C112	–	VALVE REPLACEMENT SITE PLANS
1296764	1–C113	–	VALVE REPLACEMENT SITE PLANS
1296765	1–C114	–	VALVE REPLACEMENT SITE PLANS
1296766	1–C115	–	VALVE REPLACEMENT SITE PLANS
1296767	1–C116	–	VALVE REPLACEMENT SITE PLANS
1296768	1–C117	–	VALVE REPLACEMENT SITE PLANS
1296769	1–C501	–	PAVEMENT REPAIR DETAILS
MECHANICAL			
1296770	1–M501	–	PIPING AND VALVE DETAILS AND GENERAL NOTES
1296771	1–M601	–	VALVE SCHEDULES
1296772	1–M602	–	VALVE SCHEDULES

ANNOTATION SYMBOL LEGEND

- [1] NOTE REFERENCE, NEW WORK
- ⟨1⟩ NOTE REFERENCE, DEMOLITION WORK
- 1152 NASA FACILITY NUMBER
- [101] FACILITY ROOM NUMBER
- SECTION LETTER OR DETAIL NUMBER / SHEET SHOWN ON
- SECTION LETTER OR DETAIL NUMBER / SHEET NUMBER ON WHICH SECTION/DETAIL APPEARS / SHEET NUMBER ON WHICH SECTION/DETAIL ORIGINATES
- N — PLAN NORTH / MAGNETIC NORTH
- 123 — VALVE NUMBER / ISOLATION VALVE

REVISIONS								REVISIONS						
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD		DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

JACOBS®

Langley Research Center
Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS	DATE
DRAWN E. DOHERTY/D. PARKER	07/30/15
ENG./DES. H. GOLDSMITH	07/30/15
CHECK G. VOLKMAN	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

APPROVALS				
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			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ±; X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

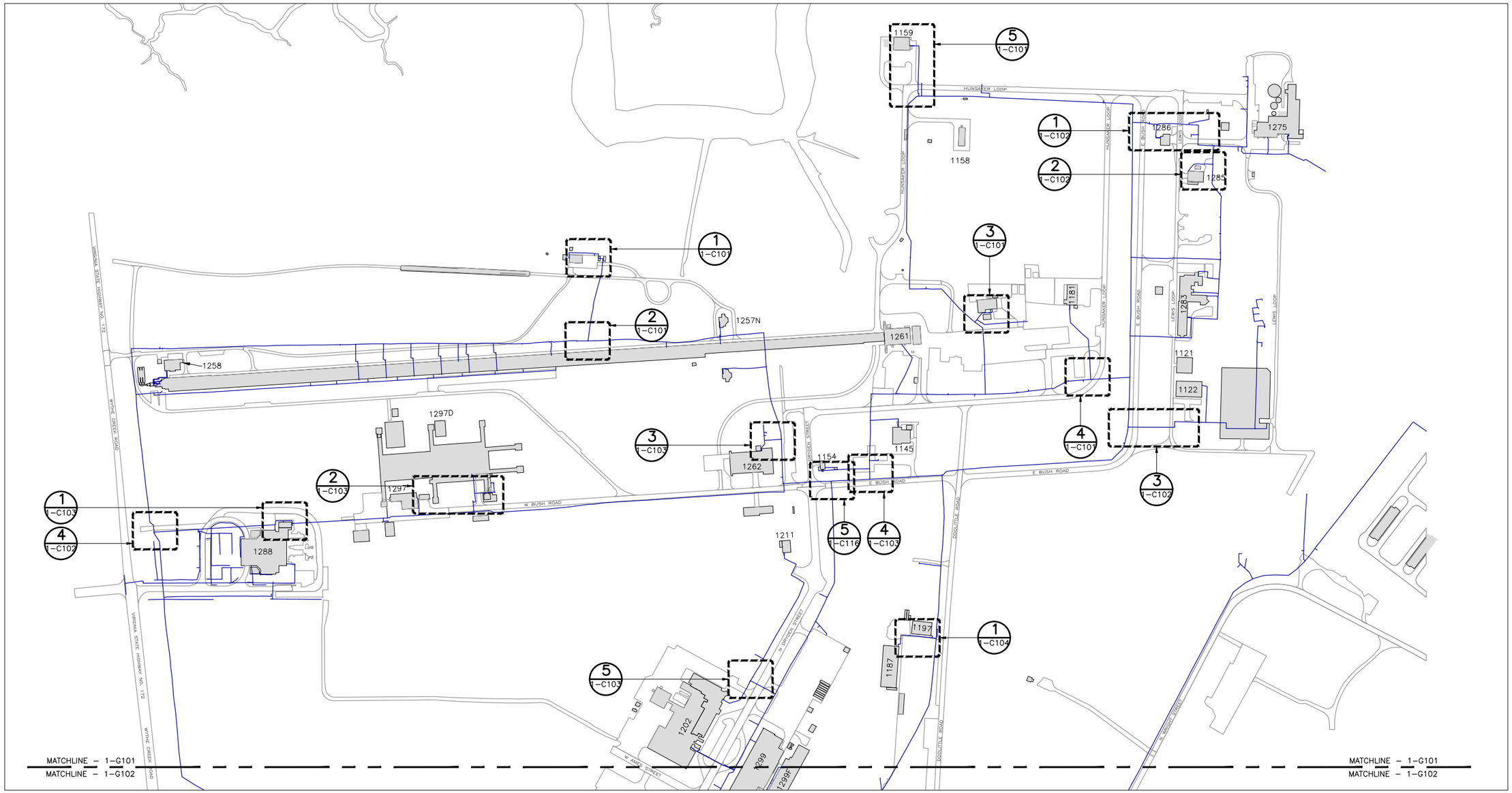
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: TITLE SHEET

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296747 | LATEST REV. –

SHEET NO. 1–G001



KEY PLAN A

SCALE: 1" = 200'

PLAN NORTH

1" = 200'-0" 200 100 0 200 400 SCALE FEET

REVISIONS								REVISIONS							
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PROJ. MGR.	G. VOLKMAN	07/30/15
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APPROVALS				
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			RES. PROJ. ENG.	

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FOR DRAWING INDEX SEE DRAWING 1296747

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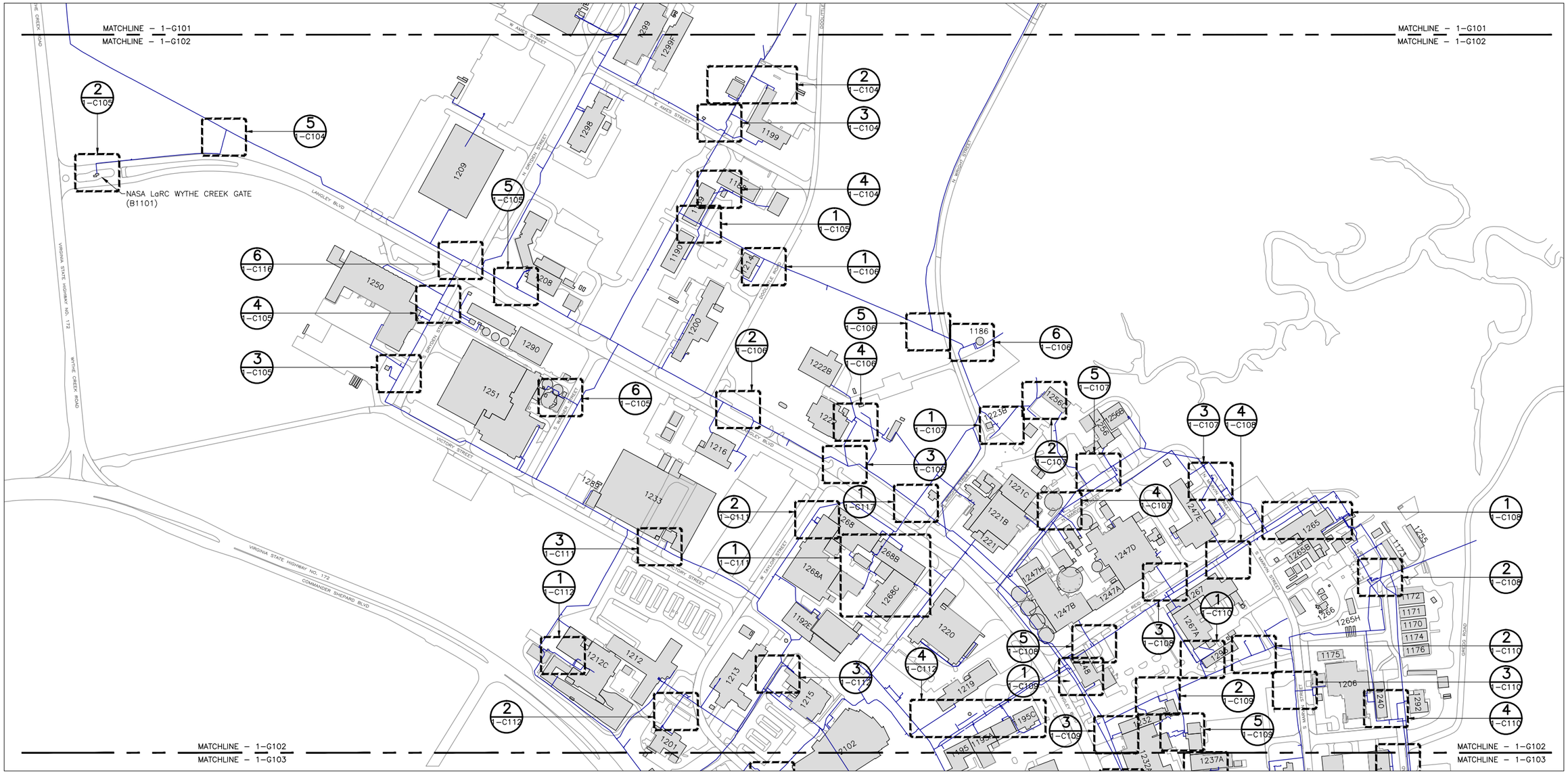
PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: KEY PLAN A

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296748 | LATEST REV. ·

SHEET NO. 1-G101



KEY PLAN B

SCALE: 1" = 200'

PLAN NORTH

1" = 200'–0" SCALE 200 100 0 200 400 FEET

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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

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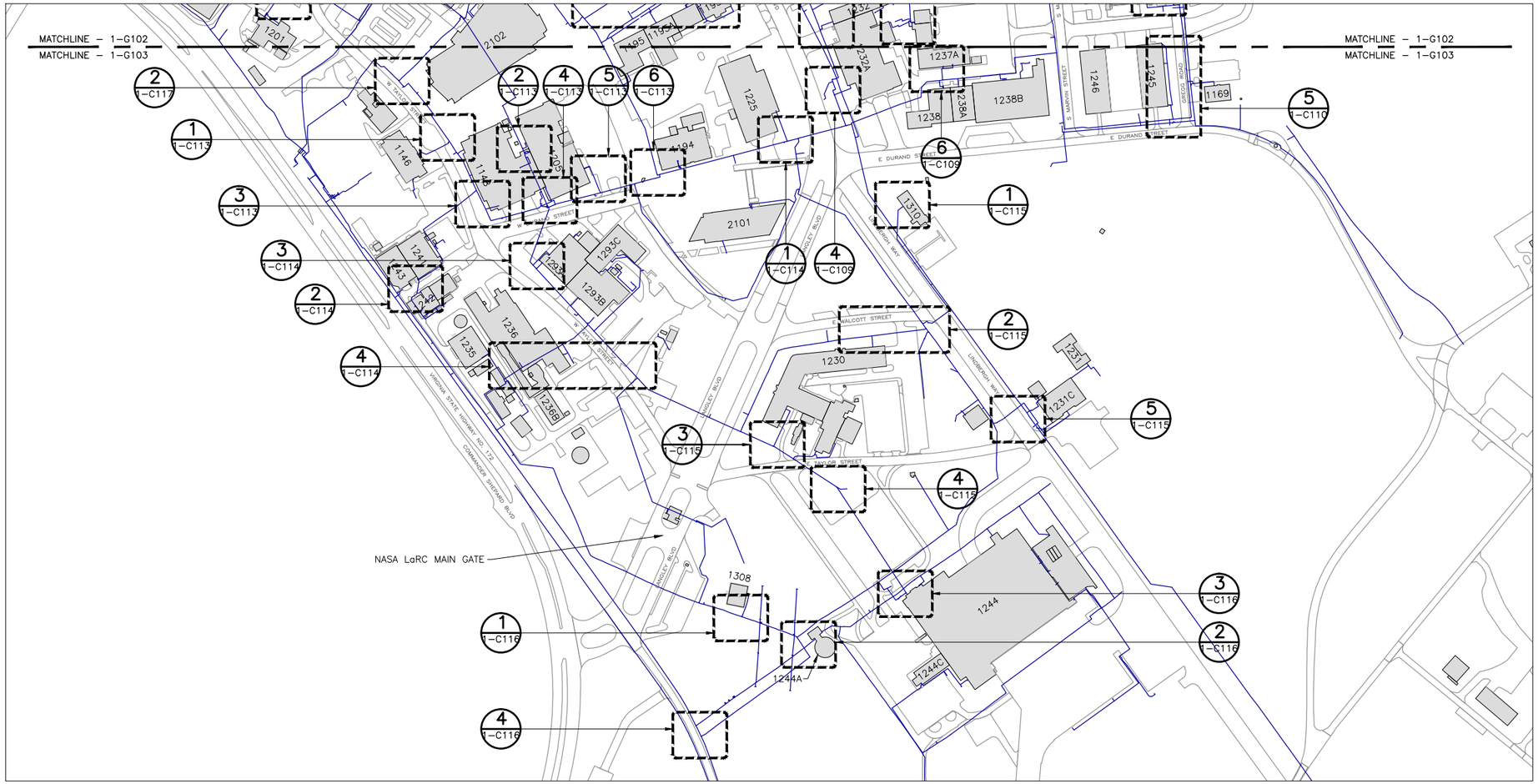
PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: KEY PLAN B

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296749 | LATEST REV. •

SHEET NO. 1–G102



KEY PLAN C

SCALE: 1" = 200'

PLAN NORTH

1" = 200'–0" 200 100 0 200 400 SCALE FEET

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REVISIONS						
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

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FOR DRAWING INDEX SEE DRAWING 1296747

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LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: KEY PLAN C

BUILDING NO.	SIZE	DRAWING NO.	LATEST REV.
1215	D	1296750	•

SHEET NO. 1–G103

ABBREVIATIONS

@	–	AT
AASHTO	–	AMERICAN ASSOCIATION OF HIGHWAY AND TRANSPORTATION OFFICIALS
ABAND	–	ABANDON
AF	–	AIR FORCE
AFF	–	ABOVE FINISHED FLOOR
AG	–	ABOVE GRADE/GROUND
ALM	–	ALARM
ALUM	–	ALUMINUM
APPROX	–	APPROXIMATE
ASJ	–	ALL SERVICE JACKET
BG	–	BELOW GRADE/GROUND
B	–	BASELINE
℄	–	BASELINE
BG	–	BELOW GRADE
BLDG	–	BUILDING
BM	–	BENCHMARK
BOT	–	BOTTOM
BRG	–	BEARING
CA	–	CABLE
CAP	–	CAPACITY
CB	–	CATCH BASIN
CO	–	CLEAN OUT
CI	–	CAST IRON
CJ	–	CONTROL JOINT
℄	–	CENTERLINE
CLR	–	CLEAR
CMP	–	CORRUGATED METAL PIPE
CND	–	CONDUIT
CNDS	–	CONDENSATE
CONC	–	CONCRETE
CONT	–	CONTINUOUS
CORP	–	CORPORATION
CP	–	CONCRETE PIPE
CT	–	COOLING TOWER
CU	–	COPPER
CULV	–	CULVERT
CW	–	COLD WATER
CWR	–	COLD WATER RETURN
CWS	–	COLD WATER SUPPLY
D	–	DATA
DB	–	DUCTBANK
DE	–	DOUBTFUL ELEVATION
DEMO	–	DEMOLITION
DI	–	DUCTILE IRON
ø DIA	–	DIAMETER
DN	–	DIAMETER NOMINAL
DN	–	DOWN
DP	–	DIFFERENTIAL PRESSURE
DR	–	DRAIN
?	–	DOUBTFUL
DS	–	DOWNSPOUT
DT	–	DRAIN TILE
E	–	ELECTRIC
EA	–	EACH
EBW	–	ENVIRONMENTAL BLOWDOWN WATER
EC	–	EDGE OF CONCRETE
ED	–	EXISTENCE DOUBTFUL
EJ	–	EXPANSION JOINT
EL	–	ELEVATION
ELEC	–	ELECTRICAL
ELEC	–	ELECTRIC
ELEV	–	ELEVATION
ELL	–	ELBOW
EQ	–	EQUAL
EQUIP	–	EQUIPMENT
EXP	–	EXPANSION
EXP	–	EXPOSED
EXST	–	EXISTING
EXIST	–	EXISTING
FDN	–	FOUNDATION
FF	–	FINISH FLOOR
FH	–	FIRE HYDRANT
FIN	–	FINISH
FIN FL	–	FINISH FLOOR
FL	–	FLOOR
FL	–	FLOW LINE
FLDT	–	FLOODLIGHT
FM	–	FIRE MAIN
FM	–	FORCED MAIN
FND	–	FOUNDATION
FT	–	FEET
FTNG	–	FOOTING
G	–	GAS
GALV	–	GALVANIZED
GB	–	GRADE BEAM
GFE	–	GOVERNMENT FURNISHED EQUIPMENT
GM	–	GALVANIZED METAL
GMP	–	GALVANIZED METAL PIPE
GND	–	GROUND
GOVT	–	GOVERNMENT
H	–	HIGH
H^2	–	HYDROGEN
HC	–	HANDICAPPED
HCR	–	HIGH PRESSURE CONDENSATE RETURN
HD	–	HEAD
HDPE	–	HIGH DENSITY POLYETHYLENE
HH	–	HAND HOLE
HM	–	HOLLOW METAL
HPS	–	HIGH PRESSURE STEAM
HP	–	HIGH POINT
HP	–	HIGH PRESSURE
HW	–	HEADWALL
HW	–	HOT WATER
HZ	–	HERTZ
IJ	–	ISOLATION JOINT
INV	–	INVERT
JB	–	JUNCTION BOX
JT	–	JOINT
KCMIL	–	THOUSAND CIRCULAR MIL
KV	–	KILO VOLTS
KW	–	KILOWATT
L	–	LIGHT
LG	–	LONG
LN2	–	LIQUID NITROGEN
LP	–	LOW POINT
LPR	–	LOW PRESSURE RETURN
LPS	–	LOW PRESSURE STEAM
LT	–	LEFT
MAX	–	MAXIMUM
ME	–	MATCH EXISTING
MECH	–	MECHANICAL
MET	–	METAL
MH	–	MANHOLE
MIN	–	MINIMUM
MJ	–	MECHANICALLY JOINED
MON	–	MONUMENT
No.	–	NUMBER
NRCP	–	NON–REINFORCED CONCRETE PIPE
O	–	OVERHEAD
OA	–	OUTSIDE AIR
OAT	–	OUTSIDE AIR TEMPERATURE
OC	–	ON CENTER
OH	–	OVERHEAD
OL	–	OVERHEAD LINE
OPP	–	OPPOSITE
P	–	PIPE
PAVT	–	PAVEMENT
PB	–	PULL BOX
PC	–	PUMPED CONDENSATE
PCR	–	PUMPED CONDENSATE RETURN
PD	–	POSITION DOUBTFUL
Pe	–	PROPANE
PED	–	PEDESTAL
P.I.V.	–	POST INDICATOR VALVE
PNL	–	PANEL
PROB	–	PROBABLE
PSI	–	POUNDS PER SQUARE INCH
PVC	–	POLYVINYL CHLORIDE
PWR	–	POWER
R	–	RADIUS
R	–	RISER
RC	–	REINFORCED CONCRETE
RCP	–	REINFORCED CONCRETE PIPE
RD	–	ROOF DRAIN
RDCR	–	REDUCER
RE	–	REFER
REF	–	REFERENCE
REIN	–	REINFORCING
REQ'D	–	REQUIRED
RET	–	RETURN
RGSC	–	RIGID GALVANIZED STEEL CONDUIT
RL	–	REFRIGERANT LIQUID
ROW	–	RIGHT OF WAY
RPM	–	REVOLUTIONS PER MINUTE
RS	–	REFRIGERANT SUCTION
RS	–	RIGID STEEL
RT	–	RIGHT
S	–	SOUTH
SA	–	SANITARY
SCH	–	SCHEDULE
SHT	–	SHEET
SIM	–	SIMILIAR
SLV	–	SLEEVE
SP	–	STATIC PRESSURE
SPLY	–	SUPPLY
SQ	–	SQUARE
SS	–	STAINLESS STEEL
ST	–	STORM
STA	–	STATION
STL	–	STEEL
STM	–	STEAM
STOR	–	STORAGE
SUBSTA	–	SUBSTATION
SW	–	SIDEWALK
SWGR	–	SWITCHGEAR
T	–	TELEPHONE
TB	–	TOP OF BOARD
TC	–	TERRA COTTA
TC	–	TOP OF CURB
TD	–	TOP OF DRAIN
TEL	–	TELEPHONE
THK	–	THICK
TNK	–	TANK
TOB	–	TOP OF BOARD
TOC	–	TOP OF CURB
TP	–	TOP OF PIPE
TRANS	–	TRANSFORMER
TRLR	–	TRAILER
TYP	–	TYPICAL
UGND	–	UNDERGROUND
UNK	–	UNKNOWN
UON	–	UNLESS OTHERWISE NOTED
UTIL	–	UTILITY
V	–	VALVE, VOLT
VAC	–	VACUUM
VC	–	VITRIFIED CLAY PIPE
VCP	–	VALVE CAPPED PIPE
VDOT	–	VA DEPARTMENT OF TRANSPORTATION
VERT	–	VERTICAL
VNG	–	VIRGINIA NATURAL GAS
W	–	WIDE
W/	–	WITH
WA	–	WATER
WL	–	WATER LINE
WWF	–	WELDED WIRE FABRIC
XFMP	–	TRANSFORMER MONITORING PANEL

CIVIL LEGEND (APPLIES TO ALL CIVIL SHEETS)

- EXISTING DUCTBANK
- EL 8.50 — ELEV OF TOP OF EXISTING UTILITY LINE
- EXISTING PIPING TO BE REMOVED
- EXISTING PIPING TO BE ABANDONED IN PLACE
- EXISTING BUILDING TO REMAIN
- DEMOLISHED/NEW PAVEMENT
- DEMOLISHED/NEW SIDEWALK
- NEW TO EXISTING CONNECTION
- POINT OF DISCONNECT
- X — FENCING

MANHOLE	LINE	
STORM	ST	DIA.
SANITARY	SA	
ELECTRICAL	E	
TELEPHONE	T	

- FIRE HYDRANT
- CATCH BASIN
- CLEAN OUT
- VALVE
- WA — WATER LINE
- BENCH MARK

GENERAL NOTES

1. ALL EXISTING SIZES ARE IN ENGLISH UNITS.
2. ALL ITEMS SHALL BE CONSIDERED AS EXISTING UNLESS OTHERWISE INDICATED AS BEING NEW.
3. SUBSURFACE UTILITIES NOT DESIGNATED FOR DEMOLITION OR MODIFICATION SHALL NOT BE DISTURBED.
4. CONSTRUCTION OPERATIONS SHALL BE CONDUCTED SO THAT NEW WORK FOR SUBSURFACE UTILITIES SHALL BE INSTALLED AS COMPLETELY AS PRACTICABLE BEFORE DISRUPTION OF EXISTING SERVICES.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DIMENSIONS AND ELEVATIONS. NECESSARY FOR THE PROPER CONSTRUCTION AND ALIGNMENT OF THE NEW CONDITIONS TO THE EXISTING CONDITIONS. THE CONTRACTOR SHALL MAKE ALL FIELD MEASUREMENTS NECESSARY FOR CONSTRUCTION. THE CONTRACTOR SHALL MAINTAIN A RED–LINED SET OF CONTRACT DRAWINGS THAT REFLECT CURRENT "AS–BUILT" CONDITIONS AND SUBMIT THE DRAWINGS TO THE CONTRACTING OFFICER AFTER COMPLETION OF CONSTRUCTION.
6. VERIFY THE LOCATION OF NEW WORK WITH FACILITY COORDINATOR AND CONSTRUCTION MANAGER.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ALL NON–HAZARDOUS DEBRIS GENERATED FROM THE PROJECT FROM THE CENTER PRIOR TO OR UPON COMPLETION OF THE PROJECT IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS.
8. ELEVATIONS USED ON ALL CIVIL DRAWINGS ARE BASED ON NAVD 88 (NORTH AMERICAN VERTICAL DATUM).
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING AND PROTECTING EQUIPMENT AND UNDERGROUND UTILITIES TO REMAIN. THE CONTRACTOR SHALL PERFORM A FIELD SURVEY, INCLUDING INSPECTION OF SITE CLEARANCES AND REMOVAL/INSTALLATION ROUTE INTENDED TO BE INCORPORATED INTO THE EXISTING SYSTEM PRIOR TO PROCEEDING WITH WORK. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR REPAIRS OR MODIFICATIONS NECESSARY TO MAKE THE SYSTEM PERFORM AS REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING EQUIPMENT AT NO ADDITIONAL COST TO THE GOVERNMENT.
10. THE CONTRACTOR SHALL COORDINATE ANY IMPACTS TO TRAFFIC FLOW DURING CONSTRUCTION WITH THE CONTRACTING OFFICER PRIOR TO PROCEEDING WITH WORK AFFECTING GOVERNMENT STREETS. FIRE AND RESCUE VEHICLE ACCESS TO ALL BUILDINGS SHALL BE MAINTAINED DURING CONSTRUCTION.
11. ALL SIGNS, LANDSCAPING, STRUCTURES OR OTHER APPURTENANCES DISTURBED OR DAMAGED DURING CONSTRUCTION SHALL BE REPLACED OR REPAIRED BY THE CONTRACTOR AT NO COST TO THE GOVERNMENT.
12. ALL TREES WITHIN THE CONSTRUCTION AREA NOT SPECIFICALLY DESIGNATED FOR REMOVAL SHALL BE PRESERVED, WHETHER SHOWN OR NOT SHOWN ON THE CONTRACT DRAWINGS UNLESS COORDINATED WITH THE CONTRACTING OFFICER. TREES TO BE PRESERVED SHALL BE PROTECTED WITH HIGH VISIBILITY FENCING PLACED A MINIMUM OF 5' FROM THE TREE TRUNK. THE CONTRACTOR SHALL CLEAN CUT ANY TREE ROOTS LARGER THAN 3 INCHES IN DIAMETER WHERE NECESSARY FOR CONSTRUCTION. IF TREES NOT INDICATED FOR REMOVAL ARE DAMAGED OR KILLED DURING OR UP TO 1 YEAR AFTER CONSTRUCTION THE CONTRACTOR SHALL COORDINATE WITH THE CONTRACTING OFFICER TO DEVELOP A REPLACEMENT STRATEGY AT THE CONTRACTOR'S EXPENSE.

CIVIL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR ALL SHORING AND BRACING OF EXCAVATION. SHORING AND BRACING SHALL BE MAINTAINED REGARDLESS OF THE LENGTH OF TIME THE EXCAVATION SHALL BE OPEN.
2. WATER SHALL NOT BE PERMITTED TO ACCUMULATE IN EXCAVATIONS. DEWATERING SYSTEMS SHALL BE PROVIDED BY THE CONTRACTOR TO CONVEY WATER AWAY FROM EXCAVATIONS. DEWATERING SYSTEM AND METHODS OF DISPOSAL SHALL BE APPROVED BY THE CONSTRUCTION MANAGER.
3. PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL LOCATE ALL EXISTING UNDERGROUND UTILITY LINES IN THE AREA OF PROPOSED EXCAVATION.
4. CONTRACTOR SHALL HAND DIG TO EXPOSE AND VERIFY LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO ANY MACHINE EXCAVATION. EXISTING UTILITY LOCATIONS SHOWN ARE BASED ON BEST AVAILABLE INFORMATION AND MAY NOT REFLECT FIELD CONDITIONS. NO EXCAVATION IS ALLOWED TO START WITHOUT FIRST RECEIVING A DIGGING PERMIT FROM LaRC IQA TEAM. CALL 864–7265.
5. ALL DISTURBED AREAS NEAR BUILDINGS OR PAVEMENT SHALL BE GRADED FOR DRAINAGE.
6. SEE SPECIFICATION SECTION 01 35 40.00 41 FOR REQUIREMENTS FOR EXCAVATED SOIL TO BE REMOVED FROM LaRC. IF SOIL IS STOCKPILED THE CONTRACTOR SHALL CONTROL THE AREA AND BE HELD RESPONSIBLE FOR THE REMOVAL OF SOIL FROM LaRC UPON COMPLETION OF JOB.
7. TOPSOIL BROUGHT ONTO CENTER SHALL BE TESTED PER SPECIFICATION SECTION 01 35 40.00 41. PROVIDE BACKFILL AND TOPSOIL IN AREAS WHERE GRADE HAS BEEN DISTURBED FROM BUILDING AND UTILITY REMOVAL. FINISHED GRADING SHALL MATCH CONTOURS OF ADJACENT GRASS AREA. SEED WITH KENTUCKY FESCUE 31 ALL GRASSED AREAS. SEED SHALL BE UNIFORMLY BROADCAST AT THE RATE OF 35 POUNDS PER ACRE. PROVIDE TOPSOIL AND SEEDING IN CONFORMANCE WITH 31 23 00.00 41.
8. PROVIDE EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH SPECIFICATION SECTION 01 35 40.00 41.
9. CONCRETE/ASPHALTIC JOINT SEALANT SHALL BE ELASTOMERIC SEALANT ASTM C 920, SINGLE OR MULTI COMPONENT TYPE, POURABLE OR SELF–LEVELING, WITHSTANDING INCREASE AND DECREASE OF AT LEAST 25 PERCENT OF JOINT WIDTH, FOR USE IN PEDESTRIAN AND VEHICULAR AREAS, CONFORMING TO ASTM C92.
10. CONTRACTOR SHALL SUBMIT FOR APPROVAL A JOB–MIX DESIGN, TEST REPORTS AND OTHER DOCUMENTATION NECESSARY FOR THE CONTRACTING OFFICER TO DETERMINE CONFORMANCE WITH REQUIRED GRADING, ASPHALT CONTENT AND TEMPERATURE PROPERTIES FOR ASPHALT CONCRETE.
11. SUBSURFACE: REMOVE EXISTING MATERIAL TO UNDISTURBED EARTH (APPROX. 4 FT.) AND BACKFILL WITH SELECT AGGREGATE MATERIAL COMPACTED TO 100 PERCENT OF MAXIMUM DENSITY OBTAINED BY ASTM D1557.
12. REFER TO SPECIFICATION SECTION 31 23 00.00 41 FOR EXCAVATION NEAR EXISTING UTILITIES.
13. LOCATION, SUPPORT, PROTECTION AND RESTORATION OF ALL EXISTING UTILITIES AND APPURTENANCES, WHETHER SHOWN OR NOT SHOWN ON THE CONTRACT DRAWINGS, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. WHEN UNKNOWN OR INCORRECTLY LOCATED UNDERGROUND UTILITIES ARE ENCOUNTERED DURING CONSTRUCTION THE CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER PRIOR TO PROCEEDING WITH WORK.
14. THE CONTRACTOR SHALL VERIFY THE CONDITION OF ABANDONED UTILITIES WITH THE CONTRACTING OFFICER PRIOR TO CUTTING AND CAPPING IF NEEDED FOR THE INSTALLATION OF NEW WORK.
15. THE CONTRACTOR SHALL RESTORE ALL DISTURBED AREAS TO EQUAL OR BETTER CONDITION THAN EXISTED BEFORE CONSTRUCTION AS COORDINATED WITH THE CONTRACTING OFFICER. DRAINAGE DITCHES OR WATERCOURSES THAT ARE DISTURBED BY CONSTRUCTION SHALL BE RESTORED TO THE GRADES AND CROSS-SECTIONS THAT EXISTED BEFORE CONSTRUCTION.
16. EXISTING STRIPING, MARKINGS, PAVEMENT MARKERS, LANDSCAPING, CURBS, AND SIDEWALK DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPLACED IN KIND BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE GOVERNMENT.
17. THE CONTRACTOR SHALL PERFORM DEMOLITION AND EXCAVATION IN A MANNER THAT WILL MINIMIZE DUST, NOISE, AND OTHER NUISANCE. MAINTAIN HAUL ROUTES FOR DISPOSAL OF MATERIAL CLEAN AND FREE OF DEBRIS. TRACKING OR SPILLING MUD, DIRT OR DEBRIS UPON NASA STREETS AND SIDEWALKS SHALL BE CLEANED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE GOVERNMENT.

REVISIONS								REVISIONS							
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD		DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	

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ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUP'V'N.		

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SURFACE FINISH IN MICRONCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

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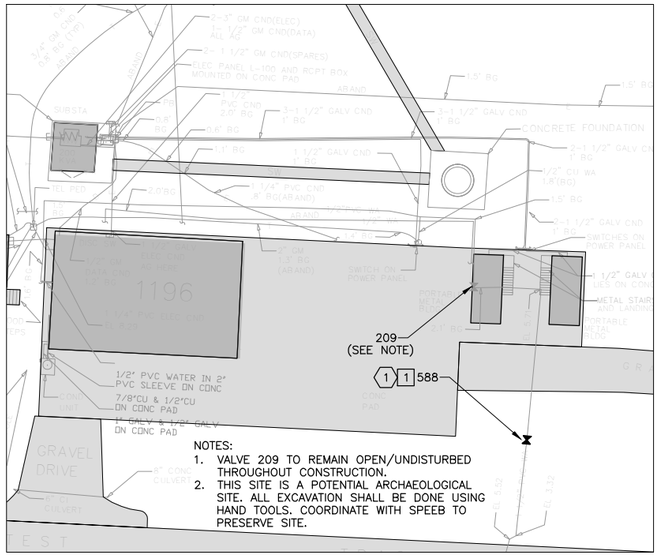
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 1)

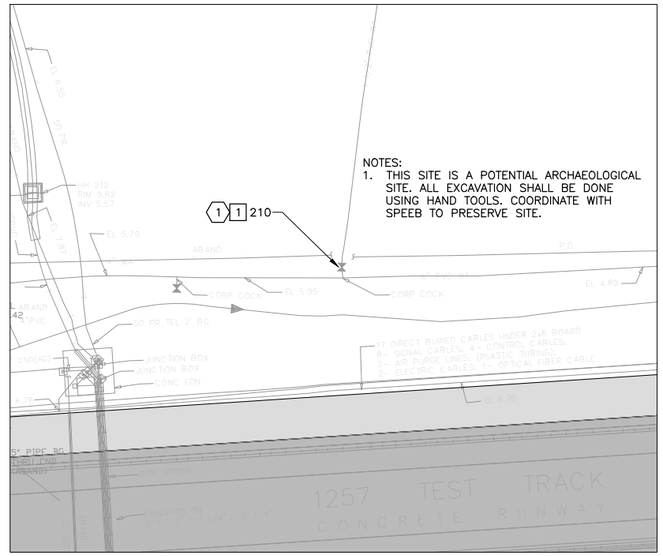
DRAWING TITLE: GENERAL AND CIVIL NOTES, LEGEND, AND ABBREVIATIONS

BUILDING NO.	SIZE	DRAWING NO.	LATEST REV.
1215	D	1296751	•

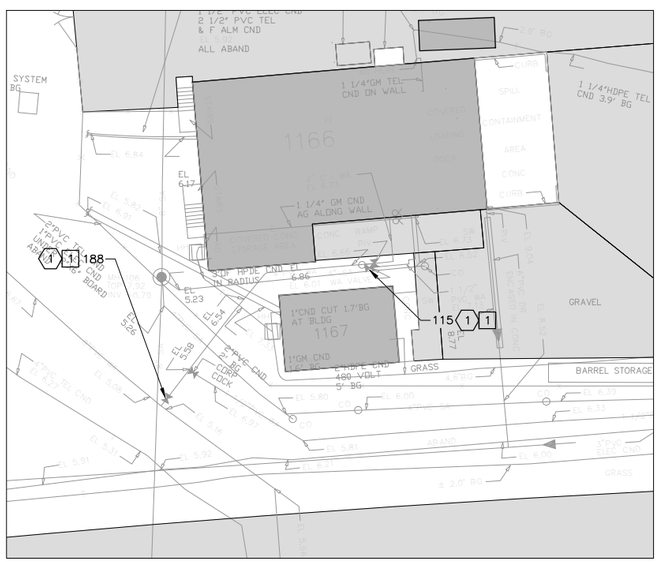
SHEET NO. 1–C001



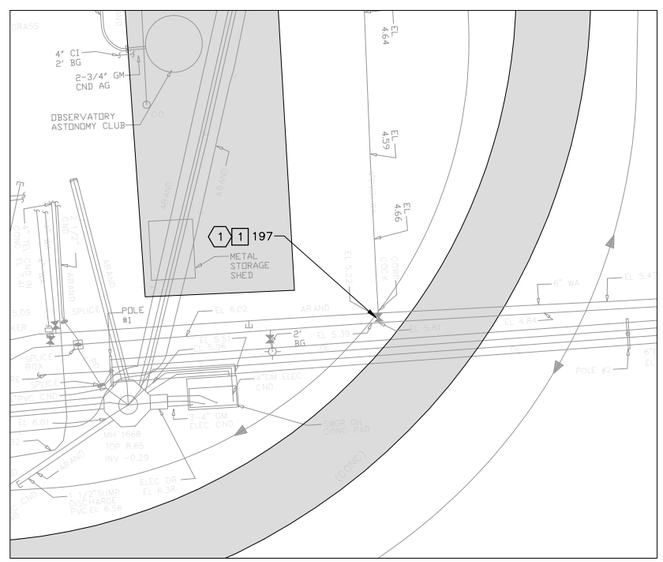
1 1-G101 | 1-C101 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH



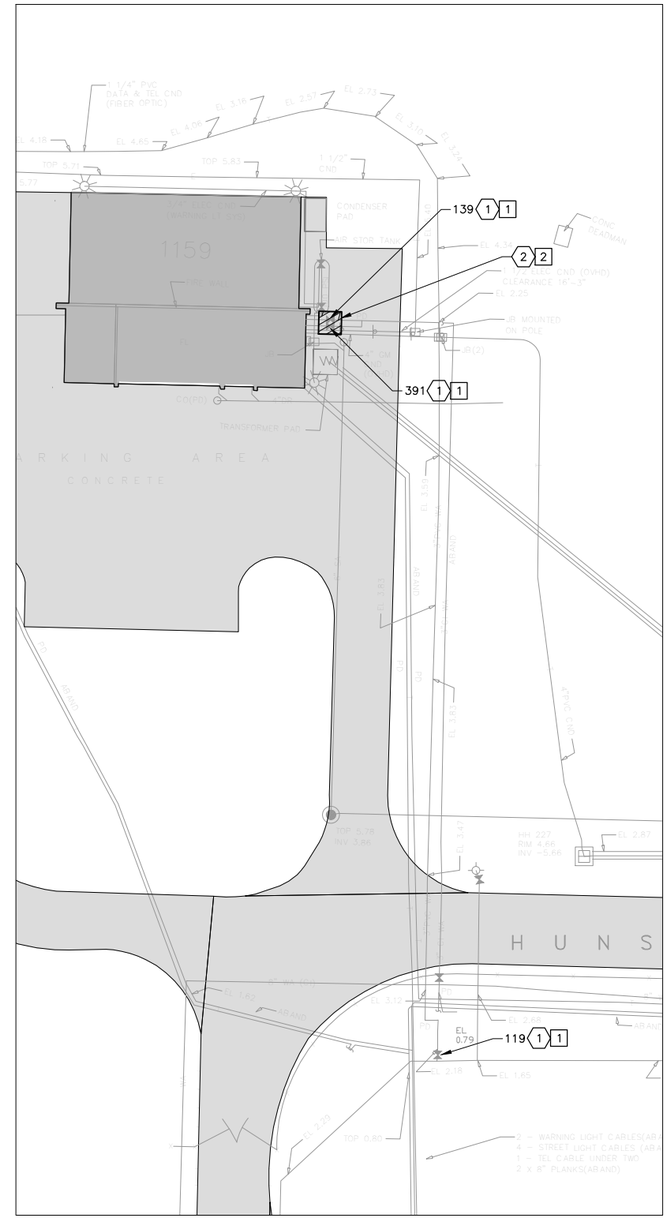
2 1-G101 | 1-C101 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH



3 1-G101 | 1-C101 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH



4 1-G101 | 1-C101 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH



5 1-G101 | 1-C101 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH

REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT/CONCRETE PAVEMENT TO ALLOW FOR VALVE REMOVAL AND INSTALLATION. FOR BIDDING PURPOSES, ASSUME PAVEMENT CUT TO BE 6' LONG x 6' WIDE x 8" THICK.

NEW WORK NOTES

1. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296770 AND VALVE SCHEDULES ON DRAWINGS 1296771–1296772.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC/PORTLAND CEMENT CONCRETE (FIELD VERIFY) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE TYPICAL DETAILS ON DWG 1296769. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE: _____

1" = 20'–0" SCALE 20 10 0 20 40 FEET

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Langley Research Center
Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	D. PARKER	07/30/15
ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUP'V'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICRONCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296752 | LATEST REV. ·

SHEET NO. 1–C101

1 1-G1011-C102 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'

NORTH

2 1-G1011-C102 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'

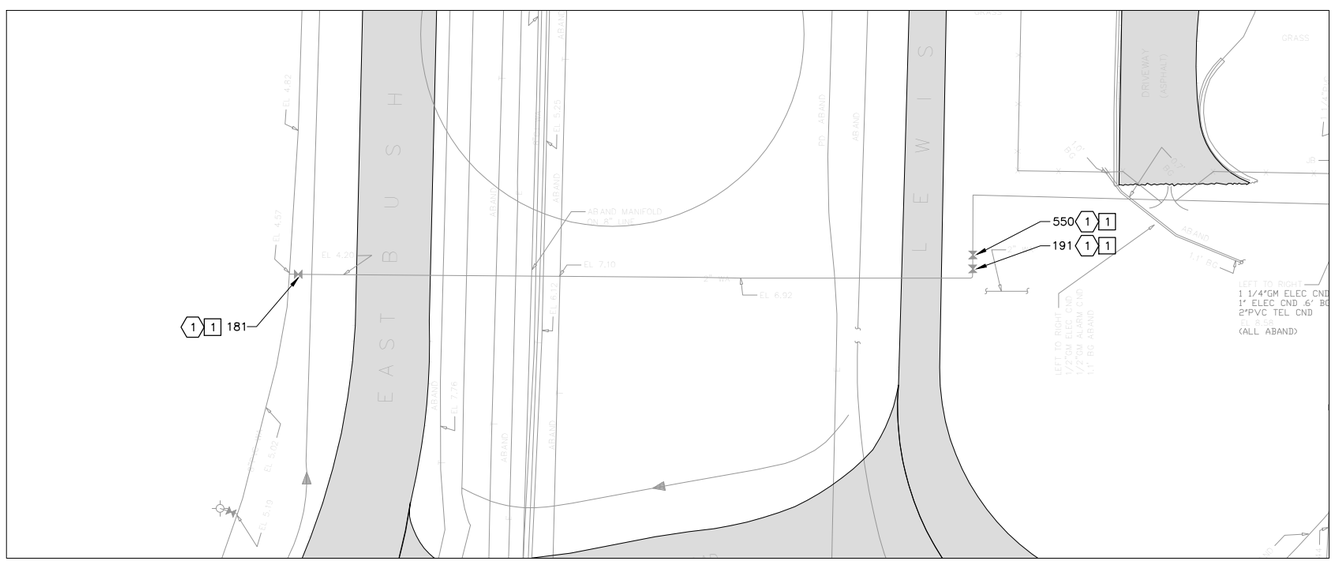
NORTH

REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.

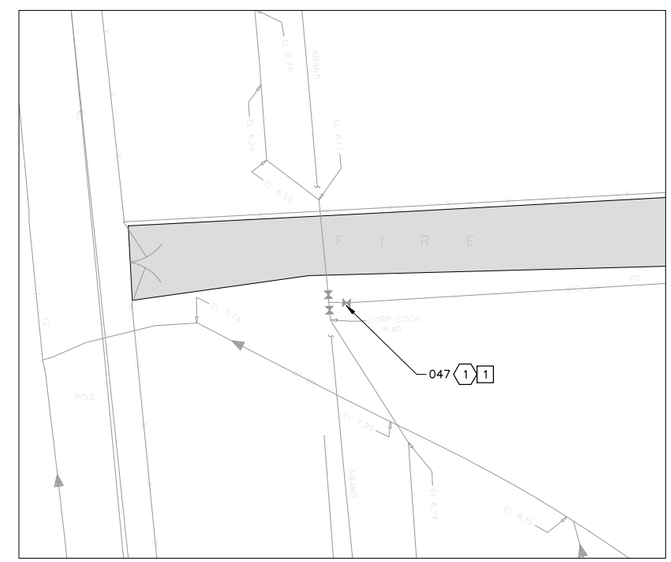
NEW WORK NOTES

1. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296770 AND VALVE SCHEDULES ON DRAWINGS 1296771–1296772.



3 1-G1011-C102 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'

NORTH



4 1-G1011-C102 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'

NORTH

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE:

1" = 20'-0" 20 10 0 20 40
SCALE FEET

REVISIONS															
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	D. PARKER	07/30/15
ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ±; X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

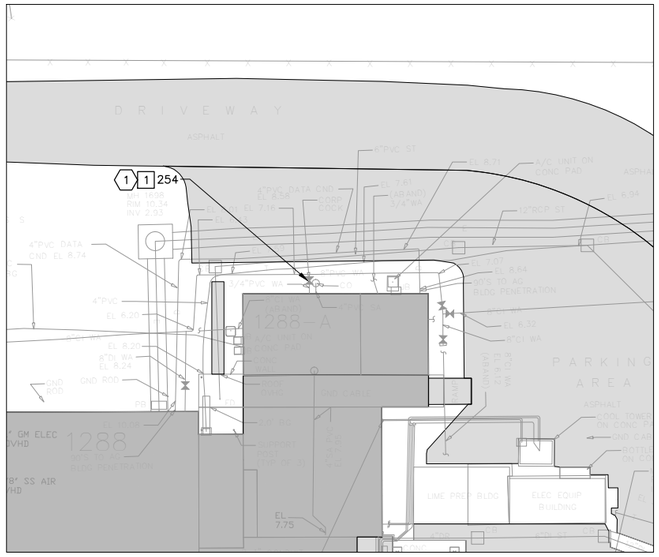
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 1)

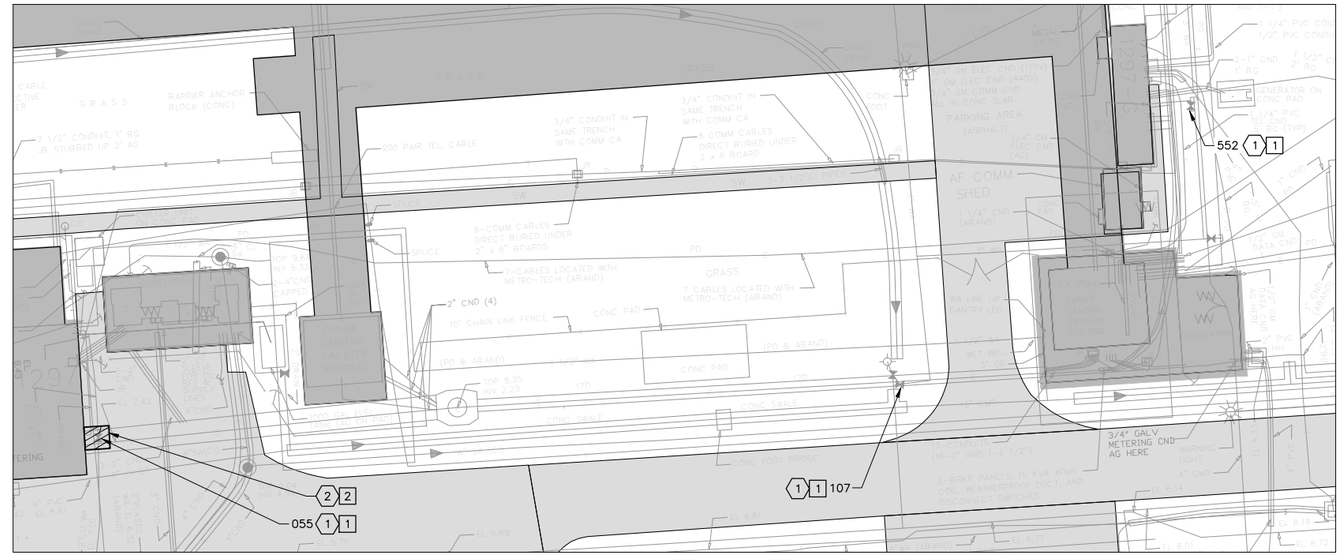
DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296753 | LATEST REV. ·

SHEET NO. 1–C102



1 VALVE REPLACEMENT SITE PLAN
1-G1011-C103
SCALE: 1" = 20'
NORTH



2 VALVE REPLACEMENT SITE PLAN
1-G1011-C103
SCALE: 1" = 20'
NORTH

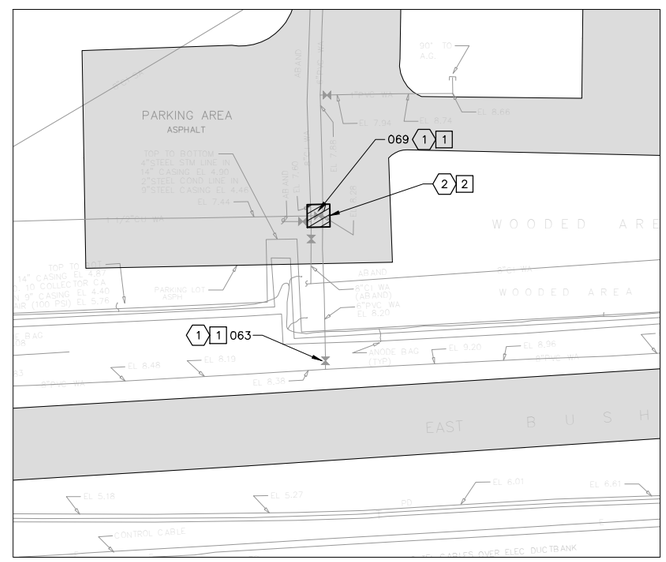
REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT/CONCRETE PAVEMENT TO ALLOW FOR VALVE REMOVAL AND INSTALLATION. FOR BIDDING PURPOSES, ASSUME PAVEMENT CUT TO BE 6' LONG x 6' WIDE x 8" THICK.

NEW WORK NOTES

1. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296770 AND VALVE SCHEDULES ON DRAWINGS 1296771–1296772.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC/PORTLAND CEMENT CONCRETE (FIELD VERIFY) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE TYPICAL DETAILS ON DWG 1296769. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.

3 VALVE REPLACEMENT SITE PLAN
1-G1011-C103
SCALE: 1" = 20'
NORTH



4 VALVE REPLACEMENT SITE PLAN
1-G1011-C103
SCALE: 1" = 20'
NORTH

5 VALVE REPLACEMENT SITE PLAN
1-G1011-C103
SCALE: 1" = 20'
NORTH

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE: _____

1" = 20'–0" SCALE 20 10 0 20 40 FEET

REVISIONS															
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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WORK ORDER NO.	CTN000188	
APPROVALS		DATE
DRAWN	D. PARKER	07/30/15
ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005
SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

BUILDING NO.	SIZE	DRAWING NO.	LATEST REV.
1215	D	1296754	·

SHEET NO. 1–C103

1 VALVE REPLACEMENT SITE PLAN
1-G101|1-C104
SCALE: 1" = 20'
NORTH

2 VALVE REPLACEMENT SITE PLAN
1-G102|1-C104
SCALE: 1" = 20'
NORTH

REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.
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3. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF CONCRETE SIDEWALK. FOR BIDDING PURPOSES, ASSUME SIDEWALK REMOVED TO BE 6' LONG x 4" THICK.

NEW WORK NOTES

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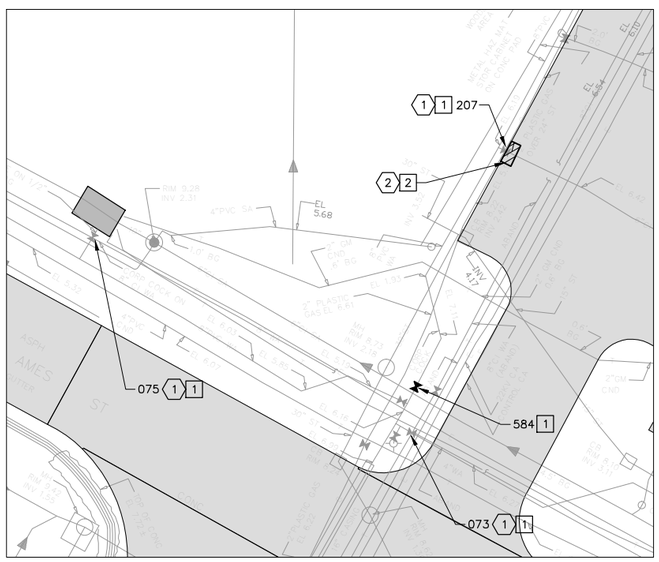
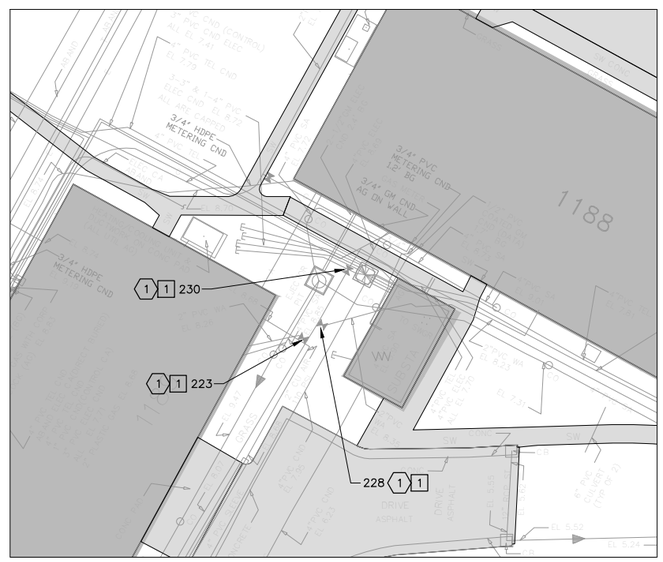
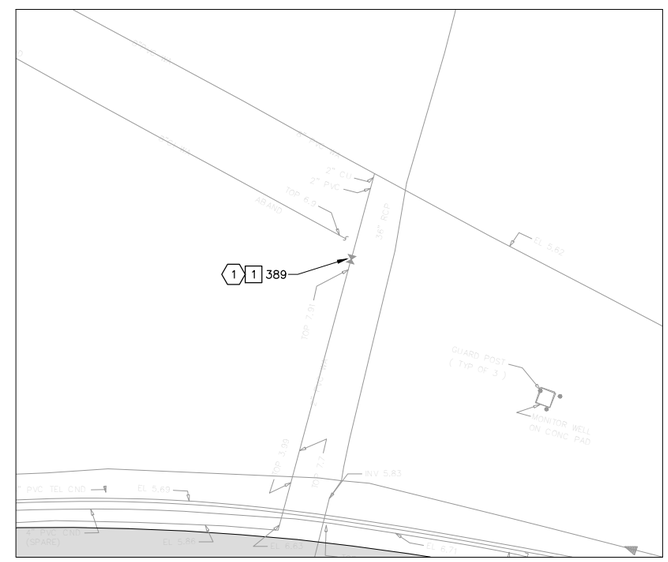


3 VALVE REPLACEMENT SITE PLAN
1-G102|1-C104
SCALE: 1" = 20'
NORTH



4 VALVE REPLACEMENT SITE PLAN
1-G102|1-C104
SCALE: 1" = 20'
NORTH



5 VALVE REPLACEMENT SITE PLAN
1-G102|1-C104
SCALE: 1" = 20'
NORTH

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE:

1" = 20'–0" 20 10 0 20 40 SCALE FEET

REVISIONS								REVISIONS							
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD		DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS	DATE
DRAWN D. PARKER	07/30/15
ENG./DES. K. WOLF	07/30/15
CHECK R. SYDNOR	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
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			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

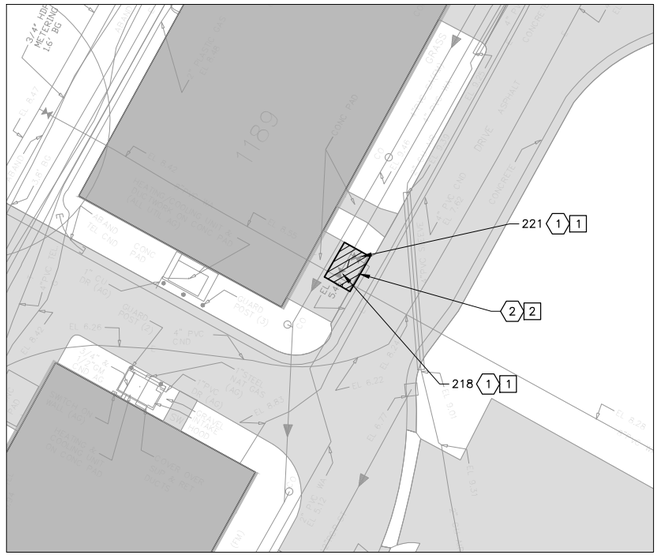
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 1)

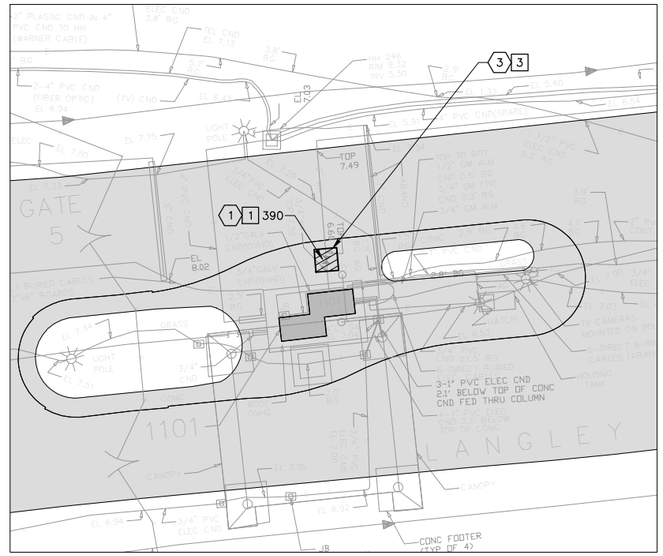
DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296755 | LATEST REV. ·

SHEET NO. 1–C104

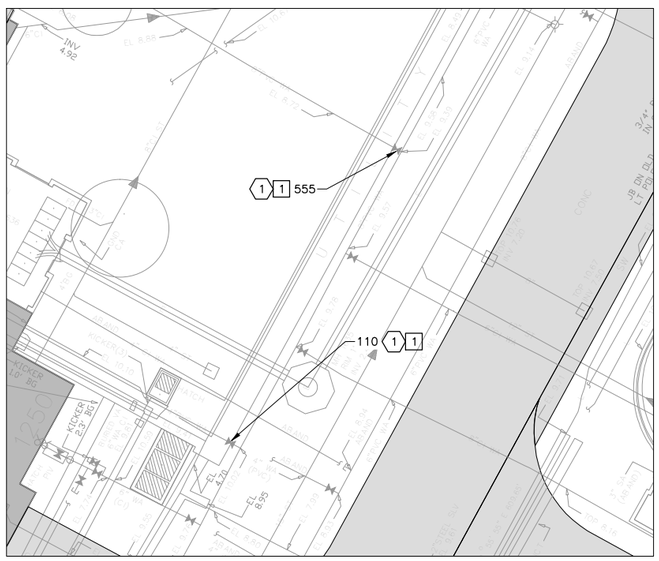


1 VALVE REPLACEMENT SITE PLAN
1-G102|1-C105
SCALE: 1" = 20'
NORTH



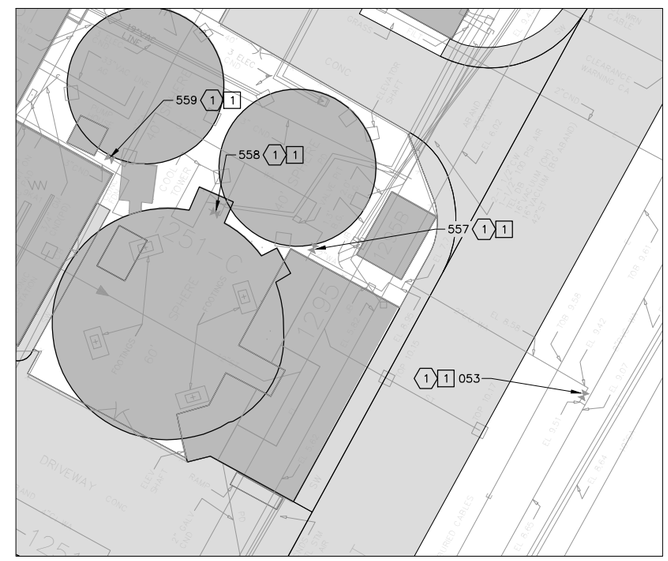
2 VALVE REPLACEMENT SITE PLAN
1-G102|1-C105
SCALE: 1" = 20'
NORTH

3 VALVE REPLACEMENT SITE PLAN
1-G102|1-C105
SCALE: 1" = 20'
NORTH



4 VALVE REPLACEMENT SITE PLAN
1-G102|1-C105
SCALE: 1" = 20'
NORTH

5 VALVE REPLACEMENT SITE PLAN
1-G102|1-C105
SCALE: 1" = 20'
NORTH



6 VALVE REPLACEMENT SITE PLAN
1-G102|1-C105
SCALE: 1" = 20'
NORTH

REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.
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UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE:

1" = 20'–0" SCALE 20 10 0 20 40 FEET

REVISIONS															
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	D. PARKER	07/30/15
ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005
SURFACE FINISH IN MICRONCHES RMS UNLESS SHOWN OTHERWISE

FOR DRAWING INDEX SEE DRAWING 1296747

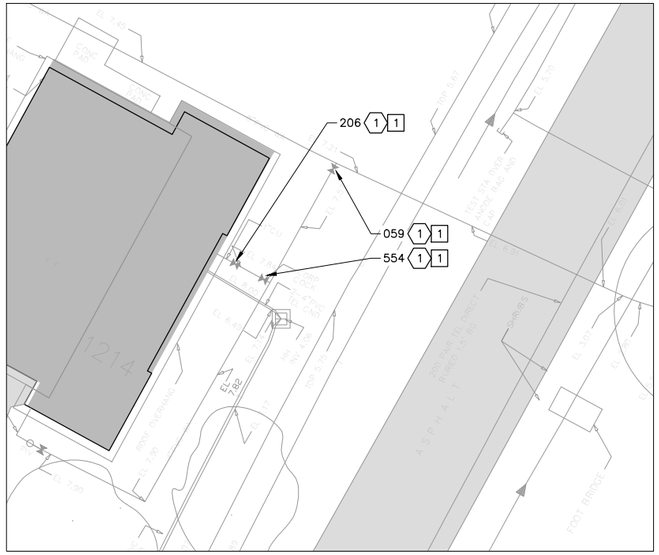
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 1)

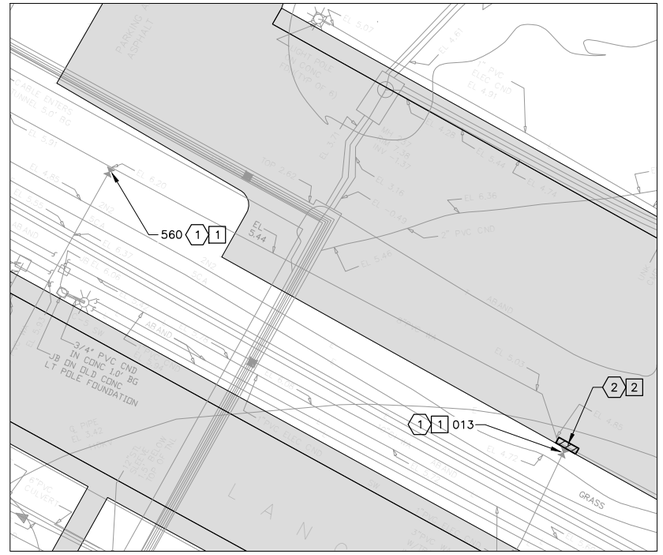
DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296756 | LATEST REV. ·

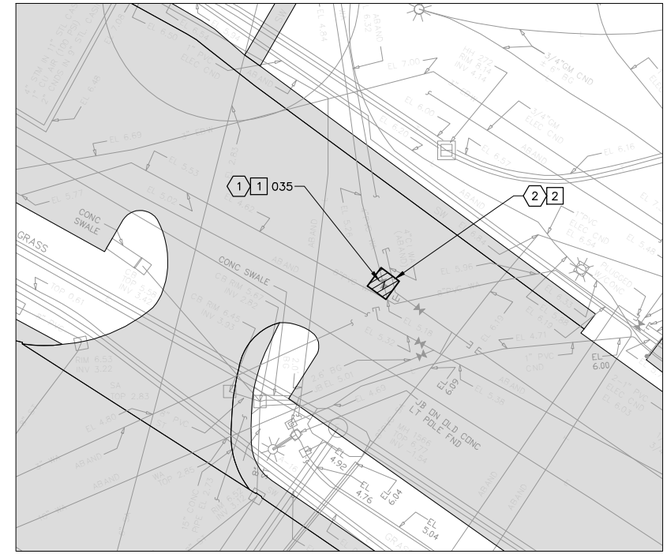
SHEET NO. 1–C105



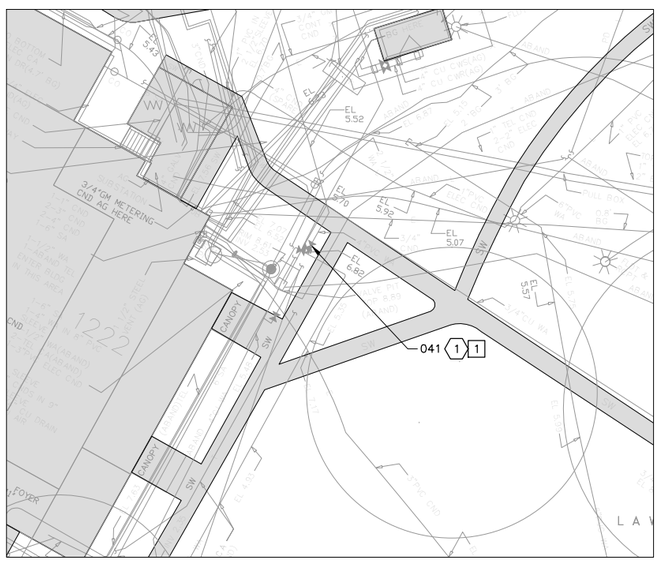
1 VALVE REPLACEMENT SITE PLAN
1-G102|1-C106
SCALE: 1" = 20'
NORTH



2 VALVE REPLACEMENT SITE PLAN
1-G102|1-C106
SCALE: 1" = 20'
NORTH



3 VALVE REPLACEMENT SITE PLAN
1-G102|1-C106
SCALE: 1" = 20'
NORTH



4 VALVE REPLACEMENT SITE PLAN
1-G102|1-C106
SCALE: 1" = 20'
NORTH

5 VALVE REPLACEMENT SITE PLAN
1-G102|1-C106
SCALE: 1" = 20'
NORTH

6 VALVE REPLACEMENT SITE PLAN
1-G102|1-C106
SCALE: 1" = 20'
NORTH

REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT/CONCRETE PAVEMENT TO ALLOW FOR VALVE REMOVAL AND INSTALLATION. FOR BIDDING PURPOSES, ASSUME PAVEMENT CUT TO BE 6' LONG x 6' WIDE x 8" THICK.

NEW WORK NOTES

1. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296770 AND VALVE SCHEDULES ON DRAWINGS 1296771–1296772.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC/PORTLAND CEMENT CONCRETE (FIELD VERIFY) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE TYPICAL DETAILS ON DWG 1296769. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE:

1" = 20'–0" 20 10 0 20 40 SCALE FEET

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REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

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DRAWN	D. PARKER	07/30/15
ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

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			DRAWN	
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			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± ; X.XX (2 DECIMAL PLACES) ±.02 ; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICRONCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

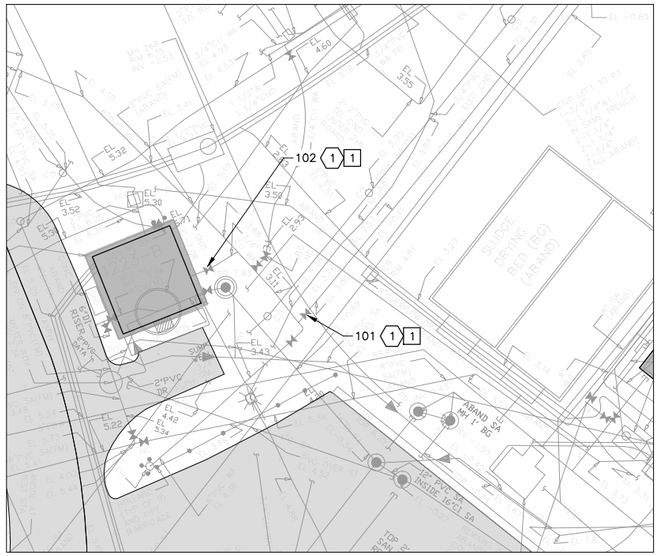
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296757 | LATEST REV. ·

SHEET NO. 1–C106



1 VALVE REPLACEMENT SITE PLAN
1-G102|1-C107
SCALE: 1" = 20'
NORTH

2 VALVE REPLACEMENT SITE PLAN
1-G102|1-C107
SCALE: 1" = 20'
NORTH

3 VALVE REPLACEMENT SITE PLAN
1-G102|1-C107
SCALE: 1" = 20'
NORTH

REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.
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NEW WORK NOTES

1. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296770 AND VALVE SCHEDULES ON DRAWINGS 1296771–1296772.
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3. PROVIDE CAP AFTER VALVE 215 AND ABANDON REMAINING PIPING IN PLACE.

4 VALVE REPLACEMENT SITE PLAN
1-G102|1-C107
SCALE: 1" = 20'
NORTH

5 VALVE REPLACEMENT SITE PLAN
1-G102|1-C107
SCALE: 1" = 20'
NORTH

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE: _____

1" = 20'–0" SCALE — 20 10 0 20 40 FEET

REVISIONS													
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			APPROVED	
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			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005
SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296758 | LATEST REV. ·

SHEET NO. 1–C107

1 VALVE REPLACEMENT SITE PLAN
1-G102 1-C108
SCALE: 1" = 20'

NORTH

2 VALVE REPLACEMENT SITE PLAN
1-G102 1-C108
SCALE: 1" = 20'

NORTH

REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.
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NEW WORK NOTES

1. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296770 AND VALVE SCHEDULES ON DRAWINGS 1296771–1296772.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC/PORTLAND CEMENT CONCRETE (FIELD VERIFY) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE TYPICAL DETAILS ON DWG 1296769. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.

3 VALVE REPLACEMENT SITE PLAN
1-G102 1-C108
SCALE: 1" = 20'

NORTH

4 VALVE REPLACEMENT SITE PLAN
1-G102 1-C108
SCALE: 1" = 20'

NORTH

5 VALVE REPLACEMENT SITE PLAN
1-G102 1-C108
SCALE: 1" = 20'

NORTH

UNDERGROUND UTILITIES INFORMATION
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1" = 20'–0" 20 10 0 20 40
SCALE FEET

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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

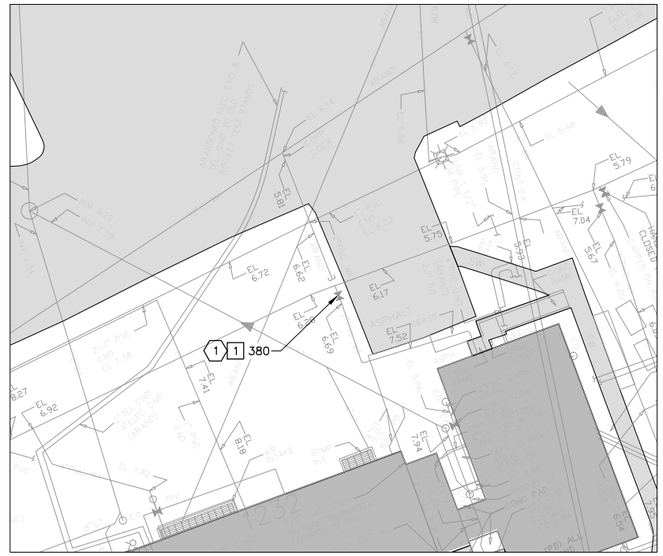
PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296759 | LATEST REV. •

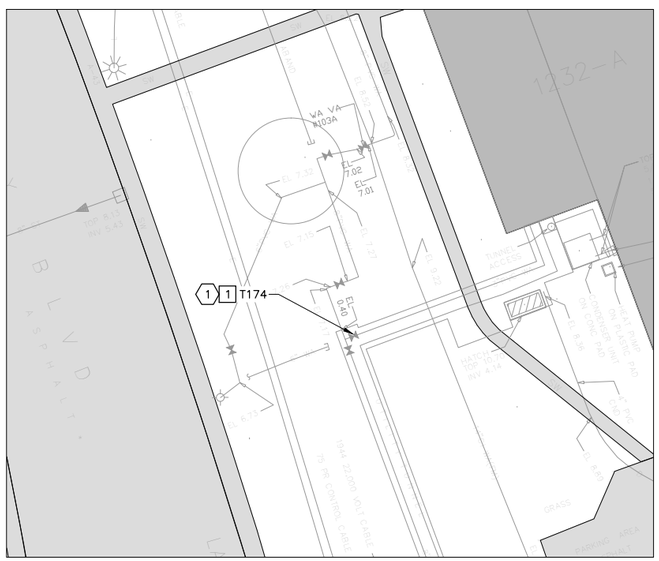
SHEET NO. 1–C108

1 VALVE REPLACEMENT SITE PLAN
1-G102|1-C109
SCALE: 1" = 20'
NORTH



2 VALVE REPLACEMENT SITE PLAN
1-G102|1-C109
SCALE: 1" = 20'
NORTH

3 VALVE REPLACEMENT SITE PLAN
1-G102|1-C109
SCALE: 1" = 20'
NORTH



4 VALVE REPLACEMENT SITE PLAN
1-G103|1-C109
SCALE: 1" = 20'
NORTH

5 VALVE REPLACEMENT SITE PLAN
1-G102|1-C109
SCALE: 1" = 20'
NORTH

6 VALVE REPLACEMENT SITE PLAN
1-G103|1-C109
SCALE: 1" = 20'
NORTH

REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT/CONCRETE PAVEMENT TO ALLOW FOR VALVE REMOVAL AND INSTALLATION. FOR BIDDING PURPOSES, ASSUME PAVEMENT CUT TO BE 6' LONG x 6' WIDE x 8" THICK.
3. REMOVE SECTION OF WOOD PICKET FENCE TO ALLOW FOR VALVE REMOVAL. REPLACE SECTION OF FENCE AFTER INSTALLATION OF NEW VALVE.

NEW WORK NOTES

1. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296770 AND VALVE SCHEDULES ON DRAWINGS 1296771–1296772.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC/PORTLAND CEMENT CONCRETE (FIELD VERIFY) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE TYPICAL DETAILS ON DWG 1296769. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.

UNDERGROUND UTILITIES INFORMATION
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SIGNATURE:

1" = 20'–0" 20 10 0 20 40
SCALE FEET

REVISIONS								REVISIONS							
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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

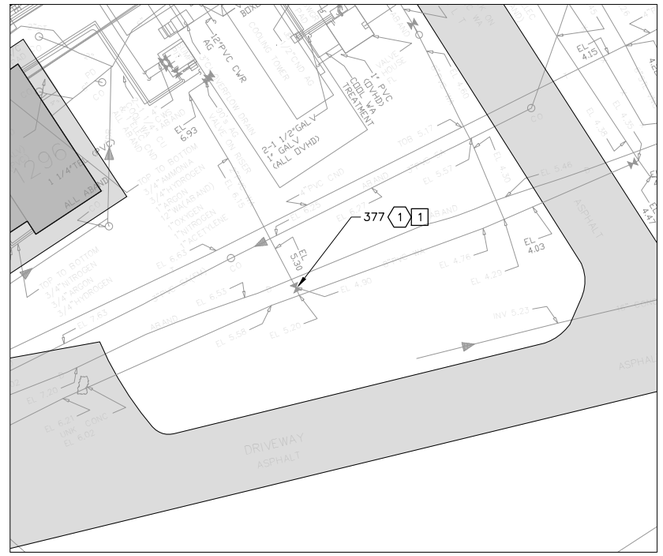
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296760 | LATEST REV. ·
SHEET NO. 1–C109

1 VALVE REPLACEMENT SITE PLAN
1-G102 1-C110
SCALE: 1" = 20'
NORTH



2 VALVE REPLACEMENT SITE PLAN
1-G102 1-C110
SCALE: 1" = 20'
NORTH

3 VALVE REPLACEMENT SITE PLAN
1-G102 1-C110
SCALE: 1" = 20'
NORTH

4 VALVE REPLACEMENT SITE PLAN
1-G102 1-C110
SCALE: 1" = 20'
NORTH

5 VALVE REPLACEMENT SITE PLAN
1-G103 1-C110
SCALE: 1" = 20'
NORTH

REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.
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NEW WORK NOTES

1. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296770 AND VALVE SCHEDULES ON DRAWINGS 1296771–1296772.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC/PORTLAND CEMENT CONCRETE (FIELD VERIFY) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE TYPICAL DETAILS ON DWG 1296769. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.

UNDERGROUND UTILITIES INFORMATION
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1" = 20'–0" 20 10 0 20 40
SCALE FEET

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SURFACE FINISH IN MICRONCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

BUILDING NO.	SIZE	DRAWING NO.	LATEST REV.
1215	D	1296761	•

SHEET NO. 1–C110

1 VALVE REPLACEMENT SITE PLAN
1-G102 1-C111
SCALE: 1" = 20'

NORTH

2 VALVE REPLACEMENT SITE PLAN
1-G102 1-C111
SCALE: 1" = 20'

NORTH

3 VALVE REPLACEMENT SITE PLAN
1-G102 1-C111
SCALE: 1" = 20'

NORTH

REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.
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NEW WORK NOTES

1. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296770 AND VALVE SCHEDULES ON DRAWINGS 1296771–1296772.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC/PORTLAND CEMENT CONCRETE (FIELD VERIFY) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE TYPICAL DETAILS ON DWG 1296769. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.

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1" = 20'–0" SCALE — 20 10 0 20 40 FEET

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TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ±; X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296762 | LATEST REV. ·

SHEET NO. 1–C111

1 VALVE REPLACEMENT SITE PLAN
1-G102|1-C112
SCALE: 1" = 20'

NORTH

2 VALVE REPLACEMENT SITE PLAN
1-G102|1-C112
SCALE: 1" = 20'

NORTH

3 VALVE REPLACEMENT SITE PLAN
1-G102|1-C112
SCALE: 1" = 20'

NORTH

REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.
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3. REMOVE EXISTING VALVE AND REPLACE WITH 3" PVC PIPE. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE.

NEW WORK NOTES

1. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296770 AND VALVE SCHEDULES ON DRAWINGS 1296771–1296772.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC/PORTLAND CEMENT CONCRETE (FIELD VERIFY) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE TYPICAL DETAILS ON DWG 1296769. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. PROVIDE CAP AFTER VALVE 561 AND ABANDON REMAINING PIPING IN PLACE.

4 VALVE REPLACEMENT SITE PLAN
1-G102|1-C112
SCALE: 1" = 20'

NORTH

UNDERGROUND UTILITIES INFORMATION
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1" = 20'–0" SCALE — 20 10 0 20 40 FEET

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			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICRONCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

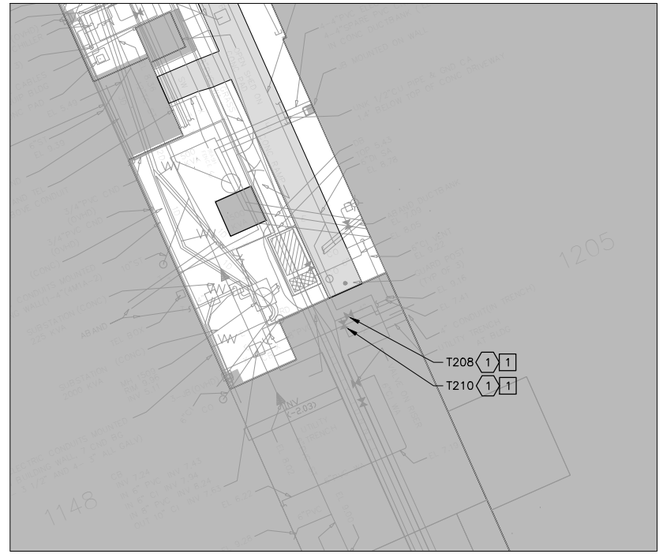
PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

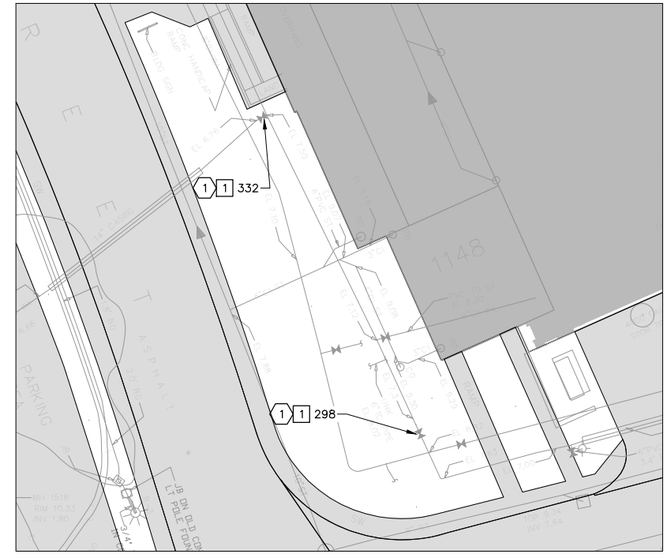
BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296763 | LATEST REV. ·

SHEET NO. 1–C112

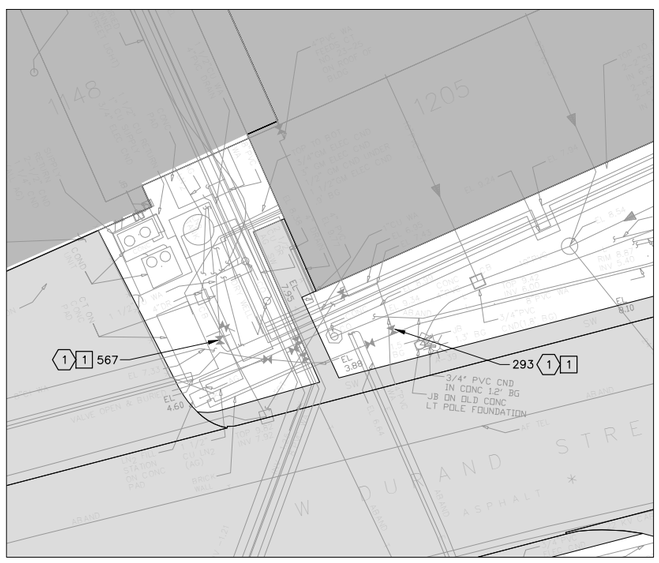
1 1-G103|1-C113 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH



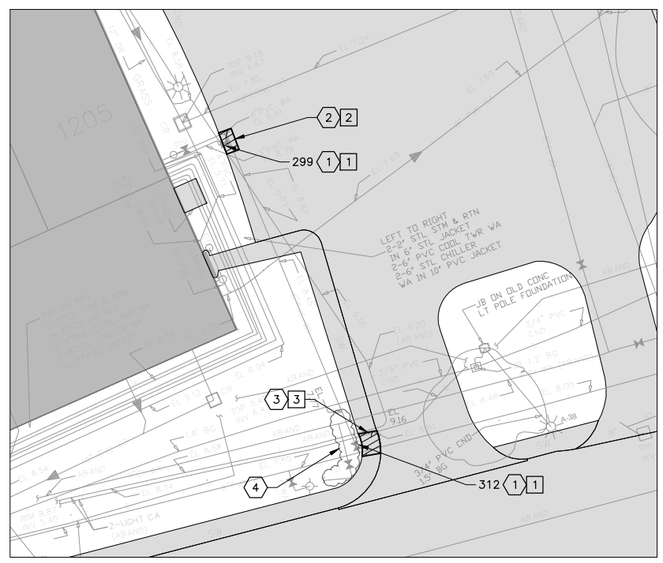
2 1-G103|1-C113 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH



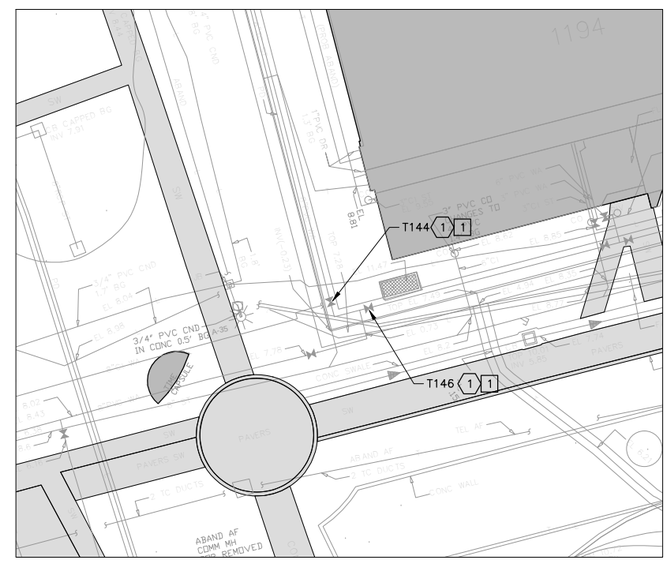
3 1-G103|1-C113 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH



4 1-G103|1-C113 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH



5 1-G103|1-C113 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH



6 1-G103|1-C113 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH

REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT/CONCRETE PAVEMENT TO ALLOW FOR VALVE REMOVAL AND INSTALLATION. FOR BIDDING PURPOSES, ASSUME PAVEMENT CUT TO BE 6' LONG x 6' WIDE x 8" THICK.
3. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF CONCRETE SIDEWALK. FOR BIDDING PURPOSES, ASSUME SIDEWALK REMOVED TO BE 6' LONG x 4" THICK.
4. THE CONTRACTOR SHALL REMOVE EXISTING SHRUBS AS REQUIRED FOR REMOVAL OF EXISTING WATER VALVE. COORDINATE EXTENTS WITH THE CONTRACTING OFFICER.

NEW WORK NOTES

1. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296770 AND VALVE SCHEDULES ON DRAWINGS 1296771–1296772.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC/PORTLAND CEMENT CONCRETE (FIELD VERIFY) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE TYPICAL DETAILS ON DWG 1296769. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. THE CONTRACTOR SHALL REPAIR SIDEWALK WITH CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT SIDEWALK. SEE TYPICAL DETAIL ON DWG 1296769.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE: _____

1" = 20'–0" SCALE 20 10 0 20 40 FEET

REVISIONS

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REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	D. PARKER	07/30/15
ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

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TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ±; X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296764 | LATEST REV. ·

SHEET NO. 1–C113

1 1-G103 1-C114 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'

NORTH

2 1-G103 1-C114 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'

NORTH

3 1-G103 1-C114 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'

NORTH

REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT/CONCRETE PAVEMENT TO ALLOW FOR VALVE REMOVAL AND INSTALLATION. FOR BIDDING PURPOSES, ASSUME PAVEMENT CUT TO BE 6' LONG x 6' WIDE x 8" THICK.
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NEW WORK NOTES

1. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296770 AND VALVE SCHEDULES ON DRAWINGS 1296771–1296772.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC/PORTLAND CEMENT CONCRETE (FIELD VERIFY) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE TYPICAL DETAILS ON DWG 1296769. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. THE CONTRACTOR SHALL REPAIR SIDEWALK WITH CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT SIDEWALK. SEE TYPICAL DETAIL ON DWG 1296769.

4 1-G103 1-C114 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'

NORTH

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE:

1" = 20'–0" SCALE 20 10 0 20 40 FEET

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SURFACE FINISH IN MICRONCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

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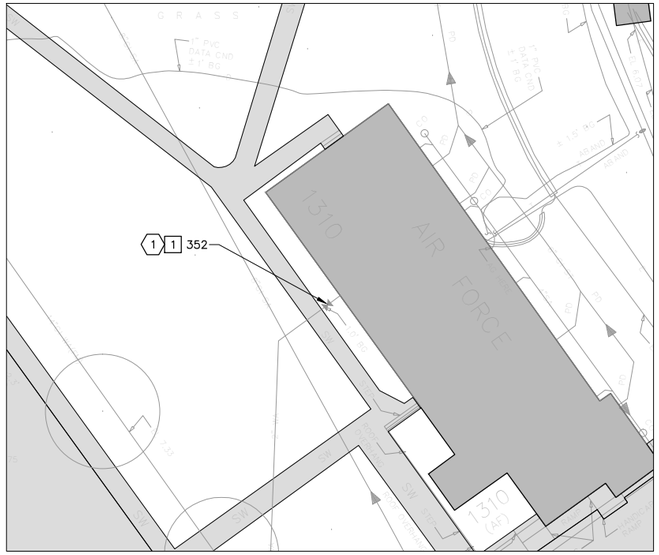
PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

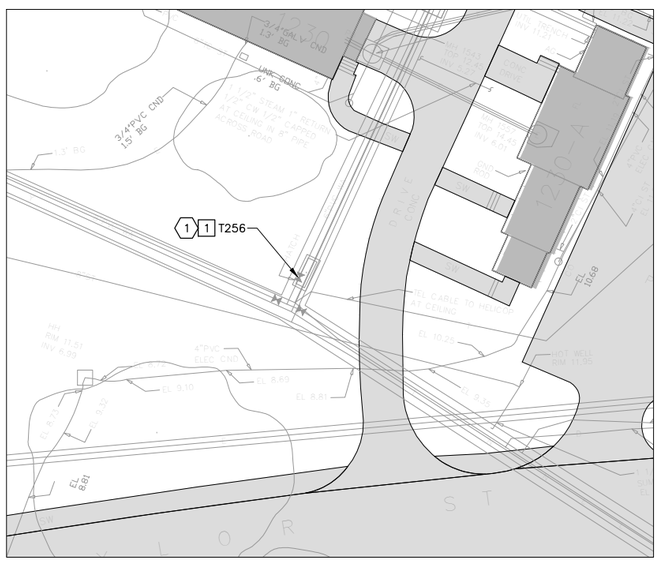
BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296765 | LATEST REV. ·

SHEET NO. 1–C114



1 VALVE REPLACEMENT SITE PLAN
1-G103 1-C115
SCALE: 1" = 20'
NORTH

2 VALVE REPLACEMENT SITE PLAN
1-G103 1-C115
SCALE: 1" = 20'
NORTH



3 VALVE REPLACEMENT SITE PLAN
1-G103 1-C115
SCALE: 1" = 20'
NORTH

4 VALVE REPLACEMENT SITE PLAN
1-G103 1-C115
SCALE: 1" = 20'
NORTH

5 VALVE REPLACEMENT SITE PLAN
1-G103 1-C115
SCALE: 1" = 20'
NORTH

REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.

NEW WORK NOTES

1. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296770 AND VALVE SCHEDULES ON DRAWINGS 1296771–1296772.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE: _____

1" = 20'-0" SCALE — 20 10 0 20 40 FEET

REVISIONS						
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DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
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			RES. PROJ. ENG.	

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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
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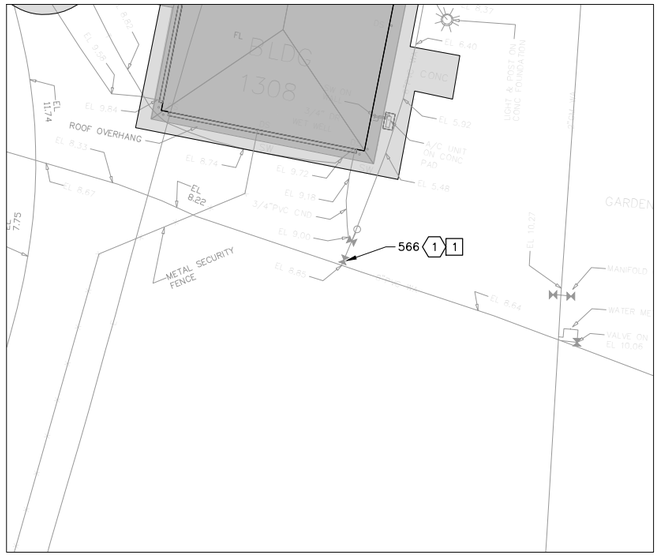
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296766 | LATEST REV. ·

SHEET NO. 1–C115



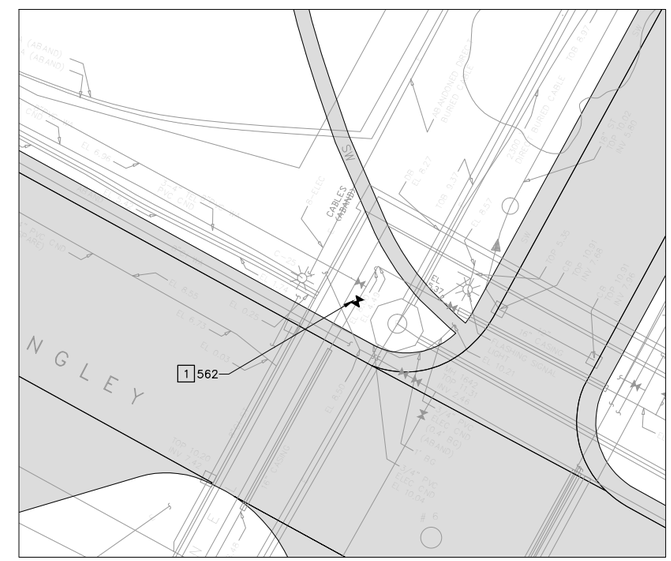
1 1-G103 1-C116 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH

2 1-G103 1-C116 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH

3 1-G103 1-C116 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH

4 1-G103 1-C116 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH

5 1-G101 1-C116 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH



6 1-G102 1-C116 VALVE REPLACEMENT SITE PLAN
SCALE: 1" = 20'
NORTH

REMOVAL NOTES

1. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.

NEW WORK NOTES

1. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296770 AND VALVE SCHEDULES ON DRAWINGS 1296771–1296772.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE: _____

1" = 20'–0" 20 10 0 20 40 SCALE FEET

REVISIONS								REVISIONS							
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD		DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	

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PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
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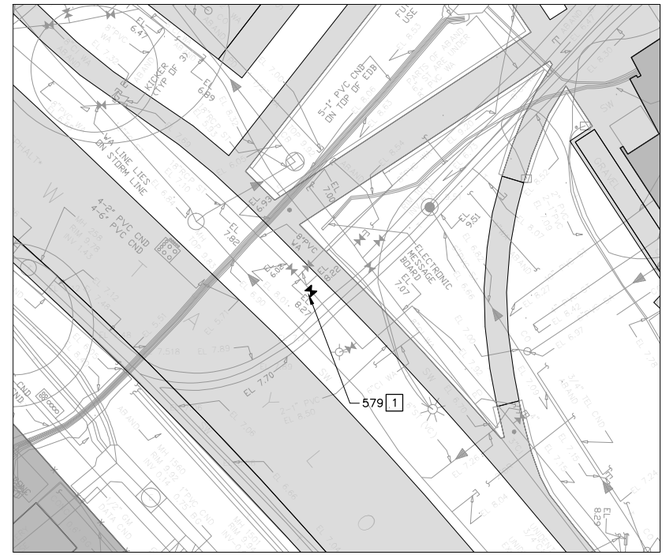
PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296767 | LATEST REV. ·
SHEET NO. 1–C116

1 VALVE REPLACEMENT SITE PLAN
1-G102 1-C117
SCALE: 1" = 20'

NORTH



2 VALVE REPLACEMENT SITE PLAN
1-G103 1-C117
SCALE: 1" = 20'

NORTH

NEW WORK NOTES

1 PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296770 AND VALVE SCHEDULES ON DRAWINGS 1296771–1296772.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE: _____

1" = 20'–0" 20 10 0 20 40
SCALE FEET

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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WORK ORDER NO. CTN000188

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DRAWN	D. PARKER	07/30/15
ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

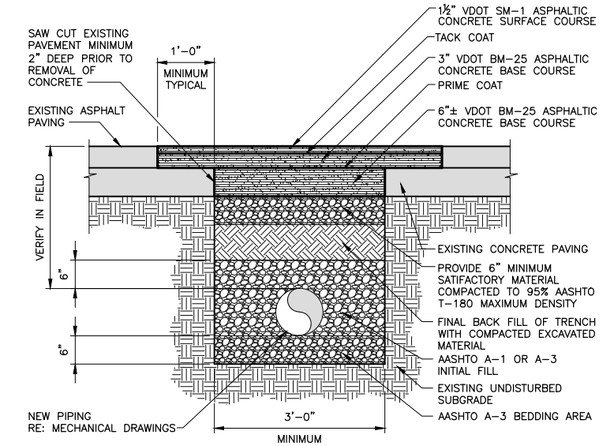
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE REPLACEMENT SITE PLANS

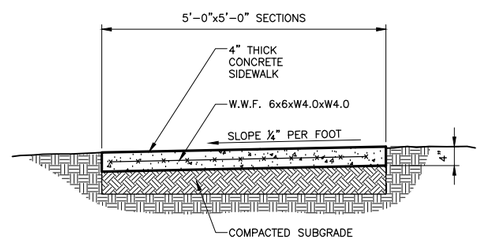
BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296768 | LATEST REV. ·

SHEET NO. 1–C117



TYPICAL ASPHALT REPAIR DETAIL

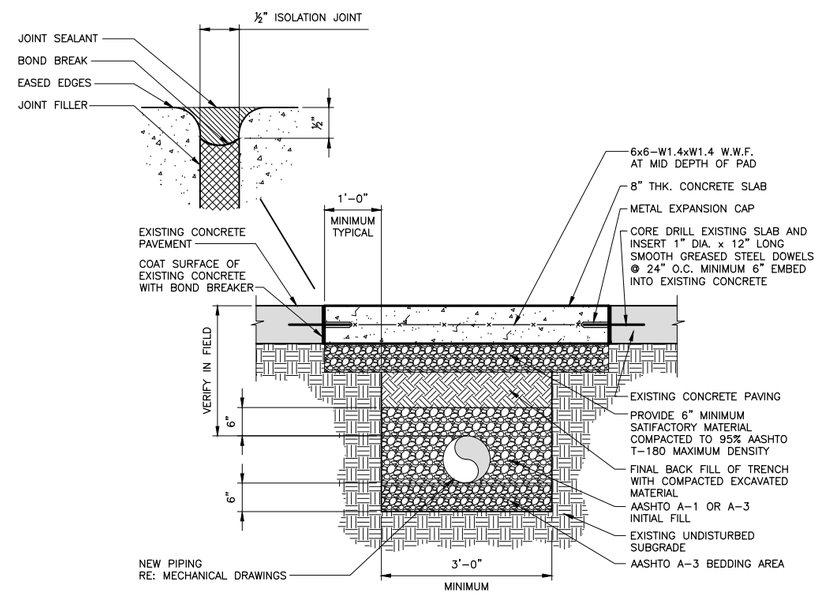
NOT TO SCALE



PROVIDE WEAKENED PLANE JOINTS AT 5'-0" O.C. AND EXPANSION JOINTS WITH SEALANT AT 30'-0" O.C. MAX.

TYPICAL SIDEWALK REPAIR DETAIL

NOT TO SCALE



TYPICAL CONCRETE REPAIR DETAIL

NOT TO SCALE

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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
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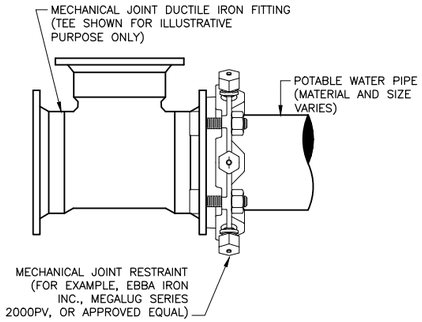
PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 1)

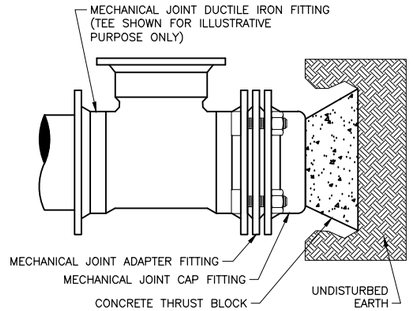
DRAWING TITLE: PAVEMENT REPAIR DETAILS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296769 | LATEST REV. ·

SHEET NO. 1-C501



PIPE TO FITTING CONNECTION DETAIL (TEE OR ELBOW) – PLAN VIEW

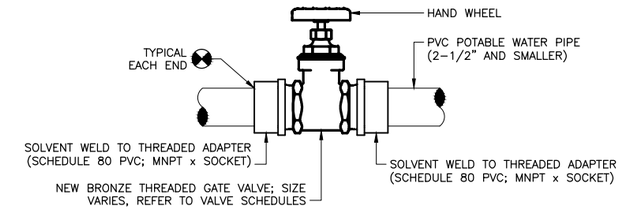


CAPPED PIPE CONNECTION DETAIL – PLAN VIEW

NOTES:
1. PIPE RESTRAINT REQUIRED AT ALL FITTING END CONNECTIONS; DETAIL SHOWS ONE END FOR ILLUSTRATION PURPOSE ONLY
2. REFER TO CONTRACT SPECIFICATIONS FOR DETAILS OF RESTRAINT FITTINGS.

TYPICAL PVC C900/905 PIPE TO MECHANICAL JOINT FITTING CONNECTION DETAILS

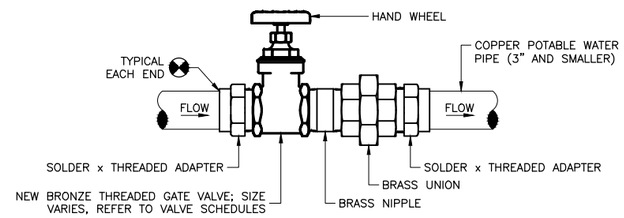
NOT TO SCALE



NOTES:
1. DETAIL APPLIES TO UNDERGROUND VALVES (2–1/2" AND SMALLER). REFER TO VALVE SCHEDULES FOR LOCATIONS.
2. NEW PVC PIPE AND FITTINGS (2–1/2" AND SMALLER) SHALL BE AS SPECIFIED IN CONTRACT SPECIFICATIONS.

TYPICAL UNDERGROUND VALVE CONNECTION DETAIL – PVC PIPE

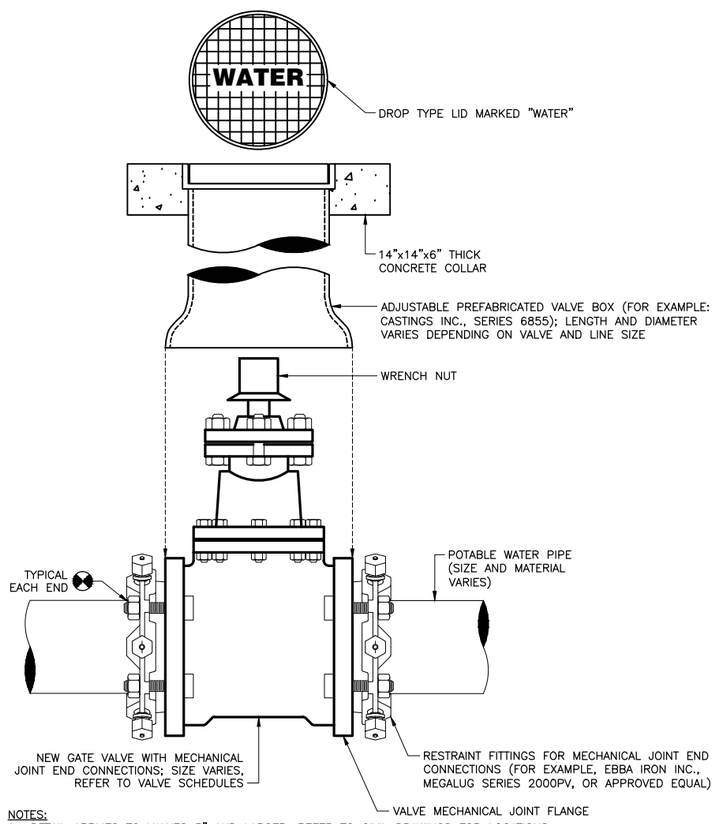
NOT TO SCALE



NOTES:
1. DETAIL APPLIES TO UNDERGROUND VALVES (3" AND SMALLER). REFER TO VALVE SCHEDULES FOR LOCATIONS.
2. NEW COPPER PIPE AND FITTINGS SHALL BE AS SPECIFIED IN CONTRACT SPECIFICATIONS.

TYPICAL UNDERGROUND VALVE CONNECTION DETAIL – COPPER PIPE

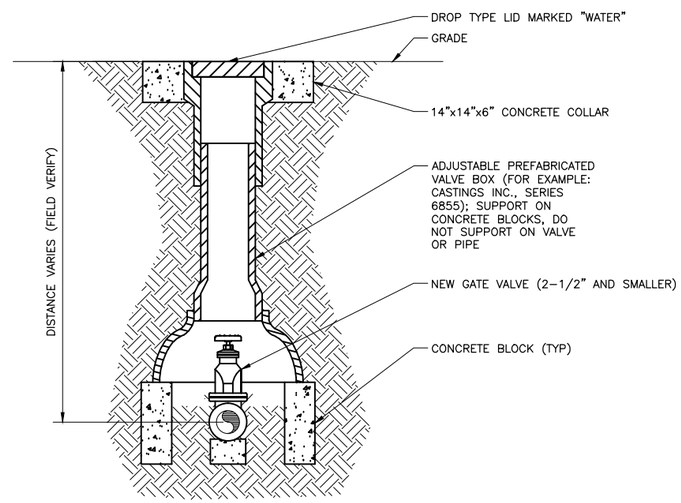
NOT TO SCALE



NOTES:
1. DETAIL APPLIES TO VALVES 3" AND LARGER. REFER TO CIVIL DRAWINGS FOR LOCATIONS.
2. REFER TO CONTRACT SPECIFICATIONS FOR DETAILS OF RESTRAINT FITTING.

TYPICAL VALVE CONNECTION DETAIL (MECHANICAL JOINT ENDS)

NOT TO SCALE



NOTE: REUSE EXISTING VALVE BOXES AND LIDS TO EXTENT POSSIBLE. SALVAGE AND REINSTALL EXISTING VALVE TAG ON LID AS APPLICABLE.

TYPICAL VALVE BOX DETAIL FOR UNDERGROUND VALVES WITH THREADED ENDS

NOT TO SCALE

MECHANICAL GENERAL NOTES

1. ALL WORK INDICATED ON CONTRACT DRAWINGS SHALL BE COMPLETED BY THE CONTRACTOR, UNLESS OTHERWISE NOTED.
2. THE CONTRACTOR SHALL COORDINATE ALL WORK WITH APPLICABLE TRADES TO PROVIDE A FINISHED PRODUCT THAT COMPLIES WITH CONTRACT REQUIREMENTS. CONTRACTOR SHALL ENSURE THE INSTALLATION AND/OR MODIFICATION TO EXISTING AND NEW EQUIPMENT AND PIPING DOES NOT RESTRICT OR IMPEDE ACCESS TO EXISTING AND NEW EQUIPMENT AND VALVES, OR RESTRICT OR ENCROACH INTO THE REQUIRED SERVICE CLEARANCE OF EXISTING AND NEW EQUIPMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY COST INCURRED TO RELOCATE EQUIPMENT, PIPING, AND APPURTENANCES, AS DIRECTED BY THE CONTRACTING OFFICER, THAT WERE MODIFIED OR INSTALLED UNDER THIS CONTRACT THAT RESTRICTS OR ENCROACHES INTO THE SERVICE CLEARANCE OF NEW OR EXISTING EQUIPMENT.
3. IT IS THE CONTRACTORS RESPONSIBILITY TO REMOVE AND DISPOSE OF ALL EQUIPMENT IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REQUIREMENTS. CONTRACTOR SHALL ALSO ADHERE TO NASA LMS–CP–2722 PROPERTY DISPOSAL.
4. DRAWINGS ARE DIAGRAMMATIC AND ARE NOT INTENDED TO BE SCALED TO PROVIDE EXACT LOCATION OF EQUIPMENT, LAYOUT OR ROUTING OF PIPE. DRAWINGS MAY NOT SHOW ALL OFFSETS AND BENDS REQUIRED TO AVOID BUILDING STRUCTURE OR EXISTING COMPONENTS. CONTRACTOR SHALL FIELD VERIFY ALL SITE CONDITIONS, DIMENSIONS, EQUIPMENT LAYOUT, CLEARANCES, AND PIPING PRIOR TO PROCURING MATERIALS OR BEGINNING INSTALLATION OF NEW WORK. ALL DEVIATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE CONTRACTING OFFICER.
5. EQUIPMENT SELECTIONS INDICATED FROM A SPECIFIC MANUFACTURER IS BASIS FOR DESIGN AND FOR REFERENCE ONLY. EQUIPMENT OF EQUAL QUALITY AND PERFORMANCE FROM OTHER MANUFACTURERS MAY BE SUBMITTED TO THE CONTRACTING OFFICER FOR APPROVAL BY THE ENGINEER. CONTRACTOR SHALL SUBMIT REVISED DESIGN INCLUDING LAYOUT, STRUCTURAL SUPPORT AND ANY OTHER DESIGN CHANGES FOR EQUIPMENT OTHER THAN INDICATED. ALL EQUIPMENT INSTALLATION SHALL BE PER MANUFACTURER'S RECOMMENDATIONS. THE REDESIGN COST SHALL BE THE CONTRACTORS RESPONSIBILITY.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSPECTING EXISTING EQUIPMENT AND FINISHES PRIOR TO COMMENCING WORK, AND RECORDING AND REPORTING ANY DAMAGE TO THE CONTRACTING OFFICER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE INCURRED DURING THE WORK EFFORT. SUCH DAMAGE SHALL BE REPLACED OR REPAIRED BY THE CONTRACTOR, TO THE CONTRACTING OFFICER'S SATISFACTION.
7. THE ENDS OF PIPE THAT ARE EXPOSED BY DEMOLITION AND ARE TO BE REUSED IN THE NEW WORK SHALL BE COVERED TO MAINTAIN CLEANLINESS OF SYSTEM FROM DUST AND DEBRIS, AND PROTECTED TO PREVENT DAMAGE.
8. CONTRACTOR SHALL PERFORM TO GREATEST EXTENT POSSIBLE, ALL OF THE FABRICATION, EXAMINATION, AND TESTING WORK IN SHOP TO LIMIT THE TIME OF FIELD WORK AND DOWNTIME OF FACILITY OPERATIONS.
9. THE CONTRACTOR SHALL TAG ALL NEW VALVES WITH THE NUMBERS AS GIVEN ON THE DRAWINGS. VALVE TAGS SHALL BE IN ACCORDANCE WITH NASA LANGLEY HANDBOOK LPR 1710.40, PRESSURE SYSTEMS HANDBOOK. CONTRACTOR SHALL REUSE EXISTING VALVE TAG AS APPLICABLE.

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Langley Research Center
Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS	DATE
DRAWN E. DOHERTY/W. PARKER	07/30/15
ENG./DES. H. GOLDSMITH	07/30/15
CHECK G. VOLKMAN	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± ; X.XX (2 DECIMAL PLACES) ±.02 ; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: PIPING AND VALVE DETAILS AND GENERAL NOTES

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296770 | LATEST REV. •

SHEET NO. 1–M501

POTABLE WATER VALVE SCHEDULE

VALVE TAG No.	BLDG No.	SHEET SHOWN	SERVICE	FUNCTION	SIZE	TYPE	ACTUATION	END CONNECTION	RATED PRESSURE (PSIG)	MANUFACTURER/PART NUMBER (OR EQUAL)	NOTES
001	1186	1–C106	POTABLE WATER	ISOLATION	10"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
009	1186	1–C106	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
011	1186	1–C106	POTABLE WATER	ISOLATION	10"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
013	1216	1–C106	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
014	1186	1–C106	POTABLE WATER	ISOLATION	10"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
018	1268B	1–C111	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
025	1233	1–C111	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
035	1222B	1–C106	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
040	1268	1–C111	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
041	1222B	1–C106	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
044	1247C	1–C107	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
047	1288	1–C102	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
051	1262	1–C103	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
053	1295	1–C105	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
055	1297	1–C103	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
059	1214	1–C106	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
063	1154	1–C103	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
069	1154	1–C103	POTABLE WATER	ISOLATION	1-1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
070	1197	1–C104	POTABLE WATER	ISOLATION	1-1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
071	1187	1–C104	POTABLE WATER	ISOLATION	1-1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
073	1199	1–C104	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
075	1199 PUMP STATION	1–C104	POTABLE WATER	ISOLATION	1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
081	1211	1–C103	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
084	1265	1–C108	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
086	1265	1–C108	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
099	1250	1–C105	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
101	1223B	1–C107	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
102	1223B	1–C107	POTABLE WATER	ISOLATION	3/4"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
105	1186	1–C106	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
107	1297G	1–C103	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
109	1247B	1–C108	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
110	1250	1–C105	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
113	1231C	1–C115	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
115	1166	1–C101	POTABLE WATER	ISOLATION	1-1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
119	1159	1–C101	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
133	1230	1–C115	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
139	1159	1–C101	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
159	1285	1–C102	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
165	1244A	1–C116	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
168	1231C	1–C115	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
176	1286	1–C102	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
181	1122	1–C102	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4

NOTES
1. REFER TO CONTRACT SPECIFICATION SECTION 33 11 00, PARAGRAPH 2.2 FOR SALIENT FEATURES.
2. VALVE SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C509 STANDARD, AND SHALL BE UL LISTED, FM APPROVED, AND CERTIFIED TO ANSI/NSF 61. STANDARD MECHANICAL JOINT ENDS SHALL COMPLY WITH ANSI/AWWA C111. EPOXY COATING SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C550 STANDARD AND BE CERTIFIED TO ANSI/NSF 61. VALVES SHALL HAVE NON–RISING STEM (NRS), 2" SQUARE WRENCH NUT, AND TRIPLE O–RING SEAL STUFFING BOX (2 UPPER & 1 LOWER O–RINGS), WITH FOURTH O–RING SERVING AS A DIRT SEAL.
3. VALVE SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C509 STANDARD, AND SHALL BE CERTIFIED TO ANSI/NSF 61.
4. VALVE LOCATED BELOW GRADE.

POTABLE WATER VALVE SCHEDULE

VALVE TAG No.	BLDG No.	SHEET SHOWN	SERVICE	FUNCTION	SIZE	TYPE	ACTUATION	END CONNECTION	RATED PRESSURE (PSIG)	MANUFACTURER/PART NUMBER (OR EQUAL)	NOTES
188	1166	1–C101	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
191	1122	1–C102	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
197	1181	1–C101	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
201	1236	1–C114	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
202	1268D	1–C111	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
205	1256	1–C107	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
206	1214	1–C106	POTABLE WATER	ISOLATION	1"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
207	1199	1–C104	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
210	1196	1–C101	POTABLE WATER	ISOLATION	1-1/2	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
215	1247E	1–C107	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
217	1247D	1–C108	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
218	1189	1–C105	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
221	1190	1–C105	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
223	1189	1–C104	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
228	1191	1–C104	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
230	1188	1–C104	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
232	1286	1–C102	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
237	1292	1–C110	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
241	1206	1–C110	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
243	1206A	1–C110	POTABLE WATER	ISOLATION	2-1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
247	1232	1–C109	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
249	1186	1–C106	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
254	1288A	1–C103	POTABLE WATER	ISOLATION	3/4"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
257	1248	1–C109	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
265	1169	1–C110	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
267	1195B	1–C112	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
268	1268D	1–C111	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
269	1268D	1–C111	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
272	1195C	1–C112	POTABLE WATER	ISOLATION	1-1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
273	1195C	1–C112	POTABLE WATER	ISOLATION	1-1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
274	1232	1–C109	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
279	1310	1–C115	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
281	1199	1–C104	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
290	1172	1–C108	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
293	1205	1–C113	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
296	1245	1–C110	POTABLE WATER	ISOLATION	3/4"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
298	1148	1–C113	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
299	1205	1–C113	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
311	1146	1–C113	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
312	1205	1–C113	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
322	1236	1–C114	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
323	1236A	1–C114	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 5

NOTES
1. REFER TO CONTRACT SPECIFICATION SECTION 33 11 00, PARAGRAPH 2.2 FOR SALIENT FEATURES.
2. VALVE SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C509 STANDARD, AND SHALL BE UL LISTED, FM APPROVED, AND CERTIFIED TO ANSI/NSF 61. STANDARD MECHANICAL JOINT ENDS SHALL COMPLY WITH ANSI/AWWA C111. EPOXY COATING SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C550 STANDARD AND BE CERTIFIED TO ANSI/NSF 61. VALVES SHALL HAVE NON–RISING STEM (NRS), 2" SQUARE WRENCH NUT, AND TRIPLE O–RING SEAL STUFFING BOX (2 UPPER & 1 LOWER O–RINGS), WITH FOURTH O–RING SERVING AS A DIRT SEAL.
3. VALVE SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C509 STANDARD, AND SHALL BE CERTIFIED TO ANSI/NSF 61.
4. VALVE LOCATED BELOW GRADE.
5. VALVE SERVING BUILDING 1235 IS LOCATED IN BUILDING 1236A, ROOM 100.

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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SUPV'N.	

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NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ±; X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE SCHEDULES

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296771 | LATEST REV. ·

SHEET NO. 1–M601

POTABLE WATER VALVE SCHEDULE

VALVE TAG No.	BLDG No.	SHEET SHOWN	SERVICE	FUNCTION	SIZE	TYPE	ACTUATION	END CONNECTION	RATED PRESSURE (PSIG)	MANUFACTURER/PART NUMBER (OR EQUAL)	NOTES
325	1215	1–C112	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
327	1215	1–C112	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
329	1215	1–C112	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
332	1241	1–C113	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
338	1236A	1–C114	POTABLE WATER	ISOLATION	1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 5
343	1199	1–C104	POTABLE WATER	ISOLATION	1-1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
351	1237C	1–C109	POTABLE WATER	ISOLATION	1-1/4"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
352	1310	1–C115	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
362	1212C	1–C112	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
363	1201	1–C112	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
370	1244A	1–C116	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
371	1237A	1–C109	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
373	1241	1–C114	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
374	1296	1–C110	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
375	1195	1–C112	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
377	1296	1–C110	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
380	1232	1–C109	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
382	1237A	1–C109	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
389	1101	1–C104	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
390	1101	1–C105	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
391	1159	1–C101	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
405	1242	1–C114	POTABLE WATER	ISOLATION	2-1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
550	1122	1–C102	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
552	1297G	1–C103	POTABLE WATER	ISOLATION	3/8"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
553	1198	1–C104	POTABLE WATER	ISOLATION	1-1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
554	1214	1–C106	POTABLE WATER	ISOLATION	1"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
555	1250	1–C105	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
556	1250	1–C105	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
557	1295C	1–C105	POTABLE WATER	ISOLATION	3/4"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
558	1295C	1–C105	POTABLE WATER	ISOLATION	3/4"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3
559	1295E	1–C105	POTABLE WATER	ISOLATION	3/4"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3
560	1216	1–C106	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
561	1212C	1–C112	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
562	DISTRIBUTION	1–C116	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
563	1201	1–C112	POTABLE WATER	ISOLATION	2-1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
564	1231C	1–C115	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
565	1208	1–C105	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
566	1308	1–C116	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
567	1205	1–C113	POTABLE WATER	ISOLATION	1-1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
568	1237C	1–C109	POTABLE WATER	ISOLATION	1-1/4"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
569	1237B	1–C109	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4

NOTES
1. REFER TO CONTRACT SPECIFICATION SECTION 33 11 00, PARAGRAPH 2.2 FOR SALIENT FEATURES.
2. VALVE SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C509 STANDARD, AND SHALL BE UL LISTED, FM APPROVED, AND CERTIFIED TO ANSI/NSF 61. STANDARD MECHANICAL JOINT ENDS SHALL COMPLY WITH ANSI/AWWA C111. EPOXY COATING SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C550 STANDARD AND BE CERTIFIED TO ANSI/NSF 61. VALVES SHALL HAVE NON–RISING STEM (NRS), 2" SQUARE WRENCH NUT, AND TRIPLE O–RING SEAL STUFFING BOX (2 UPPER & 1 LOWER O–RINGS), WITH FOURTH O–RING SERVING AS A DIRT SEAL.
3. VALVE SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C509 STANDARD, AND SHALL BE CERTIFIED TO ANSI/NSF 61.
4. VALVE LOCATED BELOW GRADE.
5. VALVE IS LOCATED IN BUILDING 1236A, ROOM 100.

POTABLE WATER VALVE SCHEDULE

VALVE TAG No.	BLDG No.	SHEET SHOWN	SERVICE	FUNCTION	SIZE	TYPE	ACTUATION	END CONNECTION	RATED PRESSURE (PSIG)	MANUFACTURER/PART NUMBER (OR EQUAL)	NOTES
570	1237B	1–C109	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
571	1248	1–C109	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
572	1247D	1–C108	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
573	1245	1–C110	POTABLE WATER	ISOLATION	3/4"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
574	1245	1–C110	POTABLE WATER	ISOLATION	3/4"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
575	1256C	1–C107	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
576	DISTRIBUTION	1–C106	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
577	DISTRIBUTION	1–C117	POTABLE WATER	ISOLATION	10"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
578	DISTRIBUTION	1–C109	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
579	DISTRIBUTION	1–C117	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
580	DISTRIBUTION	1–C108	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
581	1247E	1–C108	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
582	1256C	1–C107	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
584	DISTRIBUTION	1–C104	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
585	DISTRIBUTION	1–C116	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
586	1268C	1–C111	POTABLE WATER	ISOLATION	2-1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
588	1196	1–C101	POTABLE WATER	ISOLATION	1-1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
A070	1197	1–C104	POTABLE WATER	ISOLATION	1-1/2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
T140	1219	1–C112	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 5
T140A	1219	1–C112	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 5
T144	1194	1–C113	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 5
T146	1194	1–C113	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 5
T160B	1225	1–C114	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 5
T174	1232A	1–C109	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 5
T208	1205	1–C113	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 5
T210	1205	1–C113	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 5
T224	1293A	1–C113	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 5
T238	1236	1–C114	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 5
T244	1228	1–C114	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 5
T256	1230	1–C115	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 5
T262	1230B	1–C115	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 5
T262B	1244	1–C116	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 5

NOTES
1. REFER TO CONTRACT SPECIFICATION SECTION 33 11 00, PARAGRAPH 2.2 FOR SALIENT FEATURES.
2. VALVE SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C509 STANDARD, AND SHALL BE UL LISTED, FM APPROVED, AND CERTIFIED TO ANSI/NSF 61. STANDARD MECHANICAL JOINT ENDS SHALL COMPLY WITH ANSI/AWWA C111. EPOXY COATING SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C550 STANDARD AND BE CERTIFIED TO ANSI/NSF 61. VALVES SHALL HAVE NON–RISING STEM (NRS), 2" SQUARE WRENCH NUT, AND TRIPLE O–RING SEAL STUFFING BOX (2 UPPER & 1 LOWER O–RINGS), WITH FOURTH O–RING SERVING AS A DIRT SEAL.
3. VALVE SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C509 STANDARD, AND SHALL BE CERTIFIED TO ANSI/NSF 61.
4. VALVE LOCATED BELOW GRADE.
5. VALVE LOCATED IN UTILITY TUNNEL.

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Langley Research Center
Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS	DATE
DRAWN E. DOHERTY	07/30/15
ENG./DES. H. GOLDSMITH	07/30/15
CHECK G. VOLKMAN	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± ; X.XX (2 DECIMAL PLACES) ±.02 ; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICRONCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296747

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 1)

DRAWING TITLE: VALVE SCHEDULES

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296772 | LATEST REV. ·

SHEET NO. 1–M602

POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF
(WORK PACKAGE 2)

POTABLE WATER PIPING REPLACEMENT

LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA

DRAWING INDEX – WORK PACKAGE 2

DRAWING No.	SHEET No.	REV.	TITLE
GENERAL			
1296775	2–G001	–	TITLE SHEET
1296776	2–G101	–	KEY PLAN A
1296777	2–G102	–	KEY PLAN B
CIVIL			
1296778	2–C001	–	GENERAL AND CIVIL NOTES, LEGEND, AND ABBREVIATIONS
1296779	2–C101	–	DOMESTIC WATER PIPING AND VALVE REPLACEMENT SITE PLANS
1296780	2–C102	–	DOMESTIC WATER PIPING AND VALVE REPLACEMENT SITE PLANS
1296781	2–C103	–	DOMESTIC WATER PIPING AND VALVE REPLACEMENT SITE PLANS
1296782	2–C104	–	DOMESTIC WATER PIPING AND VALVE REPLACEMENT SITE PLANS
1296783	2–C105	–	DOMESTIC WATER PIPING AND VALVE REPLACEMENT SITE PLANS
1296784	2–C501	–	PAVEMENT REPAIR DETAILS
MECHANICAL			
1296785	2–M501	–	PIPING AND VALVE DETAILS AND GENERAL NOTES
1296786	2–M601	–	VALVE SCHEDULES

ANNOTATION SYMBOL LEGEND

- [1] NOTE REFERENCE, NEW WORK
- (1) NOTE REFERENCE, DEMOLITION WORK
- 1152 NASA FACILITY NUMBER
- [101] FACILITY ROOM NUMBER
- SECTION LETTER OR DETAIL NUMBER / SHEET SHOWN ON
- SECTION LETTER OR DETAIL NUMBER / SHEET NUMBER ON WHICH SECTION/DETAIL APPEARS / SHEET NUMBER ON WHICH SECTION/DETAIL ORIGINATES
- N — PLAN NORTH / MAGNETIC NORTH
- 123 — VALVE NUMBER / ISOLATION VALVE

REVISIONS															
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CHECK G. VOLKMAN	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± ; X.XX (2 DECIMAL PLACES) ±.02 ; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

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LANGLEY RESEARCH CENTER
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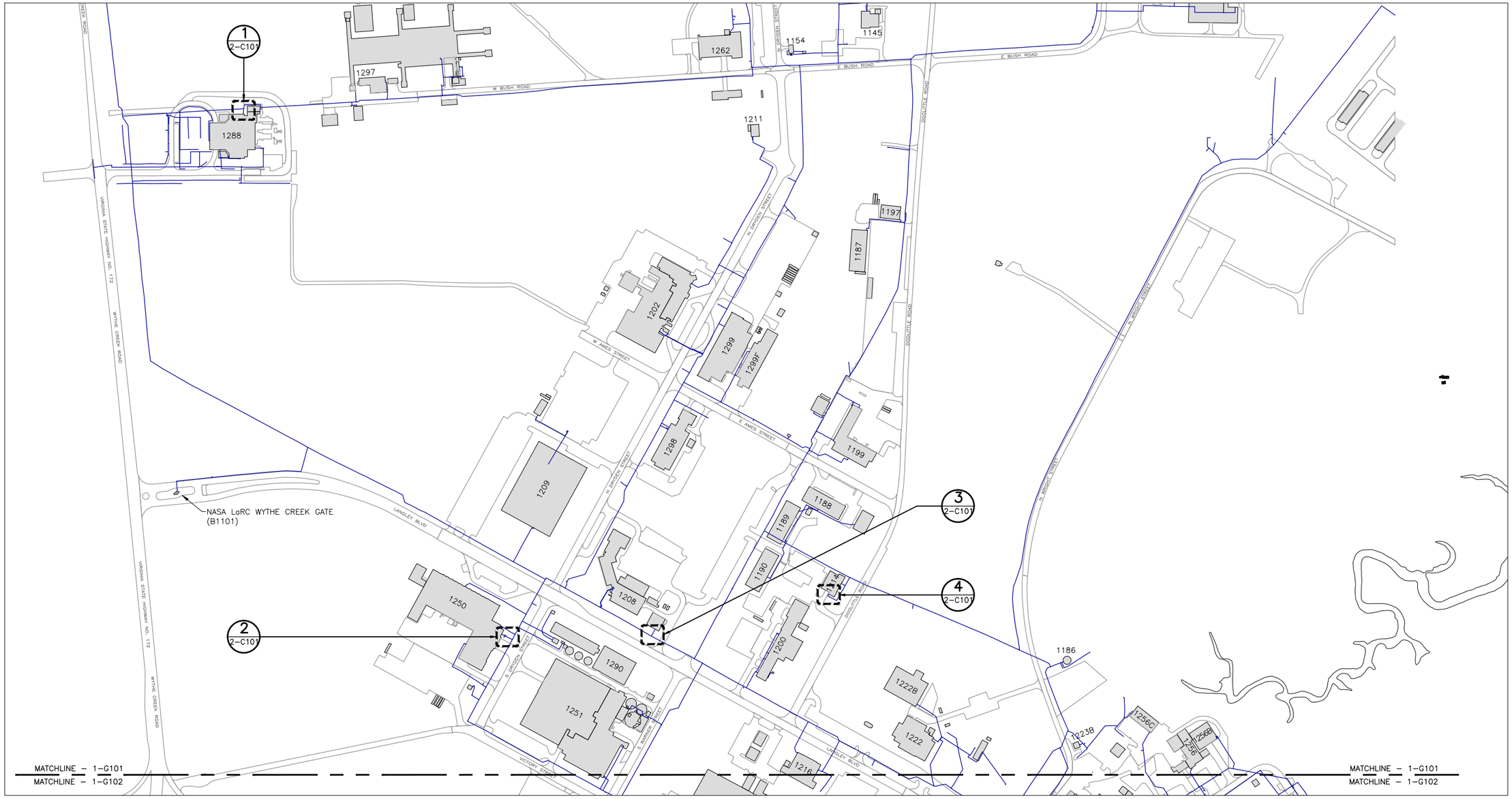
PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 2)

DRAWING TITLE: TITLE SHEET

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296775 | LATEST REV. ·

SHEET NO. 2–G001



KEY PLAN A

SCALE: 1" = 200'

NORTH

1" = 200'-0" 200 100 0 200 400 SCALE FEET

REVISIONS								REVISIONS							
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD		DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	

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WORK ORDER NO.	CTN000188	
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DRAWN	D. PARKER	07/30/15
ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± ; X.XX (2 DECIMAL PLACES) ±.02 ; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296775

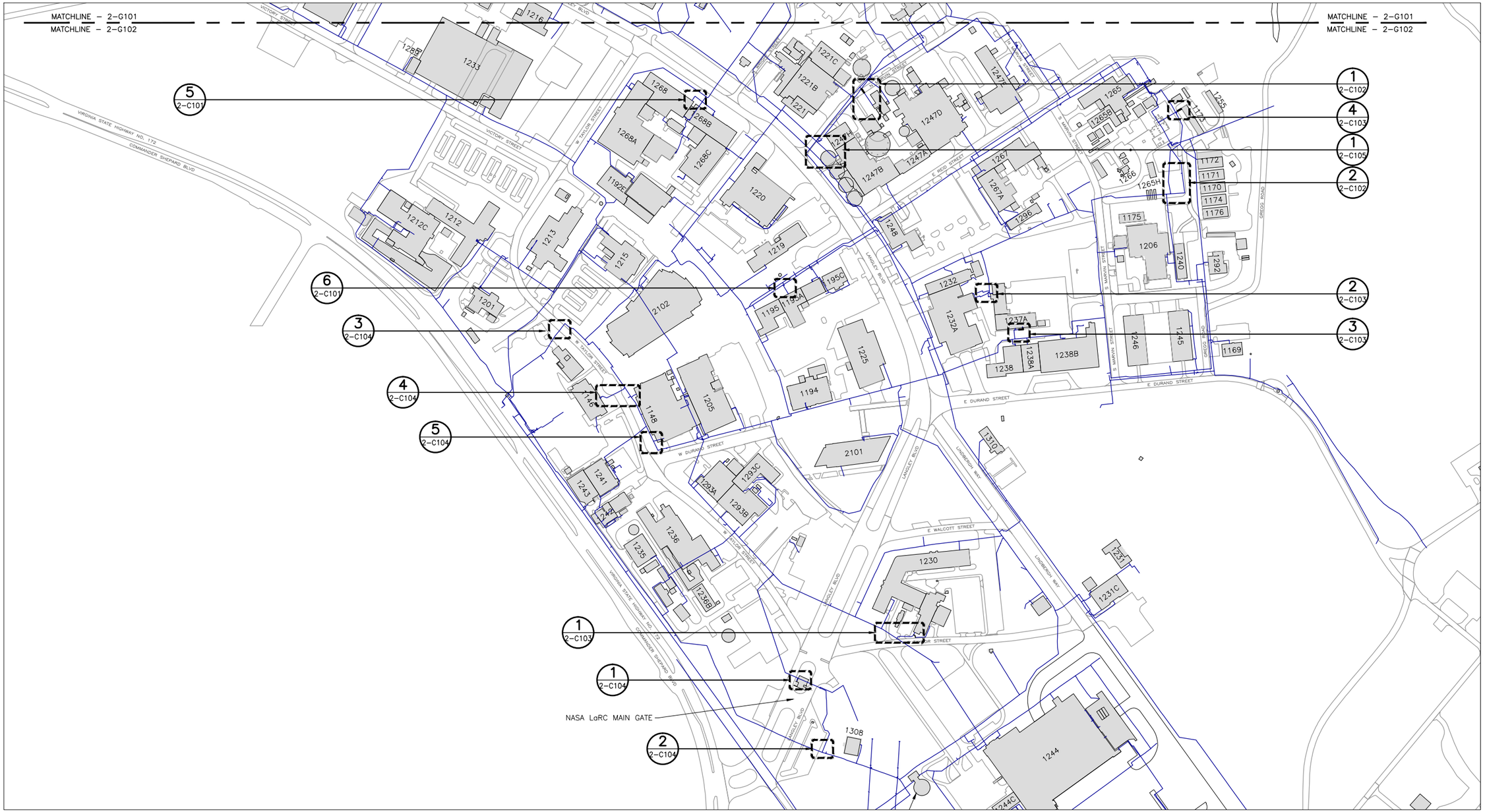
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 2)

DRAWING TITLE: KEY PLAN A

BUILDING NO.	SIZE	DRAWING NO.	LATEST REV.
1215	D	1296776	•

SHEET NO. 2-G101



KEY PLAN B – WORK PACKAGE 2

SCALE: 1" = 200'

NORTH

1" = 200'–0" 200 100 0 200 400
SCALE FEET

REVISIONS								REVISIONS							
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD		DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	

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ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296775

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 2)

DRAWING TITLE: KEY PLAN B

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296777 | LATEST REV. ·

SHEET NO. 2–G102

ABBREVIATIONS

@	–	AT
AASHTO	–	AMERICAN ASSOCIATION OF HIGHWAY AND TRANSPORTATION OFFICIALS
ABAND	–	ABANDON
AF	–	AIR FORCE
AFF	–	ABOVE FINISHED FLOOR
AG	–	ABOVE GRADE/GROUND
ALM	–	ALARM
ALUM	–	ALUMINUM
APPROX	–	APPROXIMATE
ASJ	–	ALL SERVICE JACKET
BG	–	BELOW GRADE/GROUND
B	–	BASELINE
℄	–	BASELINE
BG	–	BELOW GRADE
BLDG	–	BUILDING
BM	–	BENCHMARK
BOT	–	BOTTOM
BRG	–	BEARING
CA	–	CABLE
CAP	–	CAPACITY
CB	–	CATCH BASIN
CO	–	CLEAN OUT
CI	–	CAST IRON
CJ	–	CONTROL JOINT
℄	–	CENTERLINE
CLR	–	CLEAR
CMP	–	CORRUGATED METAL PIPE
CND	–	CONDUIT
CNDS	–	CONDENSATE
CONC	–	CONCRETE
CONT	–	CONTINUOUS
CORP	–	CORPORATION
CP	–	CONCRETE PIPE
CT	–	COOLING TOWER
CU	–	COPPER
CULV	–	CULVERT
CW	–	COLD WATER
CWR	–	COLD WATER RETURN
CWS	–	COLD WATER SUPPLY
D	–	DATA
DB	–	DUCTBANK
DE	–	DOUBTFUL ELEVATION
DEMO	–	DEMOLITION
DI	–	DUCTILE IRON
ø DIA	–	DIAMETER
DN	–	DIAMETER NOMINAL
DN	–	DOWN
DP	–	DIFFERENTIAL PRESSURE
DR	–	DRAIN
?	–	DOUBTFUL
DS	–	DOWNSPOUT
DT	–	DRAIN TILE
E	–	ELECTRIC
EA	–	EACH
EBW	–	ENVIRONMENTAL BLOWDOWN WATER
EC	–	EDGE OF CONCRETE
ED	–	EXISTENCE DOUBTFUL
EJ	–	EXPANSION JOINT
EL	–	ELEVATION
ELEC	–	ELECTRICAL
ELEC	–	ELECTRIC
ELEV	–	ELEVATION
ELL	–	ELBOW
EQ	–	EQUAL
EQUIP	–	EQUIPMENT
EXP	–	EXPANSION
EXP	–	EXPOSED
EXST	–	EXISTING
EXIST	–	EXISTING
FDN	–	FOUNDATION
FF	–	FINISH FLOOR
FH	–	FIRE HYDRANT
FIN	–	FINISH
FIN FL	–	FINISH FLOOR
FL	–	FLOOR
FL	–	FLOW LINE
FLDT	–	FLOODLIGHT
FM	–	FIRE MAIN
FM	–	FORCED MAIN
FND	–	FOUNDATION
FT	–	FEET
FTNG	–	FOOTING
G	–	GAS
GALV	–	GALVANIZED
GB	–	GRADE BEAM
GFE	–	GOVERNMENT FURNISHED EQUIPMENT
GM	–	GALVANIZED METAL
GMP	–	GALVANIZED METAL PIPE
GND	–	GROUND
GOVT	–	GOVERNMENT
H	–	HIGH
H_2	–	HYDROGEN
HC	–	HANDICAPPED
HCR	–	HIGH PRESSURE CONDENSATE RETURN
HD	–	HEAD
HDPE	–	HIGH DENSITY POLYETHYLENE
HH	–	HAND HOLE
HM	–	HOLLOW METAL
HPS	–	HIGH PRESSURE STEAM
HP	–	HIGH POINT
HP	–	HIGH PRESSURE
HW	–	HEADWALL
HW	–	HOT WATER
HZ	–	HERTZ
IJ	–	ISOLATION JOINT
INV	–	INVERT
JB	–	JUNCTION BOX
JT	–	JOINT
KCMIL	–	THOUSAND CIRCULAR MIL
KV	–	KILO VOLTS
KW	–	KILOWATT
L	–	LIGHT
LG	–	LONG
LN2	–	LIQUID NITROGEN
LP	–	LOW POINT
LPR	–	LOW PRESSURE RETURN
LPS	–	LOW PRESSURE STEAM
LT	–	LEFT
MAX	–	MAXIMUM
ME	–	MATCH EXISTING
MECH	–	MECHANICAL
MET	–	METAL
MH	–	MANHOLE
MIN	–	MINIMUM
MJ	–	MECHANICALLY JOINED
MON	–	MONUMENT
No.	–	NUMBER
NRCP	–	NON–REINFORCED CONCRETE PIPE
O	–	OVERHEAD
OA	–	OUTSIDE AIR
OAT	–	OUTSIDE AIR TEMPERATURE
OC	–	ON CENTER
OH	–	OVERHEAD
OL	–	OVERHEAD LINE
OPP	–	OPPOSITE
P	–	PIPE
PAVT	–	PAVEMENT
PB	–	PULL BOX
PC	–	PUMPED CONDENSATE
PCR	–	PUMPED CONDENSATE RETURN
PD	–	POSITION DOUBTFUL
Pe	–	PROPANE
PED	–	PEDESTAL
P.I.V.	–	POST INDICATOR VALVE
PNL	–	PANEL
PROB	–	PROBABLE
PSI	–	POUNDS PER SQUARE INCH
PVC	–	POLYVINYL CHLORIDE
PWR	–	POWER
R	–	RADIUS
R	–	RISER
RC	–	REINFORCED CONCRETE
RCP	–	REINFORCED CONCRETE PIPE
RD	–	ROOF DRAIN
RDCR	–	REDUCER
RE	–	REFER
REF	–	REFERENCE
REIN	–	REINFORCING
REQ'D	–	REQUIRED
RET	–	RETURN
RGSC	–	RIGID GALVANIZED STEEL CONDUIT
RL	–	REFRIGERANT LIQUID
ROW	–	RIGHT OF WAY
RPM	–	REVOLUTIONS PER MINUTE
RS	–	REFRIGERANT SUCTION
RS	–	RIGID STEEL
RT	–	RIGHT
S	–	SOUTH
SA	–	SANITARY
SCH	–	SCHEDULE
SHT	–	SHEET
SIM	–	SIMILIAR
SLV	–	SLEEVE
SP	–	STATIC PRESSURE
SPLY	–	SUPPLY
SQ	–	SQUARE
SS	–	STAINLESS STEEL
ST	–	STORM
STA	–	STATION
STL	–	STEEL
STM	–	STEAM
STOR	–	STORAGE
SUBSTA	–	SUBSTATION
SW	–	SIDEWALK
SWGR	–	SWITCHGEAR
T	–	TELEPHONE
TB	–	TOP OF BOARD
TC	–	TERRA COTTA
TC	–	TOP OF CURB
TD	–	TOP OF DRAIN
TEL	–	TELEPHONE
THK	–	THICK
TNK	–	TANK
TOB	–	TOP OF BOARD
TOC	–	TOP OF CURB
TP	–	TOP OF PIPE
TRANS	–	TRANSFORMER
TRLR	–	TRAILER
TYP	–	TYPICAL
UGND	–	UNDERGROUND
UNK	–	UNKNOWN
UON	–	UNLESS OTHERWISE NOTED
UTIL	–	UTILITY
V	–	VALVE, VOLT
VAC	–	VACUUM
VC	–	VITRIFIED CLAY PIPE
VCP	–	VALVE CAPPED PIPE
VDOT	–	VA DEPARTMENT OF TRANSPORTATION
VERT	–	VERTICAL
VNG	–	VIRGINIA NATURAL GAS
W	–	WIDE
W/	–	WITH
WA	–	WATER
WL	–	WATER LINE
WWF	–	WELDED WIRE FABRIC
XFMP	–	TRANSFORMER MONITORING PANEL

CIVIL LEGEND (APPLIES TO ALL CIVIL SHEETS)

- EXISTING DUCTBANK
- EL 8.50 — ELEV OF TOP OF EXISTING UTILITY LINE
- EXISTING PIPING TO BE REMOVED
- EXISTING PIPING TO BE ABANDONED IN PLACE
- EXISTING BUILDING TO REMAIN
- DEMOLISHED/NEW PAVEMENT
- DEMOLISHED/NEW SIDEWALK
- NEW TO EXISTING CONNECTION
- POINT OF DISCONNECT
- X — FENCING

MANHOLE	LINE
STORM	ST — DIA.
SANITARY	SA
ELECTRICAL	E
TELEPHONE	T

- FIRE HYDRANT
- CATCH BASIN
- CLEAN OUT
- VALVE
- WA — WATER LINE
- BENCH MARK

GENERAL NOTES

1. ALL EXISTING SIZES ARE IN ENGLISH UNITS.
2. ALL ITEMS SHALL BE CONSIDERED AS EXISTING UNLESS OTHERWISE INDICATED AS BEING NEW.
3. SUBSURFACE UTILITIES NOT DESIGNATED FOR DEMOLITION OR MODIFICATION SHALL NOT BE DISTURBED.
4. CONSTRUCTION OPERATIONS SHALL BE CONDUCTED SO THAT NEW WORK FOR SUBSURFACE UTILITIES SHALL BE INSTALLED AS COMPLETELY AS PRACTICABLE BEFORE DISRUPTION OF EXISTING SERVICES.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DIMENSIONS AND ELEVATIONS. NECESSARY FOR THE PROPER CONSTRUCTION AND ALIGNMENT OF THE NEW CONDITIONS TO THE EXISTING CONDITIONS. THE CONTRACTOR SHALL MAKE ALL FIELD MEASUREMENTS NECESSARY FOR CONSTRUCTION. THE CONTRACTOR SHALL MAINTAIN A RED–LINED SET OF CONTRACT DRAWINGS THAT REFLECT CURRENT "AS–BUILT" CONDITIONS AND SUBMIT THE DRAWINGS TO THE CONTRACTING OFFICER AFTER COMPLETION OF CONSTRUCTION.
6. VERIFY THE LOCATION OF NEW WORK WITH FACILITY COORDINATOR AND CONSTRUCTION MANAGER.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ALL NON–HAZARDOUS DEBRIS GENERATED FROM THE PROJECT FROM THE CENTER PRIOR TO OR UPON COMPLETION OF THE PROJECT IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS.
8. ELEVATIONS USED ON ALL CIVIL DRAWINGS ARE BASED ON NAVD 88 (NORTH AMERICAN VERTICAL DATUM).
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING AND PROTECTING EQUIPMENT AND UNDERGROUND UTILITIES TO REMAIN. THE CONTRACTOR SHALL PERFORM A FIELD SURVEY, INCLUDING INSPECTION OF SITE CLEARANCES AND REMOVAL/INSTALLATION ROUTE INTENDED TO BE INCORPORATED INTO THE EXISTING SYSTEM PRIOR TO PROCEEDING WITH WORK. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR REPAIRS OR MODIFICATIONS NECESSARY TO MAKE THE SYSTEM PERFORM AS REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING EQUIPMENT AT NO ADDITIONAL COST TO THE GOVERNMENT.
10. THE CONTRACTOR SHALL COORDINATE ANY IMPACTS TO TRAFFIC FLOW DURING CONSTRUCTION WITH THE CONTRACTING OFFICER PRIOR TO PROCEEDING WITH WORK AFFECTING GOVERNMENT STREETS. FIRE AND RESCUE VEHICLE ACCESS TO ALL BUILDINGS SHALL BE MAINTAINED DURING CONSTRUCTION.
11. ALL SIGNS, LANDSCAPING, STRUCTURES OR OTHER APPURTENANCES DISTURBED OR DAMAGED DURING CONSTRUCTION SHALL BE REPLACED OR REPAIRED BY THE CONTRACTOR AT NO COST TO THE GOVERNMENT.
12. ALL TREES WITHIN THE CONSTRUCTION AREA NOT SPECIFICALLY DESIGNATED FOR REMOVAL SHALL BE PRESERVED, WHETHER SHOWN OR NOT SHOWN ON THE CONTRACT DRAWINGS UNLESS COORDINATED WITH THE CONTRACTING OFFICER. TREES TO BE PRESERVED SHALL BE PROTECTED WITH HIGH VISIBILITY FENCING PLACED A MINIMUM OF 5' FROM THE TREE TRUNK. THE CONTRACTOR SHALL CLEAN CUT ANY TREE ROOTS LARGER THAN 3 INCHES IN DIAMETER WHERE NECESSARY FOR CONSTRUCTION. IF TREES NOT INDICATED FOR REMOVAL ARE DAMAGED OR KILLED DURING OR UP TO 1 YEAR AFTER CONSTRUCTION THE CONTRACTOR SHALL COORDINATE WITH THE CONTRACTING OFFICER TO DEVELOP A REPLACEMENT STRATEGY AT THE CONTRACTOR'S EXPENSE.

CIVIL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR ALL SHORING AND BRACING OF EXCAVATION. SHORING AND BRACING SHALL BE MAINTAINED REGARDLESS OF THE LENGTH OF TIME THE EXCAVATION SHALL BE OPEN.
2. WATER SHALL NOT BE PERMITTED TO ACCUMULATE IN EXCAVATIONS. DEWATERING SYSTEMS SHALL BE PROVIDED BY THE CONTRACTOR TO CONVEY WATER AWAY FROM EXCAVATIONS. DEWATERING SYSTEM AND METHODS OF DISPOSAL SHALL BE APPROVED BY THE CONSTRUCTION MANAGER.
3. PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL LOCATE ALL EXISTING UNDERGROUND UTILITY LINES IN THE AREA OF PROPOSED EXCAVATION.
4. CONTRACTOR SHALL HAND DIG TO EXPOSE AND VERIFY LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO ANY MACHINE EXCAVATION. EXISTING UTILITY LOCATIONS SHOWN ARE BASED ON BEST AVAILABLE INFORMATION AND MAY NOT REFLECT FIELD CONDITIONS. NO EXCAVATION IS ALLOWED TO START WITHOUT FIRST RECEIVING A DIGGING PERMIT FROM LaRC IQA TEAM. CALL 864–7265.
5. ALL DISTURBED AREAS NEAR BUILDINGS OR PAVEMENT SHALL BE GRADED FOR DRAINAGE.
6. SEE SPECIFICATION SECTION 01 35 40.00 41 FOR REQUIREMENTS FOR EXCAVATED SOIL TO BE REMOVED FROM LaRC. IF SOIL IS STOCKPILED THE CONTRACTOR SHALL CONTROL THE AREA AND BE HELD RESPONSIBLE FOR THE REMOVAL OF SOIL FROM LaRC UPON COMPLETION OF JOB.
7. TOPSOIL BROUGHT ONTO CENTER SHALL BE TESTED PER SPECIFICATION SECTION 01 35 40.00 41. PROVIDE BACKFILL AND TOPSOIL IN AREAS WHERE GRADE HAS BEEN DISTURBED FROM BUILDING AND UTILITY REMOVAL. FINISHED GRADING SHALL MATCH CONTOURS OF ADJACENT GRASS AREA. SEED WITH KENTUCKY FESCUE 31 ALL GRASSED AREAS. SEED SHALL BE UNIFORMLY BROADCAST AT THE RATE OF 35 POUNDS PER ACRE. PROVIDE TOPSOIL AND SEEDING IN CONFORMANCE WITH 31 23 00.00 41.
8. PROVIDE EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH SPECIFICATION SECTION 01 35 40.00 41.
9. CONCRETE/ASPHALTIC JOINT SEALANT SHALL BE ELASTOMERIC SEALANT ASTM C 920, SINGLE OR MULTI COMPONENT TYPE, POURABLE OR SELF–LEVELING, WITHSTANDING INCREASE AND DECREASE OF AT LEAST 25 PERCENT OF JOINT WIDTH, FOR USE IN PEDESTRIAN AND VEHICULAR AREAS, CONFORMING TO ASTM C92.
10. CONTRACTOR SHALL SUBMIT FOR APPROVAL A JOB–MIX DESIGN, TEST REPORTS AND OTHER DOCUMENTATION NECESSARY FOR THE CONTRACTING OFFICER TO DETERMINE CONFORMANCE WITH REQUIRED GRADING, ASPHALT CONTENT AND TEMPERATURE PROPERTIES FOR ASPHALT CONCRETE.
11. SUBSURFACE: REMOVE EXISTING MATERIAL TO UNDISTURBED EARTH (APPROX. 4 FT.) AND BACKFILL WITH SELECT AGGREGATE MATERIAL COMPACTED TO 100 PERCENT OF MAXIMUM DENSITY OBTAINED BY ASTM D1557.
12. REFER TO SPECIFICATION SECTION 31 23 00.00 41 FOR EXCAVATION NEAR EXISTING UTILITIES.
13. LOCATION, SUPPORT, PROTECTION AND RESTORATION OF ALL EXISTING UTILITIES AND APPURTENANCES, WHETHER SHOWN OR NOT SHOWN ON THE CONTRACT DRAWINGS, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. WHEN UNKNOWN OR INCORRECTLY LOCATED UNDERGROUND UTILITIES ARE ENCOUNTERED DURING CONSTRUCTION THE CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER PRIOR TO PROCEEDING WITH WORK.
14. THE CONTRACTOR SHALL VERIFY THE CONDITION OF ABANDONED UTILITIES WITH THE CONTRACTING OFFICER PRIOR TO CUTTING AND CAPPING IF NEEDED FOR THE INSTALLATION OF NEW WORK.
15. THE CONTRACTOR SHALL RESTORE ALL DISTURBED AREAS TO EQUAL OR BETTER CONDITION THAN EXISTED BEFORE CONSTRUCTION AS COORDINATED WITH THE CONTRACTING OFFICER. DRAINAGE DITCHES OR WATERCOURSES THAT ARE DISTURBED BY CONSTRUCTION SHALL BE RESTORED TO THE GRADES AND CROSS-SECTIONS THAT EXISTED BEFORE CONSTRUCTION.
16. EXISTING STRIPING, MARKINGS, PAVEMENT MARKERS, LANDSCAPING, CURBS, AND SIDEWALK DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPLACED IN KIND BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE GOVERNMENT.
17. THE CONTRACTOR SHALL PERFORM DEMOLITION AND EXCAVATION IN A MANNER THAT WILL MINIMIZE DUST, NOISE, AND OTHER NUISANCE. MAINTAIN HAUL ROUTES FOR DISPOSAL OF MATERIAL CLEAN AND FREE OF DEBRIS. TRACKING OR SPILLING MUD, DIRT OR DEBRIS UPON NASA STREETS AND SIDEWALKS SHALL BE CLEANED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE GOVERNMENT.

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DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	D. PARKER	07/30/15
ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

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			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296775

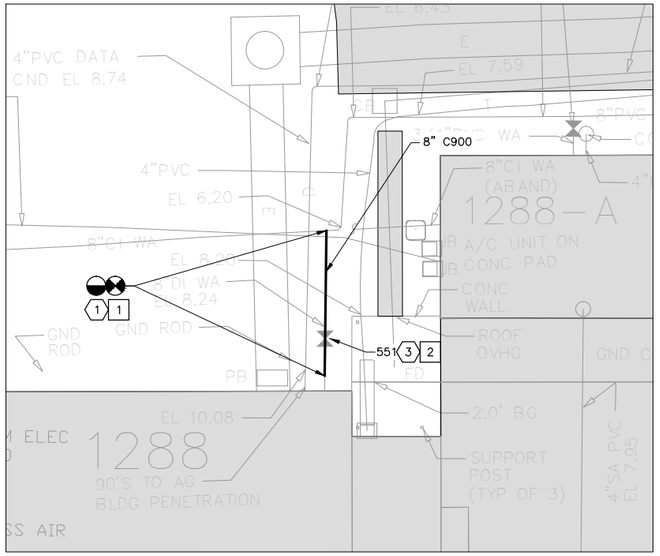
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 2)

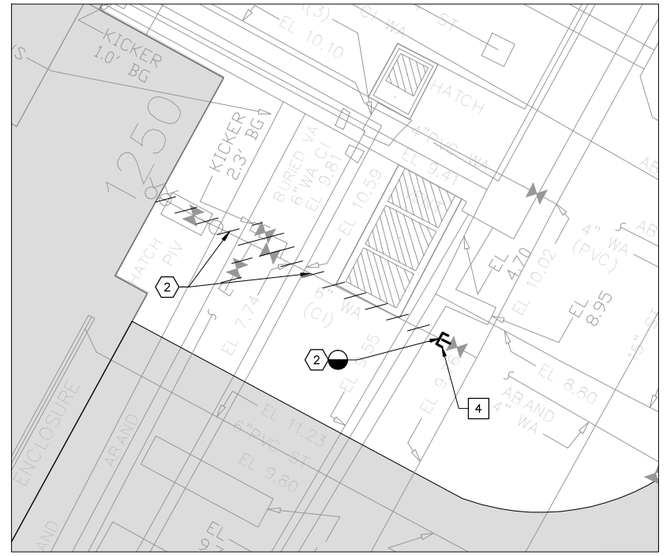
DRAWING TITLE: GENERAL AND CIVIL NOTES, LEGEND, AND ABBREVIATIONS

BUILDING NO.	SIZE	DRAWING NO.	LATEST REV.
1215	D	1296778	•

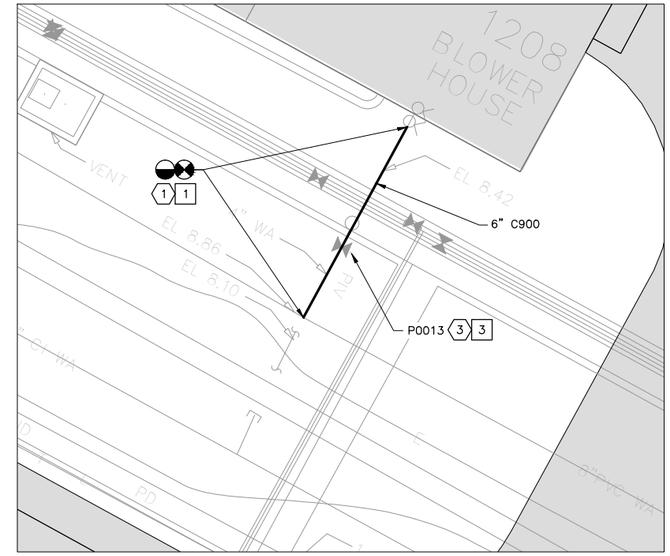
SHEET NO. 2–C001



1 (2-G101 2-C101) SITE ALTERATION PLAN–BUILDING 1288
SCALE: 1" = 10'
NORTH



2 (2-G102 2-C101) SITE ALTERATION PLAN–BUILDING 1250
SCALE: 1" = 10'
NORTH



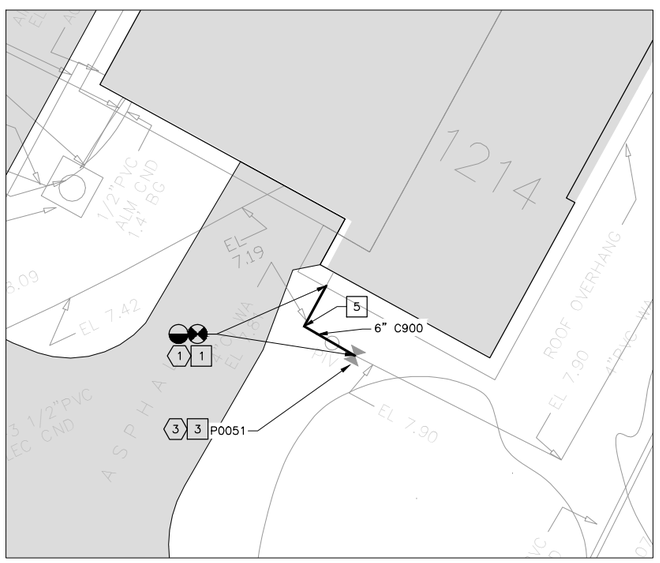
3 (2-G103 2-C101) SITE ALTERATION PLAN–1208 BLOWER HOUSE
SCALE: 1" = 10'
NORTH

REMOVAL NOTES

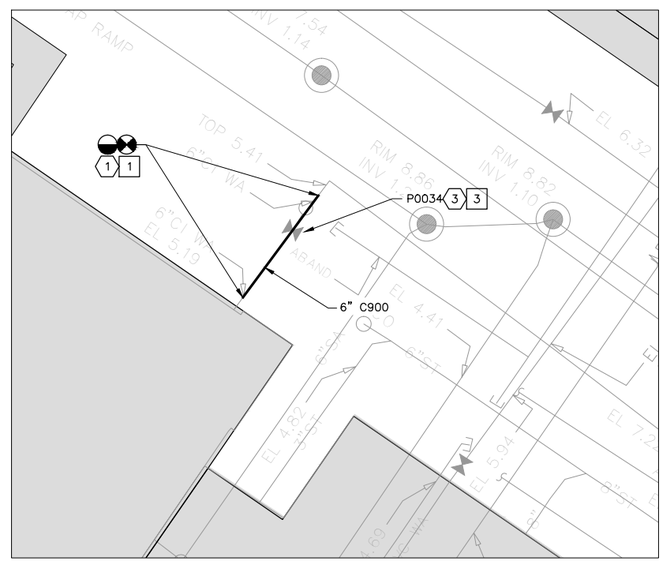
1. REMOVE EXISTING WATER PIPING AS SHOWN IN SITE PLAN.
2. DISCONNECT EXISTING WATER PIPING AT POINT INDICATED AND ABANDON IN PLACE AS SHOWN IN SITE PLAN.
3. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION.
4. THE CONTRACTOR SHALL REMOVE EXISTING SHRUBS AS INDICATED COORDINATE EXTENTS WITH THE CONTRACTING OFFICER.
5. REMOVE EXISTING POST INDICATOR VALVE. PREPARE PIPING END TO BUILDING 1195 FOR CONNECTION TO NEW PIPING DURING NEW WORK.

NEW WORK NOTES

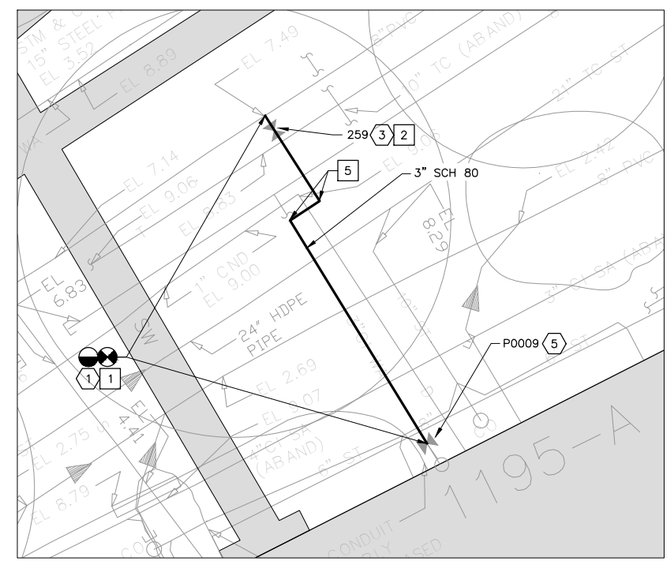
1. PROVIDE NEW WATER PIPING AND ALL FITTINGS AS REQUIRED TO CONNECT TO EXISTING WATER PIPING SYSTEM AS SHOWN IN SITE PLAN. SEE DWG 1296785 FOR TYPICAL CONNECTION DETAIL.
2. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296785 AND VALVE SCHEDULE ON DWG 1296786.
3. PROVIDE NEW POST INDICATOR VALVE. SEE INSTALLATION DETAIL ON DWG 1296785 AND VALVE SCHEDULE ON DWG 1296786.
4. PROVIDE PLUG AT OUTLET OF 6" VALVE.
5. THE CONTRACTOR SHALL INSTALL THRUST BLOCK AT INDICATED LOCATION. REFER TO DETAIL ON DWG 1296784.



4 (2-G104 2-C101) SITE ALTERATION PLAN–BUILDING 1214
SCALE: 1" = 10'
NORTH



5 (2-G105 2-C101) SITE ALTERATION PLAN–BUILDING 1268
SCALE: 1" = 10'
NORTH



6 (2-G106 2-C101) SITE ALTERATION PLAN–BUILDING 1195A
SCALE: 1" = 10'
NORTH

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE:

1" = 10'–0" SCALE — 10 5 0 10 20 FEET

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PROJ. MGR.	G. VOLKMAN	07/30/15
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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296775

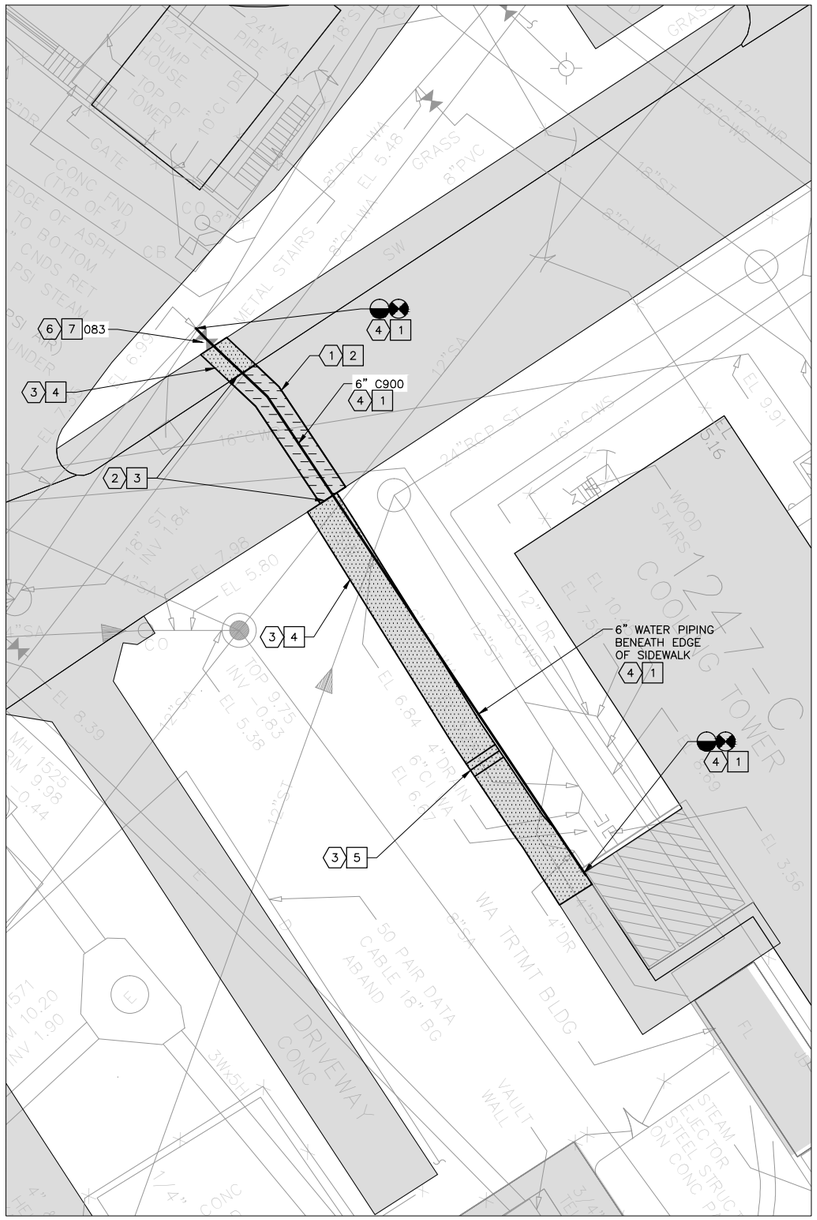
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 2)

DRAWING TITLE: DOMESTIC WATER PIPING AND VALVE REPLACEMENT SITE PLANS

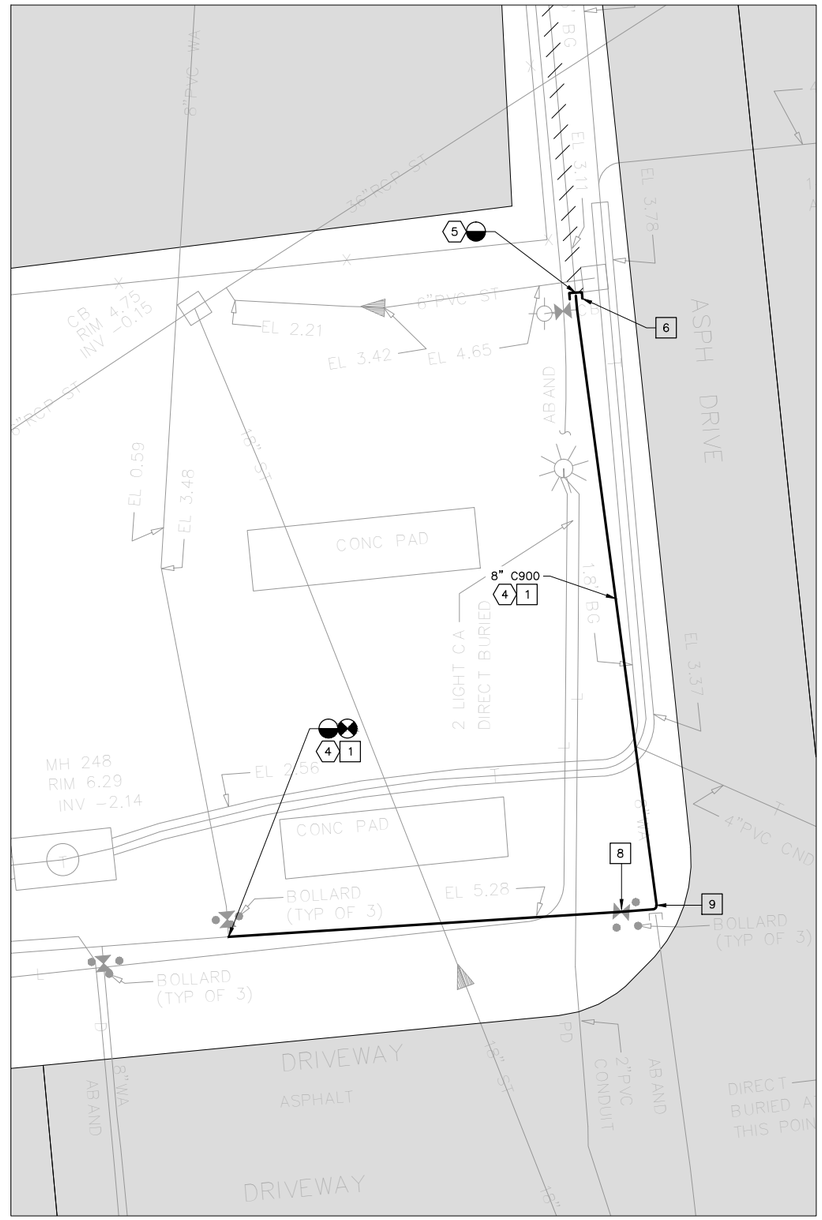
BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296779 | LATEST REV. ·

SHEET NO. 2–C101



1 SITE ALTERATION PLAN–BUILDING 1247C
2–G102 2–C102 SCALE: 1" = 10'

NORTH



2 SITE ALTERATION PLAN–NEAR BUILDING 1172
2–G102 2–C102 SCALE: 1" = 10'

NORTH

REMOVAL NOTES

1. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT PAVEMENT TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF CURB (AND GUTTER) TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
3. THE CONTRACTOR SHALL SAWCUT AND REMOVE 4" (+/–) THICK REINFORCED CONCRETE SIDEWALK AND CONCRETE STEPS TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
4. REMOVE EXISTING WATER PIPING AS SHOWN IN SITE PLAN.
5. DISCONNECT EXISTING WATER PIPING AT POINT INDICATED AND ABANDON IN PLACE AS SHOWN IN SITE PLAN.
6. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION.
7. THE CONTRACTOR SHALL REMOVE EXISTING SHRUBS AS INDICATED COORDINATE EXTENTS WITH THE CONTRACTING OFFICER.

NEW WORK NOTES

1. PROVIDE NEW WATER PIPING AND ALL FITTINGS AS REQUIRED TO CONNECT TO EXISTING WATER PIPING SYSTEM AS SHOWN IN SITE PLAN. SEE DWG 1296785 FOR TYPICAL CONNECTION DETAIL.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE DETAIL ON DWG 1296794. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. THE CONTRACTOR SHALL INSTALL NEW CURB (AND GUTTER) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT CURB (AND GUTTER).
4. THE CONTRACTOR SHALL PROVIDE NEW REINFORCED SIDEWALK TO MATCH THICKNESS, SLOPE, WIDTH, AND ELEVATION OF EXISTING ADJACENT SIDEWALK. REFER TO DETAIL ON DWG 1296794 AND SPECIFICATION SECTION 03 30 00.00 41.
5. THE CONTRACTOR SHALL PROVIDE NEW CONCRETE STEPS TO MATCH EXISTING.
6. PROVIDE CAP AS SHOWN IN SITE PLAN.
7. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296785 AND VALVE SCHEDULE ON DWG 1296786.
8. VALVE 266 TO BE RE–USED DURING INSTALLATION OF NEW PIPING.
9. THE CONTRACTOR SHALL INSTALL THRUST BLOCK AT INDICATED LOCATION. REFER TO DETAIL ON DWG 1296784.

UNDERGROUND UTILITIES INFORMATION
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1" = 10'–0" SCALE — 10 5 0 10 20 FEET

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			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005
SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE ✓

FOR DRAWING INDEX SEE DRAWING 1296775

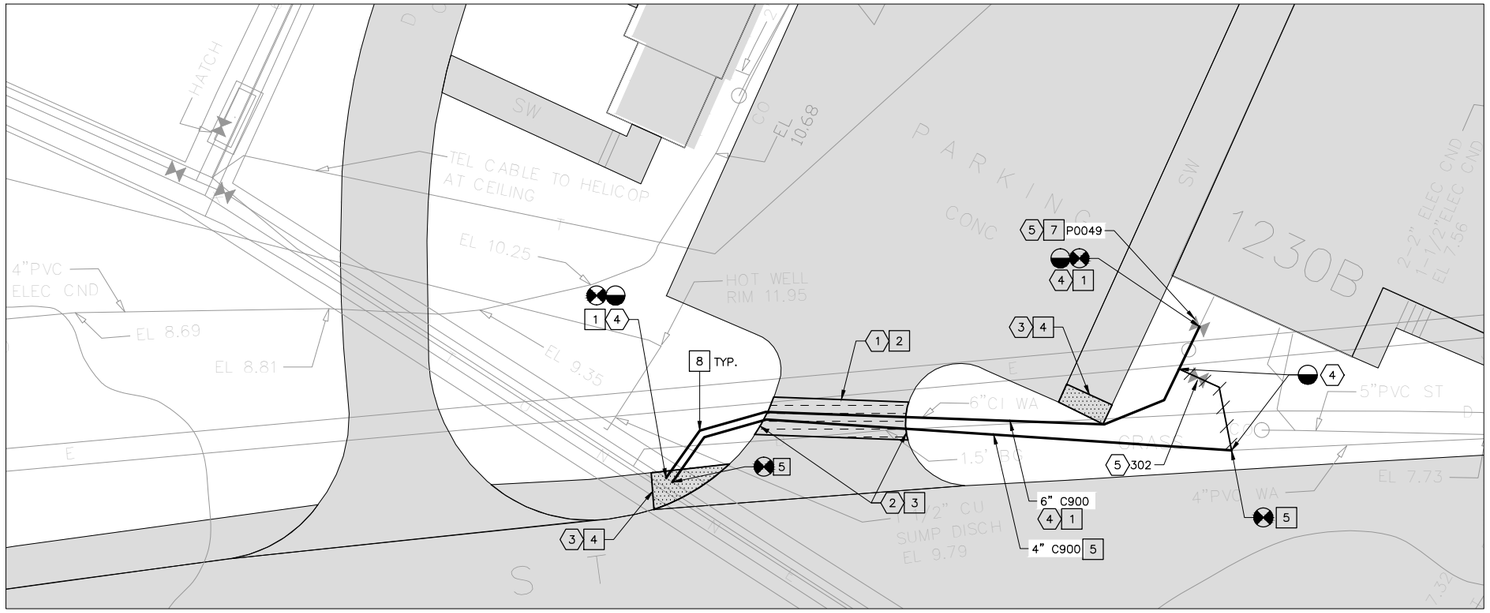
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 2)

DRAWING TITLE: DOMESTIC WATER PIPING AND VALVE REPLACEMENT SITE PLANS

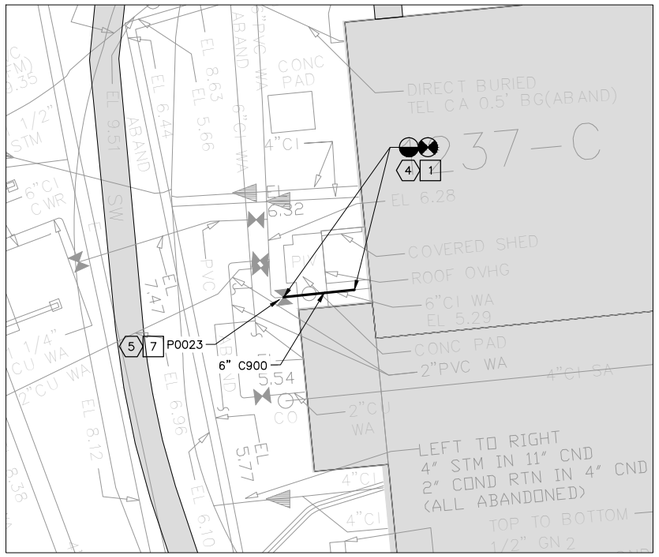
BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296780 | LATEST REV. •

SHEET NO. 2–C102



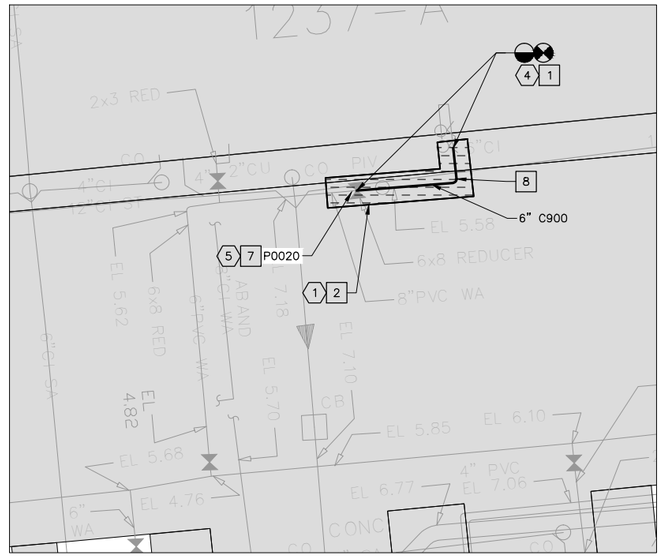
1 2-G102 2-C103 SITE ALTERATION PLAN—BUILDING 1230B
SCALE: 1" = 10'

NORTH



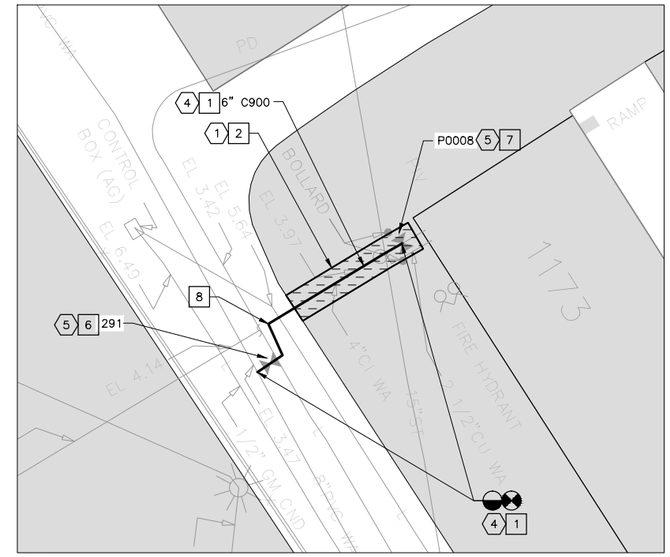
2 2-G102 2-C103 SITE ALTERATION PLAN—BUILDING 1237C
SCALE: 1" = 10'

NORTH



3 2-G102 2-C103 SITE ALTERATION PLAN—BUILDING 1237A
SCALE: 1" = 10'

NORTH



4 2-G102 2-C103 SITE ALTERATION PLAN—BUILDING 1173
SCALE: 1" = 10'

NORTH

REMOVAL NOTES

1. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT PAVEMENT TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF CURB (AND GUTTER) TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
3. THE CONTRACTOR SHALL SAWCUT AND REMOVE 4" (+/−) THICK REINFORCED CONCRETE SIDEWALK TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
4. REMOVE EXISTING WATER PIPING AS SHOWN IN SITE PLAN.
5. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION.
6. THE CONTRACTOR SHALL REMOVE EXISTING SHRUBS AS INDICATED COORDINATE EXTENTS WITH THE CONTRACTING OFFICER.

NEW WORK NOTES

1. PROVIDE NEW WATER PIPING AND ALL FITTINGS AS REQUIRED TO CONNECT TO EXISTING WATER PIPING SYSTEM AS SHOWN IN SITE PLAN. SEE DWG 1296785 FOR TYPICAL CONNECTION DETAIL.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE DETAIL ON DWG 1296784. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. THE CONTRACTOR SHALL INSTALL NEW CURB (AND GUTTER) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT CURB (AND GUTTER).
4. THE CONTRACTOR SHALL PROVIDE NEW REINFORCED SIDEWALK TO MATCH THICKNESS, SLOPE, WIDTH, AND ELEVATION OF EXISTING ADJACENT SIDEWALK. REFER TO DETAIL ON DWG 1296784 AND SPECIFICATION SECTION 03 30 00.00 41.
5. PROVIDE NEW 4" C900 PIPING. PROVIDE NEW CONNECTION AT 8" DCW IN TUNNEL AND ROUTE TO TIE IN POINT AT EXISTING 4" DCW AS SHOWN ON PLAN.
6. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296785 AND VALVE SCHEDULE ON DWG 1296786.
7. PROVIDE NEW POST INDICATOR VALVE. SEE INSTALLATION DETAIL ON DWG 1296785 AND VALVE SCHEDULE ON DWG 1296786.
8. THE CONTRACTOR SHALL INSTALL THRUST BLOCK AT INDICATED LOCATION. REFER TO DETAIL ON DWG 1296784.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE: _____

1" = 10'–0" SCALE 10 5 0 10 20 FEET

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DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS						
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	D. PARKER	07/30/15
ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
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TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005
SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296775

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

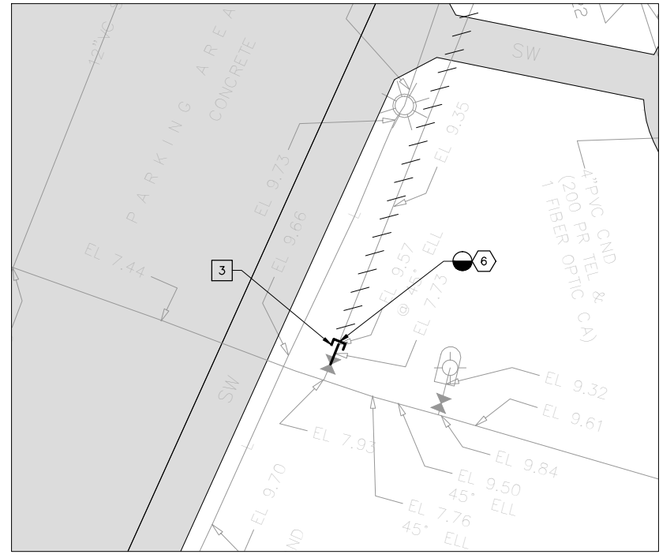
PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 2)

DRAWING TITLE: DOMESTIC WATER PIPING AND VALVE REPLACEMENT SITE PLANS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296781 | LATEST REV. •

SHEET NO. 2–C103

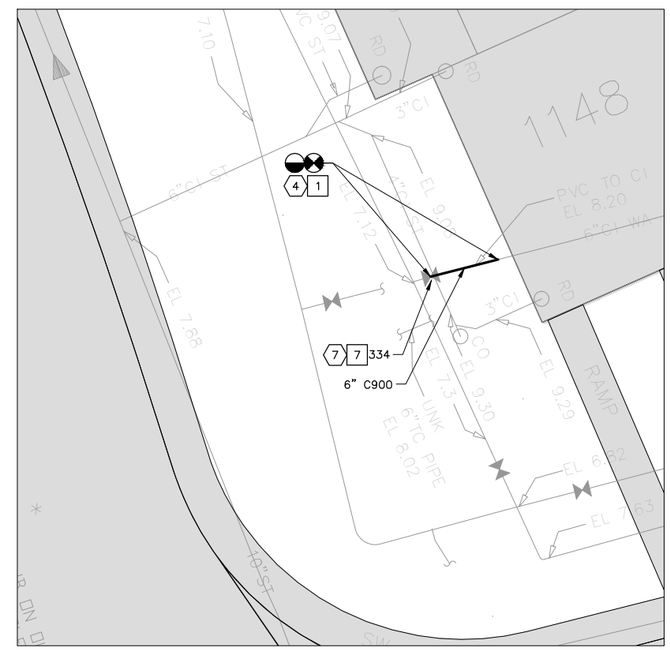
1 SITE ALTERATION PLAN–BUILDING 1228
2–G102|2–C104
SCALE: 1" = 10'
NORTH



2 SITE ALTERATION PLAN–NEAR BUILDING 1308
2–G102|2–C104
SCALE: 1" = 10'
NORTH

3 SITE ALTERATION PLAN–WEST TAYLOR STREET
2–G102|2–C104
SCALE: 1" = 10'
NORTH

4 SITE ALTERATION PLAN–BUILDINGS 1146 AND 1148
2–G102|2–C104
SCALE: 1" = 10'
NORTH



5 SITE ALTERATION PLAN–BUILDING 1148
2–G102|2–C104
SCALE: 1" = 10'
NORTH

REMOVAL NOTES

1. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT PAVEMENT TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF CURB (AND GUTTER) TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
3. THE CONTRACTOR SHALL SAWCUT AND REMOVE 4" (+/–) THICK REINFORCED CONCRETE SIDEWALK TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
4. REMOVE EXISTING WATER PIPING AS SHOWN IN SITE PLAN.
5. DISCONNECT EXISTING WATER PIPING AT POINT INDICATED AND ABANDON IN PLACE AS SHOWN IN SITE PLAN. SEE SITE PLAN 2 ON THIS SHEET FOR OTHER END OF ABANDONED PIPING.
6. DISCONNECT EXISTING WATER PIPING AT POINT INDICATED AND ABANDON IN PLACE AS SHOWN IN SITE PLAN. SEE SITE PLAN 1 ON THIS SHEET FOR OTHER END OF ABANDONED PIPING.
7. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION.
8. THE CONTRACTOR SHALL REMOVE EXISTING SHRUBS AS INDICATED COORDINATE EXTENTS WITH THE CONTRACTING OFFICER.

NEW WORK NOTES

1. PROVIDE NEW WATER PIPING AND ALL FITTINGS AS REQUIRED TO CONNECT TO EXISTING WATER PIPING SYSTEM AS SHOWN IN SITE PLAN. SEE DWG 1296785 FOR TYPICAL CONNECTION DETAIL.
2. PROVIDE SHORT LENGTH OF 3" SCH 80 PVC PIPE BEYOND BRANCH TO BUILDING 1228 AND CAP AS SHOWN IN SITE PLAN.
3. PROVIDE PLUG AT OUTLET OF 2" VALVE AS SHOWN IN SITE PLAN. VALVE TO BE LEFT NORMALLY CLOSED.
4. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE DETAIL ON DWG 1296784. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
5. THE CONTRACTOR SHALL INSTALL NEW CURB (AND GUTTER) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT CURB (AND GUTTER).
6. THE CONTRACTOR SHALL PROVIDE NEW REINFORCED SIDEWALK TO MATCH THICKNESS, SLOPE, WIDTH, AND ELEVATION OF EXISTING ADJACENT SIDEWALK. REFER TO DETAIL ON DWG 1296784 AND SPECIFICATION SECTION 03 30 00.00 41.
7. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296785 AND VALVE SCHEDULE ON DWG 1296786.
8. PROVIDE POST INDICATOR NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296785 AND VALVE SCHEDULE ON DWG 1296786.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE: _____

1" = 10'–0" 10 5 0 10 20 SCALE FEET

REVISIONS								REVISIONS							
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD		DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	

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CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

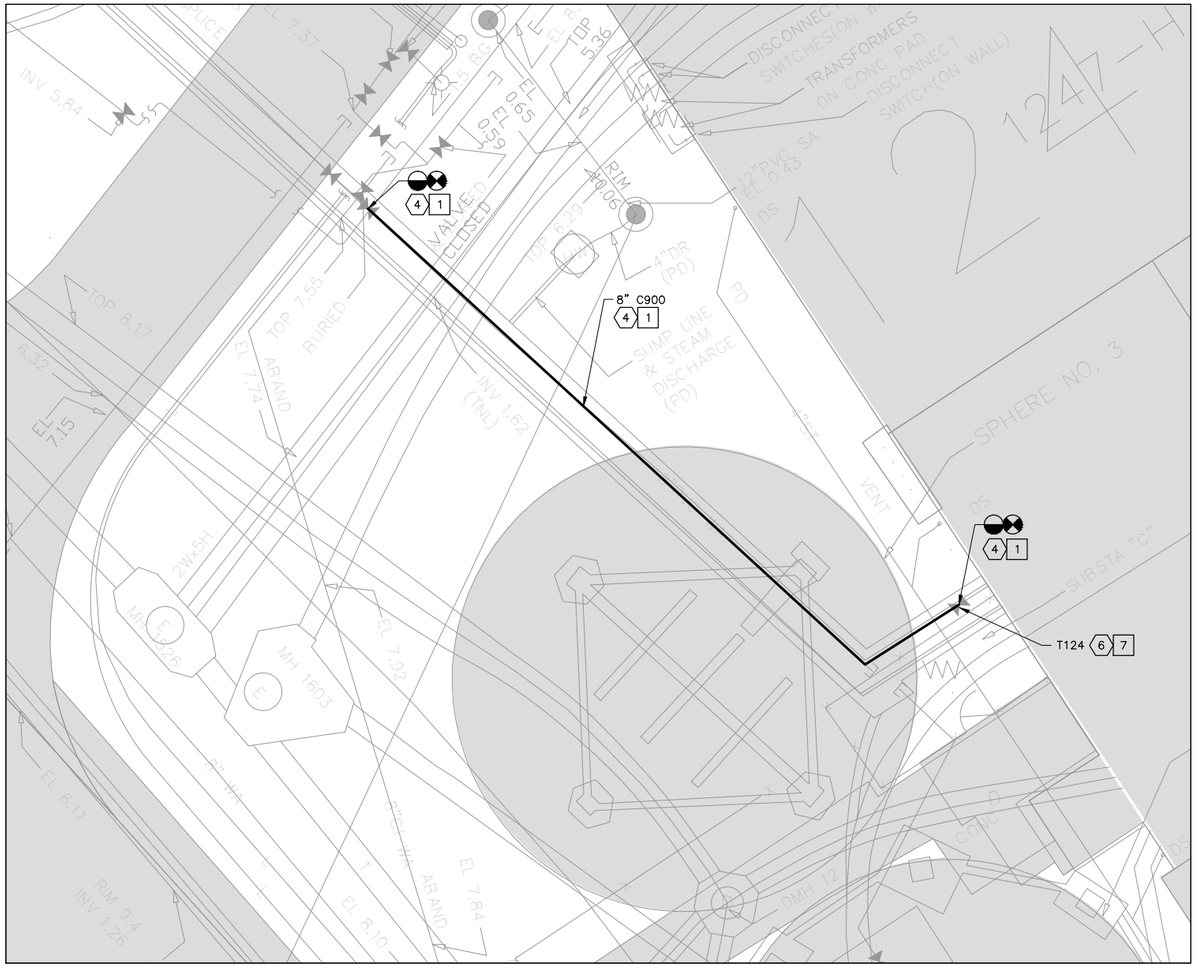
TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005
SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296775

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 2)
DRAWING TITLE: DOMESTIC WATER PIPING AND VALVE REPLACEMENT SITE PLANS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296782 | LATEST REV. ·
SHEET NO. 2–C104



1
2-G102|2-C105

SITE ALTERATION PLAN–BUILDING 1247B

SCALE: 1" = 10'

NORTH

REMOVAL NOTES

1. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT PAVEMENT TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF CURB (AND GUTTER) TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
3. THE CONTRACTOR SHALL SAWCUT AND REMOVE 4" (+/–) THICK REINFORCED CONCRETE SIDEWALK AND CONCRETE STEPS TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
4. REMOVE EXISTING WATER PIPING AS SHOWN IN SITE PLAN.
5. DISCONNECT EXISTING WATER PIPING AT POINT INDICATED AND ABANDON IN PLACE AS SHOWN IN SITE PLAN.
6. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION.
7. THE CONTRACTOR SHALL REMOVE EXISTING SHRUBS AS INDICATED COORDINATE EXTENTS WITH THE CONTRACTING OFFICER.

NEW WORK NOTES

1. PROVIDE NEW WATER PIPING AND ALL FITTINGS AS REQUIRED TO CONNECT TO EXISTING WATER PIPING SYSTEM AS SHOWN IN SITE PLAN. SEE DWG 1296785 FOR TYPICAL CONNECTION DETAIL.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE DETAIL ON DWG 1296784. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. THE CONTRACTOR SHALL INSTALL NEW CURB (AND GUTTER) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT CURB (AND GUTTER).
4. THE CONTRACTOR SHALL PROVIDE NEW REINFORCED SIDEWALK TO MATCH THICKNESS, SLOPE, WIDTH, AND ELEVATION OF EXISTING ADJACENT SIDEWALK. REFER TO DETAIL ON DWG 1296784 AND SPECIFICATION SECTION 03 30 00.00 41.
5. THE CONTRACTOR SHALL PROVIDE NEW CONCRETE STEPS TO MATCH EXISTING.
6. PROVIDE CAP AS SHOWN IN SITE PLAN.
7. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL ON DWG 1296785 AND VALVE SCHEDULE ON DWG 1296786.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE: _____

1" = 10'–0" SCALE 10 5 0 10 20 FEET

REVISIONS															
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
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			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005 — SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296775

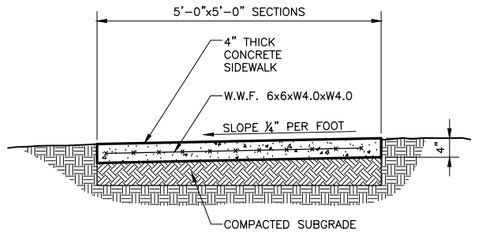
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 2)

DRAWING TITLE: DOMESTIC WATER PIPING AND VALVE REPLACEMENT SITE PLANS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296783 | LATEST REV. ·

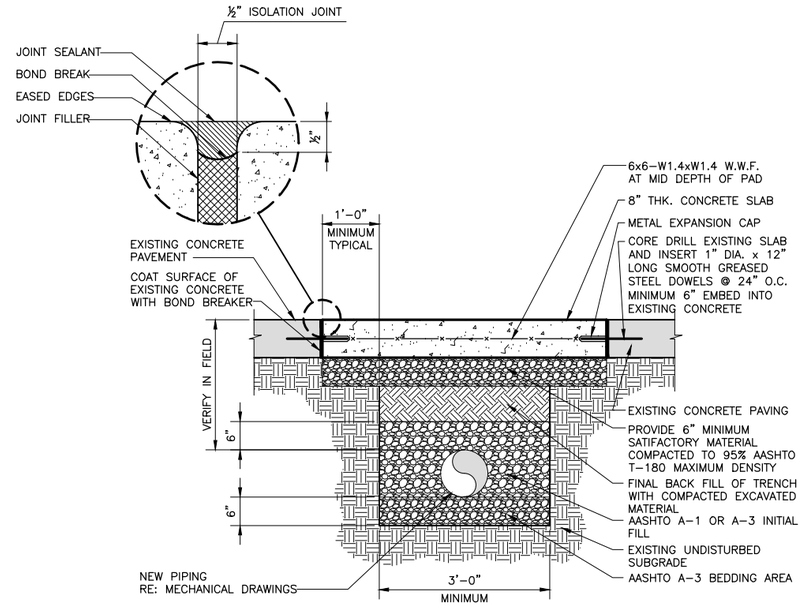
SHEET NO. 2–C105



PROVIDE WEAKENED PLANE JOINTS AT 5'-0" O.C. AND EXPANSION JOINTS WITH SEALANT AT 30'-0" O.C. MAX.

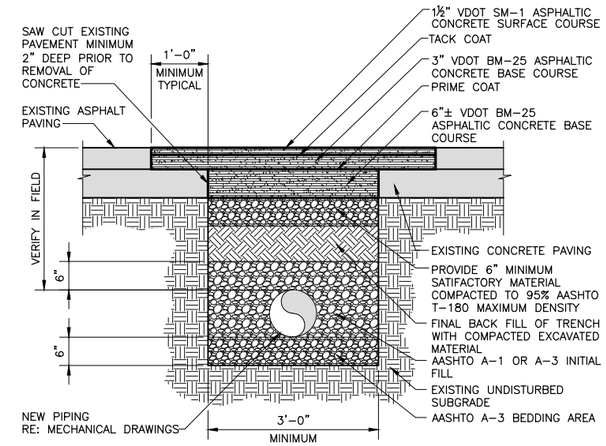
TYPICAL SIDEWALK REPAIR DETAIL

SCALE: 3/4" = 10'



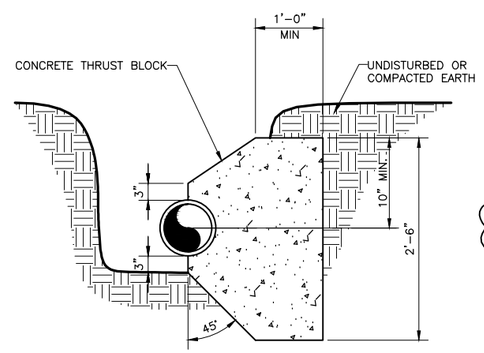
TYPICAL CONCRETE PAVING REPAIR DETAIL

SCALE: 3/4" = 10'

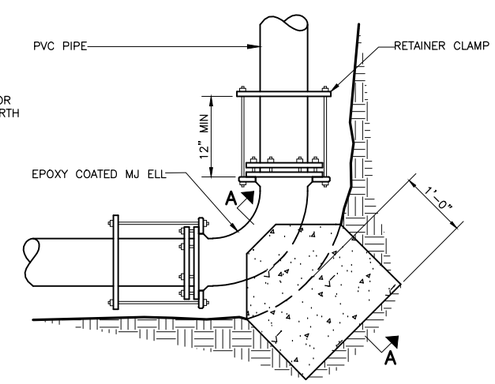


TYPICAL ASPHALT PAVING REPAIR DETAIL

SCALE: 3/4" = 10'



SECTION A – A



PLAN

THRUST BLOCK DETAIL

REQUIRED AT ALL CHANGE OF DIRECTIONS FOR ALL WATER LINES

NOT TO SCALE

3/4" = 1'-0" SCALE — 0 3 6 9 1 0 2 10 3 4 FEET

REVISIONS															
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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NAME	ORGANIZATION	DATE		DATE
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			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

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FOR DRAWING INDEX SEE DRAWING 1296775

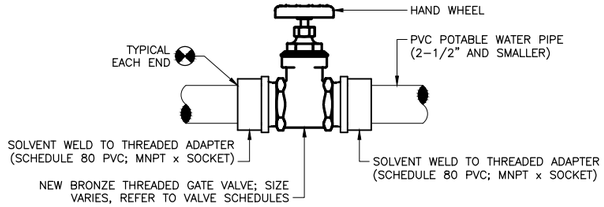
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 2)

DRAWING TITLE: PAVEMENT REPAIR DETAILS

BUILDING NO.	SIZE	DRAWING NO.	LATEST REV.
1215	D	1296784	•

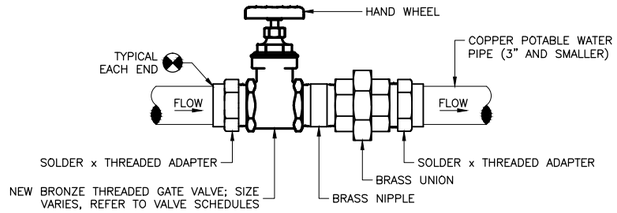
SHEET NO. 2-C501



NOTES:
1. DETAIL APPLIES TO UNDERGROUND VALVES (2–1/2" AND SMALLER). REFER TO VALVE SCHEDULES FOR LOCATIONS.
2. NEW PVC PIPE AND FITTINGS (2–1/2" AND SMALLER) SHALL BE AS SPECIFIED IN CONTRACT SPECIFICATIONS.

TYPICAL UNDERGROUND VALVE CONNECTION DETAIL – PVC PIPE

NOT TO SCALE



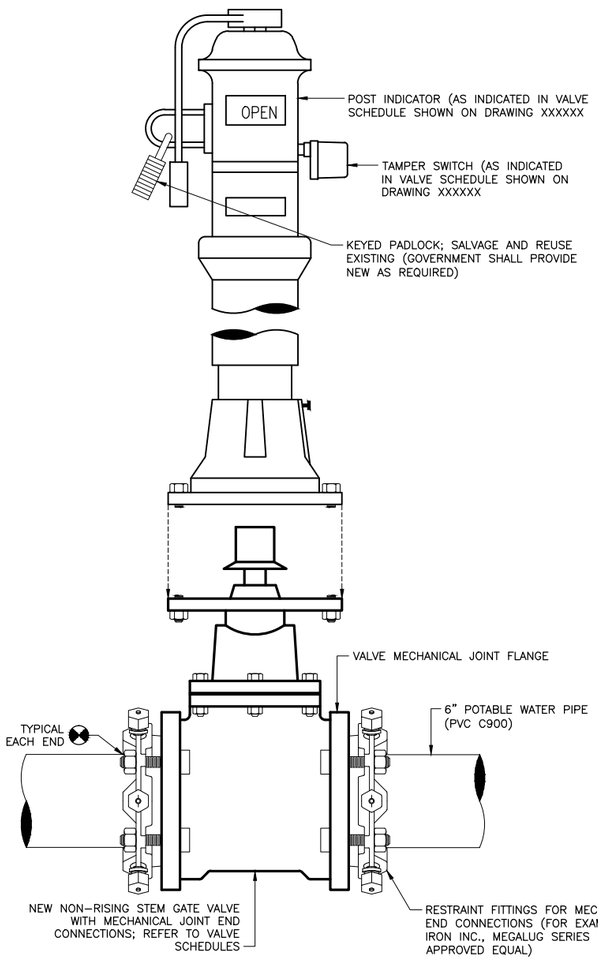
NOTES:
1. DETAIL APPLIES TO UNDERGROUND VALVES (3" AND SMALLER). REFER TO VALVE SCHEDULES FOR LOCATIONS.
2. NEW COPPER PIPE AND FITTINGS SHALL BE AS SPECIFIED IN CONTRACT SPECIFICATIONS.

TYPICAL UNDERGROUND VALVE CONNECTION DETAIL – COPPER PIPE

NOT TO SCALE

MECHANICAL GENERAL NOTES

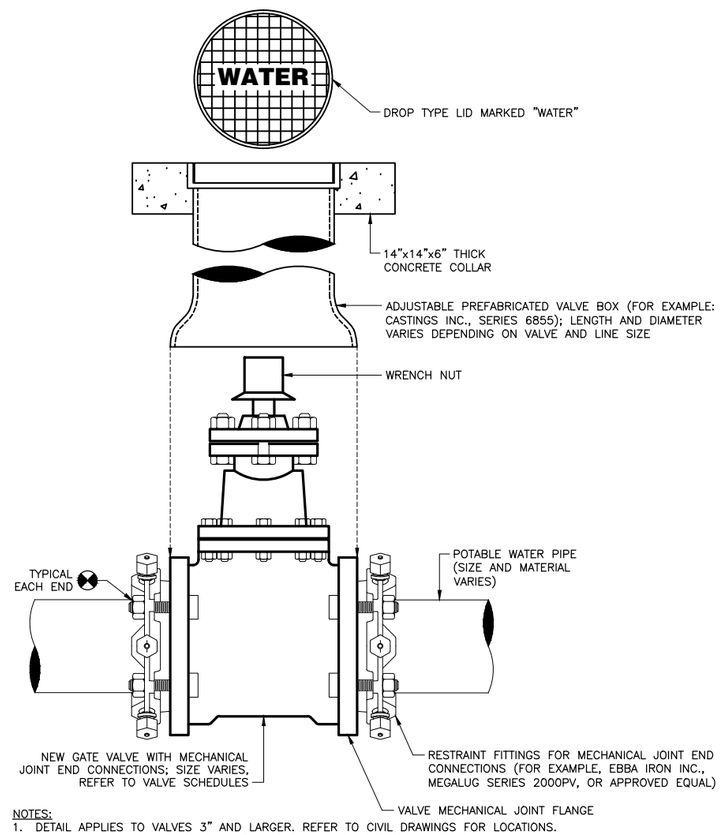
1. ALL WORK INDICATED ON CONTRACT DRAWINGS SHALL BE COMPLETED BY THE CONTRACTOR, UNLESS OTHERWISE NOTED.
2. THE CONTRACTOR SHALL COORDINATE ALL WORK WITH APPLICABLE TRADES TO PROVIDE A FINISHED PRODUCT THAT COMPLIES WITH CONTRACT REQUIREMENTS. CONTRACTOR SHALL ENSURE THE INSTALLATION AND/OR MODIFICATION TO EXISTING AND NEW EQUIPMENT AND PIPING DOES NOT RESTRICT OR IMPEDE ACCESS TO EXISTING AND NEW EQUIPMENT AND VALVES, OR RESTRICT OR ENCROACH INTO THE REQUIRED SERVICE CLEARANCE OF EXISTING AND NEW EQUIPMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY COST INCURRED TO RELOCATE EQUIPMENT, PIPING, AND APPURTENANCES, AS DIRECTED BY THE CONTRACTING OFFICER, THAT WERE MODIFIED OR INSTALLED UNDER THIS CONTRACT THAT RESTRICTS OR ENCROACHES INTO THE SERVICE CLEARANCE OF NEW OR EXISTING EQUIPMENT.
3. IT IS THE CONTRACTORS RESPONSIBILITY TO REMOVE AND DISPOSE OF ALL EQUIPMENT IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REQUIREMENTS. CONTRACTOR SHALL ALSO ADHERE TO NASA LMS–CP–2722 PROPERTY DISPOSAL.
4. DRAWINGS ARE DIAGRAMMATIC AND ARE NOT INTENDED TO BE SCALED TO PROVIDE EXACT LOCATION OF EQUIPMENT, LAYOUT OR ROUTING OF PIPE. DRAWINGS MAY NOT SHOW ALL OFFSETS AND BENDS REQUIRED TO AVOID BUILDING STRUCTURE OR EXISTING COMPONENTS. CONTRACTOR SHALL FIELD VERIFY ALL SITE CONDITIONS, DIMENSIONS, EQUIPMENT LAYOUT, CLEARANCES, AND PIPING PRIOR TO PROCURING MATERIALS OR BEGINNING INSTALLATION OF NEW WORK. ALL DEVIATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE CONTRACTING OFFICER.
5. EQUIPMENT SELECTIONS INDICATED FROM A SPECIFIC MANUFACTURER IS BASIS FOR DESIGN AND FOR REFERENCE ONLY. EQUIPMENT OF EQUAL QUALITY AND PERFORMANCE FROM OTHER MANUFACTURERS MAY BE SUBMITTED TO THE CONTRACTING OFFICER FOR APPROVAL BY THE ENGINEER. CONTRACTOR SHALL SUBMIT REVISED DESIGN INCLUDING LAYOUT, STRUCTURAL SUPPORT AND ANY OTHER DESIGN CHANGES FOR EQUIPMENT OTHER THAN INDICATED. ALL EQUIPMENT INSTALLATION SHALL BE PER MANUFACTURER'S RECOMMENDATIONS. THE REDESIGN COST SHALL BE THE CONTRACTORS RESPONSIBILITY.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSPECTING EXISTING EQUIPMENT AND FINISHES PRIOR TO COMMENCING WORK, AND RECORDING AND REPORTING ANY DAMAGE TO THE CONTRACTING OFFICER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE INCURRED DURING THE WORK EFFORT. SUCH DAMAGE SHALL BE REPLACED OR REPAIRED BY THE CONTRACTOR, TO THE CONTRACTING OFFICER'S SATISFACTION.
7. THE ENDS OF PIPE THAT ARE EXPOSED BY DEMOLITION AND ARE TO BE REUSED IN THE NEW WORK SHALL BE COVERED TO MAINTAIN CLEANLINESS OF SYSTEM FROM DUST AND DEBRIS, AND PROTECTED TO PREVENT DAMAGE.
8. CONTRACTOR SHALL PERFORM TO GREATEST EXTENT POSSIBLE, ALL OF THE FABRICATION, EXAMINATION, AND TESTING WORK IN SHOP TO LIMIT THE TIME OF FIELD WORK AND DOWNTIME OF FACILITY OPERATIONS.
9. THE CONTRACTOR SHALL TAG ALL NEW VALVES WITH THE NUMBERS AS GIVEN ON THE DRAWINGS. VALVE TAGS SHALL BE IN ACCORDANCE WITH NASA LANGLEY HANDBOOK LPR 1710.40, PRESSURE SYSTEMS HANDBOOK. CONTRACTOR SHALL REUSE EXISTING VALVE TAG AS APPLICABLE.



NOTES:
1. DETAIL APPLIES TO ALL NEW POST INDICATOR VALVE LOCATIONS (REFER TO CIVIL DRAWINGS FOR LOCATIONS).
2. REFER TO CONTRACT SPECIFICATIONS FOR DETAILS OF RESTRAINT FITTING.

TYPICAL POST INDICATOR VALVE DETAIL

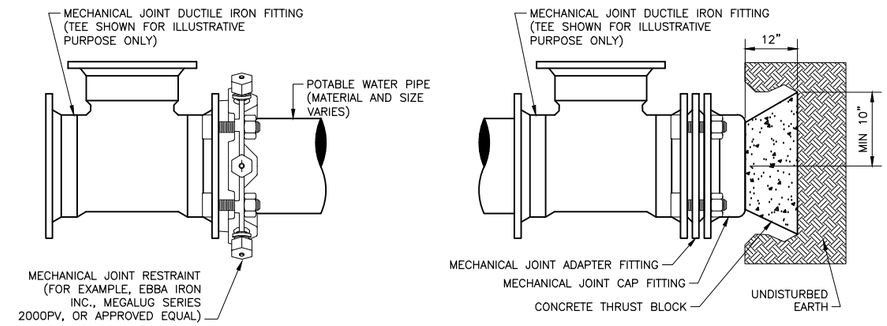
NOT TO SCALE



NOTES:
1. DETAIL APPLIES TO VALVES 3" AND LARGER. REFER TO CIVIL DRAWINGS FOR LOCATIONS.
2. REFER TO CONTRACT SPECIFICATIONS FOR DETAILS OF RESTRAINT FITTING.

TYPICAL VALVE CONNECTION DETAIL (MECHANICAL JOINT ENDS)

NOT TO SCALE



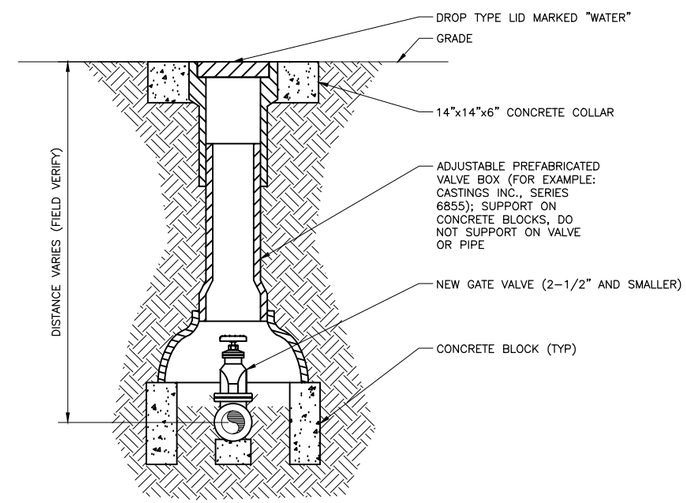
PIPE TO FITTING CONNECTION DETAIL (TEE OR ELBOW) – PLAN VIEW

CAPPED PIPE CONNECTION DETAIL – PLAN VIEW

NOTES:
1. PIPE RESTRAINT REQUIRED AT ALL FITTING END CONNECTIONS; DETAIL SHOWS ONE END FOR ILLUSTRATION PURPOSE ONLY
2. REFER TO CONTRACT SPECIFICATIONS FOR DETAILS OF RESTRAINT FITTINGS.

TYPICAL PVC C900/905 PIPE TO MECHANICAL JOINT FITTING CONNECTION DETAILS

NOT TO SCALE



NOTE: REUSE EXISTING VALVE BOXES AND LIDS TO EXTENT POSSIBLE. SALVAGE AND REINSTALL EXISTING VALVE TAG ON LID AS APPLICABLE.

TYPICAL VALVE BOX DETAIL FOR UNDERGROUND VALVES WITH THREADED ENDS

NOT TO SCALE

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			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± ; X.XX (2 DECIMAL PLACES) ±.02 ; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296775

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 2)

DRAWING TITLE: PIPING AND VALVE DETAILS AND GENERAL NOTES

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296785 | LATEST REV. ·

SHEET NO. 2–M501

POTABLE WATER VALVE SCHEDULE

VALVE TAG No.	BLDG No.	SHEET SHOWN	SERVICE	FUNCTION	SIZE	TYPE	ACTUATION	END CONNECTION	RATED PRESSURE (PSIG)	MANUFACTURER/PART NUMBER (OR EQUAL)	NOTES
083	1247C	2–C102	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
259	1195A	2–C101	POTABLE WATER	ISOLATION	3"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
291	1173	2–C103	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
302	1230B	2–C103	POTABLE WATER	ISOLATION	4"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
334	1148	2–C104	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
350	1228	2–C104	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
551	1288	2–C101	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 4
589	1146	2–C104	POTABLE WATER	ISOLATION	2"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 3, 4
T124	1247B	2–C105	POTABLE WATER	ISOLATION	8"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 5

NOTES
1. REFER TO CONTRACT SPECIFICATION SECTION 33 11 00, PARAGRAPH 2.2 FOR SALIENT FEATURES.
2. VALVE SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C509 STANDARD, AND SHALL BE UL LISTED, FM APPROVED, AND CERTIFIED TO ANSI/NSF 61. STANDARD MECHANICAL JOINT ENDS SHALL COMPLY WITH ANSI/AWWA C111. EPOXY COATING SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C550 STANDARD AND BE CERTIFIED TO ANSI/NSF 61. VALVES SHALL HAVE NON–RISING STEM (NRS), 2" SQUARE WRENCH NUT, AND TRIPLE O–RING SEAL STUFFING BOX (2 UPPER & 1 LOWER O–RINGS), WITH FOURTH O–RING SERVING AS A DIRT SEAL.
3. VALVE SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C509 STANDARD, AND SHALL BE CERTIFIED TO ANSI/NSF 61.
4. VALVE LOCATED BELOW GRADE.
5. VALVE LOCATED IN UTILITY TUNNEL.

POST INDICATOR VALVE SCHEDULE

VALVE TAG No.	BLDG No.	SHEET SHOWN	SERVICE	FUNCTION	SIZE	TYPE	ACTUATION	END CONNECTION	RATED PRESSURE (PSIG)	MANUFACTURER/PART NUMBER (OR EQUAL)	NOTES
P0008	1173	2–C103	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360 WITH MUELLER A–20806 ADJUSTABLE TYPE INDICATOR POST	1, 2, 3, 5
P0013	1208	2–C101	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360 WITH MUELLER A–20806 ADJUSTABLE TYPE INDICATOR POST	1, 2, 3, 5
P0020	1237A	2–C103	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360 WITH MUELLER A–20806 ADJUSTABLE TYPE INDICATOR POST	1, 2, 3, 5
P0023	1237C	2–C103	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360 WITH MUELLER A–20806 ADJUSTABLE TYPE INDICATOR POST	1, 2, 3, 5
P0034	1268	2–C101	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360 WITH MUELLER A–20806 ADJUSTABLE TYPE INDICATOR POST	1, 2, 3, 5
P0049	1230B	2–C103	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360 WITH MUELLER A–20806 ADJUSTABLE TYPE INDICATOR POST	1, 2, 3, 5
P0051	1214	2–C101	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360 WITH MUELLER A–20806 ADJUSTABLE TYPE INDICATOR POST	1, 2, 3, 5
P0078	1148	2–C104	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360 WITH MUELLER A–20806 ADJUSTABLE TYPE INDICATOR POST	1, 2, 3, 4

NOTES
1. REFER TO CONTRACT SPECIFICATION SECTION 33 11 00, PARAGRAPH 2.2 FOR SALIENT FEATURES.
2. ALL VALVES SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C509 STANDARD, AND SHALL BE UL LISTED, FM APPROVED, AND CERTIFIED TO ANSI/NSF 61. STANDARD MECHANICAL JOINT ENDS SHALL COMPLY WITH ANSI/AWWA C111. EPOXY COATING SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C550 STANDARD AND BE CERTIFIED TO ANSI/NSF 61. VALVES SHALL HAVE NON–RISING STEM (NRS), 2" SQUARE WRENCH NUT, AND TRIPLE O–RING SEAL STUFFING BOX (2 UPPER & 1 LOWER O–RINGS), WITH FOURTH O–RING SERVING AS A DIRT SEAL.
3. VALVE LOCATED BELOW GRADE.
4. PROVIDE NEW TAMPER SWITCH (FOR EXAMPLE: POTTER PCVS–2, OR EQUAL) WITH ALL MOUNTING HARDWARE AS REQUIRED. RECONNECT TO EXISTING WIRING.
5. PROVIDE NEW TAMPER SWITCH (FOR EXAMPLE: POTTER PCVS–2, OR EQUAL) WITH ALL MOUNTING HARDWARE AS REQUIRED. NO WIRING IS REQUIRED; THESE WILL BE CONNECTED ON A FUTURE PROJECT.

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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296775

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 2)

DRAWING TITLE: VALVE SCHEDULES

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296786 | LATEST REV. ·

SHEET NO. 2–M601

POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF
(WORK PACKAGE 3)

14" WATER MAIN REPLACEMENT

LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA

DRAWING INDEX – WORK PACKAGE 3

DRAWING No.	SHEET No.	REV.	TITLE
GENERAL			
1296788	3–G001	–	TITLE SHEET
1296789	3–G101	–	KEY PLAN
CIVIL			
1296790	3–C001	–	GENERAL AND CIVIL NOTES, LEGEND, AND ABBREVIATIONS
1296791	3–C101	–	14" WATER MAIN REPLACEMENT SITE PLANS
1296792	3–C102	–	14" WATER MAIN REPLACEMENT SITE PLANS
1296793	3–C103	–	14" WATER MAIN REPLACEMENT SITE PLANS
1296794	3–C104	–	14" WATER MAIN REPLACEMENT SITE PLANS
1296795	3–C105	–	14" WATER MAIN REPLACEMENT SITE PLANS
1296796	3–C106	–	14" WATER MAIN REPLACEMENT SITE PLANS
1296797	3–C107	–	14" WATER MAIN REPLACEMENT SITE PLANS
1296798	3–C108	–	14" WATER MAIN REPLACEMENT SITE PLANS
1296799	3–C109	–	14" WATER MAIN REPLACEMENT SITE PLANS
1296800	3–C501	–	PAVEMENT REPAIR DETAILS
MECHANICAL			
1296801	3–M501	–	PIPING AND VALVE DETAILS, VALVE SCHEDULE, AND GENERAL NOTES

ANNOTATION SYMBOL LEGEND

- [1] NOTE REFERENCE, NEW WORK
- (1) NOTE REFERENCE, DEMOLITION WORK
- 1152 NASA FACILITY NUMBER
- [101] FACILITY ROOM NUMBER
- SECTION LETTER OR DETAIL NUMBER / SHEET SHOWN ON
- SECTION LETTER OR DETAIL NUMBER / SHEET NUMBER ON WHICH SECTION/DETAIL APPEARS / SHEET NUMBER ON WHICH SECTION/DETAIL ORIGINATES
- N — PLAN NORTH / MAGNETIC NORTH
- 123 — VALVE NUMBER / ISOLATION VALVE

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PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

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			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ±; X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

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PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 3)

DRAWING TITLE: TITLE SHEET

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296788 | LATEST REV. ·

SHEET NO. 3–G001

KEY PLAN

SCALE: 1" = 200'

NORTH

1" = 200'-0" 200 100 0 200 400 SCALE FEET

REVISIONS						
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS						
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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FOR DRAWING INDEX SEE DRAWING 1296788

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PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 3)

DRAWING TITLE: KEY PLAN

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296789 | LATEST REV. .

SHEET NO. 3-G101

ABBREVIATIONS

@	–	AT
AASHTO	–	AMERICAN ASSOCIATION OF HIGHWAY AND TRANSPORTATION OFFICIALS
ABAND	–	ABANDON
AF	–	AIR FORCE
AFF	–	ABOVE FINISHED FLOOR
AG	–	ABOVE GRADE/GROUND
ALM	–	ALARM
ALUM	–	ALUMINUM
APPROX	–	APPROXIMATE
ASJ	–	ALL SERVICE JACKET
BG	–	BELOW GRADE/GROUND
B	–	BASELINE
℄	–	BASELINE
BG	–	BELOW GRADE
BLDG	–	BUILDING
BM	–	BENCHMARK
BOT	–	BOTTOM
BRG	–	BEARING
CA	–	CABLE
CAP	–	CAPACITY
CB	–	CATCH BASIN
CO	–	CLEAN OUT
CI	–	CAST IRON
CJ	–	CONTROL JOINT
℄	–	CENTERLINE
CLR	–	CLEAR
CMP	–	CORRUGATED METAL PIPE
CND	–	CONDUIT
CNDS	–	CONDENSATE
CONC	–	CONCRETE
CONT	–	CONTINUOUS
CORP	–	CORPORATION
CP	–	CONCRETE PIPE
CT	–	COOLING TOWER
CU	–	COPPER
CULV	–	CULVERT
CW	–	COLD WATER
CWR	–	COLD WATER RETURN
CWS	–	COLD WATER SUPPLY
D	–	DATA
DB	–	DUCTBANK
DE	–	DOUBTFUL ELEVATION
DEMO	–	DEMOLITION
DI	–	DUCTILE IRON
ø DIA	–	DIAMETER
DN	–	DIAMETER NOMINAL
DN	–	DOWN
DP	–	DIFFERENTIAL PRESSURE
DR	–	DRAIN
?	–	DOUBTFUL
DS	–	DOWNSPOUT
DT	–	DRAIN TILE
E	–	ELECTRIC
EA	–	EACH
EBW	–	ENVIRONMENTAL BLOWDOWN WATER
EC	–	EDGE OF CONCRETE
ED	–	EXISTENCE DOUBTFUL
EJ	–	EXPANSION JOINT
EL	–	ELEVATION
ELEC	–	ELECTRICAL
ELEC	–	ELECTRIC
ELEV	–	ELEVATION
ELL	–	ELBOW
EQ	–	EQUAL
EQUIP	–	EQUIPMENT
EXP	–	EXPANSION
EXP	–	EXPOSED
EXST	–	EXISTING
EXIST	–	EXISTING
FDN	–	FOUNDATION
FF	–	FINISH FLOOR
FH	–	FIRE HYDRANT
FIN	–	FINISH
FIN FL	–	FINISH FLOOR
FL	–	FLOOR
FL	–	FLOW LINE
FLDT	–	FLOODLIGHT
FM	–	FIRE MAIN
FM	–	FORCED MAIN
FND	–	FOUNDATION
FT	–	FEET
FTNG	–	FOOTING
G	–	GAS
GALV	–	GALVANIZED
GB	–	GRADE BEAM
GFE	–	GOVERNMENT FURNISHED EQUIPMENT
GM	–	GALVANIZED METAL
GMP	–	GALVANIZED METAL PIPE
GND	–	GROUND
GOVT	–	GOVERNMENT
H	–	HIGH
H_2	–	HYDROGEN
HC	–	HANDICAPPED
HCR	–	HIGH PRESSURE CONDENSATE RETURN
HD	–	HEAD
HDPE	–	HIGH DENSITY POLYETHYLENE
HH	–	HAND HOLE
HM	–	HOLLOW METAL
HPS	–	HIGH PRESSURE STEAM
HP	–	HIGH POINT
HP	–	HIGH PRESSURE
HW	–	HEADWALL
HW	–	HOT WATER
HZ	–	HERTZ
IJ	–	ISOLATION JOINT
INV	–	INVERT
JB	–	JUNCTION BOX
JT	–	JOINT
KCMIL	–	THOUSAND CIRCULAR MIL
KV	–	KILO VOLTS
KW	–	KILOWATT
L	–	LIGHT
LG	–	LONG
LN2	–	LIQUID NITROGEN
LP	–	LOW POINT
LPR	–	LOW PRESSURE RETURN
LPS	–	LOW PRESSURE STEAM
LT	–	LEFT
MAX	–	MAXIMUM
ME	–	MATCH EXISTING
MECH	–	MECHANICAL
MET	–	METAL
MH	–	MANHOLE
MIN	–	MINIMUM
MJ	–	MECHANICALLY JOINED
MON	–	MONUMENT
No.	–	NUMBER
NRCP	–	NON–REINFORCED CONCRETE PIPE
O	–	OVERHEAD
OA	–	OUTSIDE AIR
OAT	–	OUTSIDE AIR TEMPERATURE
OC	–	ON CENTER
OH	–	OVERHEAD
OL	–	OVERHEAD LINE
OPP	–	OPPOSITE
P	–	PIPE
PAVT	–	PAVEMENT
PB	–	PULL BOX
PC	–	PUMPED CONDENSATE
PCR	–	PUMPED CONDENSATE RETURN
PD	–	POSITION DOUBTFUL
Pe	–	PROPANE
PED	–	PEDESTAL
P.I.V.	–	POST INDICATOR VALVE
PNL	–	PANEL
PROB	–	PROBABLE
PSI	–	POUNDS PER SQUARE INCH
PVC	–	POLYVINYL CHLORIDE
PWR	–	POWER
R	–	RADIUS
R	–	RISER
RC	–	REINFORCED CONCRETE
RCP	–	REINFORCED CONCRETE PIPE
RD	–	ROOF DRAIN
RDCR	–	REDUCER
RE	–	REFER
REF	–	REFERENCE
REIN	–	REINFORCING
REQ'D	–	REQUIRED
RET	–	RETURN
RGSC	–	RIGID GALVANIZED STEEL CONDUIT
RL	–	REFRIGERANT LIQUID
ROW	–	RIGHT OF WAY
RPM	–	REVOLUTIONS PER MINUTE
RS	–	REFRIGERANT SUCTION
RS	–	RIGID STEEL
RT	–	RIGHT
S	–	SOUTH
SA	–	SANITARY
SCH	–	SCHEDULE
SHT	–	SHEET
SIM	–	SIMILIAR
SLV	–	SLEEVE
SP	–	STATIC PRESSURE
SPLY	–	SUPPLY
SQ	–	SQUARE
SS	–	STAINLESS STEEL
ST	–	STORM
STA	–	STATION
STL	–	STEEL
STM	–	STEAM
STOR	–	STORAGE
SUBSTA	–	SUBSTATION
SW	–	SIDEWALK
SWGR	–	SWITCHGEAR
T	–	TELEPHONE
TB	–	TOP OF BOARD
TC	–	TERRA COTTA
TC	–	TOP OF CURB
TD	–	TOP OF DRAIN
TEL	–	TELEPHONE
THK	–	THICK
TNK	–	TANK
TOB	–	TOP OF BOARD
TOC	–	TOP OF CURB
TP	–	TOP OF PIPE
TRANS	–	TRANSFORMER
TRLR	–	TRAILER
TYP	–	TYPICAL
UGND	–	UNDERGROUND
UNK	–	UNKNOWN
UON	–	UNLESS OTHERWISE NOTED
UTIL	–	UTILITY
V	–	VALVE, VOLT
VAC	–	VACUUM
VC	–	VITRIFIED CLAY PIPE
VCP	–	VALVE CAPPED PIPE
VDOT	–	VA DEPARTMENT OF TRANSPORTATION
VERT	–	VERTICAL
VNG	–	VIRGINIA NATURAL GAS
W	–	WIDE
W/	–	WITH
WA	–	WATER
WL	–	WATER LINE
WWF	–	WELDED WIRE FABRIC
XFMP	–	TRANSFORMER MONITORING PANEL

CIVIL LEGEND (APPLIES TO ALL CIVIL SHEETS)

- EXISTING DUCTBANK
- EL 8.50 — ELEV OF TOP OF EXISTING UTILITY LINE
- EXISTING PIPING TO BE REMOVED
- EXISTING PIPING TO BE ABANDONED IN PLACE
- EXISTING BUILDING TO REMAIN
- DEMOLISHED/NEW PAVEMENT
- DEMOLISHED/NEW SIDEWALK
- NEW TO EXISTING CONNECTION
- POINT OF DISCONNECT
- X — FENCING

MANHOLE	LINE
STORM	ST — DIA.
SANITARY	SA
ELECTRICAL	E
TELEPHONE	T

- FIRE HYDRANT
- CATCH BASIN
- CLEAN OUT
- VALVE
- WA — WATER LINE
- BENCH MARK

GENERAL NOTES

1. ALL EXISTING SIZES ARE IN ENGLISH UNITS.
2. ALL ITEMS SHALL BE CONSIDERED AS EXISTING UNLESS OTHERWISE INDICATED AS BEING NEW.
3. SUBSURFACE UTILITIES NOT DESIGNATED FOR DEMOLITION OR MODIFICATION SHALL NOT BE DISTURBED.
4. CONSTRUCTION OPERATIONS SHALL BE CONDUCTED SO THAT NEW WORK FOR SUBSURFACE UTILITIES SHALL BE INSTALLED AS COMPLETELY AS PRACTICABLE BEFORE DISRUPTION OF EXISTING SERVICES.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DIMENSIONS AND ELEVATIONS. NECESSARY FOR THE PROPER CONSTRUCTION AND ALIGNMENT OF THE NEW CONDITIONS TO THE EXISTING CONDITIONS. THE CONTRACTOR SHALL MAKE ALL FIELD MEASUREMENTS NECESSARY FOR CONSTRUCTION. THE CONTRACTOR SHALL MAINTAIN A RED–LINED SET OF CONTRACT DRAWINGS THAT REFLECT CURRENT "AS–BUILT" CONDITIONS AND SUBMIT THE DRAWINGS TO THE CONTRACTING OFFICER AFTER COMPLETION OF CONSTRUCTION.
6. VERIFY THE LOCATION OF NEW WORK WITH FACILITY COORDINATOR AND CONSTRUCTION MANAGER.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ALL NON–HAZARDOUS DEBRIS GENERATED FROM THE PROJECT FROM THE CENTER PRIOR TO OR UPON COMPLETION OF THE PROJECT IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS.
8. ELEVATIONS USED ON ALL CIVIL DRAWINGS ARE BASED ON NAVD 88 (NORTH AMERICAN VERTICAL DATUM).
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING AND PROTECTING EQUIPMENT AND UNDERGROUND UTILITIES TO REMAIN. THE CONTRACTOR SHALL PERFORM A FIELD SURVEY, INCLUDING INSPECTION OF SITE CLEARANCES AND REMOVAL/INSTALLATION ROUTE INTENDED TO BE INCORPORATED INTO THE EXISTING SYSTEM PRIOR TO PROCEEDING WITH WORK. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR REPAIRS OR MODIFICATIONS NECESSARY TO MAKE THE SYSTEM PERFORM AS REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING EQUIPMENT AT NO ADDITIONAL COST TO THE GOVERNMENT.
10. THE CONTRACTOR SHALL COORDINATE ANY IMPACTS TO TRAFFIC FLOW DURING CONSTRUCTION WITH THE CONTRACTING OFFICER PRIOR TO PROCEEDING WITH WORK AFFECTING GOVERNMENT STREETS. FIRE AND RESCUE VEHICLE ACCESS TO ALL BUILDINGS SHALL BE MAINTAINED DURING CONSTRUCTION.
11. ALL SIGNS, LANDSCAPING, STRUCTURES OR OTHER APPURTENANCES DISTURBED OR DAMAGED DURING CONSTRUCTION SHALL BE REPLACED OR REPAIRED BY THE CONTRACTOR AT NO COST TO THE GOVERNMENT.
12. ALL TREES WITHIN THE CONSTRUCTION AREA NOT SPECIFICALLY DESIGNATED FOR REMOVAL SHALL BE PRESERVED, WHETHER SHOWN OR NOT SHOWN ON THE CONTRACT DRAWINGS UNLESS COORDINATED WITH THE CONTRACTING OFFICER. TREES TO BE PRESERVED SHALL BE PROTECTED WITH HIGH VISIBILITY FENCING PLACED A MINIMUM OF 5' FROM THE TREE TRUNK. THE CONTRACTOR SHALL CLEAN CUT ANY TREE ROOTS LARGER THAN 3 INCHES IN DIAMETER WHERE NECESSARY FOR CONSTRUCTION. IF TREES NOT INDICATED FOR REMOVAL ARE DAMAGED OR KILLED DURING OR UP TO 1 YEAR AFTER CONSTRUCTION THE CONTRACTOR SHALL COORDINATE WITH THE CONTRACTING OFFICER TO DEVELOP A REPLACEMENT STRATEGY AT THE CONTRACTOR'S EXPENSE.

CIVIL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR ALL SHORING AND BRACING OF EXCAVATION. SHORING AND BRACING SHALL BE MAINTAINED REGARDLESS OF THE LENGTH OF TIME THE EXCAVATION SHALL BE OPEN.
2. WATER SHALL NOT BE PERMITTED TO ACCUMULATE IN EXCAVATIONS. DEWATERING SYSTEMS SHALL BE PROVIDED BY THE CONTRACTOR TO CONVEY WATER AWAY FROM EXCAVATIONS. DEWATERING SYSTEM AND METHODS OF DISPOSAL SHALL BE APPROVED BY THE CONSTRUCTION MANAGER.
3. PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL LOCATE ALL EXISTING UNDERGROUND UTILITY LINES IN THE AREA OF PROPOSED EXCAVATION.
4. CONTRACTOR SHALL HAND DIG TO EXPOSE AND VERIFY LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO ANY MACHINE EXCAVATION. EXISTING UTILITY LOCATIONS SHOWN ARE BASED ON BEST AVAILABLE INFORMATION AND MAY NOT REFLECT FIELD CONDITIONS. NO EXCAVATION IS ALLOWED TO START WITHOUT FIRST RECEIVING A DIGGING PERMIT FROM LaRC IQA TEAM. CALL 864–7265.
5. ALL DISTURBED AREAS NEAR BUILDINGS OR PAVEMENT SHALL BE GRADED FOR DRAINAGE.
6. SEE SPECIFICATION SECTION 01 35 40.00 41 FOR REQUIREMENTS FOR EXCAVATED SOIL TO BE REMOVED FROM LaRC. IF SOIL IS STOCKPILED THE CONTRACTOR SHALL CONTROL THE AREA AND BE HELD RESPONSIBLE FOR THE REMOVAL OF SOIL FROM LaRC UPON COMPLETION OF JOB.
7. TOPSOIL BROUGHT ONTO CENTER SHALL BE TESTED PER SPECIFICATION SECTION 01 35 40.00 41. PROVIDE BACKFILL AND TOPSOIL IN AREAS WHERE GRADE HAS BEEN DISTURBED FROM BUILDING AND UTILITY REMOVAL. FINISHED GRADING SHALL MATCH CONTOURS OF ADJACENT GRASS AREA. SEED WITH KENTUCKY FESCUE 31 ALL GRASSED AREAS. SEED SHALL BE UNIFORMLY BROADCAST AT THE RATE OF 35 POUNDS PER ACRE. PROVIDE TOPSOIL AND SEEDING IN CONFORMANCE WITH 31 23 00.00 41.
8. PROVIDE EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH SPECIFICATION SECTION 01 35 40.00 41.
9. CONCRETE/ASPHALTIC JOINT SEALANT SHALL BE ELASTOMERIC SEALANT ASTM C 920, SINGLE OR MULTI COMPONENT TYPE, POURABLE OR SELF–LEVELING, WITHSTANDING INCREASE AND DECREASE OF AT LEAST 25 PERCENT OF JOINT WIDTH, FOR USE IN PEDESTRIAN AND VEHICULAR AREAS, CONFORMING TO ASTM C92.
10. CONTRACTOR SHALL SUBMIT FOR APPROVAL A JOB–MIX DESIGN, TEST REPORTS AND OTHER DOCUMENTATION NECESSARY FOR THE CONTRACTING OFFICER TO DETERMINE CONFORMANCE WITH REQUIRED GRADING, ASPHALT CONTENT AND TEMPERATURE PROPERTIES FOR ASPHALT CONCRETE.
11. SUBSURFACE: REMOVE EXISTING MATERIAL TO UNDISTURBED EARTH (APPROX. 4 FT.) AND BACKFILL WITH SELECT AGGREGATE MATERIAL COMPACTED TO 100 PERCENT OF MAXIMUM DENSITY OBTAINED BY ASTM D1557.
12. REFER TO SPECIFICATION SECTION 31 23 00.00 41 FOR EXCAVATION NEAR EXISTING UTILITIES.
13. LOCATION, SUPPORT, PROTECTION AND RESTORATION OF ALL EXISTING UTILITIES AND APPURTENANCES, WHETHER SHOWN OR NOT SHOWN ON THE CONTRACT DRAWINGS, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. WHEN UNKNOWN OR INCORRECTLY LOCATED UNDERGROUND UTILITIES ARE ENCOUNTERED DURING CONSTRUCTION THE CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER PRIOR TO PROCEEDING WITH WORK.
14. THE CONTRACTOR SHALL VERIFY THE CONDITION OF ABANDONED UTILITIES WITH THE CONTRACTING OFFICER PRIOR TO CUTTING AND CAPPING IF NEEDED FOR THE INSTALLATION OF NEW WORK.
15. THE CONTRACTOR SHALL RESTORE ALL DISTURBED AREAS TO EQUAL OR BETTER CONDITION THAN EXISTED BEFORE CONSTRUCTION AS COORDINATED WITH THE CONTRACTING OFFICER. DRAINAGE DITCHES OR WATERCOURSES THAT ARE DISTURBED BY CONSTRUCTION SHALL BE RESTORED TO THE GRADES AND CROSS-SECTIONS THAT EXISTED BEFORE CONSTRUCTION.
16. EXISTING STRIPING, MARKINGS, PAVEMENT MARKERS, LANDSCAPING, CURBS, AND SIDEWALK DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPLACED IN KIND BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE GOVERNMENT.
17. THE CONTRACTOR SHALL PERFORM DEMOLITION AND EXCAVATION IN A MANNER THAT WILL MINIMIZE DUST, NOISE, AND OTHER NUISANCE. MAINTAIN HAUL ROUTES FOR DISPOSAL OF MATERIAL CLEAN AND FREE OF DEBRIS. TRACKING OR SPILLING MUD, DIRT OR DEBRIS UPON NASA STREETS AND SIDEWALKS SHALL BE CLEANED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE GOVERNMENT.

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	D. PARKER	07/30/15
ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
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			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± ; X.XX (2 DECIMAL PLACES) ±.02 ; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296788

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 3)

DRAWING TITLE: GENERAL AND CIVIL NOTES, LEGEND, AND ABBREVIATIONS

BUILDING NO.	SIZE	DRAWING NO.	LATEST REV.
1215	D	1296790	•

SHEET NO. 3–C001

1 SITE ALTERATION PLAN – 14" WATER MAIN
3-G101 3-C101
SCALE: 1" = 10'

NORTH

2 SITE ALTERATION PLAN – 14" WATER MAIN
3-G101 3-C101
SCALE: 1" = 10'

NORTH

REMOVAL NOTES

1. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT PAVEMENT TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
2. REMOVE EXISTING WATER PIPING AS SHOWN IN SITE PLAN.
3. THE CONTRACTOR SHALL REMOVE EXISTING SHRUBS AS INDICATED. COORDINATE EXTENTS WITH THE CONTRACTING OFFICER.

NEW WORK NOTES

1. PROVIDE NEW WATER PIPING AND ALL FITTINGS AS REQUIRED TO CONNECT TO EXISTING WATER PIPING SYSTEM AS SHOWN IN SITE PLAN. SEE DWG 1296801 FOR TYPICAL CONNECTION DETAIL.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE DETAIL ON DWG 1296800. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. THE CONTRACTOR SHALL INSTALL THRUST BLOCK AT INDICATED LOCATION. REFER TO DETAIL ON DWG 1296800.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE: _____

1" = 10'–0" 10 5 0 10 20 SCALE FEET

REVISIONS															
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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296788

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PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 3)

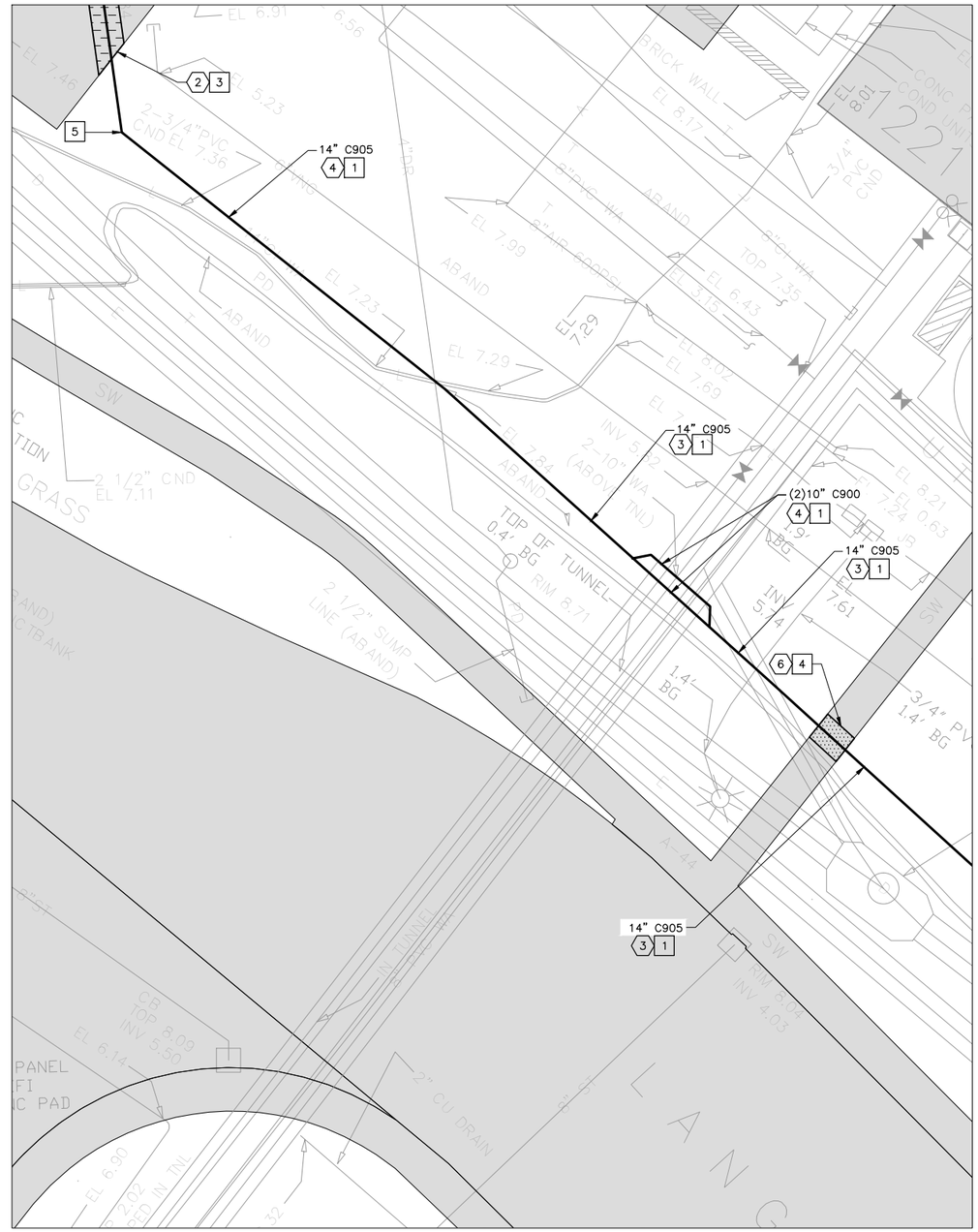
DRAWING TITLE: 14" WATER MAIN AND VALVE REPLACEMENT SITE PLAN

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296791 | LATEST REV. •

SHEET NO. 3–C101

1 3-G101 3-C102 SITE ALTERATION PLAN – 14" WATER MAIN
SCALE: 1" = 10'

NORTH



2 3-G101 3-C102 SITE ALTERATION PLAN – 14" WATER MAIN
SCALE: 1" = 10'

NORTH

REMOVAL NOTES

1. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT PAVEMENT TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF CURB (AND GUTTER) TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
3. REMOVE EXISTING WATER PIPING AS SHOWN IN SITE PLAN.
4. REMOVE EXISTING WATER PIPING FROM VALVE T122 TO VALVE T124 IN TUNNEL 1 AS SHOWN IN SITE PLAN.
5. DISCONNECT EXISTING WATER PIPING AT POINT INDICATED AND ABANDON IN PLACE AS SHOWN IN SITE PLAN.
6. THE CONTRACTOR SHALL SAWCUT AND REMOVE 4" (+/–) THICK REINFORCED CONCRETE SIDEWALK TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.

NEW WORK NOTES

1. PROVIDE NEW WATER PIPING AND ALL FITTINGS AS REQUIRED TO CONNECT TO EXISTING WATER PIPING SYSTEM AS SHOWN IN SITE PLAN. SEE DWG 1296801 FOR TYPICAL CONNECTION DETAIL.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE DETAIL ON DWG 1296800. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. THE CONTRACTOR SHALL INSTALL NEW CURB (AND GUTTER) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT CURB (AND GUTTER).
4. THE CONTRACTOR SHALL PROVIDE NEW REINFORCED SIDEWALK TO MATCH THICKNESS, SLOPE, WIDTH, AND ELEVATION OF EXISTING ADJACENT SIDEWALK. REFER TO DETAIL ON DWG 1296800 AND SPECIFICATION SECTION 03 30 00.00 41.
5. THE CONTRACTOR SHALL INSTALL THRUST BLOCK AT INDICATED LOCATION. REFER TO DETAIL ON DWG 1296800.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE: _____

1" = 10'–0" 10 5 0 10 20 SCALE FEET

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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296788

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HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 3)

DRAWING TITLE: 14" WATER MAIN AND VALVE REPLACEMENT SITE PLAN

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296792 | LATEST REV. ·

SHEET NO. 3–C102

1 SITE ALTERATION PLAN – 14" WATER MAIN

3-G1013-C103

SCALE: 1" = 10'

NORTH

REMOVAL NOTES

1. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT PAVEMENT TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF CURB (AND GUTTER) TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
3. REMOVE EXISTING WATER PIPING AS SHOWN IN SITE PLAN.
4. DISCONNECT EXISTING WATER PIPING AT POINT INDICATED AND ABANDON IN PLACE AS SHOWN IN SITE PLAN.
5. THE CONTRACTOR SHALL REMOVE EXISTING SHRUBS AS INDICATED COORDINATE EXTENTS WITH THE CONTRACTING OFFICER.

NEW WORK NOTES

1. PROVIDE NEW WATER PIPING AND ALL FITTINGS AS REQUIRED TO CONNECT TO EXISTING WATER PIPING SYSTEM AS SHOWN IN SITE PLAN. SEE DWG 1296801 FOR TYPICAL CONNECTION DETAIL.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE DETAIL ON DWG 1296800. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. THE CONTRACTOR SHALL INSTALL NEW CURB (AND GUTTER) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT CURB (AND GUTTER).
4. THE CONTRACTOR SHALL INSTALL THRUST BLOCK AT INDICATED LOCATION. REFER TO DETAIL ON DWG 1296800.

UNDERGROUND UTILITIES INFORMATION
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1" = 10'–0" SCALE — 10 5 0 10 20 FEET

FOR DRAWING INDEX SEE DRAWING 1296788

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PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 3)

DRAWING TITLE: 14" WATER MAIN AND VALVE REPLACEMENT SITE PLAN

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296793 | LATEST REV. ·

SHEET NO. 3–C103

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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

1 3-G1013-C104 SITE ALTERATION PLAN – 14" WATER MAIN
SCALE: 1" = 20'

NORTH

2 3-G1013-C104 SITE ALTERATION PLAN – 14" WATER MAIN
SCALE: 1" = 20'

NORTH

REMOVAL NOTES

1. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT PAVEMENT TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF CURB (AND GUTTER) TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
3. THE CONTRACTOR SHALL SAWCUT AND REMOVE 4" (+/–) THICK REINFORCED CONCRETE SIDEWALK TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
4. REMOVE EXISTING WATER PIPING AS SHOWN IN SITE PLAN.
5. DISCONNECT EXISTING WATER PIPING AT POINT INDICATED AND ABANDON IN PLACE AS SHOWN IN SITE PLAN.

NEW WORK NOTES

1. PROVIDE NEW WATER PIPING AND ALL FITTINGS AS REQUIRED TO CONNECT TO EXISTING WATER PIPING SYSTEM AS SHOWN IN SITE PLAN. SEE DWG 1296801 FOR TYPICAL CONNECTION DETAIL.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE DETAIL ON DWG 1296800. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. THE CONTRACTOR SHALL INSTALL NEW CURB (AND GUTTER) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT CURB (AND GUTTER).
4. THE CONTRACTOR SHALL PROVIDE NEW REINFORCED SIDEWALK TO MATCH THICKNESS, SLOPE, WIDTH, AND ELEVATION OF EXISTING ADJACENT SIDEWALK. REFER TO DETAIL ON DWG 1296800 AND SPECIFICATION SECTION 03 30 00.00 41.
5. THE CONTRACTOR SHALL INSTALL THRUST BLOCK AT INDICATED LOCATION. REFER TO DETAIL ON DWG 1296800.

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FOR DRAWING INDEX SEE DRAWING 1296788

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 3)

DRAWING TITLE: 14" WATER MAIN AND VALVE REPLACEMENT SITE PLAN

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296794 | LATEST REV. ·

SHEET NO. 3–C104

1 3-G1013-C105 SITE ALTERATION PLAN – 14" WATER MAIN
SCALE: 1" = 10'

NORTH

2 3-G1013-C105 SITE ALTERATION PLAN – 14" WATER MAIN
SCALE: 1" = 10'

NORTH

REMOVAL NOTES

1. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT PAVEMENT TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF CURB (AND GUTTER) TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
3. THE CONTRACTOR SHALL SAWCUT AND REMOVE 4" (+/–) THICK REINFORCED CONCRETE SIDEWALK TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
4. REMOVE EXISTING WATER PIPING AS SHOWN IN SITE PLAN.
5. REMOVE EXISTING PIPING AND VALVE AS INDICATED ON PLAN. FILL PIPE PENETRATION WITH NON–SHRINK GROUT AND SMOOTH FLUSH WITH SURFACE OF VALVE PIT.
6. THE CONTRACTOR SHALL REMOVE EXISTING SHRUBS AS INDICATED. COORDINATE EXTENTS WITH THE CONTRACTING OFFICER.
7. DISCONNECT EXISTING WATER PIPING AT POINT INDICATED AND ABANDON IN PLACE AS SHOWN IN SITE PLAN.

NEW WORK NOTES

1. PROVIDE NEW WATER PIPING AND ALL FITTINGS AS REQUIRED TO CONNECT TO EXISTING WATER PIPING SYSTEM AS SHOWN IN SITE PLAN. SEE DWG 1296801 FOR TYPICAL CONNECTION DETAIL.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE DETAIL ON DWG 1296800. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. THE CONTRACTOR SHALL INSTALL NEW CURB (AND GUTTER) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT CURB (AND GUTTER).
4. THE CONTRACTOR SHALL PROVIDE NEW REINFORCED SIDEWALK TO MATCH THICKNESS, SLOPE, WIDTH, AND ELEVATION OF EXISTING ADJACENT SIDEWALK. REFER TO DETAIL ON DWG 1296800 AND SPECIFICATION SECTION 03 30 00.00 41.
5. PROVIDE HORIZONTAL BORING 2' BELOW CONCRETE DRIVEWAY, AS REQUIRED FOR 14" NOMINAL DIAMETER (15.3" OUTSIDE DIAMETER) POLYETHYLENE (PE) PLASTIC WATER PIPE. PRIOR TO BORING ALL CLEARANCES SHALL BE CHECKED BY CONTRACTOR, ALL EXISTING UNDERGROUND UTILITIES SHALL BE LOCATED, MARKED, AND EXCAVATED. BORING MACHINE SHALL BE GROUNDED DURING OPERATION. FOLLOW ALL MANUFACTURER GUIDELINES AND REQUIREMENTS.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE:

1" = 10'–0" SCALE 10 5 0 10 20 FEET

REVISIONS

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DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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WORK ORDER NO. CTN000188

APPROVALS	DATE
DRAWN D. PARKER	07/30/15
ENG./DES. K. WOLF	07/30/15
CHECK R. SYDNOR	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

APPROVALS

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			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296788

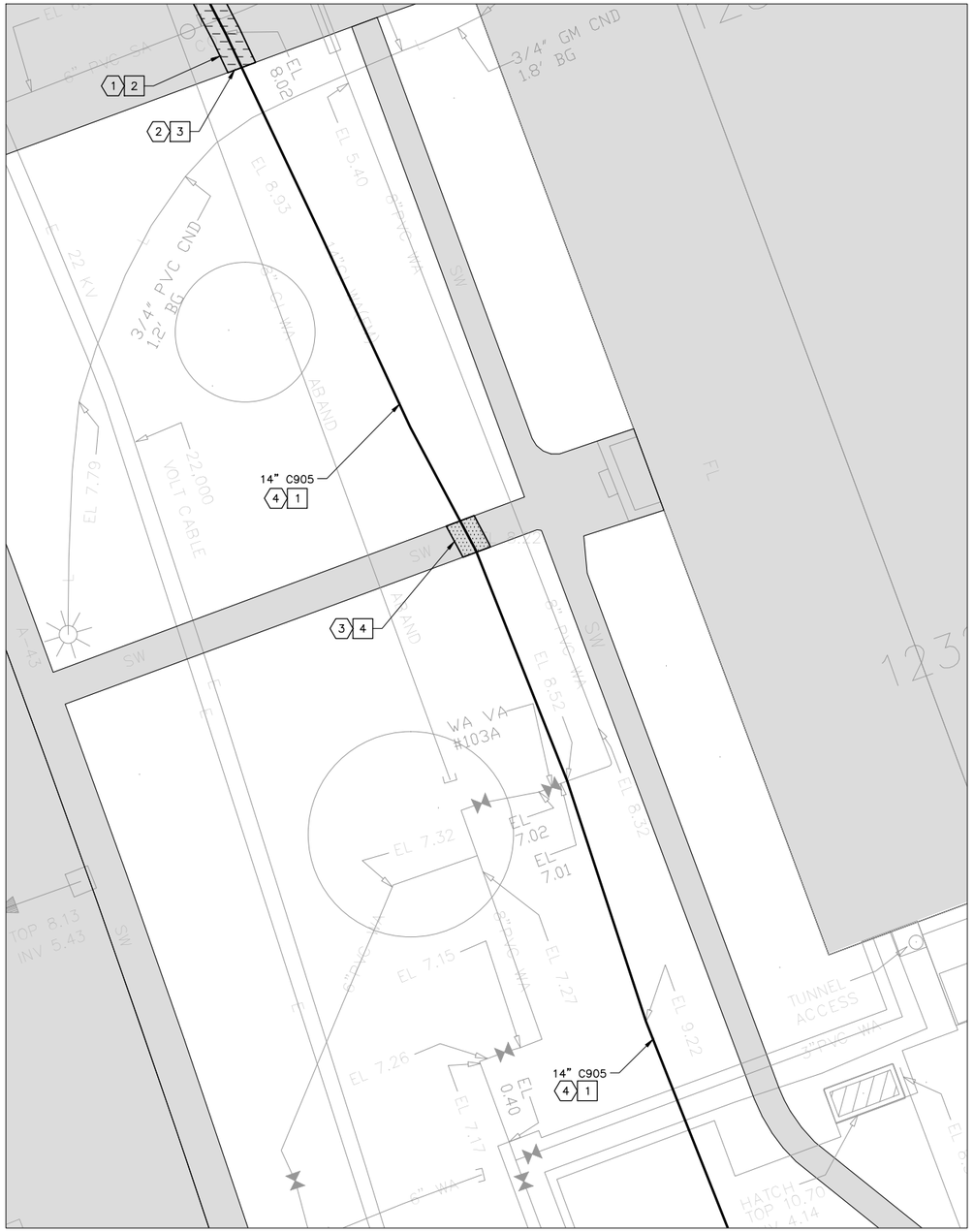
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 3)

DRAWING TITLE: 14" WATER MAIN AND VALVE REPLACEMENT SITE PLAN

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296795 | LATEST REV. .

SHEET NO. 3–C105



1 SITE ALTERATION PLAN – 14" WATER MAIN
3-G1013-C106
SCALE: 1" = 10'

NORTH

2 SITE ALTERATION PLAN – 14" WATER MAIN
3-G1013-C106
SCALE: 1" = 10'

NORTH

REMOVAL NOTES

1. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT PAVEMENT TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF CURB (AND GUTTER) TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
3. THE CONTRACTOR SHALL SAWCUT AND REMOVE 4" (+/–) THICK REINFORCED CONCRETE SIDEWALK TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
4. REMOVE EXISTING WATER PIPING AS SHOWN IN SITE PLAN.

NEW WORK NOTES

1. PROVIDE NEW WATER PIPING AND ALL FITTINGS AS REQUIRED TO CONNECT TO EXISTING WATER PIPING SYSTEM AS SHOWN IN SITE PLAN. SEE DWG 1296801 FOR TYPICAL CONNECTION DETAIL.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE DETAIL ON DWG 1296800. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. THE CONTRACTOR SHALL INSTALL NEW CURB (AND GUTTER) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT CURB (AND GUTTER).
4. THE CONTRACTOR SHALL PROVIDE NEW REINFORCED SIDEWALK TO MATCH THICKNESS, SLOPE, WIDTH, AND ELEVATION OF EXISTING ADJACENT SIDEWALK. REFER TO DETAIL ON DWG 1296800 AND SPECIFICATION SECTION 03 30 00.00 41.
5. THE CONTRACTOR SHALL INSTALL THRUST BLOCK AT INDICATED LOCATION. REFER TO DETAIL ON DWG 1296800.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE: _____

1" = 10'–0" SCALE 10 5 0 10 20 FEET

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ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

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			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± ; X.XX (2 DECIMAL PLACES) ±.02 ; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296788

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

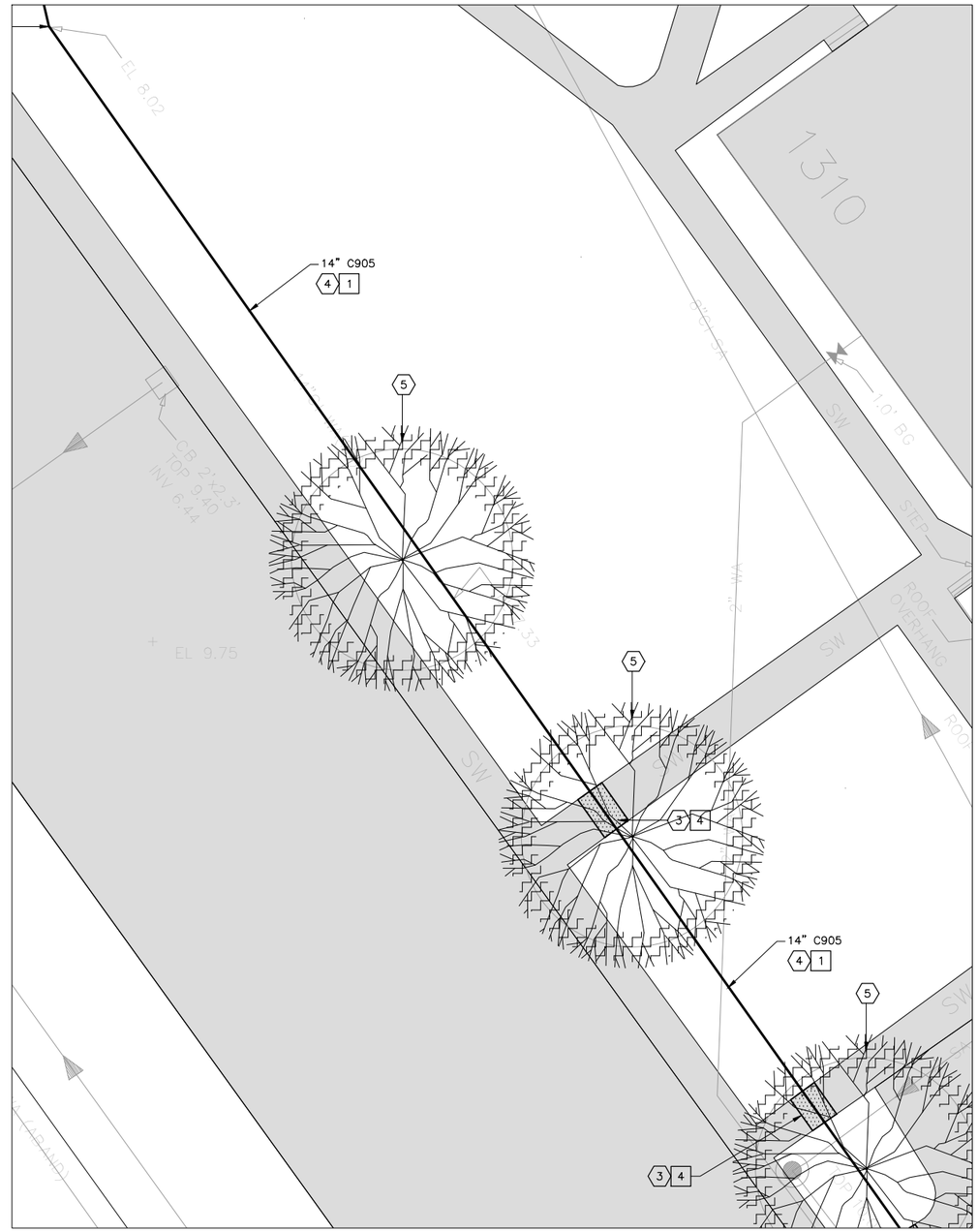
PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 3)

DRAWING TITLE: 14" WATER MAIN AND VALVE REPLACEMENT SITE PLAN

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296796 | LATEST REV. •

SHEET NO. 3–C106

1 3-G1013-C107 SITE ALTERATION PLAN – 14" WATER MAIN
SCALE: 1" = 10'



2 3-G1013-C107 SITE ALTERATION PLAN – 14" WATER MAIN
SCALE: 1" = 10'

NORTH

REMOVAL NOTES

1. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT PAVEMENT TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF CURB (AND GUTTER) TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
3. THE CONTRACTOR SHALL SAWCUT AND REMOVE 4" (+/–) THICK REINFORCED CONCRETE SIDEWALK TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
4. REMOVE EXISTING WATER PIPING AS SHOWN IN SITE PLAN.
5. REMOVE TREE AND ROOT BALL ENTIRELY.

NEW WORK NOTES

1. PROVIDE NEW WATER PIPING AND ALL FITTINGS AS REQUIRED TO CONNECT TO EXISTING WATER PIPING SYSTEM AS SHOWN IN SITE PLAN. SEE DWG 1296801 FOR TYPICAL CONNECTION DETAIL.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE DETAIL ON DWG 1296800. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. THE CONTRACTOR SHALL INSTALL NEW CURB (AND GUTTER) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT CURB (AND GUTTER).
4. THE CONTRACTOR SHALL PROVIDE NEW REINFORCED SIDEWALK TO MATCH THICKNESS, SLOPE, WIDTH, AND ELEVATION OF EXISTING ADJACENT SIDEWALK. REFER TO DETAIL ON DWG 1296800 AND SPECIFICATION SECTION 03 30 00.00 41.
5. THE CONTRACTOR SHALL INSTALL THRUST BLOCK AT INDICATED LOCATION. REFER TO DETAIL ON DWG 1296800.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE:

1" = 10'–0" 10 5 0 10 20 SCALE FEET

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ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

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			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296788

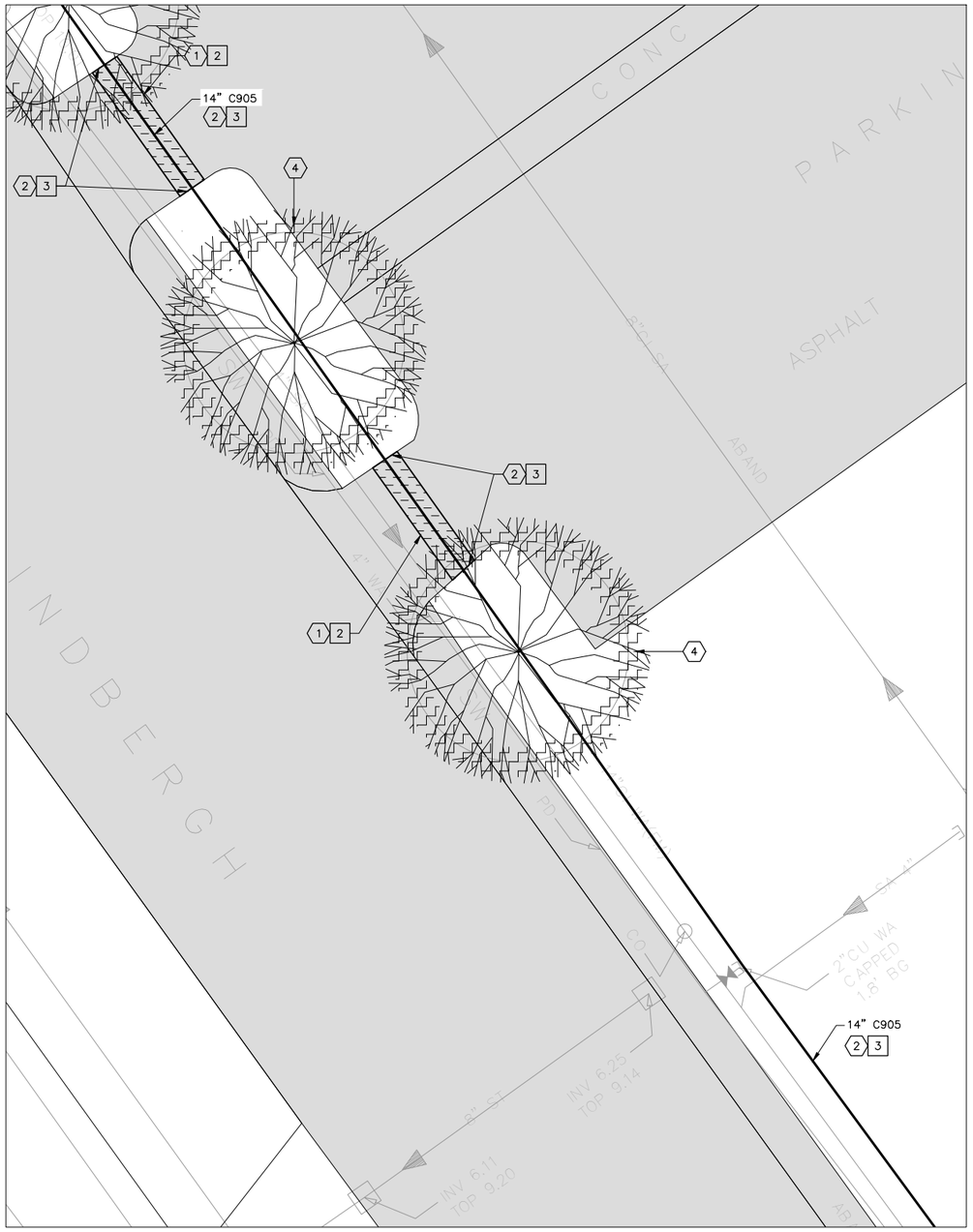
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 3)

DRAWING TITLE: 14" WATER MAIN AND VALVE REPLACEMENT SITE PLAN

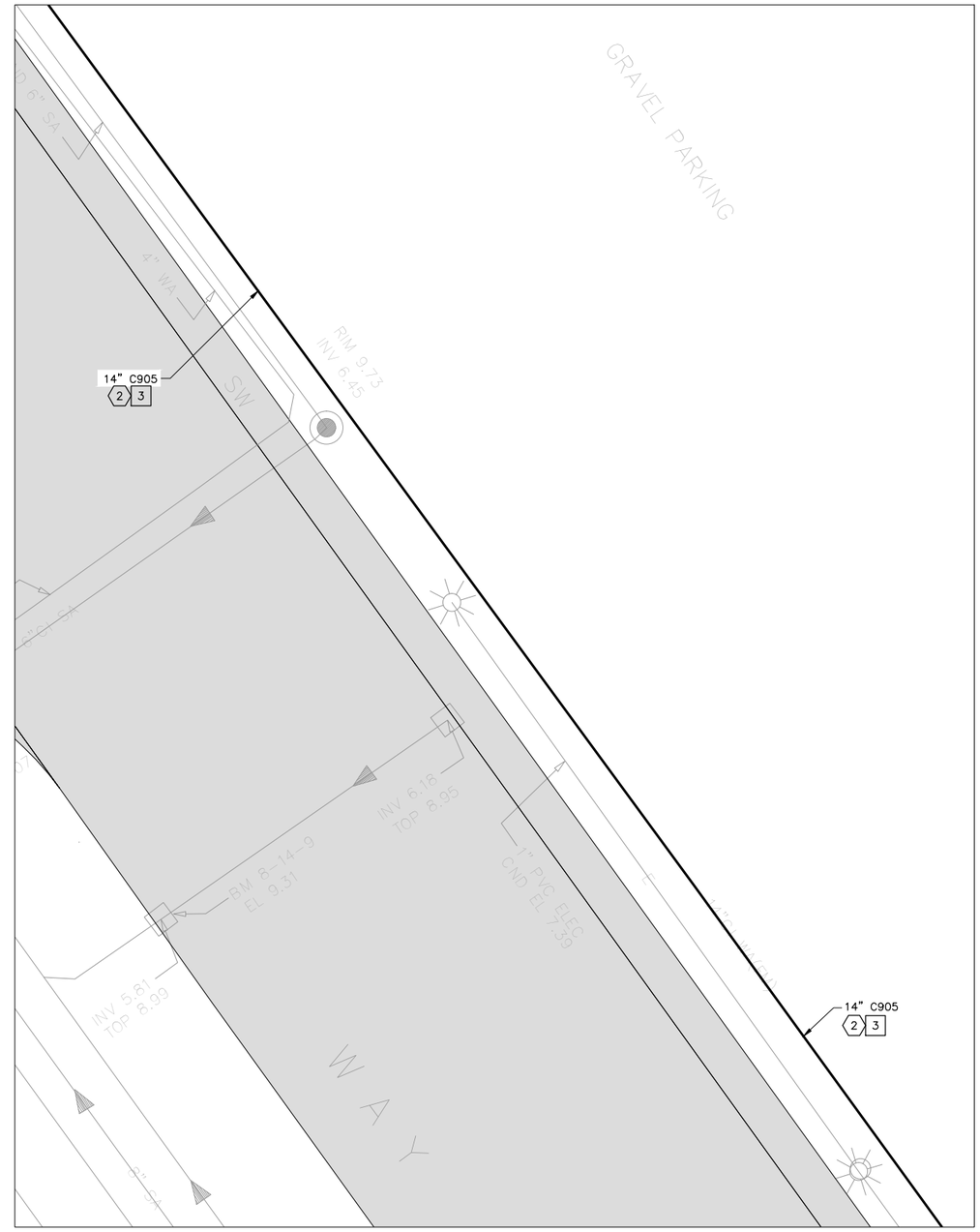
BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296797 | LATEST REV. ·

SHEET NO. 3–C107



1 3-G1013-C108 SITE ALTERATION PLAN – 14" WATER MAIN
SCALE: 1" = 10'

NORTH



2 3-G1013-C108 SITE ALTERATION PLAN – 14" WATER MAIN
SCALE: 1" = 10'

NORTH

REMOVAL NOTES

1. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT PAVEMENT TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
2. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF CURB (AND GUTTER) TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
3. REMOVE EXISTING WATER PIPING AS SHOWN IN SITE PLAN.
4. REMOVE TREE AND ROOT BALL ENTIRELY.

NEW WORK NOTES

1. PROVIDE NEW WATER PIPING AND ALL FITTINGS AS REQUIRED TO CONNECT TO EXISTING WATER PIPING SYSTEM AS SHOWN IN SITE PLAN. SEE DWG 1296801 FOR TYPICAL CONNECTION DETAIL.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE DETAIL ON DWG 1296800. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT–P–1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. THE CONTRACTOR SHALL INSTALL NEW CURB (AND GUTTER) TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT CURB (AND GUTTER).

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE:

1" = 10'–0" SCALE 10 5 0 10 20 FEET

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
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CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
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			DESIGNED	
			CHECKED	
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			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005
SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296788

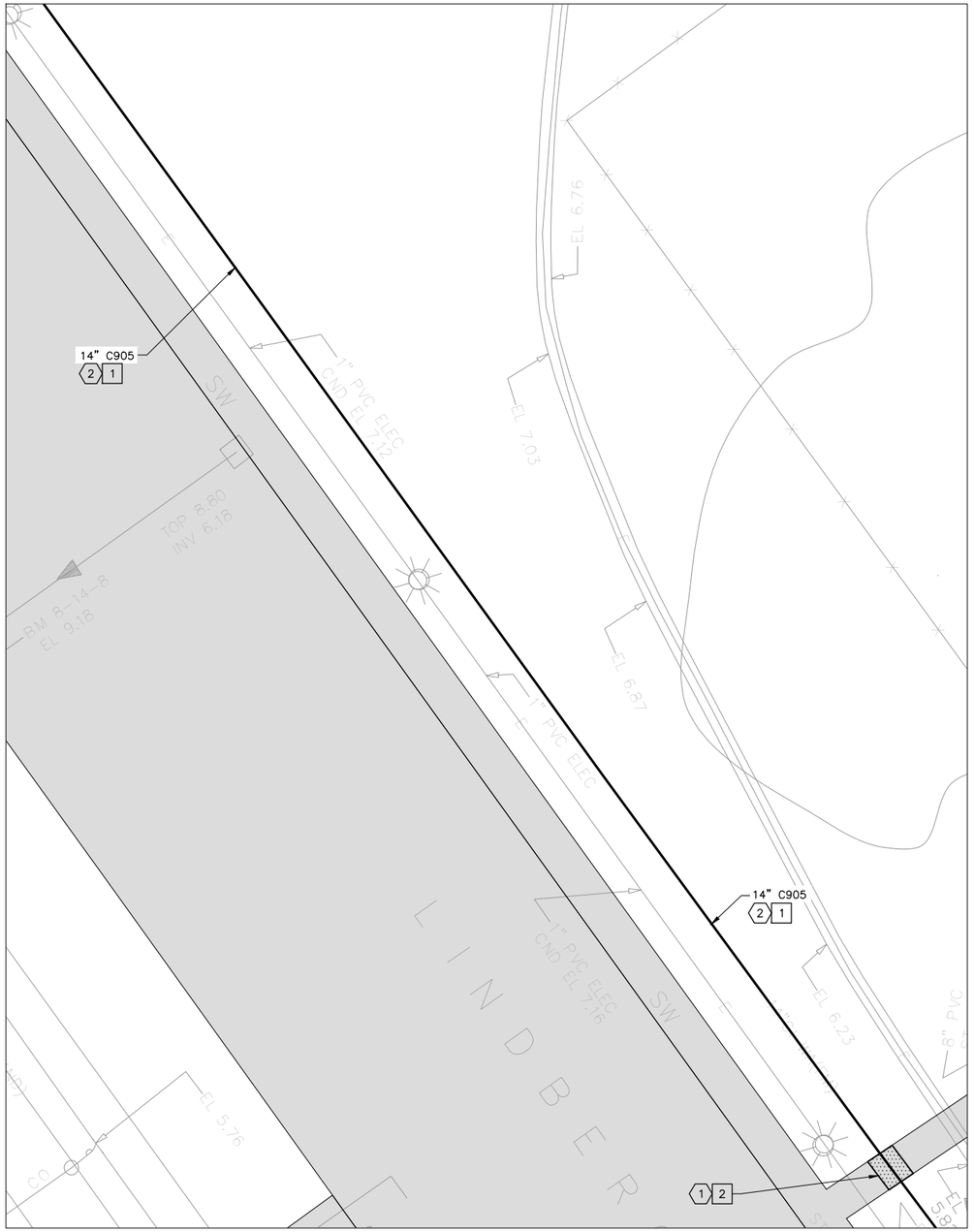
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 3)

DRAWING TITLE: 14" WATER MAIN AND VALVE REPLACEMENT SITE PLAN

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296798 | LATEST REV. ·

SHEET NO. 3–C108



1 3-G1013-C109 SITE ALTERATION PLAN – 14" WATER MAIN
SCALE: 1" = 10'

NORTH

2 3-G1013-C109 SITE ALTERATION PLAN – 14" WATER MAIN
SCALE: 1" = 10'

NORTH

REMOVAL NOTES

1. THE CONTRACTOR SHALL SAWCUT AND REMOVE 4" (+/–) THICK REINFORCED CONCRETE SIDEWALK TO ALLOW FOR WATER PIPING REMOVAL AND INSTALLATION.
2. REMOVE EXISTING WATER PIPING AS SHOWN IN SITE PLAN.
3. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION.
4. DISCONNECT EXISTING WATER PIPING AT POINT INDICATED AND ABANDON IN PLACE AS SHOWN IN SITE PLAN.

NEW WORK NOTES

1. PROVIDE NEW WATER PIPING AND ALL FITTINGS AS REQUIRED TO CONNECT TO EXISTING WATER PIPING SYSTEM AS SHOWN IN SITE PLAN. SEE DWG 1296801 FOR TYPICAL CONNECTION DETAIL.
2. THE CONTRACTOR SHALL PROVIDE NEW REINFORCED SIDEWALK TO MATCH THICKNESS, SLOPE, WIDTH, AND ELEVATION OF EXISTING ADJACENT SIDEWALK. REFER TO DETAIL ON DWG 1296800 AND SPECIFICATION SECTION 03 30 00.00 41.
3. PROVIDE CAP AT END OF NEW 14" C905 PVC WATER PIPING.
4. PROVIDE NEW VALVE. SEE INSTALLATION DETAIL AND VALVE SCHEDULE ON DWG 1296801.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE:

1" = 10'–0" SCALE 10 5 0 10 20 FEET

REVISIONS						
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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SUPV'N.		

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			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296788

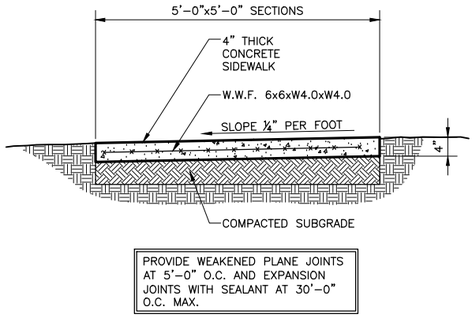
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 3)

DRAWING TITLE: 14" WATER MAIN AND VALVE REPLACEMENT SITE PLAN

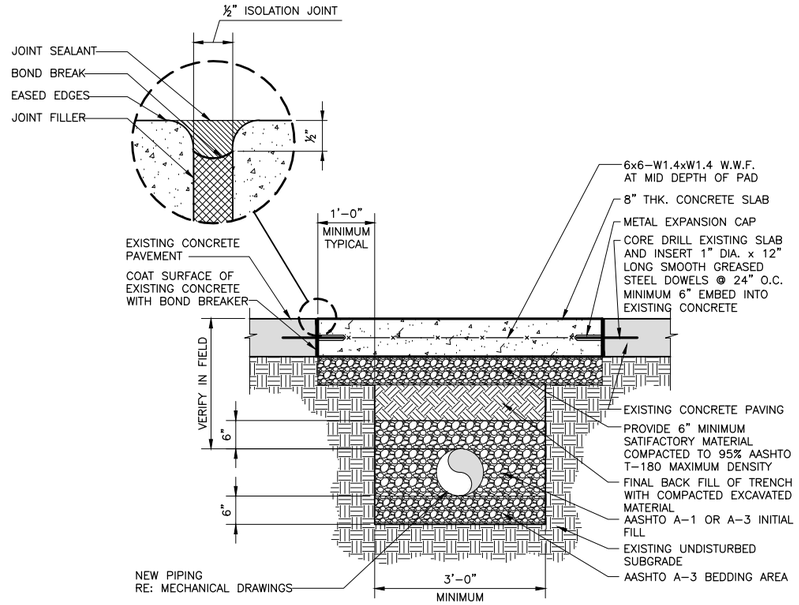
BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296799 | LATEST REV. ·

SHEET NO. 3–C109



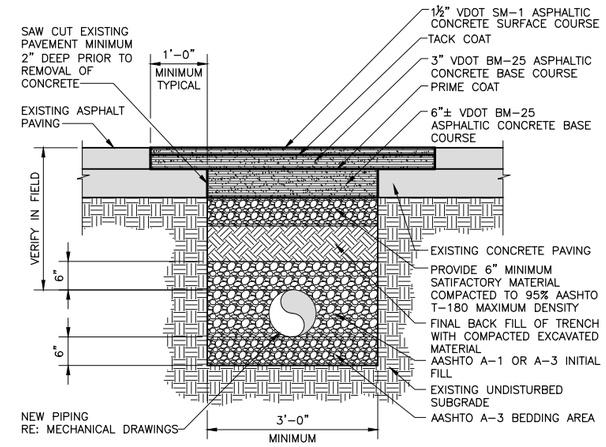
TYPICAL SIDEWALK REPAIR DETAIL

SCALE: 3/4" = 10'



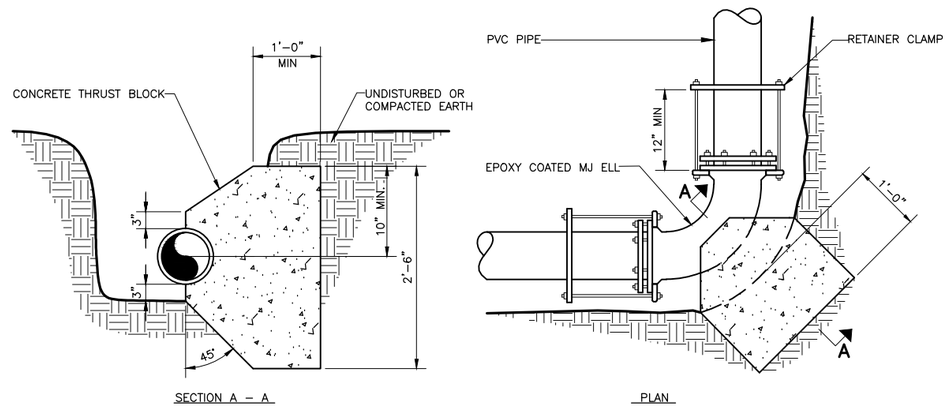
TYPICAL CONCRETE PAVING REPAIR DETAIL

SCALE: 3/4" = 10'



TYPICAL ASPHALT PAVING REPAIR DETAIL

SCALE: 3/4" = 10'



THRUST BLOCK DETAIL

REQUIRED AT ALL CHANGE OF DIRECTIONS FOR ALL WATER LINES

NOT TO SCALE

3/4" = 1'–0" 0 3 6 9 1 2 3 4 SCALE FEET

REVISIONS													
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CHECK R. SYDNOR	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

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TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005 — SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296788

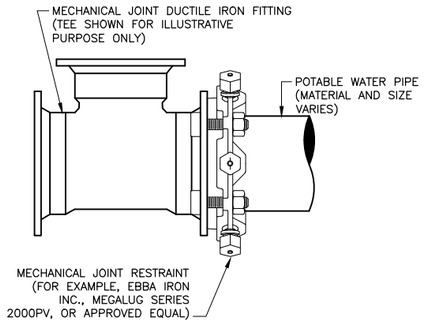
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 3)

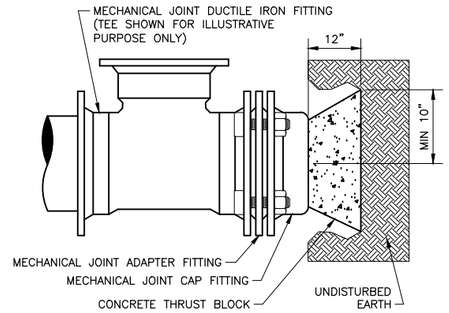
DRAWING TITLE: PAVEMENT REPAIR DETAILS

BUILDING NO.	SIZE	DRAWING NO.	LATEST REV.
1215	D	1296800	•

SHEET NO. 3–C501



PIPE TO FITTING CONNECTION DETAIL (TEE OR ELBOW) – PLAN VIEW

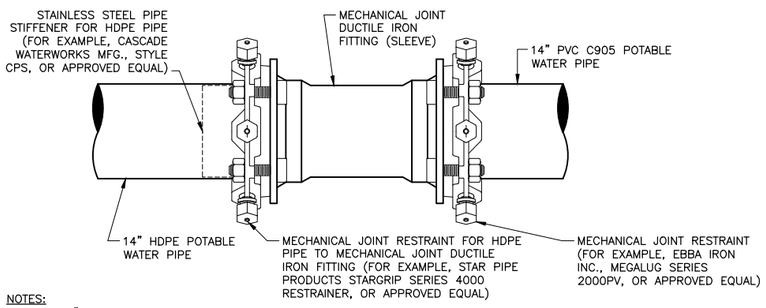


CAPPED PIPE CONNECTION DETAIL – PLAN VIEW

NOTES:
1. PIPE RESTRAINT REQUIRED AT ALL FITTING END CONNECTIONS; DETAIL SHOWS ONE END FOR ILLUSTRATION PURPOSE ONLY
2. REFER TO CONTRACT SPECIFICATIONS FOR DETAILS OF RESTRAINT FITTINGS.

TYPICAL PVC C900/905 PIPE TO MECHANICAL JOINT FITTING CONNECTION DETAILS

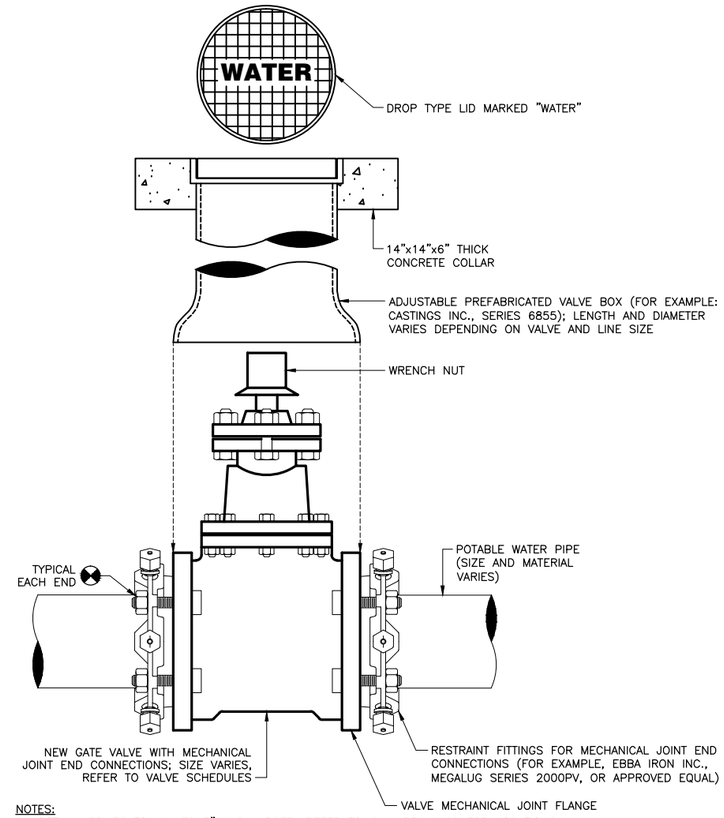
NOT TO SCALE



NOTES:
1. FOR 14" HDPE PIPING, PROVIDE TRANSITION GASKET BETWEEN MECHANICAL JOINT RESTRAINT AND SLEEVE FITTING AS REQUIRED.
2. REFER TO CONTRACT SPECIFICATIONS FOR DETAILS OF RESTRAINT FITTINGS.

TYPICAL PVC C905 AND HDPE PIPE TRANSITION DETAIL

NOT TO SCALE



NOTES:
1. DETAIL APPLIES TO VALVES 3" AND LARGER. REFER TO CIVIL DRAWINGS FOR LOCATIONS.
2. REFER TO CONTRACT SPECIFICATIONS FOR DETAILS OF RESTRAINT FITTING.

TYPICAL VALVE CONNECTION DETAIL (MECHANICAL JOINT ENDS)

NOT TO SCALE

MECHANICAL GENERAL NOTES

1. ALL WORK INDICATED ON CONTRACT DRAWINGS SHALL BE COMPLETED BY THE CONTRACTOR, UNLESS OTHERWISE NOTED.
2. THE CONTRACTOR SHALL COORDINATE ALL WORK WITH APPLICABLE TRADES TO PROVIDE A FINISHED PRODUCT THAT COMPLIES WITH CONTRACT REQUIREMENTS. CONTRACTOR SHALL ENSURE THE INSTALLATION AND/OR MODIFICATION TO EXISTING AND NEW EQUIPMENT AND PIPING DOES NOT RESTRICT OR IMPEDE ACCESS TO EXISTING AND NEW EQUIPMENT AND VALVES, OR RESTRICT OR ENCROACH INTO THE REQUIRED SERVICE CLEARANCE OF EXISTING AND NEW EQUIPMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY COST INCURRED TO RELOCATE EQUIPMENT, PIPING, AND APPURTENANCES, AS DIRECTED BY THE CONTRACTING OFFICER, THAT WERE MODIFIED OR INSTALLED UNDER THIS CONTRACT THAT RESTRICTS OR ENCROACHES INTO THE SERVICE CLEARANCE OF NEW OR EXISTING EQUIPMENT.
3. IT IS THE CONTRACTORS RESPONSIBILITY TO REMOVE AND DISPOSE OF ALL EQUIPMENT IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REQUIREMENTS. CONTRACTOR SHALL ALSO ADHERE TO NASA LMS–CP–2722 PROPERTY DISPOSAL.
4. DRAWINGS ARE DIAGRAMMATIC AND ARE NOT INTENDED TO BE SCALED TO PROVIDE EXACT LOCATION OF EQUIPMENT, LAYOUT OR ROUTING OF PIPE. DRAWINGS MAY NOT SHOW ALL OFFSETS AND BENDS REQUIRED TO AVOID BUILDING STRUCTURE OR EXISTING COMPONENTS. CONTRACTOR SHALL FIELD VERIFY ALL SITE CONDITIONS, DIMENSIONS, EQUIPMENT LAYOUT, CLEARANCES, AND PIPING PRIOR TO PROCURING MATERIALS OR BEGINNING INSTALLATION OF NEW WORK. ALL DEVIATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE CONTRACTING OFFICER.
5. EQUIPMENT SELECTIONS INDICATED FROM A SPECIFIC MANUFACTURER IS BASIS FOR DESIGN AND FOR REFERENCE ONLY. EQUIPMENT OF EQUAL QUALITY AND PERFORMANCE FROM OTHER MANUFACTURERS MAY BE SUBMITTED TO THE CONTRACTING OFFICER FOR APPROVAL BY THE ENGINEER. CONTRACTOR SHALL SUBMIT REVISED DESIGN INCLUDING LAYOUT, STRUCTURAL SUPPORT AND ANY OTHER DESIGN CHANGES FOR EQUIPMENT OTHER THAN INDICATED. ALL EQUIPMENT INSTALLATION SHALL BE PER MANUFACTURER'S RECOMMENDATIONS. THE REDESIGN COST SHALL BE THE CONTRACTORS RESPONSIBILITY.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSPECTING EXISTING EQUIPMENT AND FINISHES PRIOR TO COMMENCING WORK, AND RECORDING AND REPORTING ANY DAMAGE TO THE CONTRACTING OFFICER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE INCURRED DURING THE WORK EFFORT. SUCH DAMAGE SHALL BE REPLACED OR REPAIRED BY THE CONTRACTOR, TO THE CONTRACTING OFFICER'S SATISFACTION.
7. THE ENDS OF PIPE THAT ARE EXPOSED BY DEMOLITION AND ARE TO BE REUSED IN THE NEW WORK SHALL BE COVERED TO MAINTAIN CLEANLINESS OF SYSTEM FROM DUST AND DEBRIS, AND PROTECTED TO PREVENT DAMAGE.
8. CONTRACTOR SHALL PERFORM TO GREATEST EXTENT POSSIBLE, ALL OF THE FABRICATION, EXAMINATION, AND TESTING WORK IN SHOP TO LIMIT THE TIME OF FIELD WORK AND DOWNTIME OF FACILITY OPERATIONS.
9. THE CONTRACTOR SHALL TAG ALL NEW VALVES WITH THE NUMBERS AS GIVEN ON THE DRAWINGS. VALVE TAGS SHALL BE IN ACCORDANCE WITH NASA LANGLEY HANDBOOK LPR 1710.40, PRESSURE SYSTEMS HANDBOOK. CONTRACTOR SHALL REUSE EXISTING VALVE TAG AS APPLICABLE.

POTABLE WATER VALVE SCHEDULE

VALVE TAG No.	BLDG No.	SHEET SHOWN	SERVICE	FUNCTION	SIZE	TYPE	ACTUATION	END CONNECTION	RATED PRESSURE (PSIG)	MANUFACTURER/PART NUMBER (OR EQUAL)	NOTES
108	1231C	C–1	POTABLE WATER	ISOLATION	FIELD DETERMINE	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 2, 3, 4

NOTES
1. REFER TO CONTRACT SPECIFICATION SECTION 33 11 00, PARAGRAPH 2.2 FOR SALIENT FEATURES.
2. ALL VALVES SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C509 STANDARD, AND SHALL BE UL LISTED, FM APPROVED, AND CERTIFIED TO ANSI/NSF 61. STANDARD MECHANICAL JOINT ENDS SHALL COMPLY WITH ANSI/AWWA C111. EPOXY COATING SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C550 STANDARD AND BE CERTIFIED TO ANSI/NSF 61. VALVES SHALL HAVE NON–RISING STEM (NRS), 2" SQUARE WRENCH NUT, AND TRIPLE O–RING SEAL STUFFING BOX (2 UPPER & 1 LOWER O–RINGS), WITH FOURTH O–RING SERVING AS A DIRT SEAL.
3. VALVE LOCATED BELOW GRADE.
4. CONTRACTOR SHALL FIELD DETERMINE VALVE SIZE (8" OR 14").

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS	DATE
DRAWN E. DOHERTY/W. PARKER	07/30/15
ENG./DES. H. GOLDSMITH	07/30/15
CHECK G. VOLKMAN	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± ; X.XX (2 DECIMAL PLACES) ±.02 ; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296788

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 3)

DRAWING TITLE: PIPING AND VALVE DETAILS, VALVE SCHEDULE, AND GENERAL NOTES

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296801 | LATEST REV. .

SHEET NO. 3–M501

POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF
(WORK PACKAGE 4)

WATER METERS

LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA

DRAWING INDEX – WORK PACKAGE 4

DRAWING No.	SHEET No.	REV.	TITLE
GENERAL			
1296804	4–G001	–	TITLE SHEET
1296805	4–G101	–	KEY PLAN
CIVIL			
1296806	4–C001	–	GENERAL AND CIVIL NOTES, LEGEND, AND ABBREVIATIONS
1296807	4–C101	–	METER INSTALLATION SITE PLANS
1296808	4–C102	–	METER INSTALLATION SITE PLANS
1296809	4–C501	–	PAVEMENT REPAIR DETAILS
MECHANICAL			
1296810	4–M001	–	MECHANICAL GENERAL AND HAZARDOUS MATERIALS NOTES, LEGEND, AND ABBREVIATIONS
1296811	4–M101	–	BUILDINGS 1148, 1195A AND 1205 WATER METER INSTALLATION
1296812	4–M102	–	BUILDINGS 1205 AND 1208 WATER METER INSTALLATION
1296813	4–M103	–	BUILDINGS 1212 AND 1216 WATER METER INSTALLATION
1296814	4–M104	–	BUILDINGS 1219, 1222B AND 1225 WATER METER INSTALLATION
1296815	4–M105	–	BUILDINGS 1230, 1231C AND 1232 WATER METER INSTALLATION
1296816	4–M106	–	BUILDINGS 1232A AND 1236 WATER METER INSTALLATION
1296817	4–M107	–	BUILDINGS 1236A AND 1237A WATER METER INSTALLATION
1296818	4–M108	–	BUILDINGS 1244, 1247B, 1247D AND 1250 WATER METER INSTALLATION
1296819	4–M109	–	BUILDINGS 1268A, 1268B AND 1268C WATER METER INSTALLATION
1296820	4–M110	–	BUILDINGS 1293A AND 1293B WATER METER INSTALLATION
1296821	4–M501	–	WATER METER INSTALLATION DETAILS AND SCHEDULE
ELECTRICAL			
1296822	4–E101	–	BUILDING 1232A POTABLE WATER & SANITARY SEWER DEMOLITION DETAILS
1296823	4–E102	–	BUILDING 1232A POTABLE WATER & SANITARY SEWER NEW WORK DETAILS
1296824	4–E103	–	BUILDING 1232A POTABLE WATER & SANITARY SEWER NEW SITE WORK
1296825	4–E104	–	BUILDING 1232A POTABLE WATER & SANITARY SEWER WIRING SCHEMATICS
1296826	4–E501	–	GENERAL NOTES AND TYPICAL DETAILS
1296827	4–E601	–	BUILDING 1146 ROOM 117 OVERVIEW
1296828	4–E602	–	BUILDING 1148 ROOM 134 AND BUILDING 1205 ROOM 141 OVERVIEW
1296829	4–E603	–	BUILDING 1148 ROOM 122 OVERVIEW
1296830	4–E604	–	BUILDING 1189 ROOM 106 OVERVIEW
1296831	4–E605	–	BUILDING 1195A ROOM 112 OVERVIEW
1296832	4–E606	–	BUILDING 1199 ROOMS 101A AND 119 OVERVIEW
1296833	4–E607	–	BUILDING 1205 ROOMS 119 AND 156 OVERVIEW
1296834	4–E608	–	BUILDING 1208 ROOM 7 OVERVIEW
1296835	4–E609	–	BUILDING 1212 ROOMS 137 AND 154 OVERVIEW
1296836	4–E610	–	BUILDING 1212C ROOM 112 OVERVIEW
1296837	4–E611	–	BUILDING 1216 ROOM 121 OVERVIEW
1296838	4–E612	–	BUILDING 1219 ROOM 125 OVERVIEW
1296839	4–E613	–	BUILDING 1222B ROOM 103 OVERVIEW
1296840	4–E614	–	BUILDING 1225 ROOM 102A OVERVIEW
1296841	4–E615	–	BUILDING 1230 ROOMS 10 AND 191 OVERVIEW
1296842	4–E616	–	BUILDING 1231C ROOM 107 OVERVIEW
1296843	4–E617	–	BUILDING 1232 ROOMS 112 AND 144 OVERVIEW
1296844	4–E618	–	BUILDING 1232A ROOMS 104A AND 140E OVERVIEW
1296845	4–E619	–	BUILDING 1236 ROOM 16 OVERVIEW
1296846	4–E620	–	BUILDING 1236A ROOM 100 OVERVIEW
1296847	4–E621	–	BUILDING 1237 ROOMS 100 AND 112 LOFT OVERVIEW
1296848	4–E622	–	BUILDING 1244 ROOM 10 OVERVIEW
1296849	4–E623	–	BUILDING 1247B ROOM 14 OVERVIEW
1296850	4–E624	–	BUILDING 1247D ROOM 12 OVERVIEW
1296851	4–E625	–	BUILDING 1250 ROOM 109 OVERVIEW
1296852	4–E626	–	BUILDING 1265 ROOMS 109 AND 130 OVERVIEW
1296853	4–E627	–	BUILDING 1268A & 1268C ROOMS 50 AND 1303 OVERVIEW
1296854	4–E628	–	BUILDING 1268B ROOM 1205 OVERVIEW
1296855	4–E629	–	BUILDING 1293 ROOMS 9 AND 106 OVERVIEW

ANNOTATION SYMBOL LEGEND

- [1] NOTE REFERENCE, NEW WORK
- (1) NOTE REFERENCE, DEMOLITION WORK
- 1152 NASA FACILITY NUMBER
- [101] FACILITY ROOM NUMBER
- SECTION LETTER OR DETAIL NUMBER / SHEET SHOWN ON
- SECTION LETTER OR DETAIL NUMBER / SHEET NUMBER ON WHICH SECTION/DETAIL APPEARS / SHEET NUMBER ON WHICH SECTION/DETAIL ORIGINATES
- N — PLAN NORTH / MAGNETIC NORTH
- 123 — VALVE NUMBER / ISOLATION VALVE

REVISIONS								REVISIONS							
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD		DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	

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ENG./DES. H. GOLDSMITH	07/30/15
CHECK G. VOLKMAN	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

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TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± ; X.XX (2 DECIMAL PLACES) ±.02 ; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: TITLE SHEET

BUILDING NO. VARIOUS | SIZE D | DRAWING NO. 1296804 | LATEST REV. –

SHEET NO. 4–G001

KEY PLAN

SCALE: 1" = 200'

NORTH

1" = 200'-0" 200 100 0 200 400
SCALE FEET

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CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
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FOR DRAWING INDEX SEE DRAWING 1296804

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PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: KEY PLAN

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296805 | LATEST REV. •

SHEET NO. 4-G101

ABBREVIATIONS

@	–	AT
AASHTO	–	AMERICAN ASSOCIATION OF HIGHWAY AND TRANSPORTATION OFFICIALS
ABAND	–	ABANDON
AF	–	AIR FORCE
AFF	–	ABOVE FINISHED FLOOR
AG	–	ABOVE GRADE/GROUND
ALM	–	ALARM
ALUM	–	ALUMINUM
APPROX	–	APPROXIMATE
ASJ	–	ALL SERVICE JACKET
BG	–	BELOW GRADE/GROUND
B	–	BASELINE
℄	–	BASELINE
BG	–	BELOW GRADE
BLDG	–	BUILDING
BM	–	BENCHMARK
BOT	–	BOTTOM
BRG	–	BEARING
CA	–	CABLE
CAP	–	CAPACITY
CB	–	CATCH BASIN
CO	–	CLEAN OUT
CI	–	CAST IRON
CJ	–	CONTROL JOINT
℄	–	CENTERLINE
CLR	–	CLEAR
CMP	–	CORRUGATED METAL PIPE
CND	–	CONDUIT
CNDS	–	CONDENSATE
CONC	–	CONCRETE
CONT	–	CONTINUOUS
CORP	–	CORPORATION
CP	–	CONCRETE PIPE
CT	–	COOLING TOWER
CU	–	COPPER
CULV	–	CULVERT
CW	–	COLD WATER
CWR	–	COLD WATER RETURN
CWS	–	COLD WATER SUPPLY
D	–	DATA
DB	–	DUCTBANK
DE	–	DOUBTFUL ELEVATION
DEMO	–	DEMOLITION
DI	–	DUCTILE IRON
ø DIA	–	DIAMETER
DN	–	DIAMETER NOMINAL
DN	–	DOWN
DP	–	DIFFERENTIAL PRESSURE
DR	–	DRAIN
?	–	DOUBTFUL
DS	–	DOWNSPOUT
DT	–	DRAIN TILE
E	–	ELECTRIC
EA	–	EACH
EBW	–	ENVIRONMENTAL BLOWDOWN WATER
EC	–	EDGE OF CONCRETE
ED	–	EXISTENCE DOUBTFUL
EJ	–	EXPANSION JOINT
EL	–	ELEVATION
ELEC	–	ELECTRICAL
ELEC	–	ELECTRIC
ELEV	–	ELEVATION
ELL	–	ELBOW
EQ	–	EQUAL
EQUIP	–	EQUIPMENT
EXP	–	EXPANSION
EXP	–	EXPOSED
EXST	–	EXISTING
EXIST	–	EXISTING
FDN	–	FOUNDATION
FF	–	FINISH FLOOR
FH	–	FIRE HYDRANT
FIN	–	FINISH
FIN FL	–	FINISH FLOOR
FL	–	FLOOR
FL	–	FLOW LINE
FLDT	–	FLOODLIGHT
FM	–	FIRE MAIN
FM	–	FORCED MAIN
FND	–	FOUNDATION
FT	–	FEET
FTNG	–	FOOTING
G	–	GAS
GALV	–	GALVANIZED
GB	–	GRADE BEAM
GFE	–	GOVERNMENT FURNISHED EQUIPMENT
GM	–	GALVANIZED METAL
GMP	–	GALVANIZED METAL PIPE
GND	–	GROUND
GOVT	–	GOVERNMENT
H	–	HIGH
H_2	–	HYDROGEN
HC	–	HANDICAPPED
HCR	–	HIGH PRESSURE CONDENSATE RETURN
HD	–	HEAD
HDPE	–	HIGH DENSITY POLYETHYLENE
HH	–	HAND HOLE
HM	–	HOLLOW METAL
HPS	–	HIGH PRESSURE STEAM
HP	–	HIGH POINT
HP	–	HIGH PRESSURE
HW	–	HEADWALL
HW	–	HOT WATER
HZ	–	HERTZ
IJ	–	ISOLATION JOINT
INV	–	INVERT
JB	–	JUNCTION BOX
JT	–	JOINT
KCMIL	–	THOUSAND CIRCULAR MIL
KV	–	KILO VOLTS
KW	–	KILOWATT
L	–	LIGHT
LG	–	LONG
LN2	–	LIQUID NITROGEN
LP	–	LOW POINT
LPR	–	LOW PRESSURE RETURN
LPS	–	LOW PRESSURE STEAM
LT	–	LEFT
MAX	–	MAXIMUM
ME	–	MATCH EXISTING
MECH	–	MECHANICAL
MET	–	METAL
MH	–	MANHOLE
MIN	–	MINIMUM
MJ	–	MECHANICALLY JOINED
MON	–	MONUMENT
No.	–	NUMBER
NRCP	–	NON–REINFORCED CONCRETE PIPE
O	–	OVERHEAD
OA	–	OUTSIDE AIR
OAT	–	OUTSIDE AIR TEMPERATURE
OC	–	ON CENTER
OH	–	OVERHEAD
OL	–	OVERHEAD LINE
OPP	–	OPPOSITE
P	–	PIPE
PAVT	–	PAVEMENT
PB	–	PULL BOX
PC	–	PUMPED CONDENSATE
PCR	–	PUMPED CONDENSATE RETURN
PD	–	POSITION DOUBTFUL
Pe	–	PROPANE
PED	–	PEDESTAL
P.I.V.	–	POST INDICATOR VALVE
PNL	–	PANEL
PROB	–	PROBABLE
PSI	–	POUNDS PER SQUARE INCH
PVC	–	POLYVINYL CHLORIDE
PWR	–	POWER
R	–	RADIUS
R	–	RISER
RC	–	REINFORCED CONCRETE
RCP	–	REINFORCED CONCRETE PIPE
RD	–	ROOF DRAIN
RDCR	–	REDUCER
RE	–	REFER
REF	–	REFERENCE
REIN	–	REINFORCING
REQ'D	–	REQUIRED
RET	–	RETURN
RGSC	–	RIGID GALVANIZED STEEL CONDUIT
RL	–	REFRIGERANT LIQUID
ROW	–	RIGHT OF WAY
RPM	–	REVOLUTIONS PER MINUTE
RS	–	REFRIGERANT SUCTION
RS	–	RIGID STEEL
RT	–	RIGHT
S	–	SOUTH
SA	–	SANITARY
SCH	–	SCHEDULE
SHT	–	SHEET
SIM	–	SIMILIAR
SLV	–	SLEEVE
SP	–	STATIC PRESSURE
SPLY	–	SUPPLY
SQ	–	SQUARE
SS	–	STAINLESS STEEL
ST	–	STORM
STA	–	STATION
STL	–	STEEL
STM	–	STEAM
STOR	–	STORAGE
SUBSTA	–	SUBSTATION
SW	–	SIDEWALK
SWGR	–	SWITCHGEAR
T	–	TELEPHONE
TB	–	TOP OF BOARD
TC	–	TERRA COTTA
TC	–	TOP OF CURB
TD	–	TOP OF DRAIN
TEL	–	TELEPHONE
THK	–	THICK
TNK	–	TANK
TOB	–	TOP OF BOARD
TOC	–	TOP OF CURB
TP	–	TOP OF PIPE
TRANS	–	TRANSFORMER
TRLR	–	TRAILER
TYP	–	TYPICAL
UGND	–	UNDERGROUND
UNK	–	UNKNOWN
UON	–	UNLESS OTHERWISE NOTED
UTIL	–	UTILITY
V	–	VALVE, VOLT
VAC	–	VACUUM
VC	–	VITRIFIED CLAY PIPE
VCP	–	VALVE CAPPED PIPE
VDOT	–	VA DEPARTMENT OF TRANSPORTATION
VERT	–	VERTICAL
VNG	–	VIRGINIA NATURAL GAS
W	–	WIDE
W/	–	WITH
WA	–	WATER
WL	–	WATER LINE
WWF	–	WELDED WIRE FABRIC
XFMP	–	TRANSFORMER MONITORING PANEL

CIVIL LEGEND (APPLIES TO ALL CIVIL SHEETS)

- EXISTING DUCTBANK
- EL 8.50 — ELEV OF TOP OF EXISTING UTILITY LINE
- EXISTING PIPING TO BE REMOVED
- EXISTING PIPING TO BE ABANDONED IN PLACE
- EXISTING BUILDING TO REMAIN
- DEMOLISHED/NEW PAVEMENT
- DEMOLISHED/NEW SIDEWALK
- NEW TO EXISTING CONNECTION
- POINT OF DISCONNECT
- X — FENCING

MANHOLE	LINE
STORM	ST — DIA.
SANITARY	SA
ELECTRICAL	E
TELEPHONE	T

- FIRE HYDRANT
- CATCH BASIN
- CLEAN OUT
- VALVE
- WA — WATER LINE
- BENCH MARK

GENERAL NOTES

1. ALL EXISTING SIZES ARE IN ENGLISH UNITS.
2. ALL ITEMS SHALL BE CONSIDERED AS EXISTING UNLESS OTHERWISE INDICATED AS BEING NEW.
3. SUBSURFACE UTILITIES NOT DESIGNATED FOR DEMOLITION OR MODIFICATION SHALL NOT BE DISTURBED.
4. CONSTRUCTION OPERATIONS SHALL BE CONDUCTED SO THAT NEW WORK FOR SUBSURFACE UTILITIES SHALL BE INSTALLED AS COMPLETELY AS PRACTICABLE BEFORE DISRUPTION OF EXISTING SERVICES.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DIMENSIONS AND ELEVATIONS. NECESSARY FOR THE PROPER CONSTRUCTION AND ALIGNMENT OF THE NEW CONDITIONS TO THE EXISTING CONDITIONS. THE CONTRACTOR SHALL MAKE ALL FIELD MEASUREMENTS NECESSARY FOR CONSTRUCTION. THE CONTRACTOR SHALL MAINTAIN A RED–LINED SET OF CONTRACT DRAWINGS THAT REFLECT CURRENT "AS–BUILT" CONDITIONS AND SUBMIT THE DRAWINGS TO THE CONTRACTING OFFICER AFTER COMPLETION OF CONSTRUCTION.
6. VERIFY THE LOCATION OF NEW WORK WITH FACILITY COORDINATOR AND CONSTRUCTION MANAGER.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ALL NON–HAZARDOUS DEBRIS GENERATED FROM THE PROJECT FROM THE CENTER PRIOR TO OR UPON COMPLETION OF THE PROJECT IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS.
8. ELEVATIONS USED ON ALL CIVIL DRAWINGS ARE BASED ON NAVD 88 (NORTH AMERICAN VERTICAL DATUM).
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING AND PROTECTING EQUIPMENT AND UNDERGROUND UTILITIES TO REMAIN. THE CONTRACTOR SHALL PERFORM A FIELD SURVEY, INCLUDING INSPECTION OF SITE CLEARANCES AND REMOVAL/INSTALLATION ROUTE INTENDED TO BE INCORPORATED INTO THE EXISTING SYSTEM PRIOR TO PROCEEDING WITH WORK. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR REPAIRS OR MODIFICATIONS NECESSARY TO MAKE THE SYSTEM PERFORM AS REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING EQUIPMENT AT NO ADDITIONAL COST TO THE GOVERNMENT.
10. THE CONTRACTOR SHALL COORDINATE ANY IMPACTS TO TRAFFIC FLOW DURING CONSTRUCTION WITH THE CONTRACTING OFFICER PRIOR TO PROCEEDING WITH WORK AFFECTING GOVERNMENT STREETS. FIRE AND RESCUE VEHICLE ACCESS TO ALL BUILDINGS SHALL BE MAINTAINED DURING CONSTRUCTION.
11. ALL SIGNS, LANDSCAPING, STRUCTURES OR OTHER APPURTENANCES DISTURBED OR DAMAGED DURING CONSTRUCTION SHALL BE REPLACED OR REPAIRED BY THE CONTRACTOR AT NO COST TO THE GOVERNMENT.
12. ALL TREES WITHIN THE CONSTRUCTION AREA NOT SPECIFICALLY DESIGNATED FOR REMOVAL SHALL BE PRESERVED, WHETHER SHOWN OR NOT SHOWN ON THE CONTRACT DRAWINGS UNLESS COORDINATED WITH THE CONTRACTING OFFICER. TREES TO BE PRESERVED SHALL BE PROTECTED WITH HIGH VISIBILITY FENCING PLACED A MINIMUM OF 5' FROM THE TREE TRUNK. THE CONTRACTOR SHALL CLEAN CUT ANY TREE ROOTS LARGER THAN 3 INCHES IN DIAMETER WHERE NECESSARY FOR CONSTRUCTION. IF TREES NOT INDICATED FOR REMOVAL ARE DAMAGED OR KILLED DURING OR UP TO 1 YEAR AFTER CONSTRUCTION THE CONTRACTOR SHALL COORDINATE WITH THE CONTRACTING OFFICER TO DEVELOP A REPLACEMENT STRATEGY AT THE CONTRACTOR'S EXPENSE.

CIVIL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR ALL SHORING AND BRACING OF EXCAVATION. SHORING AND BRACING SHALL BE MAINTAINED REGARDLESS OF THE LENGTH OF TIME THE EXCAVATION SHALL BE OPEN.
2. WATER SHALL NOT BE PERMITTED TO ACCUMULATE IN EXCAVATIONS. DEWATERING SYSTEMS SHALL BE PROVIDED BY THE CONTRACTOR TO CONVEY WATER AWAY FROM EXCAVATIONS. DEWATERING SYSTEM AND METHODS OF DISPOSAL SHALL BE APPROVED BY THE CONSTRUCTION MANAGER.
3. PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL LOCATE ALL EXISTING UNDERGROUND UTILITY LINES IN THE AREA OF PROPOSED EXCAVATION.
4. CONTRACTOR SHALL HAND DIG TO EXPOSE AND VERIFY LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO ANY MACHINE EXCAVATION. EXISTING UTILITY LOCATIONS SHOWN ARE BASED ON BEST AVAILABLE INFORMATION AND MAY NOT REFLECT FIELD CONDITIONS. NO EXCAVATION IS ALLOWED TO START WITHOUT FIRST RECEIVING A DIGGING PERMIT FROM LaRC IQA TEAM. CALL 864–7265.
5. ALL DISTURBED AREAS NEAR BUILDINGS OR PAVEMENT SHALL BE GRADED FOR DRAINAGE.
6. SEE SPECIFICATION SECTION 01 35 40.00 41 FOR REQUIREMENTS FOR EXCAVATED SOIL TO BE REMOVED FROM LaRC. IF SOIL IS STOCKPILED THE CONTRACTOR SHALL CONTROL THE AREA AND BE HELD RESPONSIBLE FOR THE REMOVAL OF SOIL FROM LaRC UPON COMPLETION OF JOB.
7. TOPSOIL BROUGHT ONTO CENTER SHALL BE TESTED PER SPECIFICATION SECTION 01 35 40.00 41. PROVIDE BACKFILL AND TOPSOIL IN AREAS WHERE GRADE HAS BEEN DISTURBED FROM BUILDING AND UTILITY REMOVAL. FINISHED GRADING SHALL MATCH CONTOURS OF ADJACENT GRASS AREA. SEED WITH KENTUCKY FESCUE 31 ALL GRASSED AREAS. SEED SHALL BE UNIFORMLY BROADCAST AT THE RATE OF 35 POUNDS PER ACRE. PROVIDE TOPSOIL AND SEEDING IN CONFORMANCE WITH 31 23 00.00 41.
8. PROVIDE EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH SPECIFICATION SECTION 01 35 40.00 41.
9. CONCRETE/ASPHALTIC JOINT SEALANT SHALL BE ELASTOMERIC SEALANT ASTM C 920, SINGLE OR MULTI COMPONENT TYPE, POURABLE OR SELF–LEVELING, WITHSTANDING INCREASE AND DECREASE OF AT LEAST 25 PERCENT OF JOINT WIDTH, FOR USE IN PEDESTRIAN AND VEHICULAR AREAS, CONFORMING TO ASTM C92.
10. CONTRACTOR SHALL SUBMIT FOR APPROVAL A JOB–MIX DESIGN, TEST REPORTS AND OTHER DOCUMENTATION NECESSARY FOR THE CONTRACTING OFFICER TO DETERMINE CONFORMANCE WITH REQUIRED GRADING, ASPHALT CONTENT AND TEMPERATURE PROPERTIES FOR ASPHALT CONCRETE.
11. SUBSURFACE: REMOVE EXISTING MATERIAL TO UNDISTURBED EARTH (APPROX. 4 FT.) AND BACKFILL WITH SELECT AGGREGATE MATERIAL COMPACTED TO 100 PERCENT OF MAXIMUM DENSITY OBTAINED BY ASTM D1557.
12. REFER TO SPECIFICATION SECTION 31 23 00.00 41 FOR EXCAVATION NEAR EXISTING UTILITIES.
13. LOCATION, SUPPORT, PROTECTION AND RESTORATION OF ALL EXISTING UTILITIES AND APPURTENANCES, WHETHER SHOWN OR NOT SHOWN ON THE CONTRACT DRAWINGS, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. WHEN UNKNOWN OR INCORRECTLY LOCATED UNDERGROUND UTILITIES ARE ENCOUNTERED DURING CONSTRUCTION THE CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER PRIOR TO PROCEEDING WITH WORK.
14. THE CONTRACTOR SHALL VERIFY THE CONDITION OF ABANDONED UTILITIES WITH THE CONTRACTING OFFICER PRIOR TO CUTTING AND CAPPING IF NEEDED FOR THE INSTALLATION OF NEW WORK.
15. THE CONTRACTOR SHALL RESTORE ALL DISTURBED AREAS TO EQUAL OR BETTER CONDITION THAN EXISTED BEFORE CONSTRUCTION AS COORDINATED WITH THE CONTRACTING OFFICER. DRAINAGE DITCHES OR WATERCOURSES THAT ARE DISTURBED BY CONSTRUCTION SHALL BE RESTORED TO THE GRADES AND CROSS-SECTIONS THAT EXISTED BEFORE CONSTRUCTION.
16. EXISTING STRIPING, MARKINGS, PAVEMENT MARKERS, LANDSCAPING, CURBS, AND SIDEWALK DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPLACED IN KIND BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE GOVERNMENT.
17. THE CONTRACTOR SHALL PERFORM DEMOLITION AND EXCAVATION IN A MANNER THAT WILL MINIMIZE DUST, NOISE, AND OTHER NUISANCE. MAINTAIN HAUL ROUTES FOR DISPOSAL OF MATERIAL CLEAN AND FREE OF DEBRIS. TRACKING OR SPILLING MUD, DIRT OR DEBRIS UPON NASA STREETS AND SIDEWALKS SHALL BE CLEANED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE GOVERNMENT.

REVISIONS								REVISIONS							
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD		DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	

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Hampton, VA 23681

WORK ORDER NO. CTN000188

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DRAWN	D. PARKER	07/30/15
ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUP'V'N.		

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			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICRONCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 1)

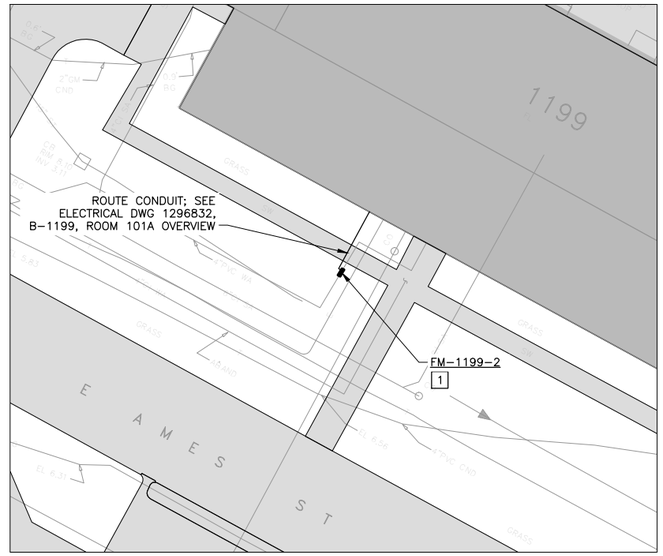
DRAWING TITLE: GENERAL AND CIVIL NOTES, LEGEND, AND ABBREVIATIONS

BUILDING NO.	SIZE	DRAWING NO.	LATEST REV.
1215	D	1296806	•

SHEET NO. 4–C001

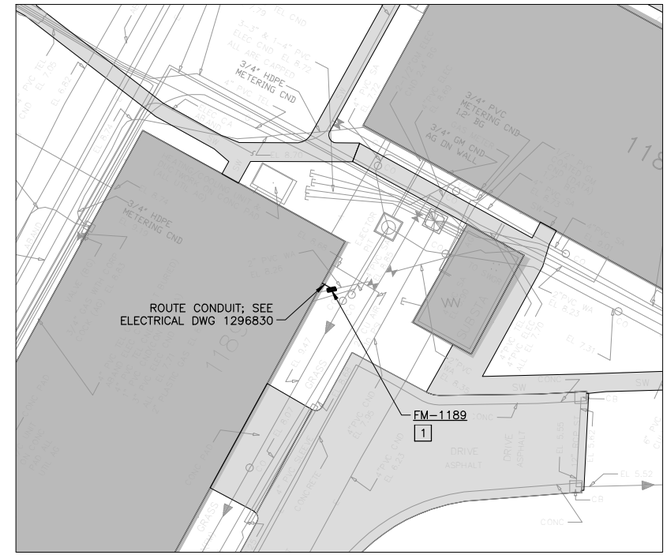
1 4-G1014-C101 BLDG 1199 WATER METER SITE PLAN
SCALE: 1" = 20'

PLAN NORTH



2 4-G1014-C101 BLDG 1199 WATER METER SITE PLAN
SCALE: 1" = 20'

PLAN NORTH



3 4-G1014-C101 BLDG 1189 WATER METER SITE PLAN
SCALE: 1" = 20'

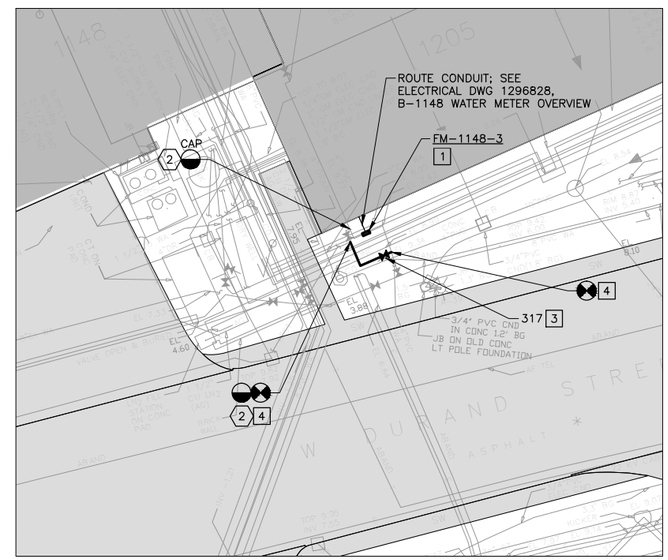
PLAN NORTH

4 4-G1014-C101 BLDG 1212C WATER METER SITE PLAN
SCALE: 1" = 20'

PLAN NORTH

5 4-G1014-C101 BLDG 1146 WATER METER SITE PLAN
SCALE: 1" = 20'

PLAN NORTH



6 4-G1014-C101 BLDG 1205 WATER METER SITE PLAN
SCALE: 1" = 20'

PLAN NORTH

REMOVAL NOTES

1. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT PAVEMENT TO ALLOW FOR NEW METER INSTALLATION.
2. REMOVE EXISTING VALVE AND PIPING TO POINTS INDICATED. PREPARE REMAINING PIPING ENDS FOR NEW WORK. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.

NEW WORK NOTES

1. PROVIDE NEW ULTRASONIC WATER METER. SEE INSTALLATION DETAIL 1 AND METER SCHEDULE ON DWG 1296821.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE DETAIL ON DWG 1296809. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT-P-1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. PROVIDE NEW VALVE. SEE INSTALLATION DETAILS ON DRAWING 1296809 AND VALVE SCHEDULE ON DRAWING 1296821.
4. PROVIDE NEW 1" COPPER PIPING AND ROUTE AS INDICATED.

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE:

1" = 20'-0" SCALE — 20 10 0 20 40 FEET

REVISIONS															
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188	
APPROVALS	DATE
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ENG./DES. K. WOLF	07/30/15
CHECK R. SYDNOR	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

APPROVALS				
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			DESIGNED	
			CHECKED	
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			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005
SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

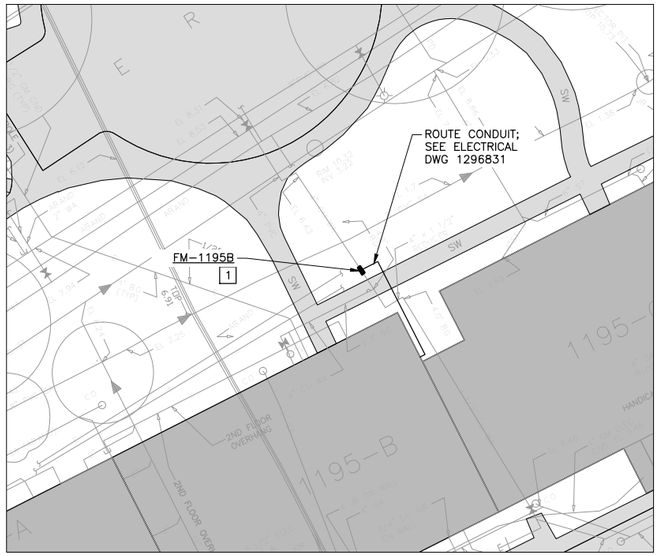
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: METER INSTALLATION SITE PLANS

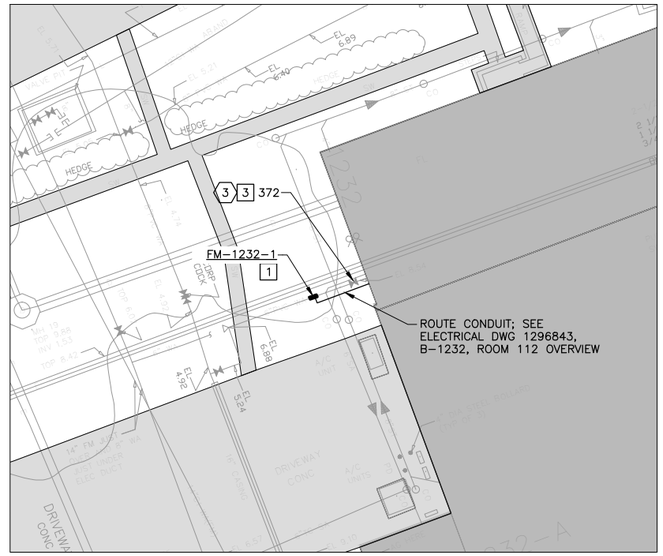
BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296807 | LATEST REV. •

SHEET NO. 4-C101



1 / 1-G1011-C102 BLDG 1195B WATER METER SITE PLAN
SCALE: 1" = 20'

PLAN NORTH



2 / 1-G1011-C102 BLDG 1232 WATER METER SITE PLAN
SCALE: 1" = 20'

PLAN NORTH

3 / 1-G1011-C102 BLDG 1237B WATER METER SITE PLAN
SCALE: 1" = 20'

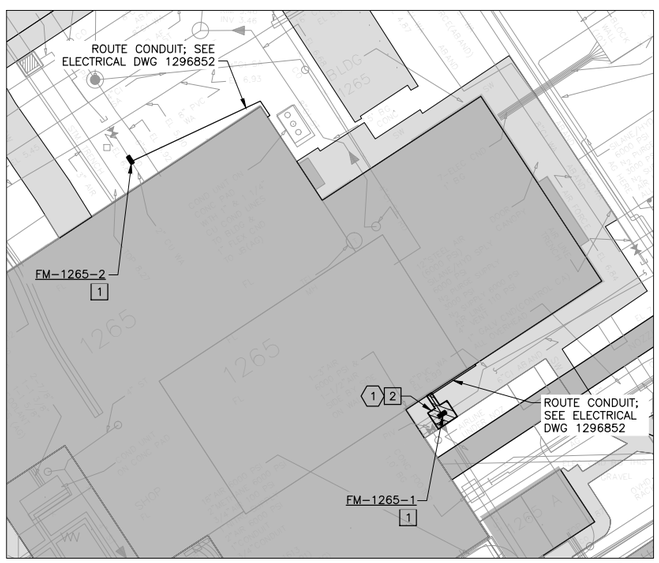
PLAN NORTH

REMOVAL NOTES

1. THE CONTRACTOR SHALL SAWCUT AND REMOVE SECTION OF ASPHALT PAVEMENT TO ALLOW FOR NEW METER INSTALLATION.
2. REMOVE EXISTING VALVE AND REPLACE WITH 2" PVC PIPE. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE.
3. REMOVE EXISTING VALVE AND PREPARE REMAINING PIPING ENDS FOR NEW VALVE INSTALLATION. FOR BIDDING PURPOSES, ASSUME EXISTING VALVE IS 4' BELOW GRADE UNLESS LOCATED IN TUNNEL.

NEW WORK NOTES

1. PROVIDE NEW ULTRASONIC WATER METER. SEE INSTALLATION DETAIL 1 AND METER SCHEDULE ON DWG 1296821.
2. THE CONTRACTOR SHALL PATCH AND REPAIR PAVING WITH ASPHALTIC CONCRETE TO MATCH THICKNESS, COMPOSITION, AND ELEVATION OF ADJACENT PAVING. SEE DETAIL ON DWG 1296809. THE CONTRACTOR SHALL PROVIDE MARKINGS FOR PARKING SPACES OR LANE MARKINGS DISTURBED DURING CONSTRUCTION. PAINT FOR PAVEMENT MARKINGS SHALL CONFORM TO FS TT-P-1952, COLOR AND WIDTH TO MATCH EXISTING. PRIOR TO PAINT APPLICATION, SURFACES SHALL BE CLEAN, FREE OF DUST, DIRT, OIL, AND OTHER SURFACE DEPOSITS. PAVEMENT MARKING PAINTS SHALL COMPLY WITH APPLICABLE STATE AND LOCAL LAWS ENACTED TO ENSURE COMPLIANCE WITH FEDERAL CLEAN AIR STANDARDS. PAINT MATERIALS SHALL CONFORM TO THE RESTRICTIONS OF THE LOCAL AIR POLLUTION CONTROL DISTRICT.
3. PROVIDE NEW VALVE. SEE INSTALLATION DETAILS ON DWG 1296809 AND VALVE SCHEDULES ON DRAWINGS 1296821.



4 / 1-G1011-C102 BLDG 1265 WATER METER SITE PLAN
SCALE: 1" = 20'

PLAN NORTH

UNDERGROUND UTILITIES INFORMATION
VERIFIED AS OF: 01/15/15
SIGNATURE: _____

1" = 20'-0" SCALE — 20 10 0 20 40 FEET

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DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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DRAWN	D. PARKER	07/30/15
ENG./DES.	K. WOLF	07/30/15
CHECK	R. SYDNOR	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

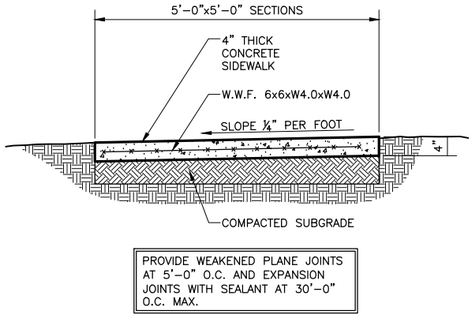
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: METER INSTALLATION SITE PLANS

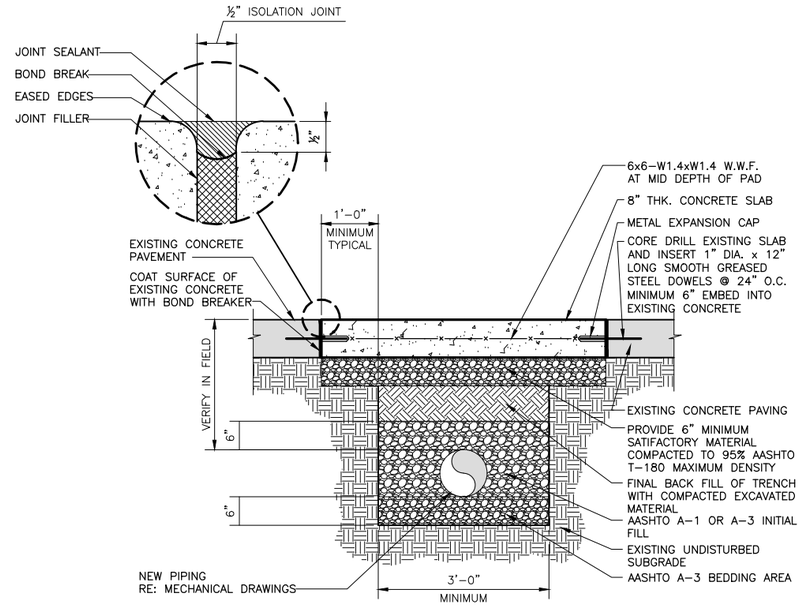
BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296808 | LATEST REV. ·

SHEET NO. 4-C102



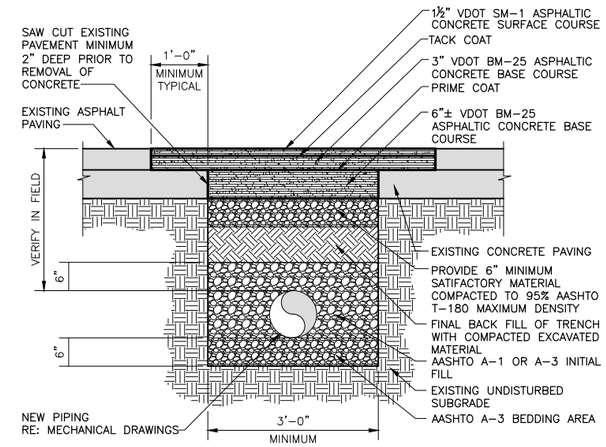
TYPICAL SIDEWALK REPAIR DETAIL

SCALE: 3/4" = 10'



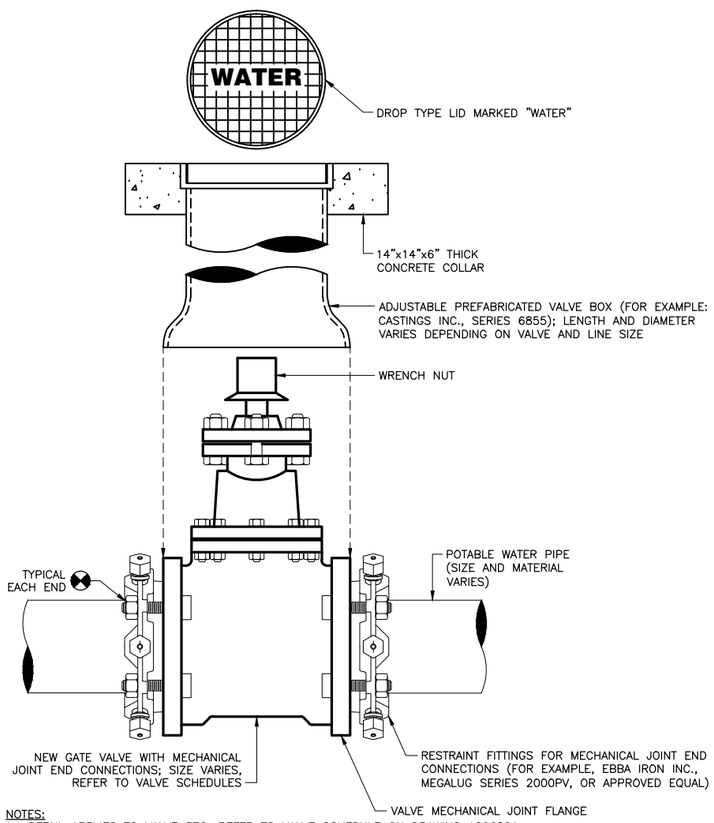
TYPICAL CONCRETE PAVING REPAIR DETAIL

SCALE: 3/4" = 10'



TYPICAL ASPHALT PAVING REPAIR DETAIL

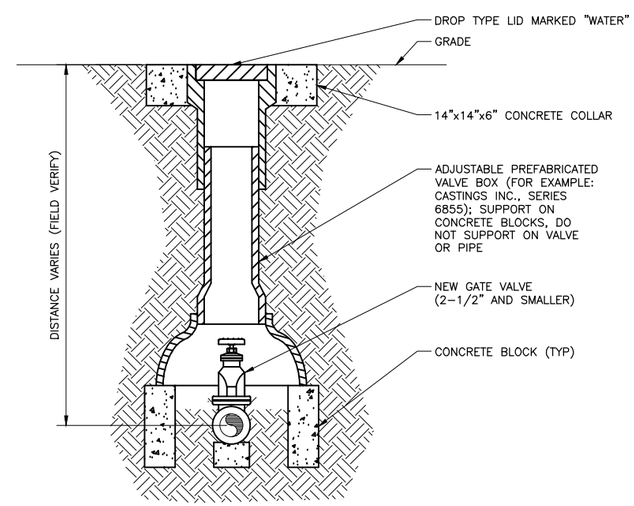
SCALE: 3/4" = 10'



NOTES:
1. DETAIL APPLIES TO VALVE 372. REFER TO VALVE SCHEDULE ON DRAWING 1296821.
2. REFER TO CONTRACT SPECIFICATIONS FOR DETAILS OF RESTRAINT FITTING.

VALVE 372 CONNECTION DETAIL (MECHANICAL JOINT ENDS)

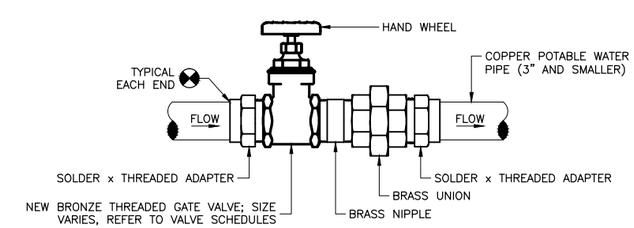
NOT TO SCALE



NOTE: REUSE EXISTING VALVE BOXES AND LIDS TO EXTENT POSSIBLE. SALVAGE AND REINSTALL EXISTING VALVE TAG ON LID AS APPLICABLE.

TYPICAL VALVE BOX DETAIL FOR UNDERGROUND VALVES WITH THREADED ENDS

NOT TO SCALE



NOTES:
1. DETAIL APPLIES TO VALVE 317. REFER TO VALVE SCHEDULE ON DRAWING 1296821.
2. NEW COPPER PIPE AND FITTINGS SHALL BE AS SPECIFIED IN CONTRACT SPECIFICATIONS.

VALVE 317 CONNECTION DETAIL – COPPER PIPE

NOT TO SCALE

REVISIONS								REVISIONS							
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PROJ. MGR.	G. VOLKMAN	07/30/15
SUP'V'N.		

APPROVALS

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			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005 — SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: PAVEMENT REPAIR DETAILS

BUILDING NO. 1215 | SIZE D | DRAWING NO. 1296809 | LATEST REV. ·

SHEET NO. 4-C501

GENERAL MECHANCIAL SYMBOLS AND LEGEND

NEW TO EXISTING POINT OF CONNECTION

EXISTING PIPING & VALVES

NEW PIPING AND VALVES

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
EXIST	EXISTING
PVC	POLYVINYL CHLORIDE
TYP	TYPICAL

HAZARDOUS MATERIALS NOTES

1. ASBESTOS CONTAINING MATERIALS ARE LOCATED IN THE PIPE INSULATION ON THE EXISTING 3" PVC DOMESTIC WATER PIPING IN BUILDING 1293A, ROOM 9. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REMOVE THE EXISTING ASBESTOS CONTAINING MATERIALS ON THE PIPING TO THE EXTENT AS REQUIRED TO INSTALL THE NEW WATER METER. CONTRACTOR SHALL BASE HIS BID ON AN INSULATION THICKNESS OF 2-INCHES AND APPROXIMATELY FIVE LINEAR FEET. THE ENDS OF EXISTING PIPE INSULATION TO REMAIN CONTAINING ASBESTOS MATERIALS SHALL BE SEALED, AND THE BOUNDARIES OF ASBESTOS AND NON-ASBESTOS INSULATION SHALL BE CLEARLY NOTED ON SURFACE OF INSULATION. REMOVAL OF ASBESTOS CONTAINING MATERIALS SHALL PRECEDE REMOVAL OF MECHANICAL & ELECTRICAL WORK. REMOVAL OF ASBESTOS CONTAINING MATERIALS SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 01 35 26.00 41 "LANGLEY SAFETY AND ENVIRONMENTAL REQUIREMENTS". THE CONTRACTOR SHALL SUBMIT LANGLEY FORM 27, "NASA LaRC ASBESTOS SAFETY PERMIT", PRIOR TO PERFORMING ANY ABATEMENT WORK.

2. EXISTING CARBON STEEL PIPING IS ASSUMED TO BE COATED WITH LEAD BASED PAINT/PRIMER. CONTRACTOR SHALL TAKE PRECAUTIONS IN ACCORDANCE WITH OSHA 1926.62 TO PROTECT PERSONNEL DURING SCRAPING, GRINDING, CUTTING, BURNING AND WELDING OPERATIONS.

MECHANICAL GENERAL NOTES

1. ALL WORK INDICATED ON CONTRACT DRAWINGS SHALL BE COMPLETED BY THE CONTRACTOR, UNLESS OTHERWISE NOTED.
2. COORDINATE INSTALLATION OF WATER METERS WITH CONTRACT ELECTRICAL DRAWINGS.
3. THE CONTRACTOR SHALL COORDINATE ALL WORK WITH APPLICABLE TRADES TO PROVIDE A FINISHED PRODUCT THAT COMPLIES WITH CONTRACT REQUIREMENTS. CONTRACTOR SHALL ENSURE THE INSTALLATION AND/OR MODIFICATION TO EXISTING AND NEW EQUIPMENT AND PIPING DOES NOT RESTRICT OR IMPEDE ACCESS TO EXISTING AND NEW EQUIPMENT AND VALVES, OR RESTRICT OR ENCROACH INTO THE REQUIRED SERVICE CLEARANCE OF EXISTING AND NEW EQUIPMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY COST INCURRED TO RELOCATE EQUIPMENT, PIPING, AND APPURTENANCES, AS DIRECTED BY THE CONTRACTING OFFICER, THAT WERE MODIFIED OR INSTALLED UNDER THIS CONTRACT THAT RESTRICTS OR ENCROACHES INTO THE SERVICE CLEARANCE OF NEW OR EXISTING EQUIPMENT.
4. IT IS THE CONTRACTORS RESPONSIBILITY TO REMOVE AND DISPOSE OF ALL EQUIPMENT IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REQUIREMENTS. CONTRACTOR SHALL ALSO ADHERE TO NASA LMS-CP-2722 PROPERTY DISPOSAL.
5. DRAWINGS ARE DIAGRAMMATIC AND ARE NOT INTENDED TO BE SCALED TO PROVIDE EXACT LOCATION OF EQUIPMENT, LAYOUT OR ROUTING OF PIPE. DRAWINGS MAY NOT SHOW ALL OFFSETS AND BENDS REQUIRED TO AVOID BUILDING STRUCTURE OR EXISTING COMPONENTS. CONTRACTOR SHALL FIELD VERIFY ALL SITE CONDITIONS, DIMENSIONS, EQUIPMENT LAYOUT, CLEARANCES, AND PIPING PRIOR TO PROCURING MATERIALS OR BEGINNING INSTALLATION OF NEW WORK. ALL DEVIATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE CONTRACTING OFFICER.
6. EQUIPMENT SELECTIONS INDICATED FROM A SPECIFIC MANUFACTURER IS BASIS FOR DESIGN AND FOR REFERENCE ONLY. EQUIPMENT OF EQUAL QUALITY AND PERFORMANCE FROM OTHER MANUFACTURERS MAY BE SUBMITTED TO THE CONTRACTING OFFICER FOR APPROVAL BY THE ENGINEER. CONTRACTOR SHALL SUBMIT REVISED DESIGN INCLUDING LAYOUT, STRUCTURAL SUPPORT AND ANY OTHER DESIGN CHANGES FOR EQUIPMENT OTHER THAN INDICATED. ALL EQUIPMENT INSTALLATION SHALL BE PER MANUFACTURER'S RECOMMENDATIONS. THE REDESIGN COST SHALL BE THE CONTRACTORS RESPONSIBILITY.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSPECTING EXISTING EQUIPMENT AND FINISHES PRIOR TO COMMENCING WORK, AND RECORDING AND REPORTING ANY DAMAGE TO THE CONTRACTING OFFICER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE INCURRED DURING THE WORK EFFORT. SUCH DAMAGE SHALL BE REPLACED OR REPAIRED BY THE CONTRACTOR, TO THE CONTRACTING OFFICER'S SATISFACTION.
8. THE ENDS OF PIPE THAT ARE EXPOSED BY DEMOLITION AND ARE TO BE REUSED IN THE NEW WORK SHALL BE COVERED TO MAINTAIN CLEANLINESS OF SYSTEM FROM DUST AND DEBRIS, AND PROTECTED TO PREVENT DAMAGE.
9. CONTRACTOR SHALL PERFORM TO GREATEST EXTENT POSSIBLE, ALL OF THE FABRICATION, EXAMINATION, AND TESTING WORK IN SHOP TO LIMIT THE TIME OF FIELD WORK AND DOWNTIME OF FACILITY OPERATIONS.
10. THE CONTRACTOR SHALL TAG ALL NEW WATER METERS WITH THE NUMBERS AS GIVEN ON THE DRAWINGS (FOR EXAMPLE: FM-1244). TAGS SHALL BE IN ACCORDANCE WITH NASA LANGLEY PRESSURE SYSTEMS HANDBOOK, LPR 1710.40.
11. PIPING SHALL BE SUPPORTED IN ACCORDANCE WITH MSS SP-58.

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	E. DOHERTY	07/30/15
ENG./DES.	H. GOLDSMITH	07/30/15
CHECK	G. VOLKMAN	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: MECHANICAL GENERAL AND HAZARDOUS MATERIALS NOTES, LEGEND, AND ABBREVIATIONS

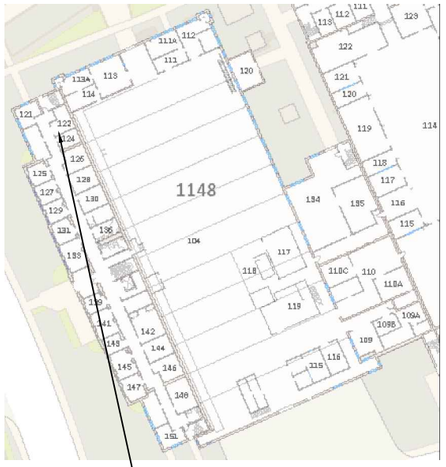
BUILDING NO.: VARIOUS

SHEET NO.: 4-M001

SIZE: D

DRAWING NO.: 1296810

LATEST REV.: -



3" COPPER WATER;
REFER TO PHOTO

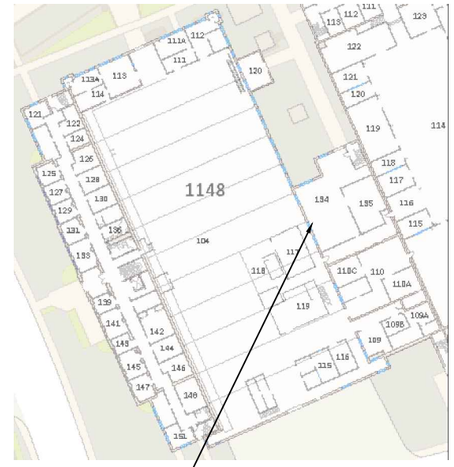
3" COPPER WATER; LOCATION
FOR NEW ULTRASONIC METER
(FM-1148-1)

1
4-M501

NORTH

BUILDING 1148 METER LOCATION – ROOM 122

NOT TO SCALE



6" CARBON STEEL WATER;
REFER TO PHOTO

6" CARBON STEEL WATER;
LOCATION FOR NEW
ULTRASONIC METER
(FM-1148-2)

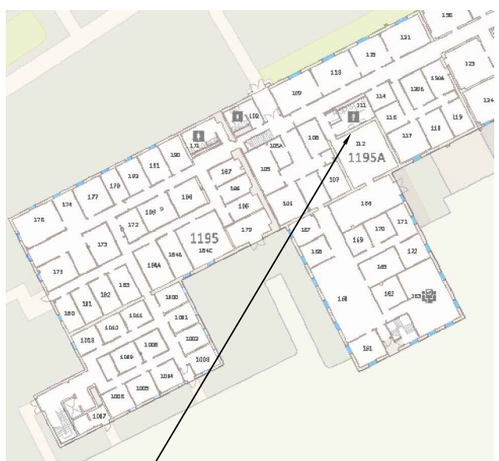
1
4-M501

NOTE: IF EXISTING PIPE INSUSLATION IS DISTURBED TO ACCOMMODATE INSTALLATION OF WATER METER, PROVIDE PIPE INSULATION ON NEW AND EXISTING PIPING IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.

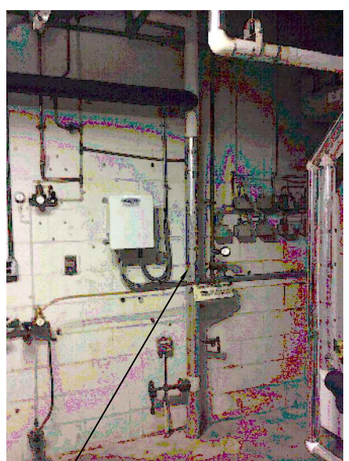
NORTH

BUILDING 1148 METER LOCATION – ROOM 134

NOT TO SCALE



2" COPPER WATER;
REFER TO PHOTO



2" COPPER WATER; LOCATION
FOR NEW ULTRASONIC METER
(FM-1195A)

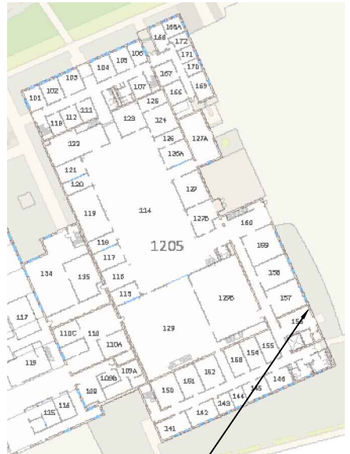
1
4-M501

NOTE: IF EXISTING PIPE INSULATION IS DISTURBED TO ACCOMMODATE INSTALLATION OF WATER METER, PROVIDE PIPE INSULATION ON NEW AND EXISTING PIPING IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.

NORTH

BUILDING 1195A METER LOCATION – ROOM 112

NOT TO SCALE



3" CARBON STEEL WATER;
REFER TO PHOTO

3" CARBON STEEL WATER;
LOCATION FOR NEW
ELECTROMAGNETIC METER
(FM-1205-2)

2
4-M501

NOTE: IF EXISTING PIPE INSULATION IS DISTURBED TO ACCOMMODATE INSTALLATION OF WATER METER, PROVIDE PIPE INSULATION ON NEW AND EXISTING PIPING IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.

NORTH

BUILDING 1205 METER LOCATION – ROOM 156

NOT TO SCALE

REVISIONS								REVISIONS							
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ENG./DES.	H. GOLDSMITH	07/30/15
CHECK	G. VOLKMAN	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

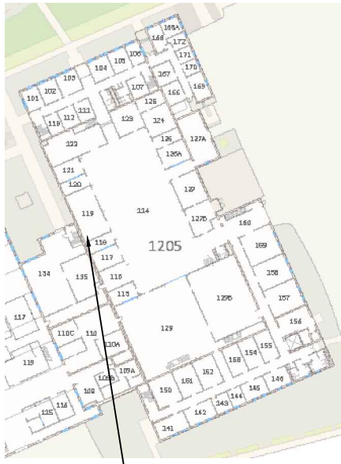
FOR DRAWING INDEX SEE DRAWING 1296804

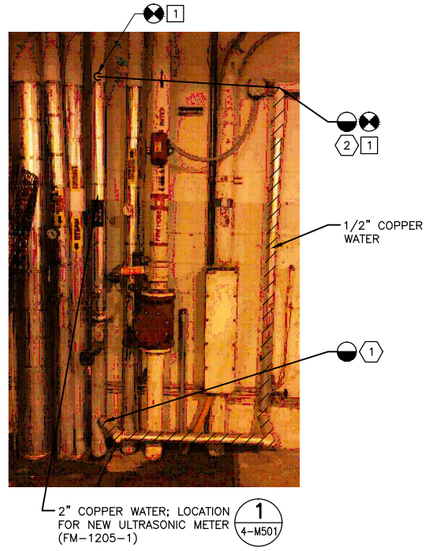
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: BUILDINGS 1148, 1195A AND 1205
WATER METER INSTALLATION

BUILDING NO.	SIZE	DRAWING NO.	LATEST REV.
VARIOUS	D	1296811	•
SHEET NO. 4-M101			





BUILDING 1205 METER LOCATION – ROOM 119

NOT TO SCALE

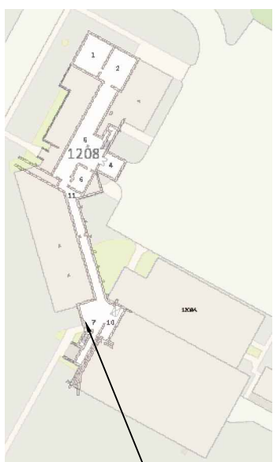
NORTH

REMOVAL NOTES:

1. DISCONNECT EXISTING ½" COPPER WATER PIPING AT POINT INDICATED AND PROVIDE CAP AT TAKE-OFF FROM 2" COPPER WATER.
2. DISCONNECT EXISTING ½" COPPER WATER AT POINT INDICATED AND PREPARE REMAINING PIPING END FOR RECONNECTION DURING NEW WORK.

NEW WORK NOTES:

1. ROUTE NEW ½" COPPER WATER PIPING AS INDICATED. INSULATE NEW PIPING ACCORDING TO CONTRACT SPECIFICATIONS.

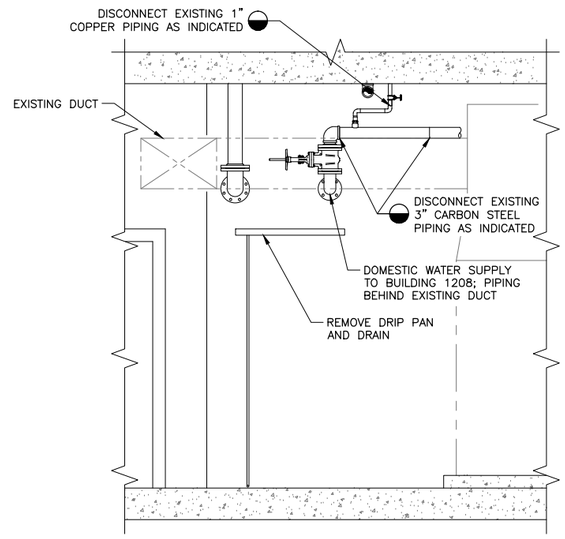


NOTE: IF EXISTING PIPE INSULATION IS DISTURBED TO ACCOMMODATE INSTALLATION OF WATER METER, PROVIDE PIPE INSULATION ON NEW AND EXISTING PIPING IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.

BUILDING 1208 METER LOCATION – ROOM 7

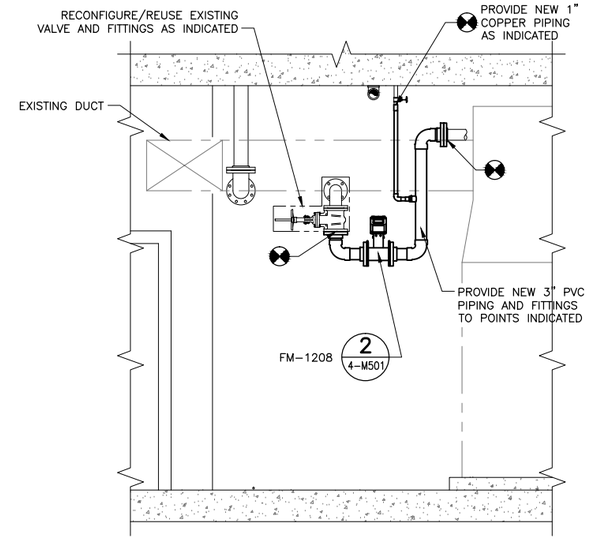
NOT TO SCALE

NORTH



BUILDING 1208 PIPING DEMOLITION ELEVATION

NOT TO SCALE



BUILDING 1208 PIPING NEW WORK ELEVATION

NOT TO SCALE

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DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS						
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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WORK ORDER NO. CTN000188

APPROVALS	DATE
DRAWN E. DOHERTY/D. PARKER	07/30/15
ENG./DES. H. GOLDSMITH	07/30/15
CHECK G. VOLKMAN	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± ; X.XX (2 DECIMAL PLACES) ±.02 ; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: BUILDINGS 1205 AND 1208
WATER METER INSTALLATION

BUILDING NO. VARIOUS | SIZE D | DRAWING NO. 1296812 | LATEST REV. -

SHEET NO. 4-M102

4" CARBON STEEL WATER; REFER TO PHOTO

4" CARBON STEEL WATER; LOCATION FOR NEW ULTRASONIC METER (FM-1212-1) 1 / 4-M501

NOTE: IF EXISTING PIPE INSULATION IS DISTURBED TO ACCOMMODATE INSTALLATION OF WATER METER, PROVIDE PIPE INSULATION ON NEW AND EXISTING PIPING IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.

BUILDING 1212 METER LOCATION – CRAWLSPACE BELOW ROOM 119A

NOT TO SCALE

NORTH

1-1/2" COPPER WATER; REFER TO PHOTO

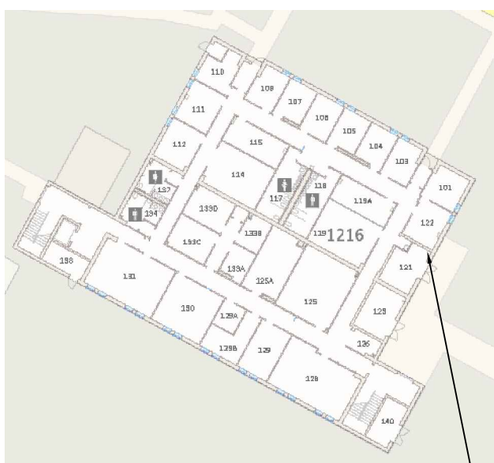
1-1/2" COPPER WATER; LOCATION FOR NEW ULTRASONIC METER (FM-1212-2) 1 / 4-M501

NOTE: IF EXISTING PIPE INSULATION IS DISTURBED TO ACCOMMODATE INSTALLATION OF WATER METER, PROVIDE PIPE INSULATION ON NEW AND EXISTING PIPING IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.

BUILDING 1212 METER LOCATION – ROOM 154

NOT TO SCALE

NORTH



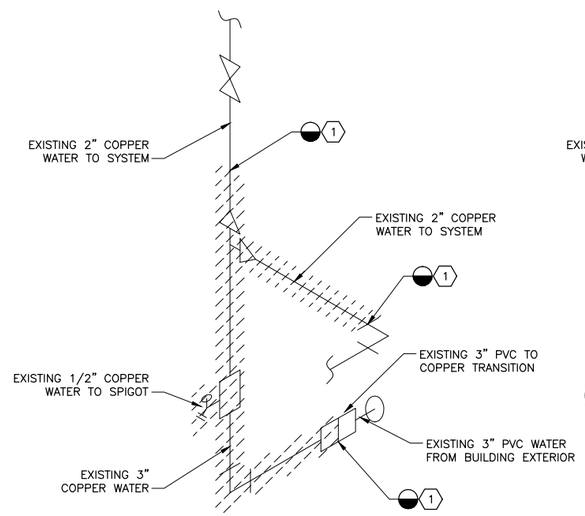
3" COPPER WATER; REFER TO PHOTO

DOMESTIC WATER PIPING MODIFICATION REQUIRED; SEE DEMOLITION AND NEW WORK ISOMETRICS THIS SHEET

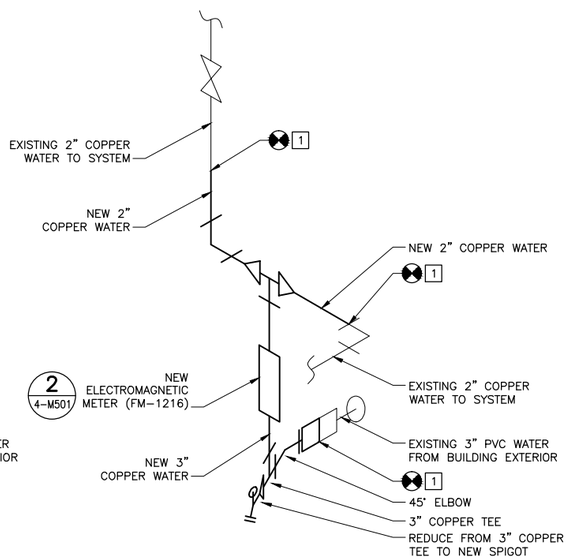
NOTE: IF EXISTING PIPE INSULATION IS DISTURBED TO ACCOMMODATE INSTALLATION OF WATER METER, PROVIDE PIPE INSULATION ON NEW AND EXISTING PIPING IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.

BUILDING 1216 METER LOCATION – ROOM 121

NOT TO SCALE



BUILDING 1216, ROOM 121 PIPING DEMOLITION ISOMETRIC



BUILDING 1216, ROOM 121 PIPING NEW WORK ISOMETRIC

NORTH

REMOVAL NOTES:

(1) REMOVE EXISTING COPPER PIPING AND FITTINGS TO POINTS INDICATED. PREPARE PIPING ENDS FOR RECONNECTION DURING NEW WORK.

NEW WORK NOTES:

[1] PROVIDE NEW COPPER PIPING AND FITTINGS TO POINTS INDICATED.

REVISIONS								REVISIONS							
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD		DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	

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CHECK G. VOLKMAN	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

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NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICRONCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: BUILDINGS 1212 AND 1216 WATER METER INSTALLATION

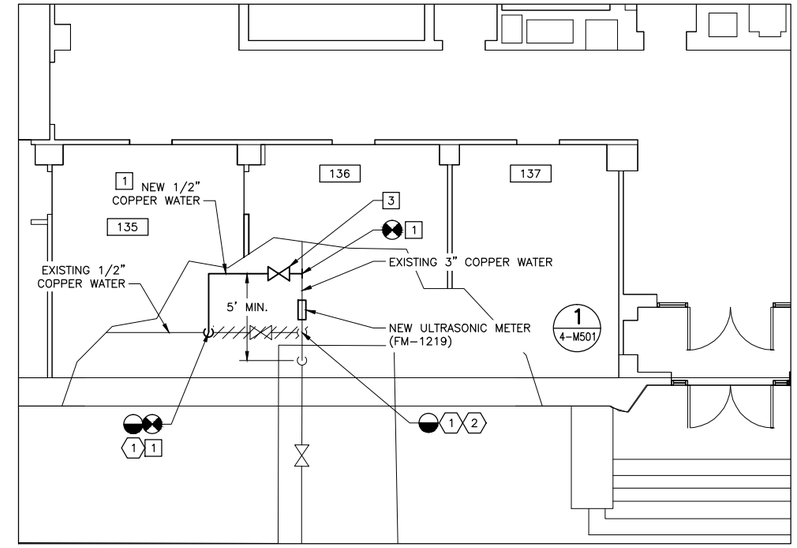
BUILDING NO.	SIZE	DRAWING NO.	LATEST REV.
VARIOUS	D	1296813	.

SHEET NO. 4-M103

BUILDING 1219 METER LOCATION – CRAWLSPACE BELOW ROOM 136

NOT TO SCALE

NORTH



BUILDING 1219 CRAWL SPACE PIPING ALTERATION PLAN

NOT TO SCALE

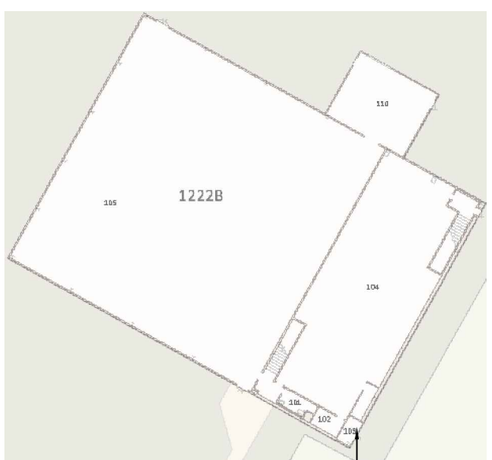
NORTH

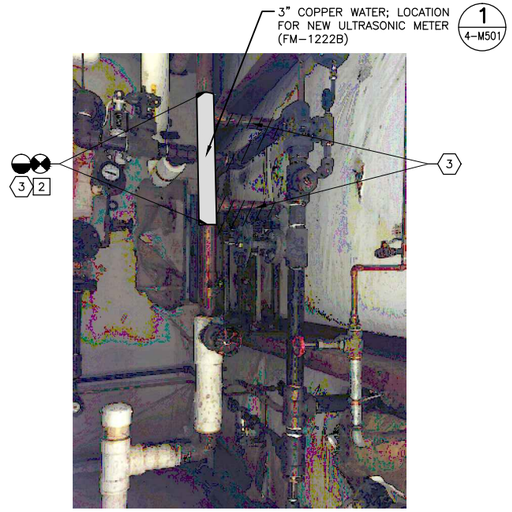
REMOVAL NOTES:

1. DISCONNECT 1/2" COPPER WATER PIPING AT POINT INDICATED.
2. PROVIDE 1/2" COPPER CAP.
3. DISCONNECT AND REMOVE EXISTING 2" COPPER WATER PIPING (LOOP NO LONGER USED FOR BACKFLOW PREVENTION).

NEW WORK NOTES:

1. PROVIDE 1/2" COPPER WATER PIPING AS INDICATED. PROVIDE INSULATION PER CONTRACT SPECIFICATIONS.
2. PROVIDE 3" COPPER WATER PIPING AND FITTINGS AS INDICATED AND INSULATE ACCORDING TO CONTRACT SPECIFICATIONS.
3. PROVIDE NEW 1/2" GATE VALVE ACCORDING TO CONTRACT SPECIFICATIONS.

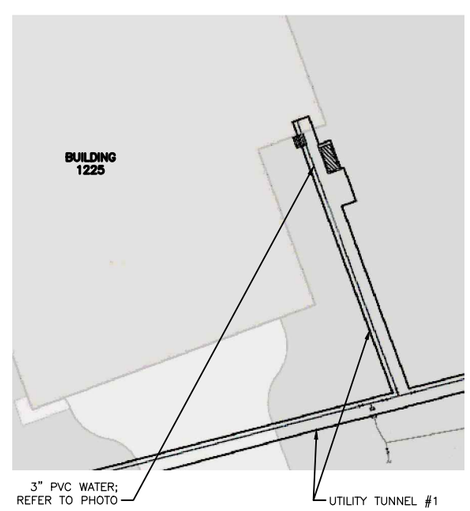




BUILDING 1222B METER LOCATION – ROOM 103

NOT TO SCALE

NORTH



BUILDING 1225 METER LOCATION – UTILITY TUNNEL #1

NOT TO SCALE

NORTH

REVISIONS								REVISIONS							
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD		DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	

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CHECK G. VOLKMAN	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICRONCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

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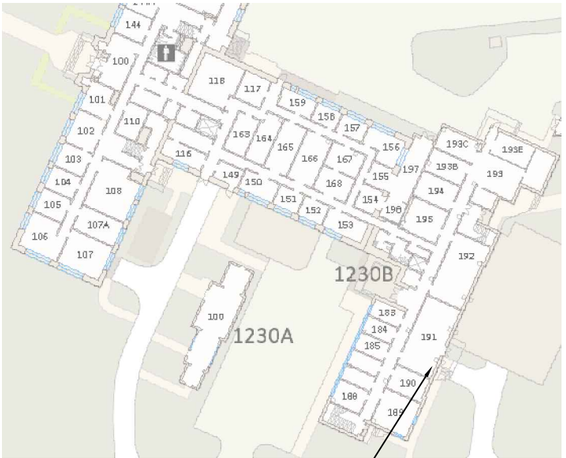
PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2
FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: BUILDINGS 1219, 1222B AND 1225
WATER METER INSTALLATION

BUILDING NO. VARIOUS | SIZE D | DRAWING NO. 1296814 | LATEST REV. ·

SHEET NO. 4–M104



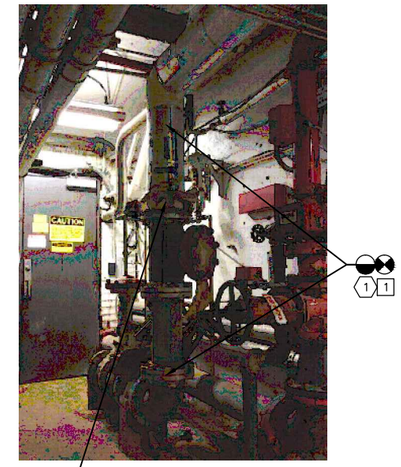
3" PVC WATER; REFER TO PHOTO

3" PVC WATER; LOCATION FOR NEW ULTRASONIC METER (FM-1230-2) 1 / 4-M501

BUILDING 1230 METER LOCATION – ROOM 191

NOT TO SCALE

NORTH



6" CARBON STEEL WATER; REFER TO PHOTO

6" PVC WATER; LOCATION FOR NEW ELECTROMAGNETIC METER (FM-1230-1) 2 / 4-M501

BUILDING 1230 METER LOCATION – ROOM 10

NOT TO SCALE

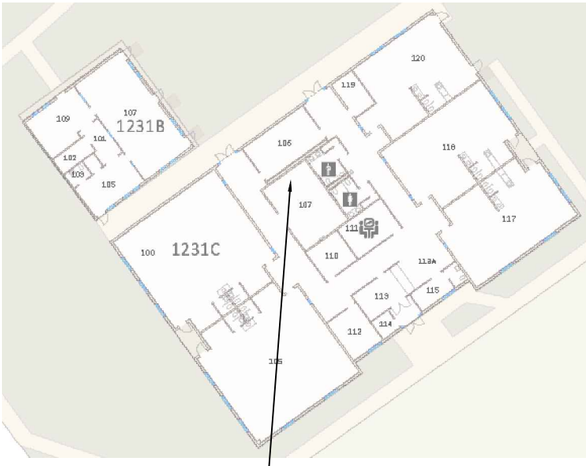
NORTH

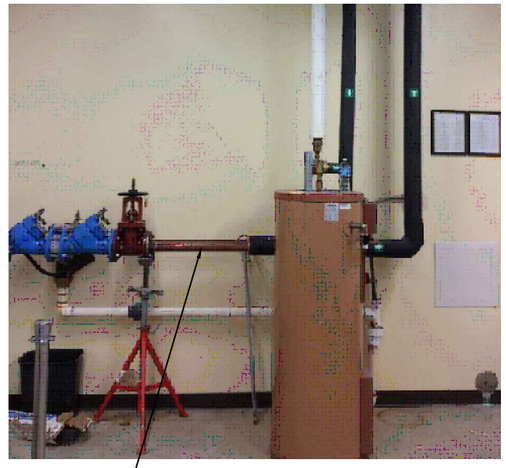
REMOVAL NOTES:

1. REMOVE EXISTING 6" CARBON STEEL PIPING AND FITTINGS TO POINTS INDICATED. PREPARE PIPING ENDS FOR RECONNECTION DURING NEW WORK.

NEW WORK NOTES:

1. PROVIDE NEW 6" SCHEDULE 80 PVC PIPING AND FITTINGS TO POINTS INDICATED. PROVIDE FLANGES AS REQUIRED FOR NEW TO EXISTING CONNECTION AND FOR NEW ELECTROMAGNETIC METER. PROVIDE INSULATION PER CONTRACT SPECIFICATIONS.
2. PROVIDE INSULATION PER CONTRACT SPECIFICATIONS.





3" COPPER WATER; REFER TO PHOTO

3" COPPER WATER; LOCATION FOR NEW ULTRASONIC METER (FM-1231C) 2 — 1 / 4-M501

BUILDING 1231C METER LOCATION – ROOM 107

NOT TO SCALE

NORTH

1-1/2" COPPER WATER; REFER TO PHOTO

1-1/2" COPPER WATER; LOCATION FOR NEW ELECTROMAGNETIC METER (FM-1232-2) 2 — 2 / 4-M501

BUILDING 1232 METER LOCATION – ROOM 144

NOT TO SCALE

NORTH

REVISIONS								REVISIONS							
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ENG./DES.	H. GOLDSMITH	07/30/15
CHECK	G. VOLKMAN	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

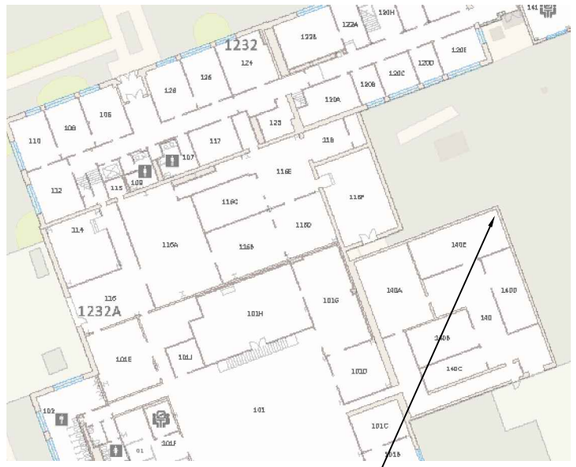
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: BUILDINGS 1230, 1231C AND 1232 WATER METER INSTALLATION

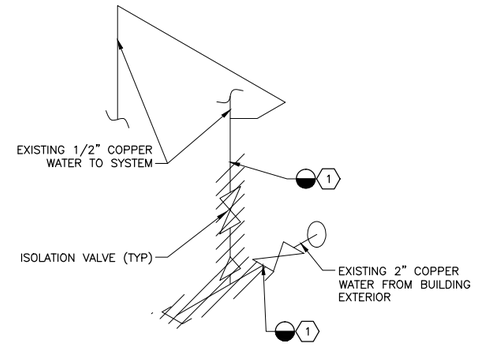
BUILDING NO.: VARIOUS | SIZE: D | DRAWING NO.: 1296815 | LATEST REV.: -

SHEET NO.: 4-M105

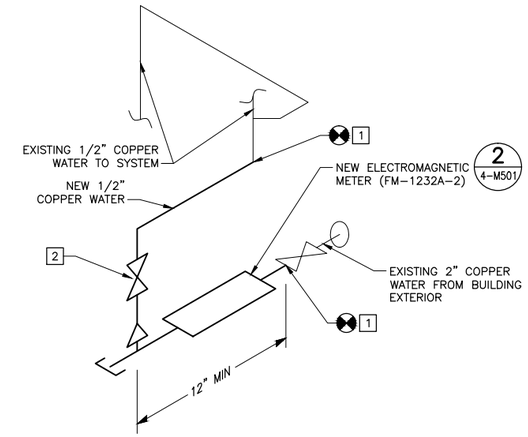


BUILDING 1232A METER LOCATION – ROOM 140E

NOT TO SCALE



BUILDING 1232A, ROOM 140E PIPING DEMOLITION ISOMETRIC



BUILDING 1232A, ROOM 140E PIPING NEW WORK ISOMETRIC

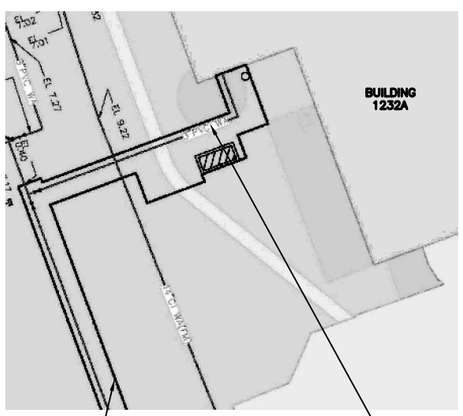
REMOVAL NOTES:

1. REMOVE EXISTING COPPER PIPING AND FITTINGS TO POINTS INDICATED. PREPARE PIPING ENDS FOR RECONNECTION DURING NEW WORK.

NEW WORK NOTES:

1. PROVIDE NEW COPPER PIPING AND FITTINGS TO POINTS INDICATED.
2. PROVIDE NEW 1/2" GATE VALVE ACCORDING TO CONTRACT SPECIFICATIONS.

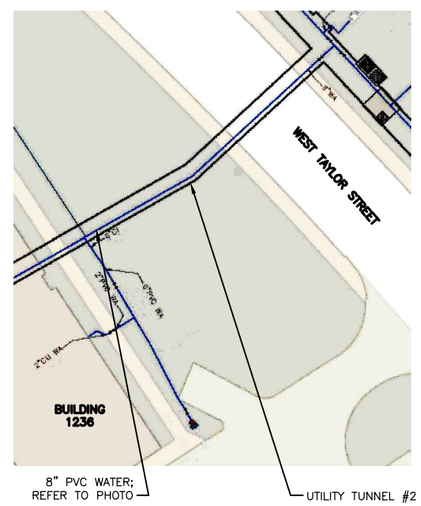
NORTH



BUILDING 1232A METER LOCATION – UTILITY TUNNEL #1

NOT TO SCALE

NORTH



BUILDING 1236 METER LOCATION – UTILITY TUNNEL #2

NOT TO SCALE

NORTH

REVISIONS															
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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WORK ORDER NO.	CTN000188	
APPROVALS		DATE
DRAWN	E. DOHERTY/D. PARKER	07/30/15
ENG./DES.	H. GOLDSMITH	07/30/15
CHECK	G. VOLKMAN	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

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			RES. PROJ. ENG.	

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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

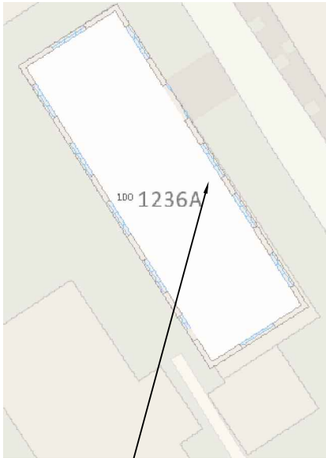
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: BUILDINGS 1232A AND 1236 WATER METER INSTALLATION

BUILDING NO. VARIOUS | SIZE D | DRAWING NO. 1296816 | LATEST REV. ·

SHEET NO. 4-M106



2" PVC WATER; REFER TO PHOTO

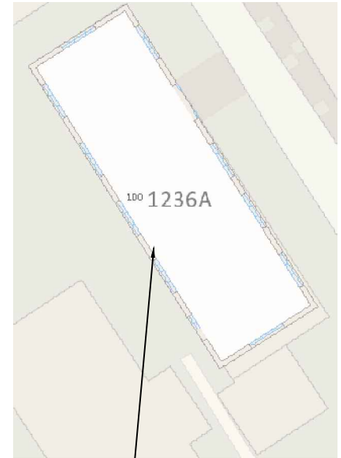
2" PVC WATER; LOCATION FOR NEW ULTRASONIC METER (FM-1236A-1) 1 / 4-M501

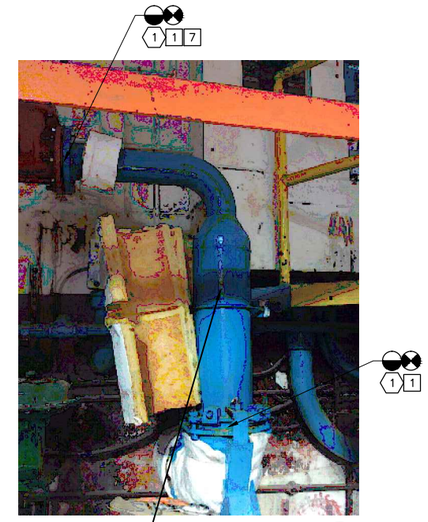
MAINTAIN CLEAR SPACE FOR LADDER ACCESS

BUILDING 1236A METER LOCATION – ROOM 100, LOCATION 1

NOT TO SCALE

NORTH





2" PVC WATER; REFER TO PHOTO

LOCATION FOR NEW ELECTROMAGNETIC METER (FM-1236A-2) 2 / 4-M501

BUILDING 1236A METER LOCATION – ROOM 100, LOCATION 2

NOT TO SCALE

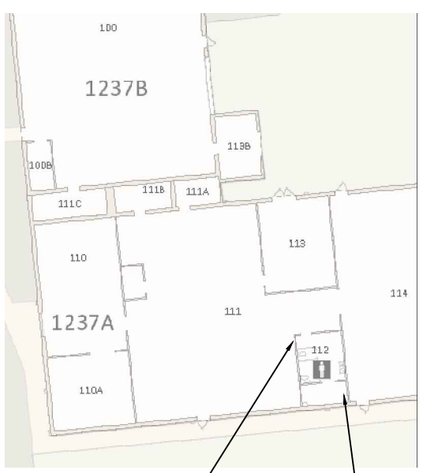
NORTH

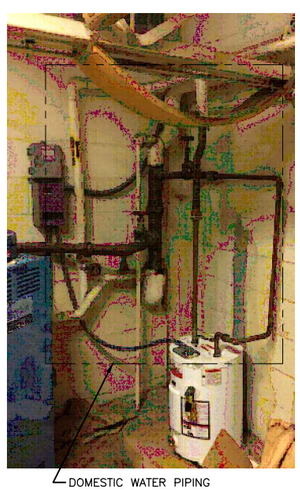
REMOVAL NOTES:

1. REMOVE EXISTING 4" AND 8" CARBON STEEL PIPING AND FITTINGS TO POINTS INDICATED. PREPARE PIPING ENDS FOR RECONNECTION DURING NEW WORK.
2. REMOVE EXISTING PIPING AND FITTINGS TO POINTS INDICATED. PREPARE PIPING ENDS FOR RECONNECTION DURING NEW WORK.

NEW WORK NOTES:

1. TRANSITION IMMEDIATELY FROM 8" CARBON STEEL ELBOW TO 4" PVC AND ROUTE TO EXISTING ISOLATION VALVE. PROVIDE INSULATION PER CONTRACT SPECIFICATIONS.
2. PROVIDE NEW 3" COPPER WATER PIPING AND FITTINGS TO POINTS INDICATED. PROVIDE DIELECTRIC FLANGE CONNECTIONS AT CONNECTIONS TO EXISTING CARBON STEEL PIPING.
3. PROVIDE NEW 3/4" COPPER WATER PIPING AND FITTINGS AS INDICATED. PROVIDE INSULATION PER CONTRACT SPECIFICATIONS.
4. PROVIDE NEW 2"x2"x3/4" COPPER TEE.
5. PROVIDE NEW 3/4" GATE VALVE ACCORDING TO CONTRACT SPECIFICATIONS.
6. PROVIDE NEW 2" GATE VALVE ACCORDING TO CONTRACT SPECIFICATIONS.
7. PROVIDE NEW CARBON STEEL (GALVANIZED) FLANGE SUPPORT (COOPER B-LINE FIG. B3094-6 OR APPROVED EQUAL) WITH NEW 2½" SCH. 40 PIPE (GALVANIZED) – LENGTH AS REQUIRED AND ¼"x6"x6" BASE PLATE (GALVANIZED) – FASTEN TO WALL USING 4 MECHANICAL EXPANSION BOLTS.





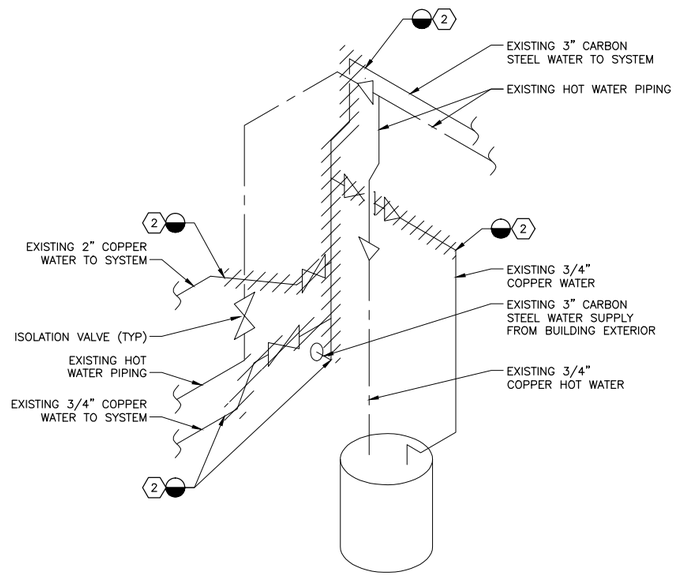
ACCESS TO 3" COPPER WATER BY LADDER

3" COPPER WATER ABOVE ROOM 112; REFER TO PHOTO

DOMESTIC WATER PIPING MODIFICATION REQUIRED; SEE NEW WORK ISOMETRICS THIS SHEET

BUILDING 1237A METER LOCATION – ABOVE ROOM 112

NOT TO SCALE



BUILDING 1237A, ABOVE ROOM 112 PIPING DEMOLITION ISOMETRIC

BUILDING 1237A, ABOVE ROOM 112 PIPING NEW WORK ISOMETRIC

NORTH

REVISIONS								REVISIONS							
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD		DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	

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WORK ORDER NO. CTN000188	
APPROVALS	DATE
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ENG./DES. H. GOLDSMITH	07/30/15
CHECK G. VOLKMAN	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

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			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

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SURFACE FINISH IN MICRONCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

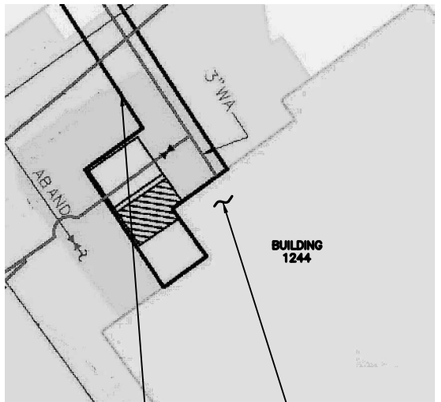
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: BUILDINGS 1236A AND 1237A WATER METER INSTALLATION

BUILDING NO. VARIOUS | SIZE D | DRAWING NO. 1296817 | LATEST REV. ·

SHEET NO. 4-M107



UTILITY TUNNEL #2

3" COPPER WATER IN BASEMENT ROOM 11; REFER TO PHOTO

1 / 4-M501

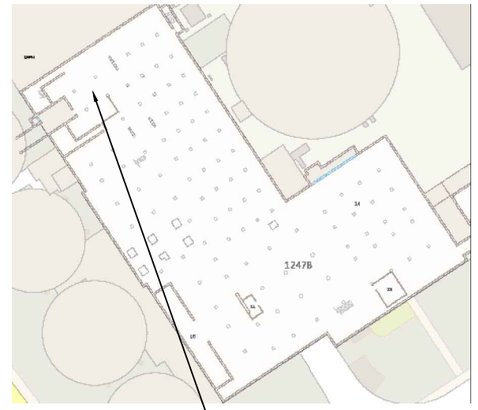
3" COPPER WATER IN BASEMENT ROOM 11 OF BUILDING 1244; [1] LOCATION FOR NEW ULTRASONIC METER (FM-1244)

NOTE: THE 3" COPPER WATER FROM UTILITY TUNNEL #2 ENTERS THE BASEMENT OF BUILDING 1244. THE LOCATION FOR THE NEW ULTRASONIC METER IS IN ROOM 11 OF THE BASEMENT, WHICH IS ACTUALLY THE END OF THE UTILITY TUNNEL.

BUILDING 1244 METER LOCATION – UTILITY TUNNEL #2

NOT TO SCALE

NORTH



8" PVC WATER; REFER TO PHOTO

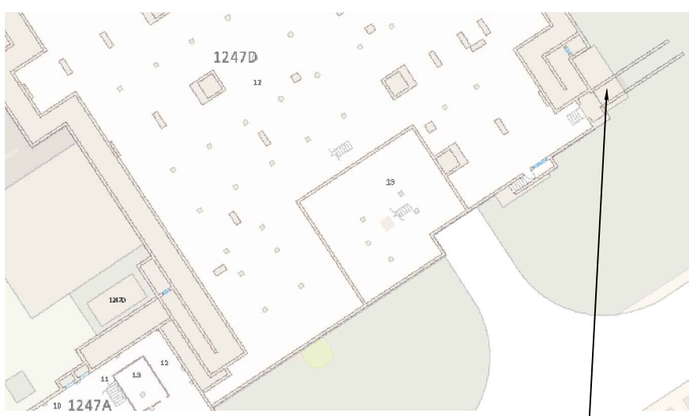
8" PVC WATER; LOCATION FOR NEW ULTRASONIC METER (FM-1247B) [1]

1 / 4-M501

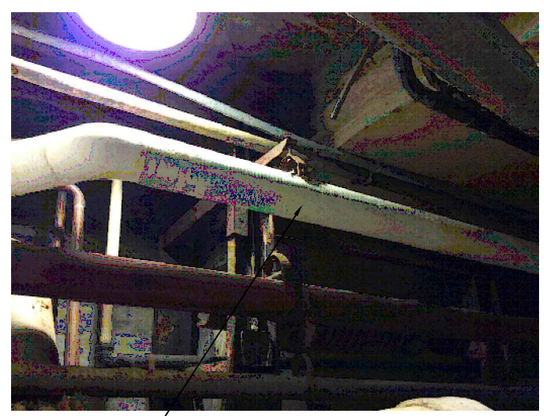
BUILDING 1247B METER LOCATION – ROOM 14

NOT TO SCALE

NORTH



3" COPPER WATER; REFER TO PHOTO



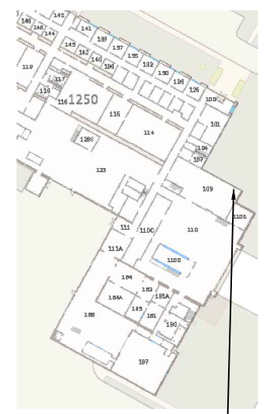
3" COPPER WATER; LOCATION FOR NEW ULTRASONIC METER (FM-1247D) [1]

1 / 4-M501

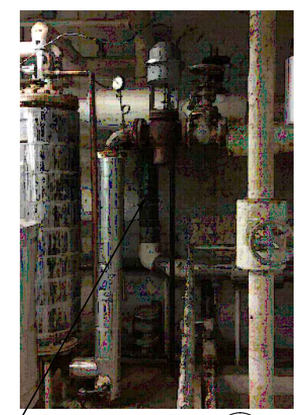
BUILDING 1247D METER LOCATION – ROOM 12

NOT TO SCALE

NORTH



4" CARBON STEEL WATER; REFER TO PHOTO



4" CARBON STEEL WATER; LOCATION FOR NEW ELECTROMAGNETIC METER (FM-1250)

2 / 4-M501

BUILDING 1250 METER LOCATION – ROOM 109

NOT TO SCALE

NORTH

NEW WORK NOTES:

[1] PROVIDE INSULATION PER CONTRACT SPECIFICATIONS.

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS	DATE
DRAWN E. DOHERTY/D. PARKER	07/30/15
ENG./DES. H. GOLDSMITH	07/30/15
CHECK G. VOLKMAN	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ±; X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: BUILDINGS 1244, 1247B, 1247D AND 1250 WATER METER INSTALLATION

BUILDING NO. VARIOUS | SIZE D | DRAWING NO. 1296818 | LATEST REV. -

SHEET NO. 4-M108

3" COPPER WATER
BELOW ROOM 1106A;
REFER TO PHOTO

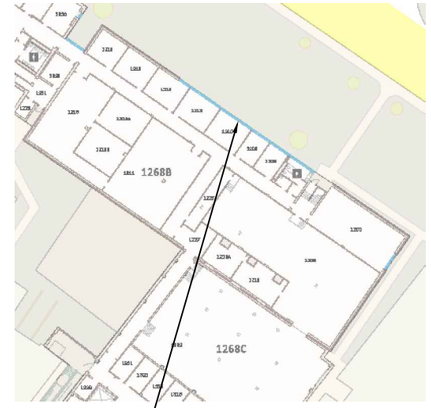
3" COPPER WATER; LOCATION
FOR NEW ULTRASONIC METER
(FM-1268A) [1]

1 / 4-M501

BUILDING 1268A METER LOCATION – CRAWLSPACE UNDER ROOM 1106A

NOT TO SCALE

NORTH



2" COPPER WATER
BELOW ROOM 1210;
REFER TO PHOTO

DISCONNECT EXIST 3/4" COPPER WATER AND
RECONNECT 2' DOWNSTREAM TO ALLOW FOR
NEW ULTRASONIC METER; PROVIDE ALL FITTINGS
AND PIPE INSULATION TO MATCH EXISTING.

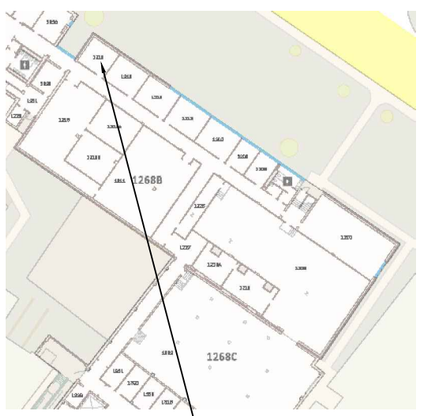
2" COPPER WATER; LOCATION
FOR NEW ULTRASONIC METER
(FM-1268B-1) [1]

1 / 4-M501

BUILDING 1268B METER LOCATION – CRAWLSPACE UNDER ROOM 1210

NOT TO SCALE

NORTH



8" PVC WATER
BELOW ROOM 1218;
REFER TO PHOTO

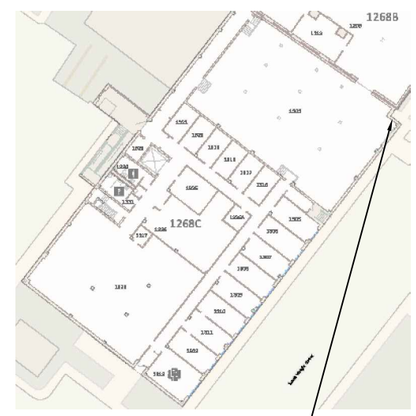
8" PVC WATER; LOCATION
FOR NEW ULTRASONIC METER
(FM-1268B-2) [1]

1 / 4-M501

BUILDING 1268B METER LOCATION – CRAWLSPACE UNDER ROOM 1218

NOT TO SCALE

NORTH



2-1/2" COPPER WATER;
REFER TO PHOTO

2-1/2" COPPER WATER;
LOCATION FOR NEW
ULTRASONIC METER
(FM-1268C) [1]

1 / 4-M501

BUILDING 1268C METER LOCATION – ROOM 1303

NOT TO SCALE

NORTH

NEW WORK NOTES:

[1] PROVIDE INSULATION PER CONTRACT SPECIFICATIONS.

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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ENG./DES. H. GOLDSMITH	07/30/15
CHECK G. VOLKMAN	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

APPROVALS

NAME	ORGANIZATION	DATE		DATE
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			TECH. PROJ. ENG.	
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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
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PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: BUILDINGS 1268A, 1268B AND 1268C WATER METER INSTALLATION

BUILDING NO. VARIOUS | SIZE D | DRAWING NO. 1296819 | LATEST REV. ·

SHEET NO. 4-M109

3" PVC WATER; REFER TO PHOTO

3" PVC WATER; LOCATION FOR NEW ULTRASONIC METER (FM-1293A) [1]

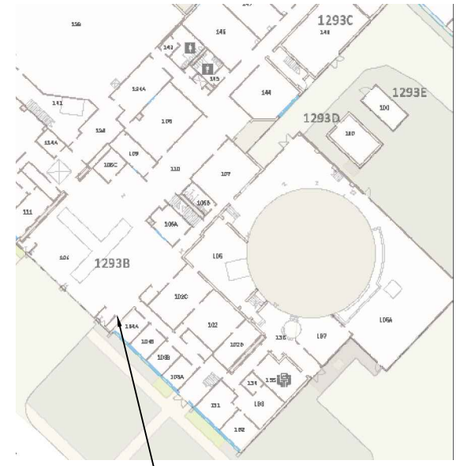
1 / 4-M501

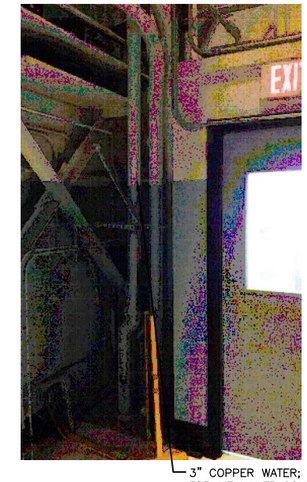
NOTE: THE PIPE INSULATION ON THE 3" PVC WATER PIPE CONTAINS ASBESTOS. REFER TO HAZARDOUS MATERIALS NOTE ON DRAWING 1296810.

BUILDING 1293A METER LOCATION – ROOM 9

NOT TO SCALE

NORTH





3" COPPER WATER; REFER TO PHOTO

3" COPPER WATER; LOCATION FOR NEW ULTRASONIC METER (FM-1293B) [1]

1 / 4-M501

BUILDING 1293B METER LOCATION – ROOM 106

NOT TO SCALE

NORTH

NEW WORK NOTES:

[1] PROVIDE INSULATION PER CONTRACT SPECIFICATIONS.

REVISIONS													
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

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CHECK G. VOLKMAN	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
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			CHECKED	
			APPROVED	
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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

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LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: BUILDINGS 1293A AND 1293B WATER METER INSTALLATION

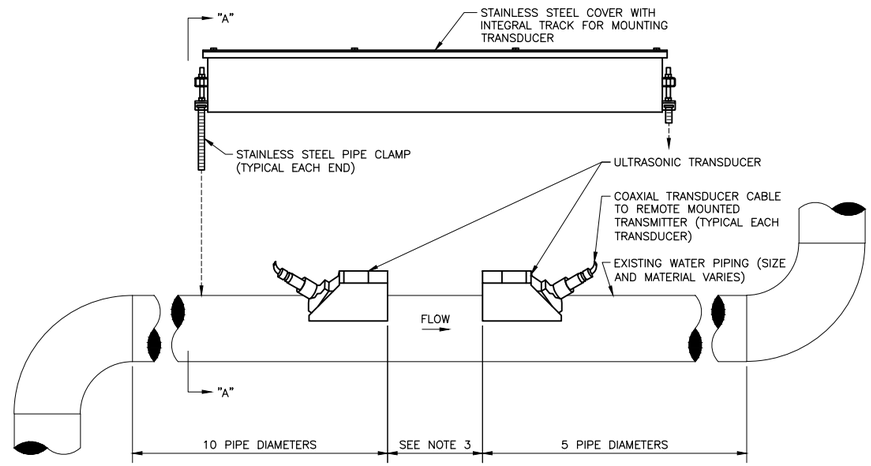
BUILDING NO. VARIOUS | SIZE D | DRAWING NO. 1296820 | LATEST REV. ·

SHEET NO. 4–M110

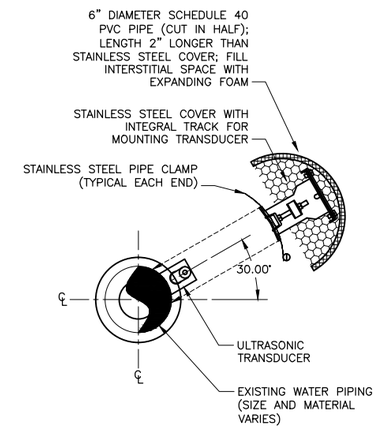
WATER FLOW METER SCHEDULE

BUILDING	METER LOCATION	TAG	PIPE SIZE	PIPE MATERIAL	METER TYPE	NOTES
1146	BELOW GRADE NEAR ROOM 117A	FM–1146	2"	COPPER	ULTRASONIC	1
1148	ROOM 122	FM–1148–1	3"	COPPER	ULTRASONIC	–
1148	ROOM 134	FM–1148–2	6"	CARBON STEEL	ULTRASONIC	–
1148	BELOW GRADE NEAR BLDG 1205, ROOM 141	FM–1148–3	4"	PVC	ULTRASONIC	–
1189	BELOW GRADE NEAR ROOM 106	FM–1189	2"	PVC	ULTRASONIC	1
1195A	ROOM 112	FM–1195A	2"	COPPER	ULTRASONIC	–
1195B	BELOW GRADE NEAR ROOM 132	FM–1195B	4"	COPPER	ULTRASONIC	1
1199	BELOW GRADE NEAR ROOM 101	FM–1199–1	1–1/2"	COPPER	ULTRASONIC	1
1199	BELOW GRADE NEAR ROOM 119	FM–1199–2	4"	PVC	ULTRASONIC	1
1205	ROOM 119	FM–1205–1	2"	COPPER	ULTRASONIC	–
1205	ROOM 156	FM–1205–2	3"	CARBON STEEL	ELECTROMAGNETIC	2
1208	ROOM 7	FM–1208	3"	CARBON STEEL	ELECTROMAGNETIC	2
1212	CRAWLSPACE BELOW ROOM 119A	FM–1212–1	4"	CARBON STEEL	ULTRASONIC	–
1212	ROOM 154	FM–1212–2	1–1/2"	COPPER	ULTRASONIC	–
1212C	BELOW GRADE NEAR ROOMS 113 AND 114	FM–1212C	2"	COPPER	ULTRASONIC	1
1216	ROOM 121	FM–1216	3"	COPPER	ELECTROMAGNETIC	2
1219	CRAWLSPACE BELOW ROOM 136	FM–1219	3"	COPPER	ULTRASONIC	–
1222B	ROOM 103	FM–1222B	3"	COPPER	ULTRASONIC	–
1225	UTILITY TUNNEL #1	FM–1225	3"	PVC	ULTRASONIC	–
1230	ROOM 10	FM–1230–1	6"	CARBON STEEL	ELECTROMAGNETIC	2
1230	ROOM 191	FM–1230–2	3"	PVC	ULTRASONIC	–
1231C	ROOM 107	FM–1231C	3"	COPPER	ULTRASONIC	–
1232	BELOW GRADE; ROOM 112	FM–1232–1	6"	PVC	ULTRASONIC	1
1232	ROOM 144	FM–1232–2	1–1/2"	COPPER	ELECTROMAGNETIC	–
1232A	UTILITY TUNNEL #1	FM–1232A–1	3"	PVC	ULTRASONIC	–
1232A	ROOM 140E	FM–1232A–2	2"	COPPER	ELECTROMAGNETIC	–
1236	UTILITY TUNNEL #2	FM–1236–1	8"	PVC	ULTRASONIC	–
1236A	ROOM 100	FM–1236A–1	2"	PVC	ULTRASONIC	–
1236A	ROOM 100	FM–1236A–2	4"	PVC	ELECTROMAGNETIC	2
1237A	ABOVE ROOM 112	FM–1237A	3"	COPPER	ELECTROMAGNETIC	2
1237B	BELOW GRADE NEAR ROOMS 100H AND 104A	FM–1237B	2"	COPPER	ULTRASONIC	1
1244	UTILITY TUNNEL #2; ROOM 11	FM–1244	3"	COPPER	ULTRASONIC	–
1247B	ROOM 14	FM–1247B	8"	PVC	ULTRASONIC	–
1247D	ROOM 12	FM–1247D	3"	COPPER	ULTRASONIC	–
1250	ROOM 109	FM–1250	4"	CARBON STEEL	ELECTROMAGNETIC	2
1265	BELOW GRADE NEAR ROOM 11	FM–1265–1	6"	PVC	ULTRASONIC	1
1265	BELOW GRADE NEAR ROOM 102	FM–1265–2	2"	COPPER	ULTRASONIC	1
1268A	CRAWLSPACE BELOW ROOM 1106A	FM–1268A	3"	COPPER	ULTRASONIC	–
1268B	CRAWLSPACE BELOW ROOM 1210	FM–1268B–1	2"	COPPER	ULTRASONIC	–
1268B	CRAWLSPACE BELOW ROOM 1218	FM–1268B–2	8"	PVC	ULTRASONIC	–
1268C	ROOM 1303	FM–1268C	2–1/2"	COPPER	ULTRASONIC	–
1293A	ROOM 9	FM–1293A	3"	PVC	ULTRASONIC	–
1293B	ROOM 106	FM–1293B	3"	COPPER	ULTRASONIC	–

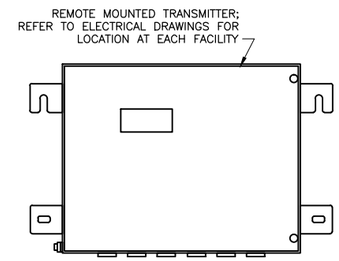
NOTES:
1. REFER TO CIVIL DRAWINGS FOR LOCATION OF WATER METER.
2. ELECTROMAGNETIC METER SHALL HAVE 150# FLANGED END CONNECTIONS.
3. REFER TO CONTRACT SPECIFICATION SECTION 40 95 00.00 41, PARAGRAPHS 2.3 AND 2.4 FOR SALIENT FEATURES OF FLOW METERS.
4. EXISTING COPPER PIPING IS ASSUMED TO BE TYPE L; CARBON STEEL IS ASSUMED TO BE SCHEDULE 40; PVC PIPING IS ASSUMED TO BE SCHEDULE 80.



ELEVATION VIEW



VIEW "A" – "A"



REMOTE TRANSMITTER

NOTES:
1. DETAIL APPLIES TO ALL ULTRASONIC METER INSTALLATIONS AND IS SHOWN FOR REFERENCE. INSTALL TRANSMITTER AND TRANSDUCERS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. MAINTAIN ALL REQUIRED MINIMUM UPSTREAM AND DOWNSTREAM STRAIGHT LENGTH PIPE DIAMETERS AS REQUIRED BY MANUFACTURER.
2. ORIENT TRANSDUCERS ON PIPE AT "10 O'CLOCK OR 2 O'CLOCK", AS SHOWN IN VIEW "A"–"A", OR IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
3. DISTANCE BETWEEN EACH TRANSDUCER SHALL BE ACCORDING TO MANUFACTURER'S INSTRUCTIONS.
4. IF EXISTING PIPE INSULATION IS DISTURBED TO ACCOMMODATE INSTALLATION OF WATER METER, PROVIDE PIPE INSULATION IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.

TYPICAL ULTRASONIC METER DETAIL

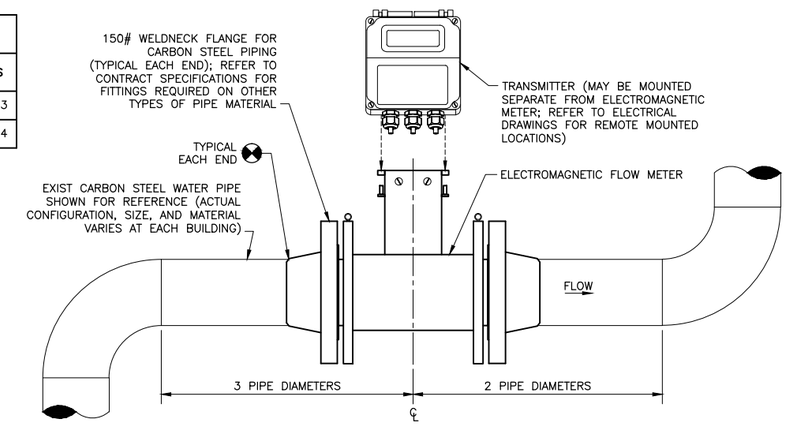
NOT TO SCALE

1 / 4–M501

POTABLE WATER VALVE SCHEDULE

VALVE TAG No.	BLDG No.	SHEET SHOWN	SERVICE	FUNCTION	SIZE	TYPE	ACTUATION	END CONNECTION	RATED PRESSURE (PSIG)	MANUFACTURER/PART NUMBER (OR EQUAL)	NOTES
317	1205	4–C101	POTABLE WATER	ISOLATION	1"	GATE	MANUAL	THREADED	200	NIBCO MODEL T–113–LF	1, 2, 3
372	1232	4–C102	POTABLE WATER	ISOLATION	6"	GATE	MANUAL	MECHANICAL JOINT	200	MUELLER Co. MODEL A–2360	1, 3, 4

NOTES
1. REFER TO CONTRACT SPECIFICATION SECTION 33 11 00, PARAGRAPH 2.2 FOR SALIENT FEATURES.
2. VALVE SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C509 STANDARD, AND SHALL BE CERTIFIED TO ANSI/NSF 61.
3. VALVE LOCATED BELOW GRADE.
4. VALVE SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C509 STANDARD, AND SHALL BE UL LISTED, FM APPROVED, AND CERTIFIED TO ANSI/NSF 61. STANDARD MECHANICAL JOINT ENDS SHALL COMPLY WITH ANSI/AWWA C111. EPOXY COATING SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI/AWWA C550 STANDARD AND BE CERTIFIED TO ANSI/NSF 61. VALVES SHALL HAVE NON–RISING STEM (NRS), 2" SQUARE WRENCH NUT, AND TRIPLE O–RING SEAL STUFFING BOX (2 UPPER & 1 LOWER O–RINGS), WITH FOURTH O–RING SERVING AS A DIRT SEAL.



NOTES:
1. DETAIL APPLIES TO ALL ELECTROMAGNETIC METER INSTALLATIONS. TYPE OF PIPE CONNECTION VARIES BASED ON PIPE SIZE AND MATERIAL (PVC, CARBON STEEL, OR COPPER). INSTALL METER IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. MAINTAIN ALL REQUIRED UPSTREAM AND DOWNSTREAM STRAIGHT LENGTH PIPE DIAMETERS FROM CENTERLINE OF METER AS REQUIRED BY MANUFACTURER.
2. REMOVE SECTION OF EXISTING PIPE AS REQUIRED TO ACCOMMODATE ELECTROMAGNETIC FLOW METER.
3. IF EXISTING PIPE INSULATION IS DISTURBED TO ACCOMMODATE INSTALLATION OF WATER METER, PROVIDE PIPE INSULATION IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.

TYPICAL ELECTROMAGNETIC METER DETAIL

NOT TO SCALE

2 / 4–M501

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ENG./DES. H. GOLDSMITH	07/30/15
CHECK G. VOLKMAN	07/30/15
PROJ. MGR. G. VOLKMAN	07/30/15
SUPV'N.	

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			DESIGNED	
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			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ±; X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

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LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681–2199

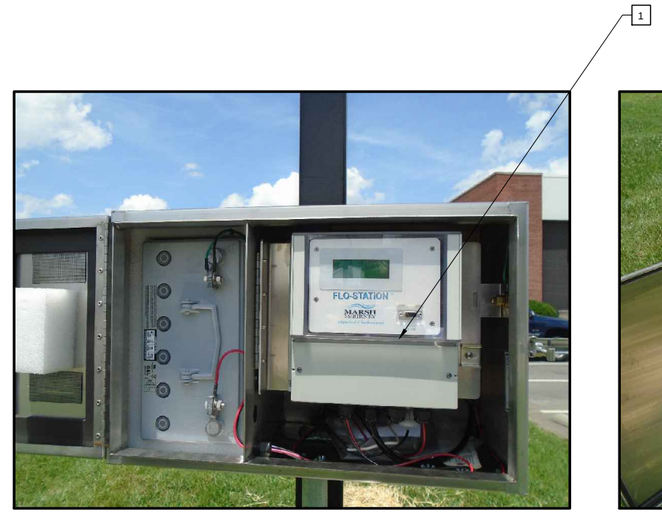
PROJECT TITLE: POTABLE WATER SUPPLY, PHASE 2 FY'16 MINOR CoF (WORK PACKAGE 4)

DRAWING TITLE: WATER METER INSTALLATION DETAILS AND SCHEDULE

BUILDING NO.: VARIOUS | SIZE: D | DRAWING NO.: 1296821 | LATEST REV.: ·

SHEET NO.: 4–M501

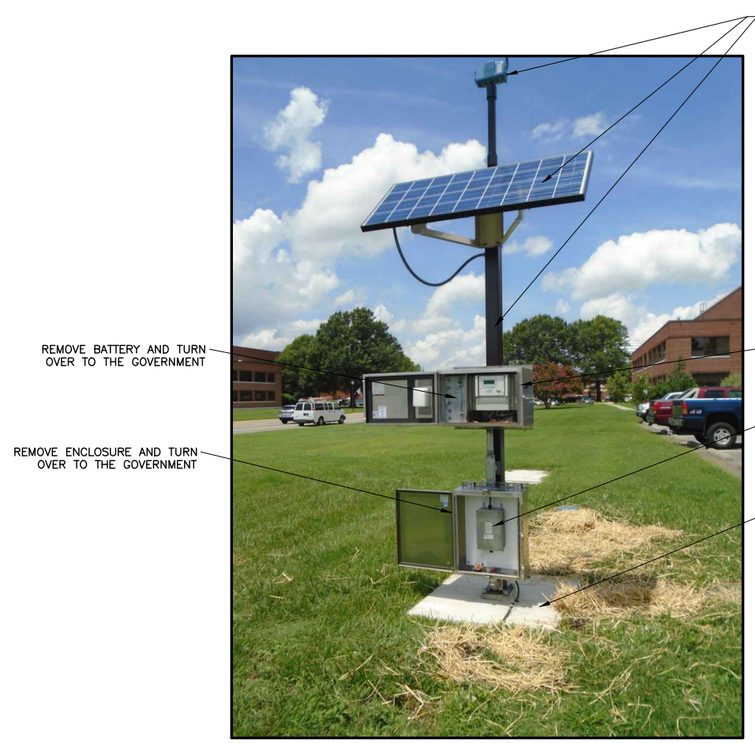
POTABLE WATER FLOW METER



SANITARY SEWER FLOW METER ENCLOSURE

SANITARY SEWER FLOW METER IS MODULE

POTABLE WATER FLOW METER SOLAR PANEL/PEDESTAL



SANITARY SEWER FLOW METER SOLAR PANEL/PEDESTAL

NEW WORK NOTES

1. DISCONNECT/REMOVE ALL INTERNAL COMPONENTS EXCEPT FOR THE FLOW METER AND TERMINAL BLOCKS AND TURN OVER TO THE GOVERNMENT. ENCLOSURE, FLOW METER, AND TERMINAL BLOCKS SHALL BE RE-USED FOR THE NEW INSTALLATION IN BUILDING 1232A.
2. REFERENCE DRAWING 1296823 FOR NEW WORK.
3. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.

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REVISIONS

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PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

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			RES. PROJ. ENG.	

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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

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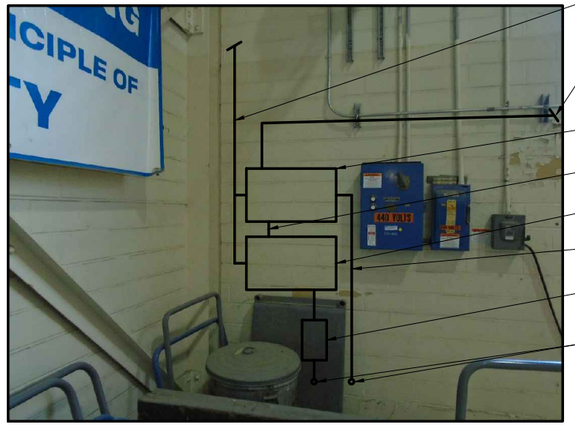
PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

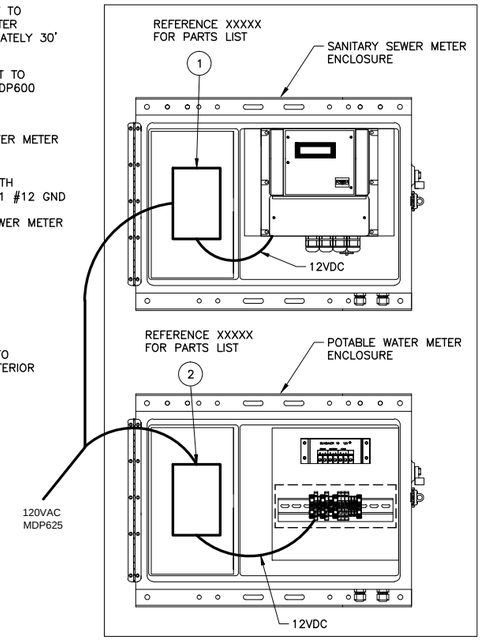
DRAWING TITLE: BUILDING 1232A POTABLE WATER & SANITARY SEWER DEMOLITION DETAILS

BUILDING NO. 1232A | SIZE D | DRAWING NO. 1296822 | LATEST REV. -

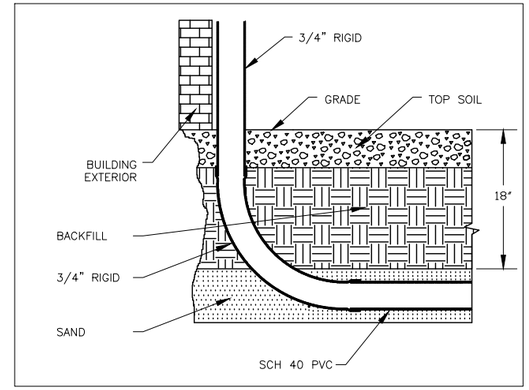
SHEET NO. 4-E101



BUILDING 1232A EQUIPMENT LOCATION
NOT TO SCALE

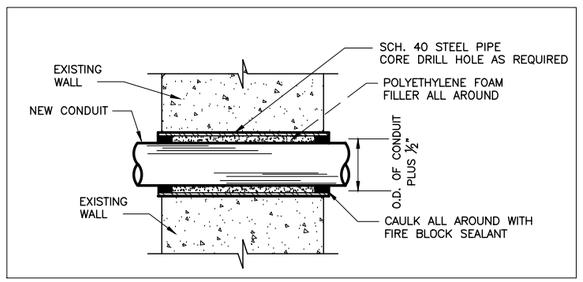


BUILDING 1232A EQUIPMENT
NOT TO SCALE

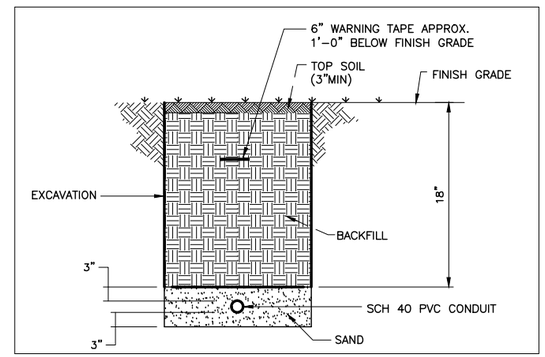


TYPICAL RIGID TO PVC CONDUIT DETAIL
NOT TO SCALE

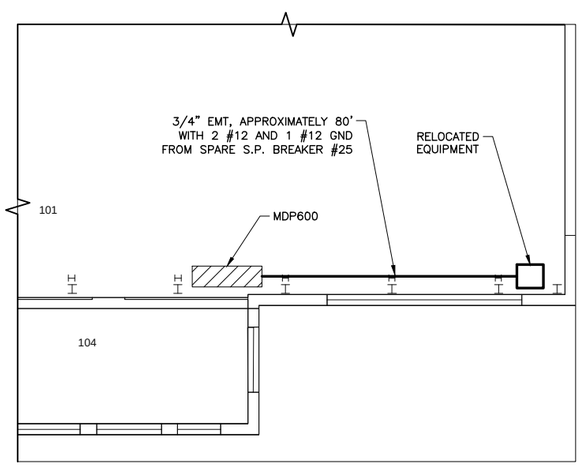
BUILDING 1232A ANTENNA ASSEMBLY LOCATION
NOT TO SCALE



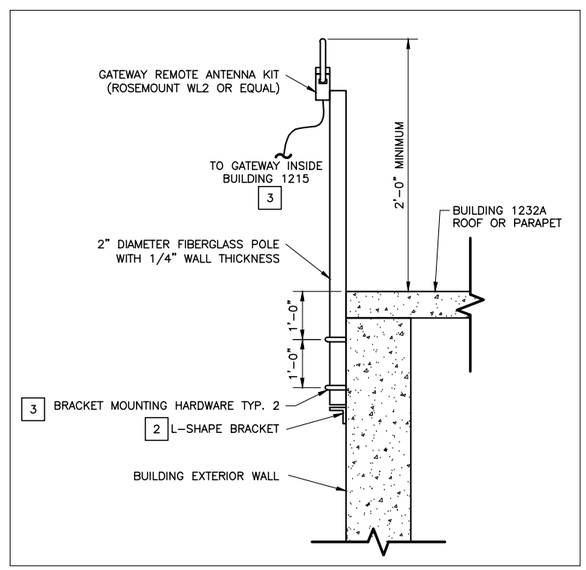
TYPICAL WALL PENETRATION DETAIL
NOT TO SCALE



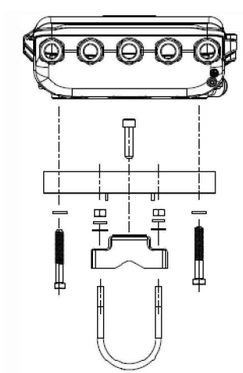
TYPICAL CONDUIT TRENCH DETAIL
NOT TO SCALE



BUILDING 1232A ELECTRICAL PLAN
NOT TO SCALE



BUILDING 1232A TRANSMITTER BUILDING MOUNTING DETAIL
NOT TO SCALE



TRANSMITTER/REPEATER U-BOLT MOUNTING DETAIL
NOT TO SCALE

ROSEMOUNT 00848-4350-2001 KIT OR EQUAL

NEW WORK NOTES

1. REFERENCE DRAWING 1296824 FOR PARTS LIST.
2. PROVIDE VERTICAL SUPPORT POLE WITH L-SHAPE BRACKET MCMASTER CARR #17715A11 OR CONTRACTING OFFICER APPROVED EQUAL. EQUAL SHALL BE 2-1/2" X 2-1/2" LONG AND 2" WIDE AND MADE OF GALVANIZED STEEL, 0.11" THICK, MINIMUM. ATTACH TO CONCRETE WITH (2) 0.145 DIAMETER POWDER ACTUATED FASTENERS, INSTALL PER MANUFACTURER'S INSTRUCTIONS.
3. PROVIDE (2) PIPE GRIP TIES, SIMPSON STRONG TIE PGT2E OR CONTRACTING OFFICER APPROVED EQUAL. EQUAL SHALL BE CAPABLE OF SECURING/TIGHTENING FIBERGLASS POLE INDEPENDENTLY OF ATTACHING TO WALL. MATERIAL SHALL BE 12 GAUGE GALVANIZED STEEL. ATTACH PIPE GRIP TO CONCRETE WITH (4) 1/4" X 1-3/4" CONCRETE SCREWS. INSTALL SCREWS PER MANUFACTURER'S INSTRUCTIONS.
4. REFERENCE DRAWING 1296825 FOR WIRING DETAILS.
5. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.

LEGEND

- EXISTING
- NEW WORK
- PANELBOARD

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ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

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			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

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LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1232A POTABLE WATER & SANITARY SEWER NEW WORK DETAILS

BUILDING NO. 1232A | SIZE D | DRAWING NO. 1296823 | LATEST REV. .

SHEET NO. 4-E102

PARTS LIST

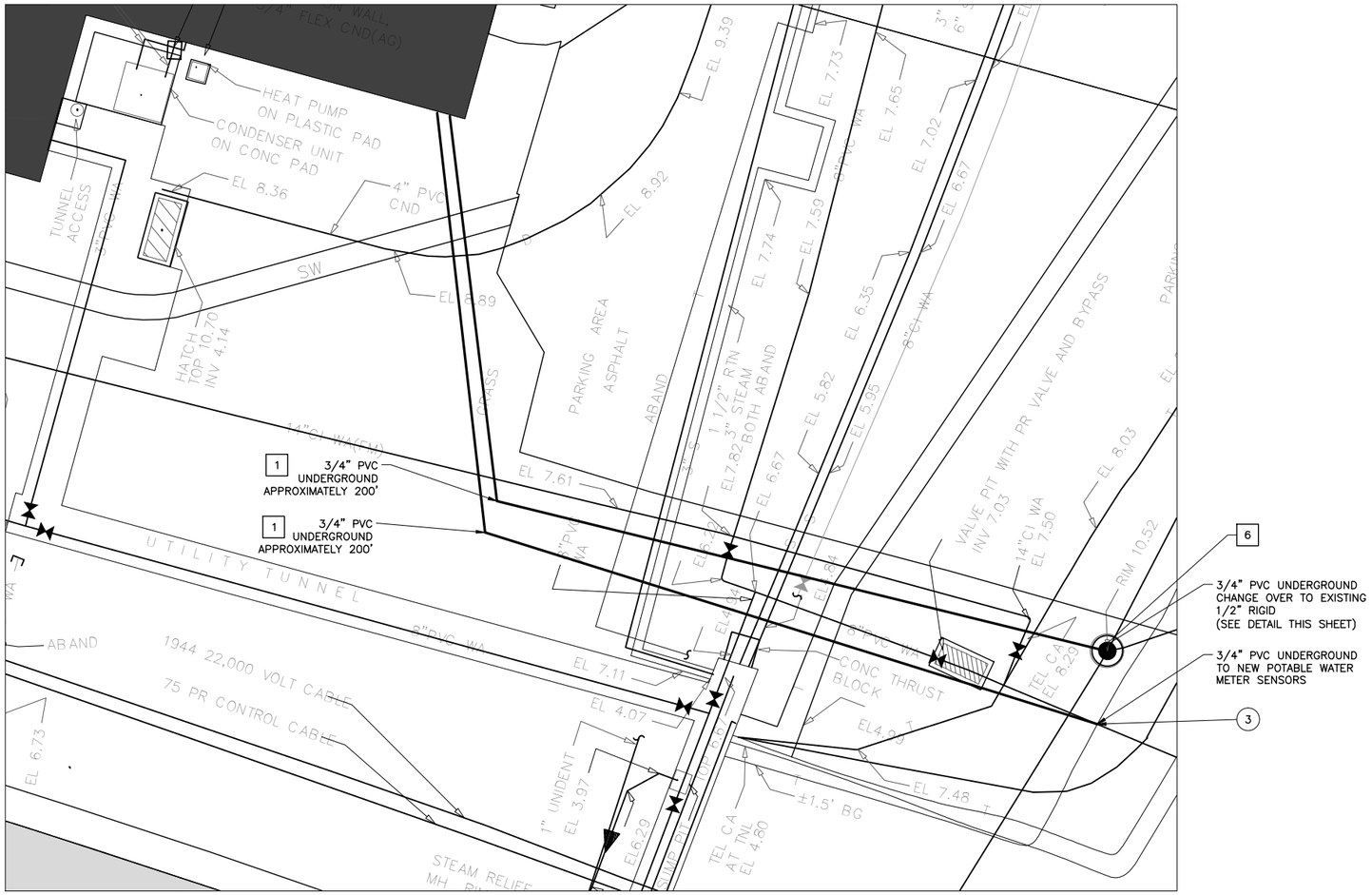
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	POWER CONVERTER	MARSH–MCBIRNEY	6631800
2	1	12VDC POWER SUPPLY	RHINO	PSB12–030–P
3	2	ULTRASONIC FLOW SENSOR WITH 250' OF CABLE	SPIRAX SARCO	UTT10–50S
4	1	SEALING FITTING	KILLARK	ENY–1
	1	SEALING COMPOUND		SC–X–X

LEGEND

- EXISTING
- NEW WORK
- HAZARDOUS AREA CLASS 1, DIVISION 1 REFERENCE NFPA 820 TABLE 4.2 SECTION 21

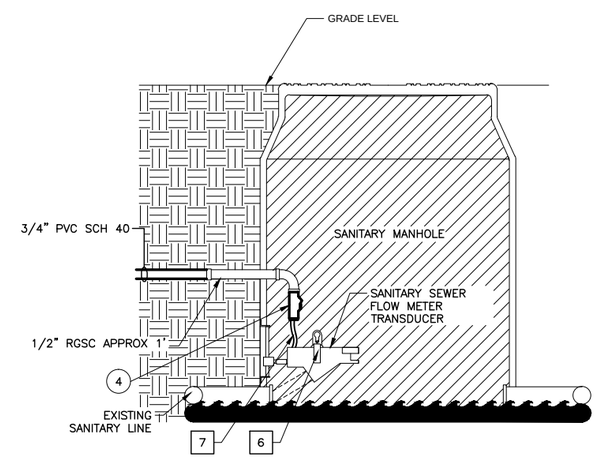
NEW WORK NOTES

1. HORIZONTAL BORE NEW CONDUIT TO BUILDING 1232A.
2. REFERENCE DRAWING 1296823 FOR CONDUIT DETAILS.
3. REFERENCE DRAWING 1296823 FOR NEW WORK DETAILS
4. REFERENCE DRAWING 1296822 FOR DEMOLITION DETAILS.
5. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
6. THE CONTRACTOR SHALL REMOVE EXISTING FLOW METER TRANSDUCER AND CABLE, RETURN TO MANUFACTURER (MARSH–MCBIRNEY) FOR NEW EXTENDED CABLE INSTALLATION (250' NEW CABLE). RE–INSTALL TRANSDUCER PER MANUFACTURERS RECOMMENDATIONS WITH NEW CABLE TO BUILDING 1232A RE–LOCATED FLOW METER.
7. THE CONTRACTOR SHALL NOT CUT EXCESS WIRE. EXCESS WIRE SHALL BE COILED UP IN MANHOLE.



BUILDING 1232A ELECTRICAL PLAN

NOT TO SCALE



DETAIL – SANITARY SEWER FLOWMETER STATION B1232A

NOT TO SCALE

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FOR DRAWING INDEX SEE DRAWING 1296804

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PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1232A POTABLE WATER & SANITARY SEWER NEW SITE WORK

BUILDING NO. 1232A | SIZE D | DRAWING NO. 1296824 | LATEST REV. .

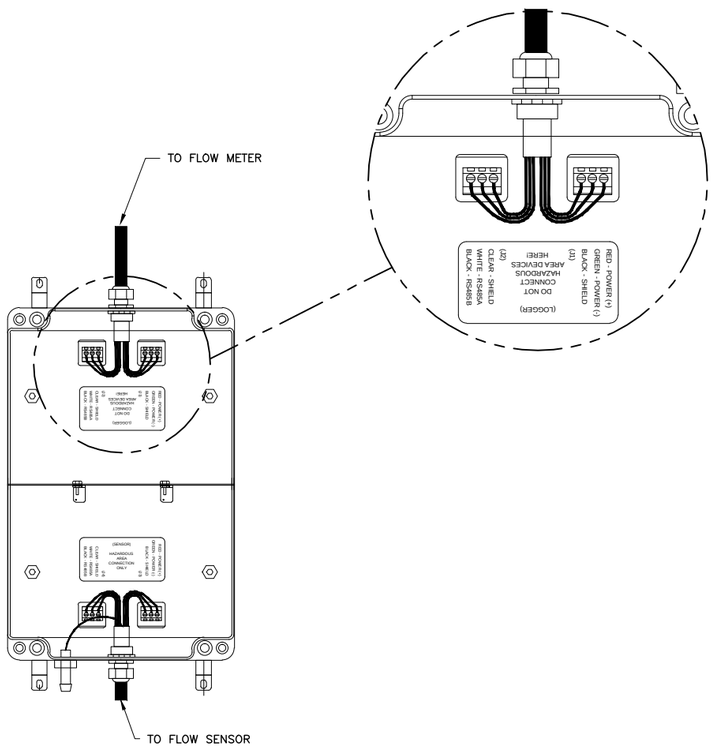
SHEET NO. 4–E103

NEW WORK NOTES

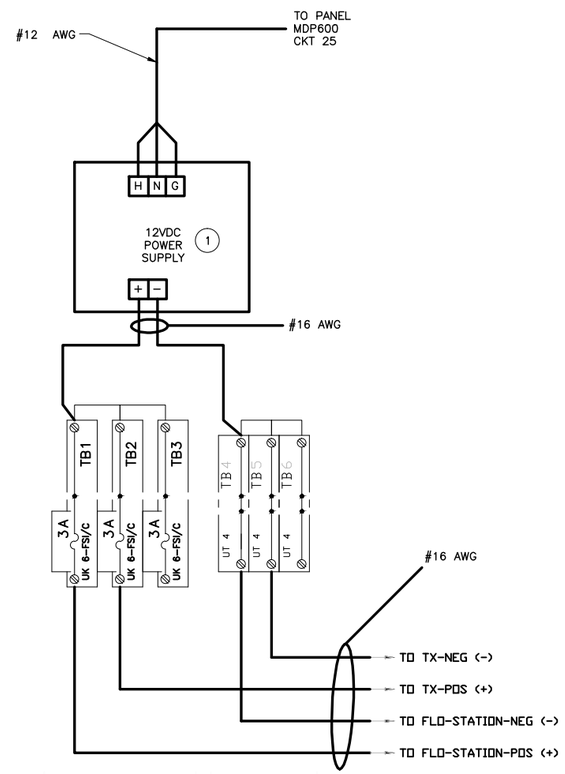
1. REFERENCE DRAWING 1296826 FOR GENERAL NOTES
2. REFERENCE DRAWING 1296823 FOR CONDUIT DETAILS
3. REFERENCE DRAWING 1296824 FOR PARTS LIST.
4. REFERENCE DRAWING 1296823 FOR NEW WORK DETAILS.

LEGEND

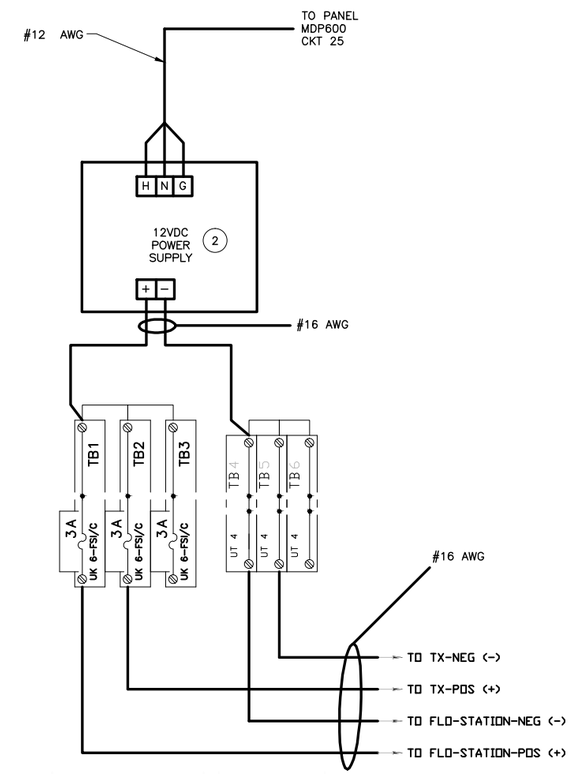
EXISTING
NEW WORK



IS MODULE WIRING DETAIL



SANITARY SEWER FLOW METER POWER SUPPLY WIRING DETAIL



POTABLE WATER FLOW METER POWER SUPPLY WIRING DETAIL

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PROJ. MGR.	G. VOLKMAN	07/30/15
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			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005
SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1232A POTABLE WATER & SANITARY SEWER WIRING SCHEMATICS

BUILDING NO. 1232A | SIZE D | DRAWING NO. 1296825 | LATEST REV. .

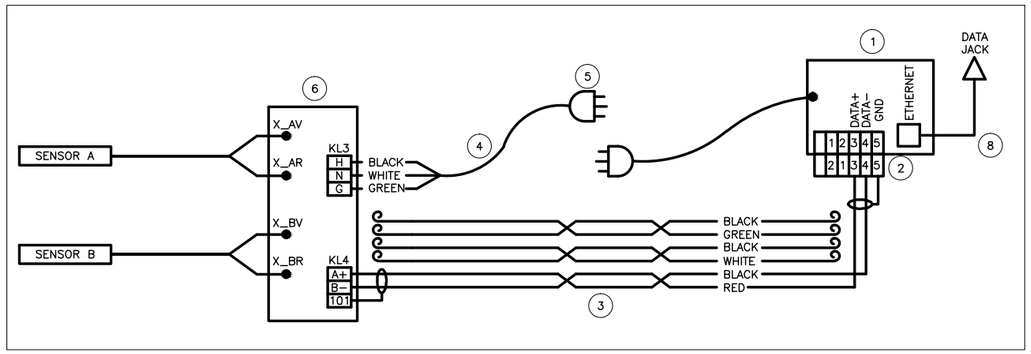
SHEET NO. 4-E104

PARTS LIST

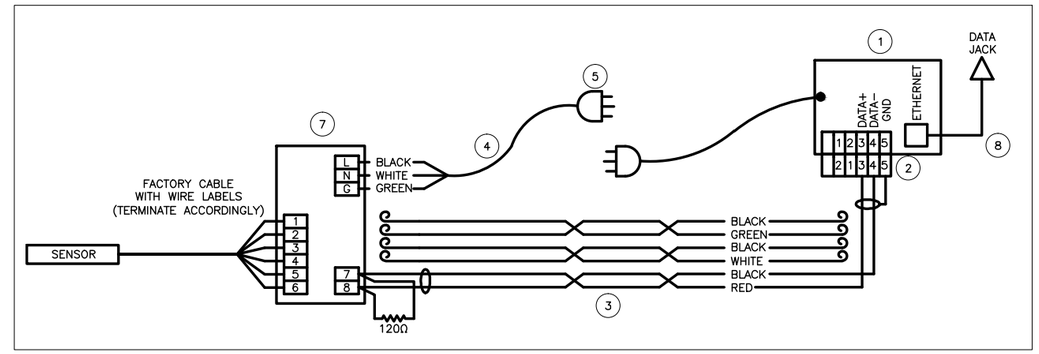
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	2	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150
2	2	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB
3		BELDEN 8777 6-CONDUCOTR CABLE	BELDEN	N/A
4	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3
5	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA
6	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC
7	1	ELECTROMAGNETIC FLOW METER WITH REMOTE MOUNT TRANSMITTER	ONICON	F-3100
8		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD

GENERAL NOTES

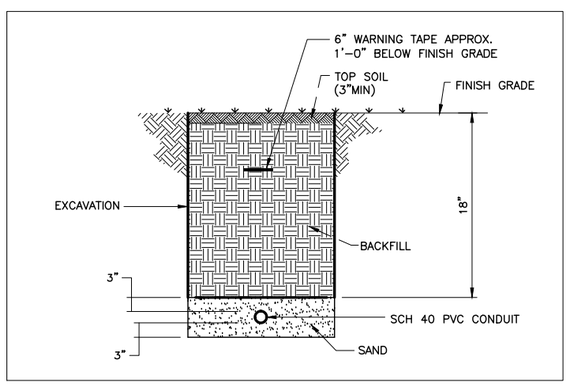
1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH 2014 EDITION OF THE NATIONAL ELECTRICAL CODE.
2. ALL NEW ELECTRICAL EQUIPMENT SHALL BE UNDERWRITERS LABORATORY LISTED OR NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION APPROVED FOR ITS SPECIFIC USE, EQUIPMENT DESIGN, FABRICATION, TESTING, AND PERFORMANCE. INSTALLATION SHALL COMPLY WITH APPLICABLE REQUIREMENTS OF NFPA 70 AND NASA REQUIREMENTS LPR-1710.6 ELECTRICAL SAFETY CLEARANCE PROCEDURES.
3. UNLESS OTHERWISE NOTED ALL CONDUCTORS SHALL BE IN CONDUIT AND COPPER WIRE WITH TYPE THHN INSULATION. ALL CONDUITS SHALL BE MINIMUM OF 3/4 INCH.
4. RIGID STEEL CONDUIT SHALL BE USED FOR ABOVE GRADE OUTDOOR LOCATIONS, CONDUIT SHALL COMPLY WITH UL 6 AND BE GALVANIZED BY THE HOT DIP PROCESS. FITTINGS SHALL BE THREADED.
5. ELECTRIC METALLIC TUBING SHALL BE USED FOR INDOOR LOCATIONS, CONDUIT SHALL COMPLY WITH UL 797 AND BE ZINC-COATED STEEL. FITTINGS SHALL BE ZINC-COATED, RAIN TIGHT, GLAND COMPRESSION WITH INSULATED THROAT. CRIMP, SPRING, OR SETSCREW TYPE FITTINGS ARE NOT ACCEPTABLE.
6. SCHEDULE 40 PVC CONDUIT SHALL BE USED FOR UNDERGROUND LOCATIONS. (REFERENCE RIGID TO PVC DETAIL ON THIS SHEET)
7. CONDUIT BODIES/BOXES SHALL HAVE GASKETS EXCEPT AT THE LOWEST POINT OF A CONDUIT RUN WHERE DRAINAGE IS REQUIRED. GASKETS SHALL BE SOLID, COVERS SHALL HAVE CAPTIVE SCREWS AND BE ACCESSIBLE AFTER THE WORK HAS BEEN COMPLETED.
8. WALL PENETRATIONS SHALL BE PROPERLY SEALED. (REFERENCE WALL PENETRATION DETAIL THIS SHEET)
9. CONDUIT TRENCHES SHALL BE EXCAVATED BY HAND AND A DIG PERMIT SHALL BE OBTAINED PRIOR TO EXCAVATION.
10. THE COMPLETE ELECTRICAL INSTALLATION SHALL BE TESTED FOR FUNCTIONAL AND OPERATIONAL TESTS. SUCCESSFUL OPERATION TEST OBSERVED BY THE CONTRACTING OFFICER WILL BE BASIS FOR ACCEPTANCE.
11. REFERENCE SPECIFICATIONS FOR UNDERGROUND FLOW METER SENSOR INSTALLATION REQUIREMENTS.
12. THE CONTRACTOR SHALL COORDINATE POWER OUTAGES FOR EQUIPMENT INSTALLATION WITH THE CONTRACTING OFFICER.
13. THE CONTRACTOR SHALL PERFORM A FIELD SURVEY, INCLUDING INSPECTION OF ALL EXISTING EQUIPMENT CONDITION, UTILITIES CLEARANCES , INSTALLATION ROUTES AND NEW EQUIPMENT LOCATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRS OR MODIFICATIONS NECESSARY TO MAKE THE SYSTEM PERFORM AS REQUIRED.
14. ALL EQUIPMENT SHALL BE INSTALLED ON A 3/4" THICK SALT TREATED PLYWOOD BACKBOARD, PROPERLY SIZED TO ACCOMMODATE ALL EQUIPMENT AND ANY LOCATION RESTRICTIONS.



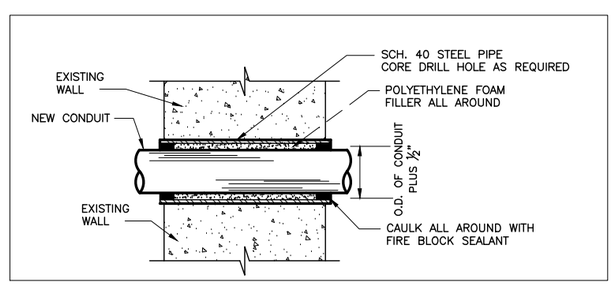
TYPICAL ULTRASONIC METER WIRING DIAGRAM



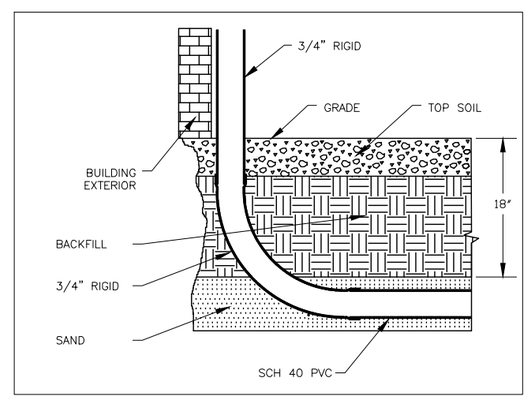
TYPICAL ELECTROMAGNETIC METER WIRING DIAGRAM



TYPICAL CONDUIT TRENCH DETAIL



TYPICAL WALL PENETRATION DETAIL



TYPICAL RIGID TO PVC CONDUIT DETAIL

REVISIONS															
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Langley Research Center
Hampton, VA 23681

WORK ORDER NO. CTN000188		
APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02 X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: GENERAL NOTES AND TYPICAL DETAILS

BUILDING NO. N/A | SIZE D | DRAWING NO. 1296826 | LATEST REV. -

SHEET NO. 4-E501

PARTS LIST

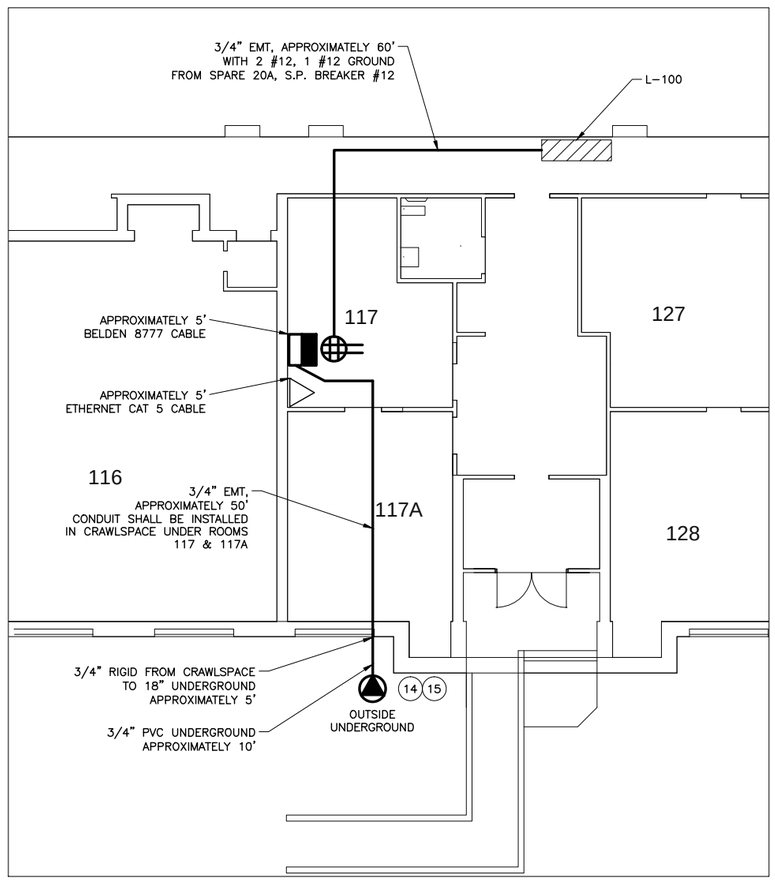
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	1	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
2	1	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11	1	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
3	2	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
4	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	13		BELDEN 8777 6-CONDUCOTR CABLE	BELDEN	N/A
5	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	14	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 80' OF CABLE [6]	FLEXIM	FSQ-NNNTS-000/OS
6	1	3/4" RIGID INSULATING BUSHING	ARLINGTON	RGD75	15	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
7	1	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	16		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
8	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
9	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					

LEGEND

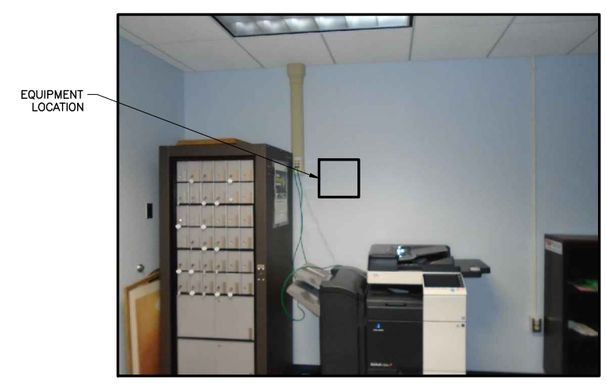
- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL AND CIVIL DRAWINGS FOR SENSOR LOCATION AND SITE UTILITY PLAN.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
5. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
6. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1146, ROOM 117 OVERVIEW



B-1146, ROOM 117 EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1146 ROOM 117 OVERVIEW

BUILDING NO. 1146 | SIZE D | DRAWING NO. 1296827 | LATEST REV. -

SHEET NO. 4-E601

PARTS LIST

ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	2	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	2	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
2	2	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11	2	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
3	4	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
4	2	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	13		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
5	2	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	14	1	(PAIR) TYPE P CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 30' OF CABLE [6]	FLEXIM	FSP-NNNTS-000/OS
6	1	3/4" RIGID INSULATING BUSHING	ARLINGTON	RGD75	15	2	PERMALOCK TYPE P MOUNTING TRACK	FLEXIM	MOU-PLM-DS-SSK2
7	6	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	16	1	(PAIR) TYPE M CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 20' OF CABLE [6]	FLEXIM	FSM-NNNTS-000
8	2	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA	17		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
9	12'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					

LEGEND

- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL AND CIVIL DRAWINGS FOR SENSOR LOCATIONS AND SITE UTILITY PLAN.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
5. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
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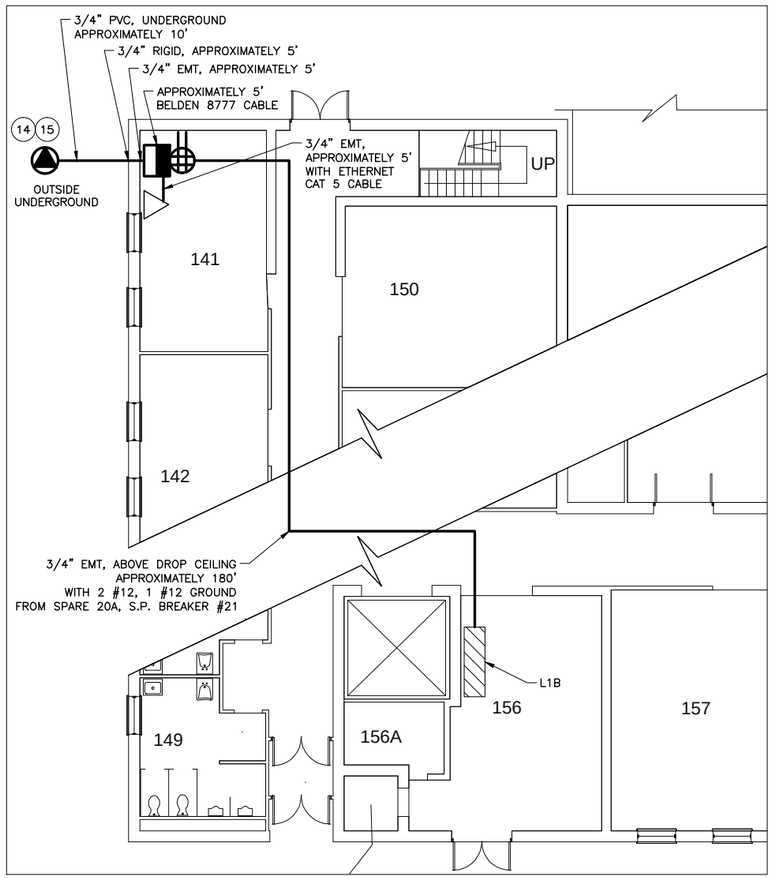
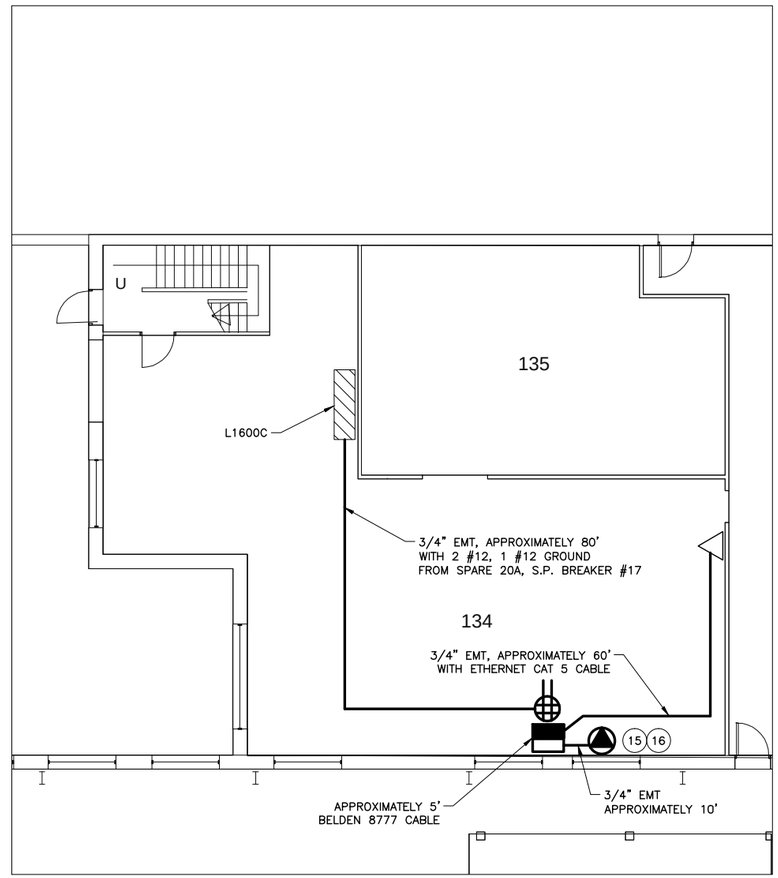


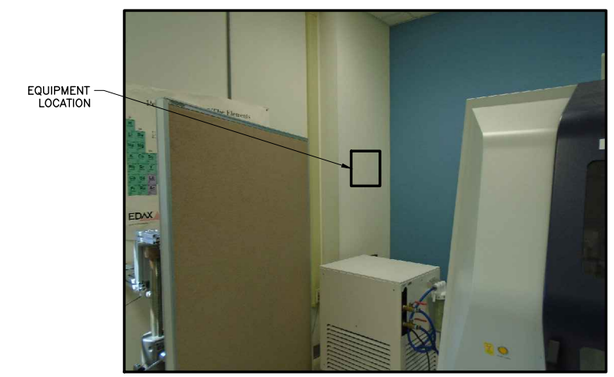
B-1148 WATER METER OVERVIEW

(EQUIPMENT IS LOCATED INSIDE B-1205, ROOM 141)



B-1148, ROOM 134 OVERVIEW

B-1148, ROOM 134 EQUIPMENT LOCATION



B-1205, ROOM 141 EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICRONICHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1148 ROOM 134 AND BUILDING 1205 ROOM 141 OVERVIEW

BUILDING NO. 1148 | SIZE D | DRAWING NO. 1296828 | LATEST REV. .

SHEET NO. 4-E602

PARTS LIST

ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	1	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
2	1	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
3	2	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
4	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	13	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 20' OF CABLE [6]	FLEXIM	FSQ-NNNTS-000
5	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	14	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
6	2	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	15		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
7	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
8	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					
9	1	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231					

LEGEND

- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATION.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
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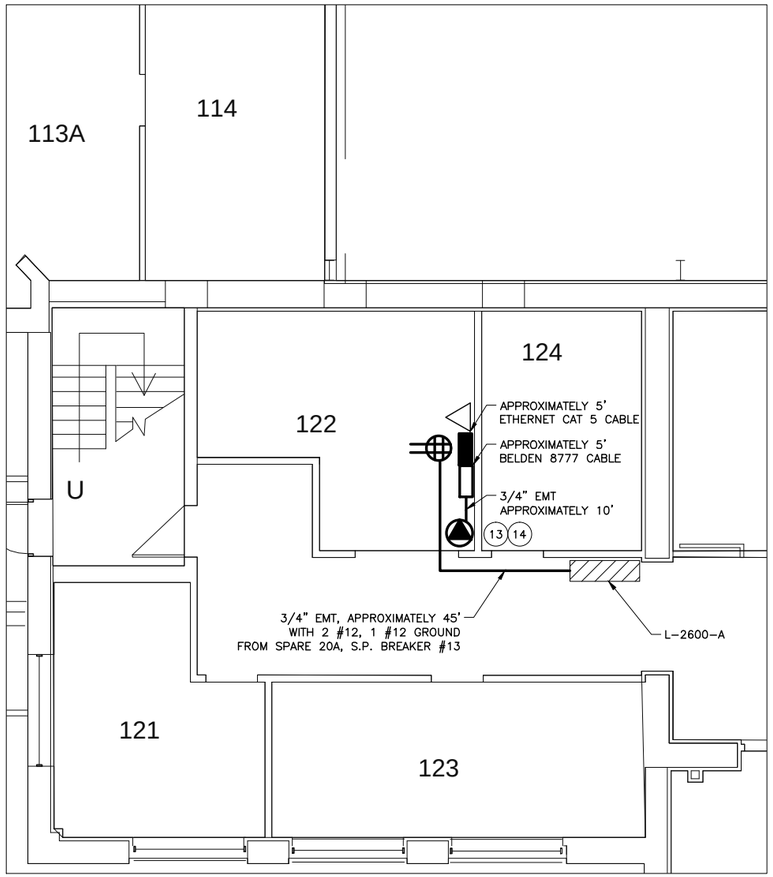
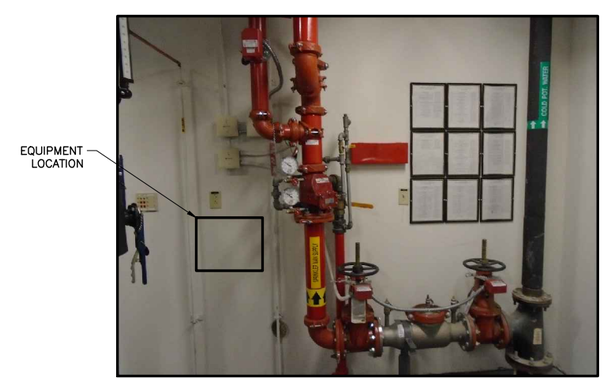


B-1148, ROOM 122 OVERVIEW



B-1148, ROOM 122 EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Langley Research Center
Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± ; X.XX (2 DECIMAL PLACES) ±.02 ; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICRONICHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1148 ROOM 122 OVERVIEW

BUILDING NO. 1148 | SIZE D | DRAWING NO. 1296829 | LATEST REV. .

SHEET NO. 4-E603

PARTS LIST

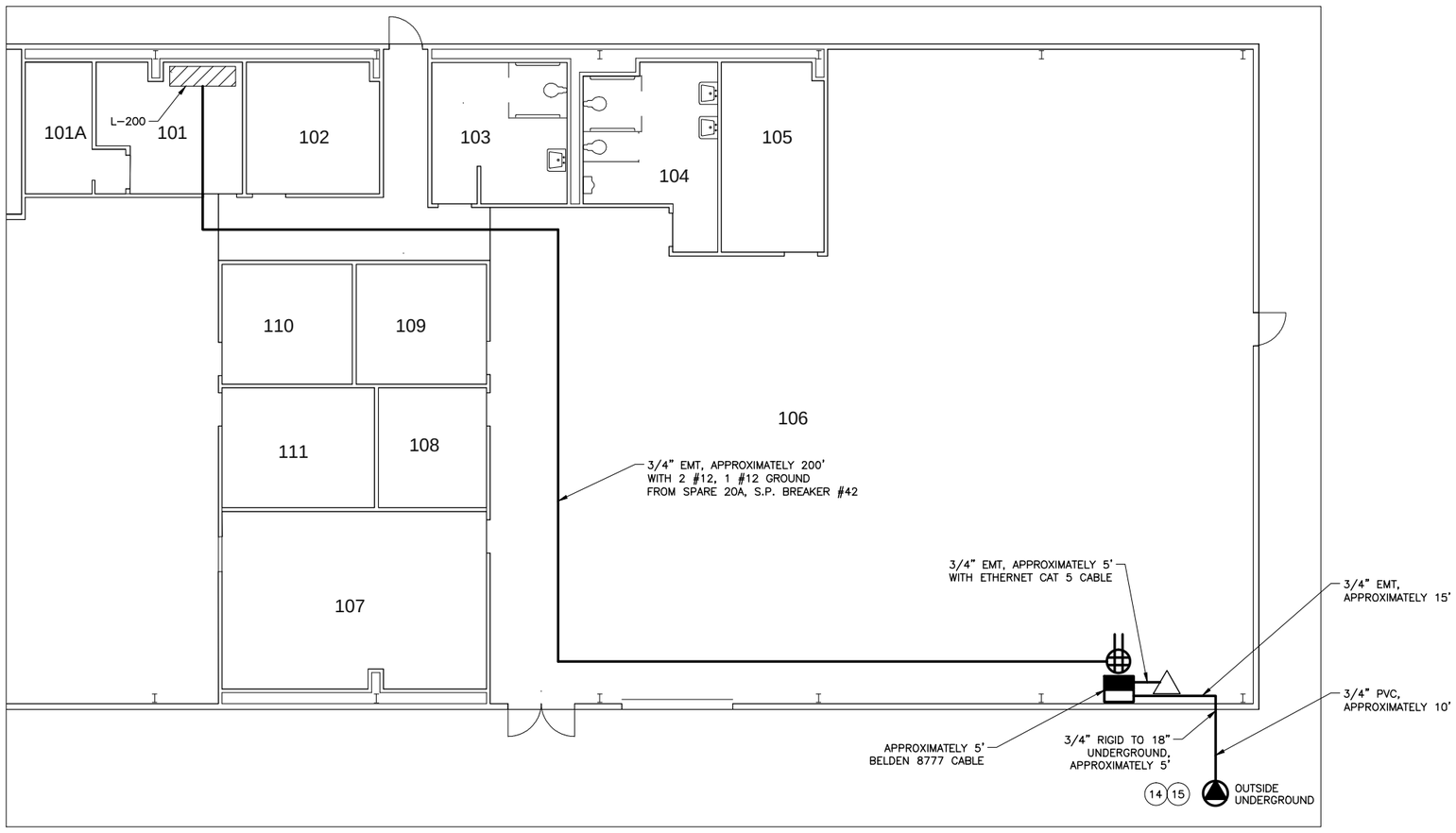
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	1	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
2	1	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11	1	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
3	2	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
4	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	13		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
5	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	14	1	(PAIR) TYPE P CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 40' OF CABLE [6]	FLEXIM	FSP-NNNTS-000/OS
6	3	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	15	1	PERMALOCK TYPE P MOUNTING TRACK	FLEXIM	MOU-PLM-DS-SSK2
7	1	3/4" RIGID INSULATING BUSHING	ARLINGTON	RGD75	16		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
8	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
9	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					

LEGEND

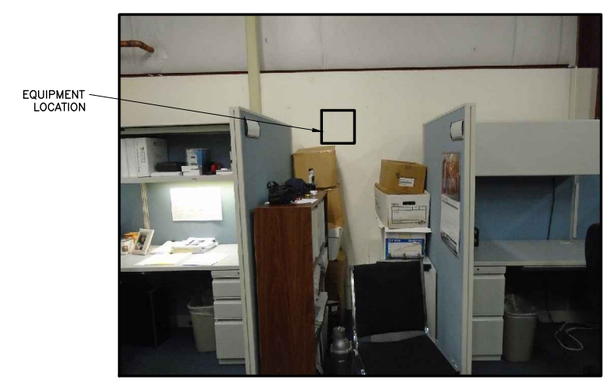
- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL AND CIVIL DRAWINGS FOR SENSOR LOCATION AND SITE UTILITY PLAN.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
5. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
6. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1189, ROOM 106 OVERVIEW



B-1189, ROOM 106 EQUIPMENT LOCATION

REVISIONS															
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Langley Research Center
Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS			
NAME	ORGANIZATION	DATE	
			DRAWN
			DESIGNED
			CHECKED
			APPROVED
			TECH. PROJ. ENG.
			RES. PROJ. ENG.

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ±; X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: DESIGN FOR POTABLE WATER SUPPLY PHASE XX

DRAWING TITLE: BUILDING 1189 ROOM 106 OVERVIEW

BUILDING NO. 1189 | SIZE D | DRAWING NO. 1296830 | LATEST REV. -

SHEET NO. 4-E604

PARTS LIST

ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	2	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	2	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
2	2	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11	2	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
3	4	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
4	2	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	13		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
5	2	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	14	1	(PAIR) TYPE M CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 270' OF CABLE [7]	FLEXIM	FSM-NNNTS-000/IP68
6	3	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	15	1	PERMALOCK TYPE P MOUNTING TRACK	FLEXIM	MOU-PLM-DS-SSK2
7	1	3/4" RIGID INSULATING BUSHING	ARLINGTON	RGD75	16	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 50' OF CABLE [7]	FLEXIM	FSQ-NNNTS-000
8	2	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA	17	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
9	12'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3	18		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')

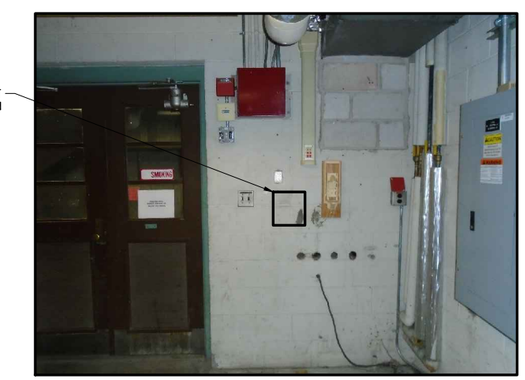
LEGEND

- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL AND CIVIL DRAWINGS FOR SENSOR LOCATIONS AND SITE UTILITY PLAN.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
5. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
6. CONDUIT SHALL BE ROUTED UNDER EXISTING SIDEWALK. DIG DOWN TO PROPER DEPTH ON BOTH SIDES OF THE SIDEWALK AND DRIVE IN NEW HORIZONTAL CONDUIT.
7. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.

B-1195A, ROOM 112 OVERVIEW



B-1195A, ROOM 112 EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1195A ROOM 112 OVERVIEW

BUILDING NO. 1195A | SIZE D | DRAWING NO. 1296831 | LATEST REV. -

SHEET NO. 4-E605

PARTS LIST

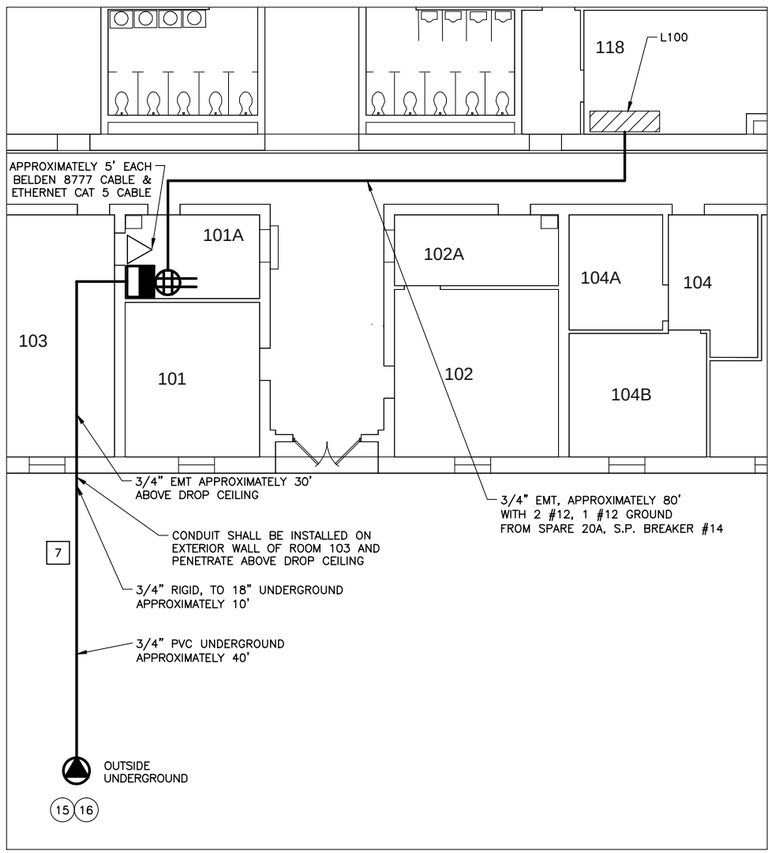
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	2	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	11	2	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
2	2	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	12		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
3	4	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	13		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
4	2	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	14	1	20 AMP, SINGLE POLE BREAKER (22KA), TYPE QPHW	CUTLER HAMMER	N/A
5	2	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	15	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 90' OF CABLE [9]	FLEXIM	FSQ-NNNTS-000/OS
6	4	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	16	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
7	2	3/4" RIGID INSULATING BUSHING	ARLINGTON	RGD75	17	1	(PAIR) TYPE P CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 50' OF CABLE [9]	FLEXIM	FSP-NNNTS-000/OS
8	2	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA	18	1	PERMALOCK TYPE P MOUNTING TRACK	FLEXIM	MOU-PLM-DS-SSK2
9	12'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3	19		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
10	2	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231					

LEGEND

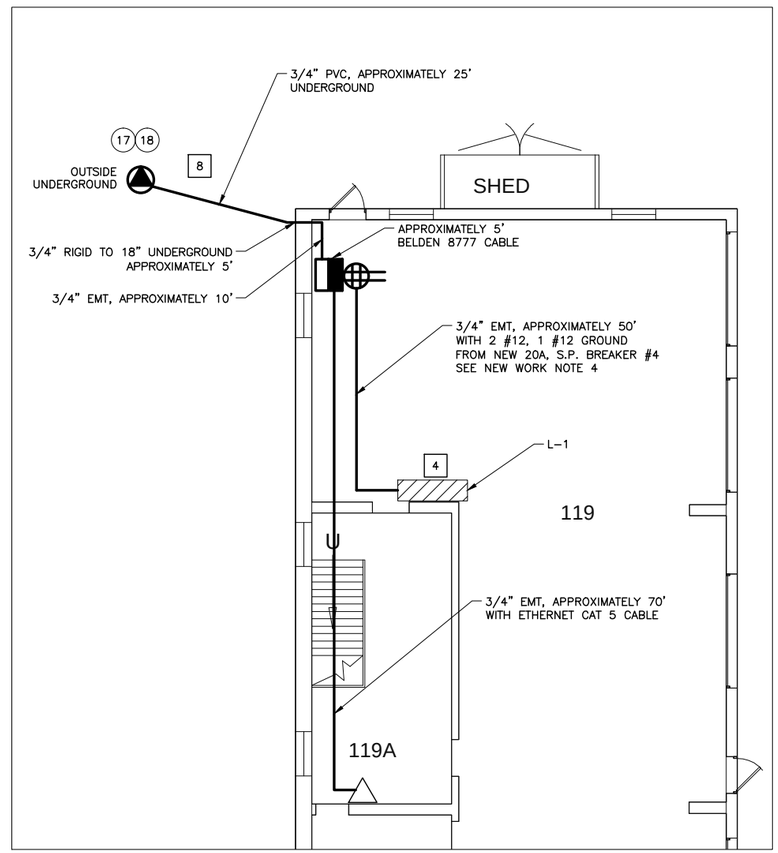
- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

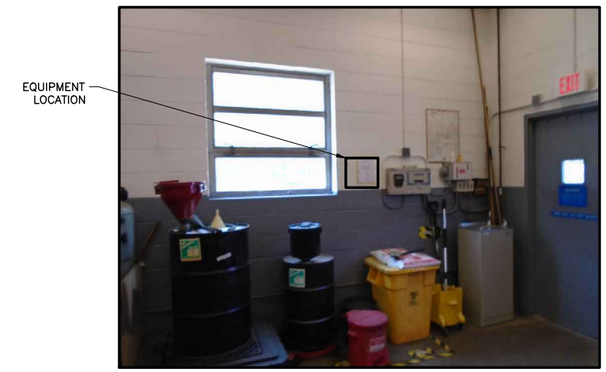
1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL AND CIVIL DRAWINGS FOR SENSOR LOCATIONS AND SITE UTILITY PLANS.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. FURNISH AND INSTALL NEW 20 AMP, S.P. BREAKER FOR CIRCUIT #4 IN PANEL L-1. BREAKER SHALL BE CUTLER HAMMER TYPE "QPHW".
5. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
6. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
7. CONDUIT SHALL BE ROUTED UNDER EXISTING SIDEWALK. DIG DOWN TO PROPER DEPTH ON BOTH SIDES OF THE SIDEWALK AND DRIVE IN NEW HORIZONTAL CONDUIT.
8. CONDUIT SHALL BE ROUTED UNDER EXISTING CONCRETE DRIVEWAY. REFERENCE CIVIL DRAWINGS FOR INSTALLATION AND BACKFILL DETAILS.
9. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1199, ROOM 101A OVERVIEW



B-1199, ROOM 119 OVERVIEW



B-1199, ROOM 119 EQUIPMENT LOCATION

B-1199, ROOM 101A EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1199 ROOMS 101A AND 119 OVERVIEW

BUILDING NO. 1199 | SIZE D | DRAWING NO. 1296832 | LATEST REV. .

SHEET NO. 4-E606

PARTS LIST

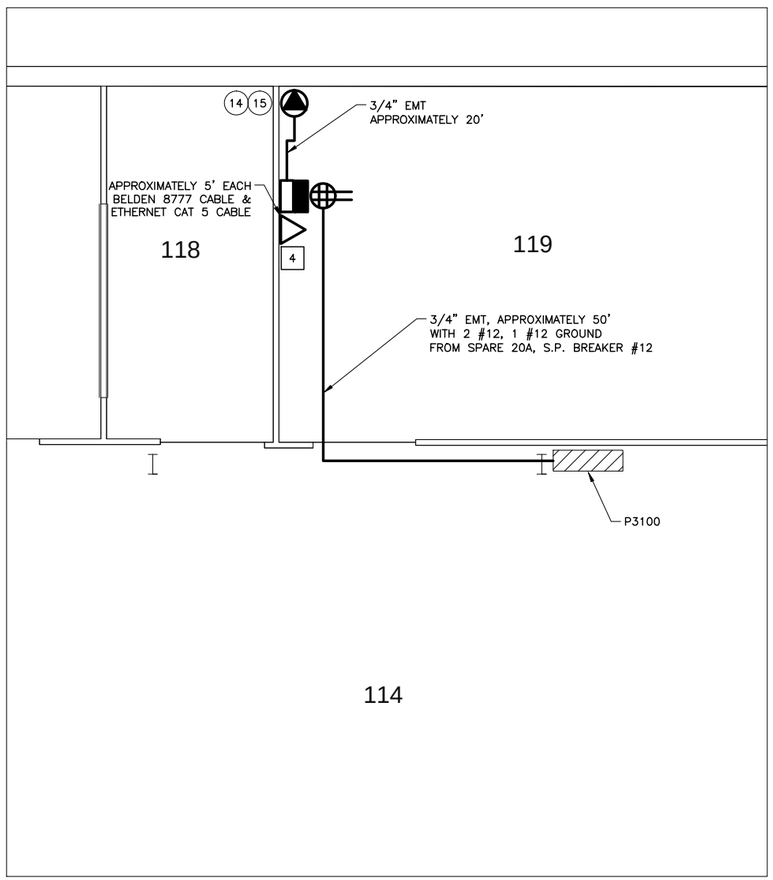
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	2	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	2	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
2	2	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11	2	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
3	4	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
4	1	ELECTROMAGNETIC FLOW METER WITH REMOTE MOUNT TRANSMITTER (APPROXIMATELY 55' OF CABLE) [8]	ONICON	F-3100	13		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
5	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	14	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 30' OF CABLE [8]	FLEXIM	FSQ-NNNTS-000
6	2	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	15	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
7	4	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	16		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
8	2	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
9	12'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					

LEGEND

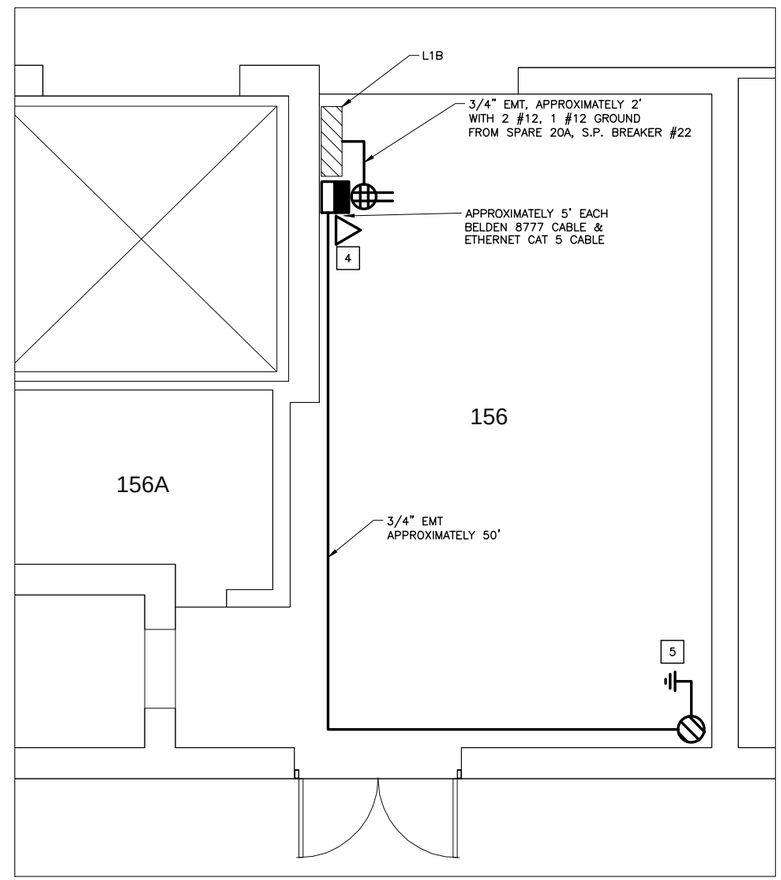
- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR
- ELECTROMAGNETIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATIONS.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. NEW DATA JACK SHALL BE PROVIDED BY THE GOVERNMENT.
5. GROUND PER MANUFACTURERS RECOMMENDATIONS.
6. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
7. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
8. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1205, ROOM 119 OVERVIEW



B-1205, ROOM 156 OVERVIEW

B-1205, ROOM 156 EQUIPMENT LOCATION

B-1205, ROOM 119 EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02 X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1205 ROOMS 119 AND 156 OVERVIEW

BUILDING NO. 1205 | SIZE D | DRAWING NO. 1296833 | LATEST REV. .

SHEET NO. 4-E607

PARTS LIST

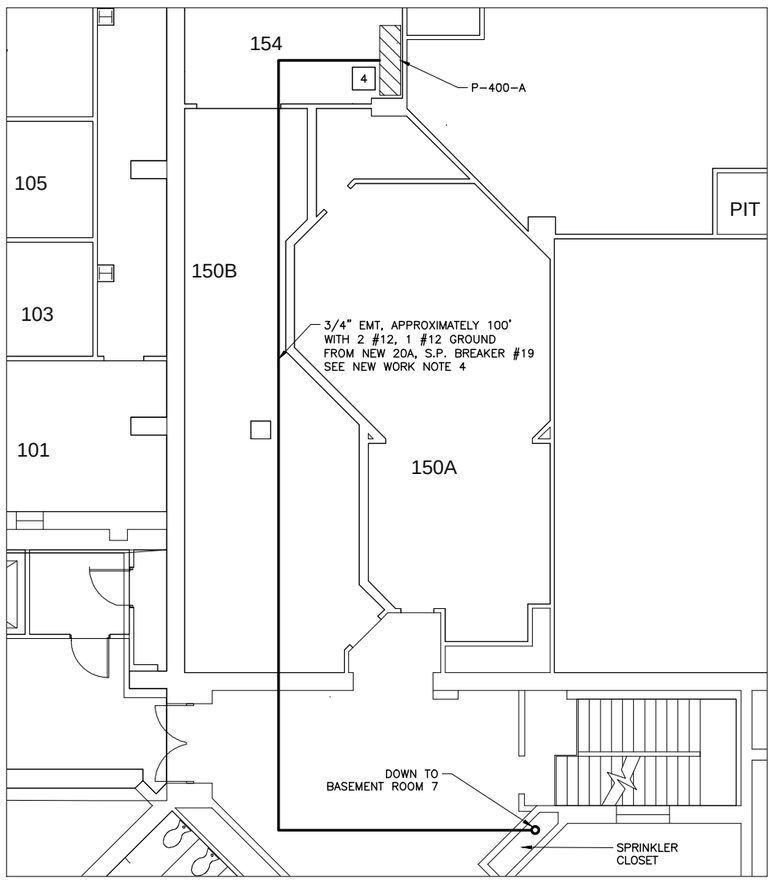
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	1	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
2	1	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11	1	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
3	2	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
4	1	ELECTROMAGNETIC FLOW METER WITH REMOTE MOUNT TRANSMITTER (APPROXIMATELY 40' OF CABLE) [9]	ONICON	F-3100	13		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
5	1	20 AMP, SINGLE POLE BREAKER (22KA), TYPE THQB	GENERAL ELECTRIC	N/A					
6	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13					
7	2	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75					
8	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
9	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					

LEGEND

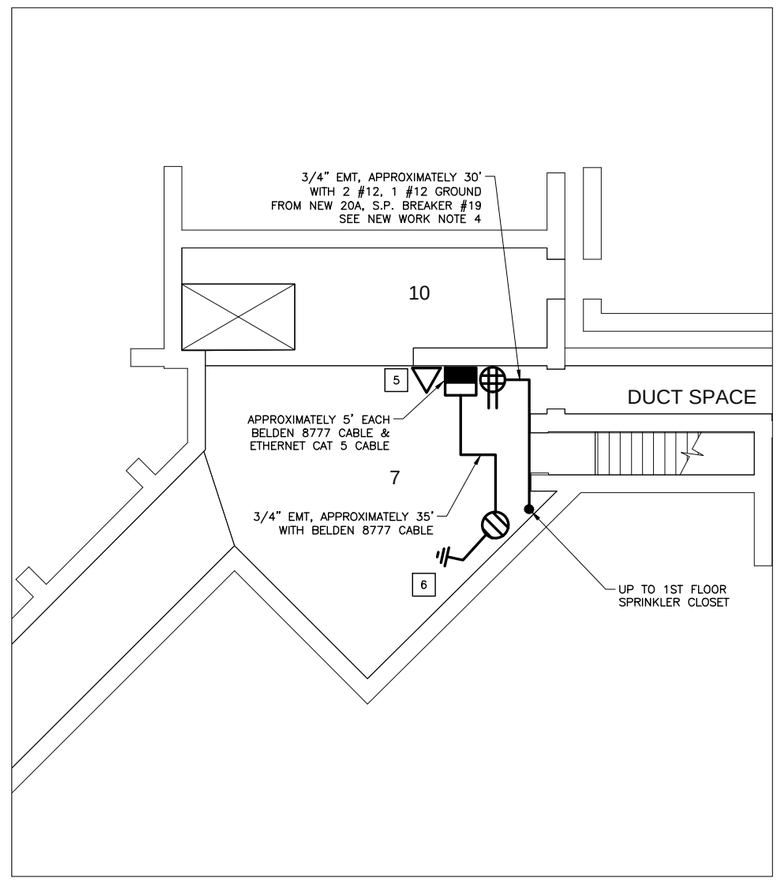
- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ELECTROMAGNETIC SENSOR

NEW WORK NOTES

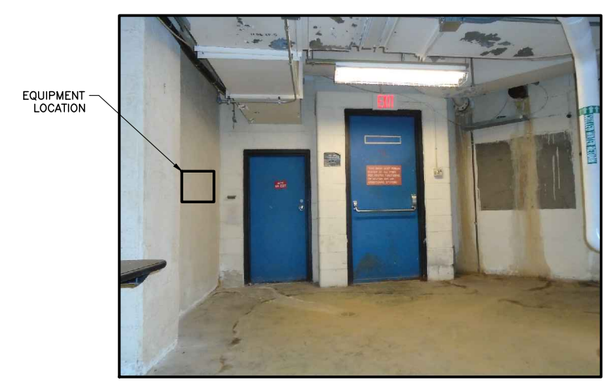
1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATION.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. FURNISH AND INSTALL NEW 20 AMP, S.P. BREAKER FOR CIRCUIT #19 IN PANEL P-400-A. BREAKER SHALL BE GENERAL ELECTRIC TYPE "THQB".
5. NEW DATA JACK SHALL BE PROVIDED BY THE GOVERNMENT.
6. GROUND PER MANUFACTURERS RECOMMENDATIONS.
7. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
8. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
9. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1208, 1ST FLOOR OVERVIEW



B-1208, ROOM 7 OVERVIEW



B-1208, ROOM 7 EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ±; X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

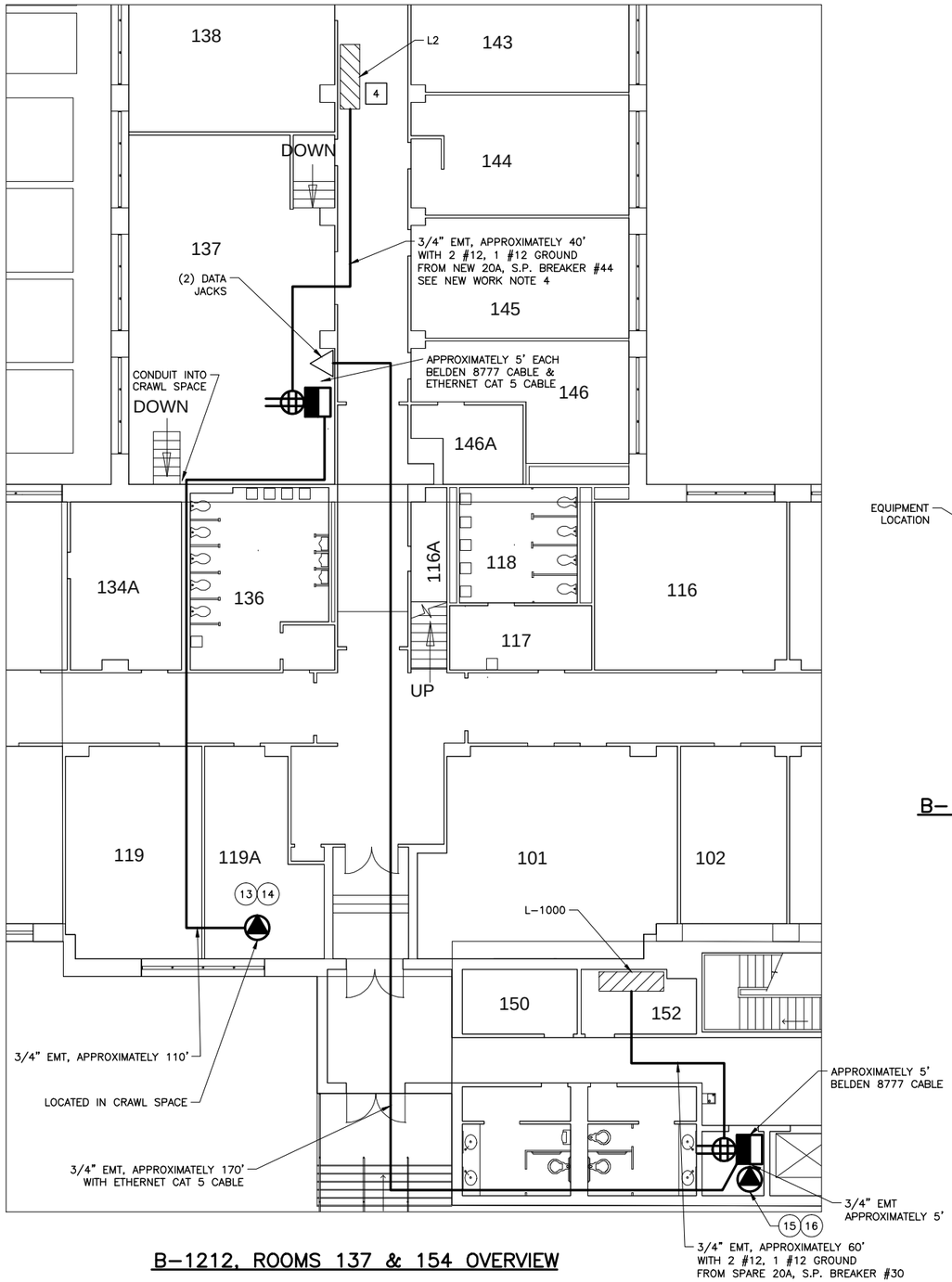
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1208 ROOM 7 OVERVIEW

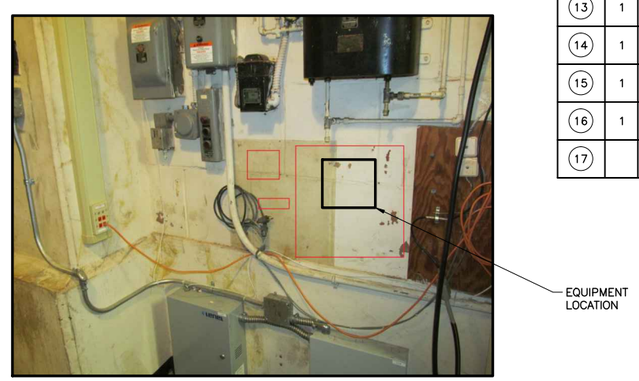
BUILDING NO. 1208 | SIZE D | DRAWING NO. 1296834 | LATEST REV. .

SHEET NO. 4-E608



B-1212, ROOMS 137 & 154 OVERVIEW

B-1212, ROOM 154 EQUIPMENT LOCATION



B-1212, ROOM 137 EQUIPMENT LOCATION

LEGEND

- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATIONS.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. FURNISH AND INSTALL NEW 20 AMP, S.P. BREAKER FOR CIRCUIT #44 IN PANEL L2. BREAKER SHALL BE GENERAL ELECTRIC TYPE "TEB111020".
5. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
6. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
7. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.

PARTS LIST

ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	2	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB
2	2	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150
3	4	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W
4	2	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC
5	2	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13
6	6	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75
7	2	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA
8	12'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3
9	2	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
10	2	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
13	1	(PAIR) TYPE M CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 120' OF CABLE [7]	FLEXIM	FSM-NNNTS-000
14	1	PERMALOCK TYPE P MOUNTING TRACK	FLEXIM	MOU-PLM-DS-SSK2
15	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 15' OF CABLE [7]	FLEXIM	FSQ-NNNTS-000
16	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
17		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Langley Research Center
Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1212 ROOMS 137 AND 154 OVERVIEW

BUILDING NO. 1212 | SIZE D | DRAWING NO. 1296835 | LATEST REV. .

SHEET NO. 4-E609

PARTS LIST

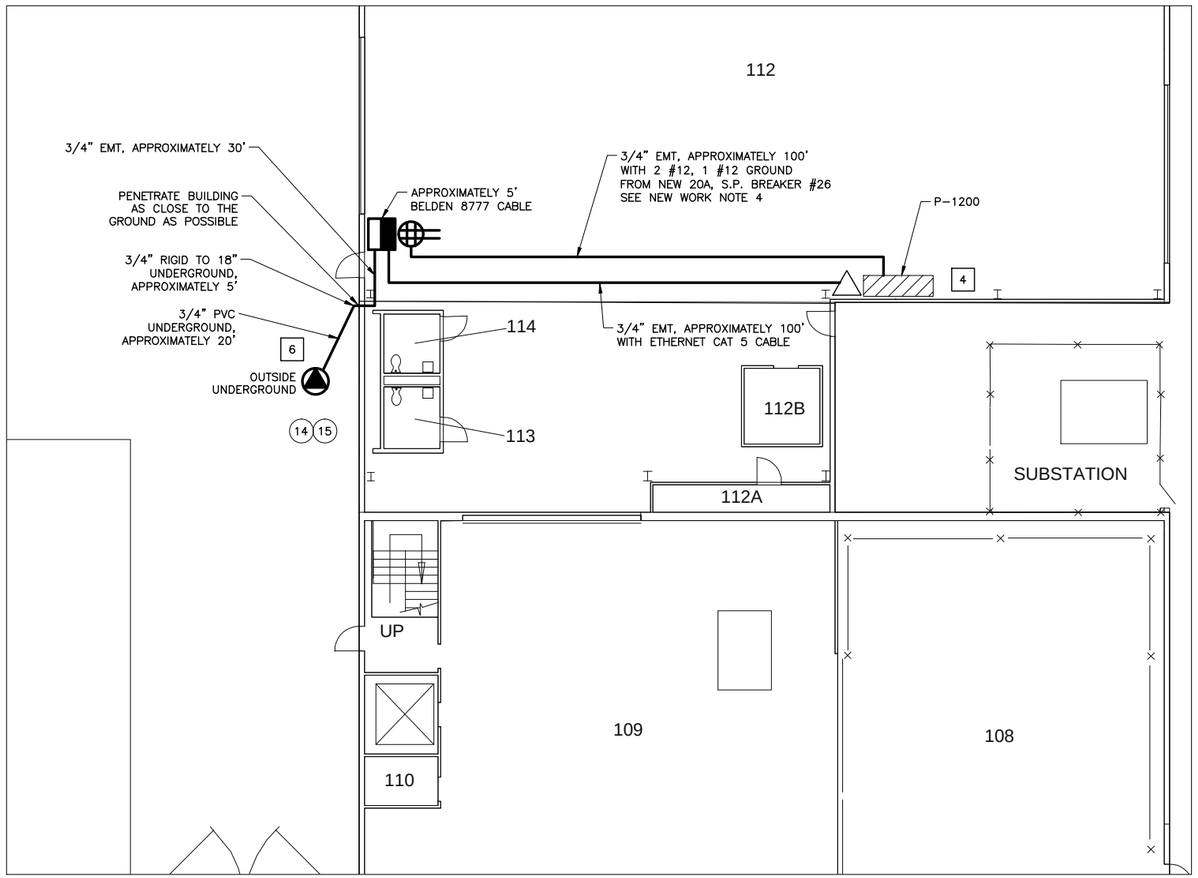
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	1	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
2	1	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11	1	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
3	2	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
4	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	13		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
5	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	14	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 70' OF CABLE [8]	FLEXIM	FSQ-NNNTS-000/OS
6	3	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	15	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
7	1	3/4" RIGID INSULATING BUSHING	ARLINGTON	RGD75	16		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
8	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
9	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					

LEGEND

- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL AND CIVIL DRAWINGS FOR SENSOR LOCATION AND SITE UTILITY PLAN.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. FURNISH AND INSTALL NEW 20 AMP, S.P. BREAKER FOR CIRCUIT #26 IN PANEL P-1200. BREAKER SHALL BE CUTLER HAMMER TYPE "BAB1020".
5. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
6. CONDUIT SHALL BE ROUTED UNDER EXISTING CONCRETE DRIVEWAY. REFERENCE CIVIL DRAWINGS FOR INSTALLATION AND BACKFILL DETAILS.
7. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
8. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1212C, ROOM 112 OVERVIEW

B-1212C, ROOM 112 EQUIPMENT LOCATION

REVISIONS															
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1212C ROOM 112 OVERVIEW

BUILDING NO. 1212C | SIZE D | DRAWING NO. 1296836 | LATEST REV. .

SHEET NO. 4-E610

PARTS LIST

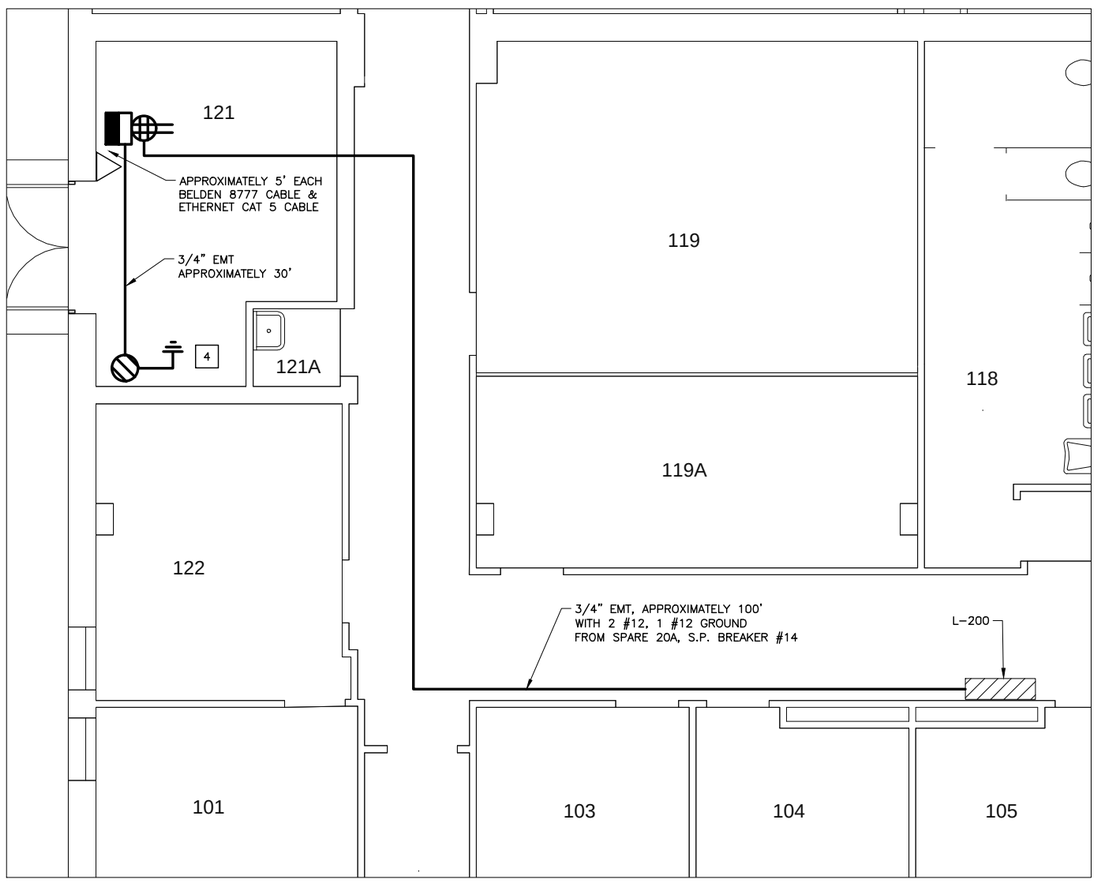
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	1	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
2	1	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
3	2	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
4	1	ELECTROMAGNETIC FLOW METER WITH REMOTE MOUNT TRANSMITTER (APPROXIMATELY 35' OF CABLE) [7]	ONICON	F-3100					
5	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13					
6	2	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75					
7	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
8	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					
9	1	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231					

LEGEND

- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ELECTROMAGNETIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATION.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. GROUND PER MANUFACTURERS RECOMMENDATIONS.
5. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
6. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
7. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1216, ROOM 121 OVERVIEW

B-1216, ROOM 121 EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ±; X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1216 ROOM 121 OVERVIEW

BUILDING NO. 1216 | SIZE D | DRAWING NO. 1296837 | LATEST REV. -

SHEET NO. 4-E611

PARTS LIST

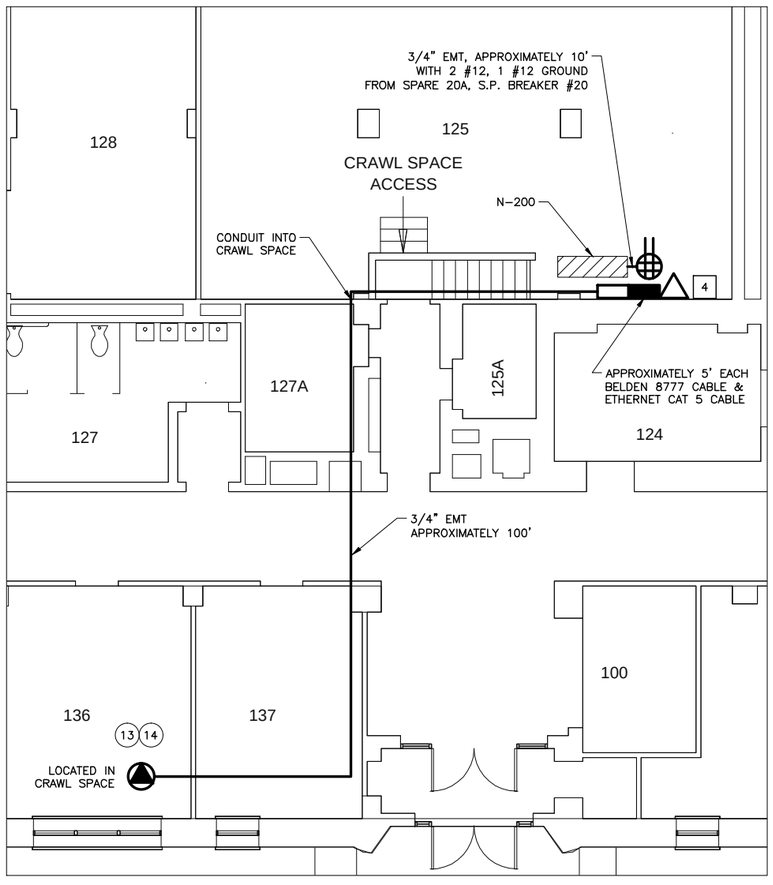
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	1	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
2	1	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
3	2	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
4	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	13	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 110' OF CABLE [7]	FLEXIM	FSQ-NNNTS-000
5	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	14	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
6	2	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	15		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
7	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
8	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					
9	1	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231					

LEGEND

- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATION.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. NEW DATA JACK SHALL BE PROVIDED BY THE GOVERNMENT.
5. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
6. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
7. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1219, ROOM 125 OVERVIEW

B-1219, ROOM 125 EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ±; X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1219 ROOM 125 OVERVIEW

BUILDING NO. 1219 | SIZE D | DRAWING NO. 1296838 | LATEST REV. -

SHEET NO. 4-E612

PARTS LIST

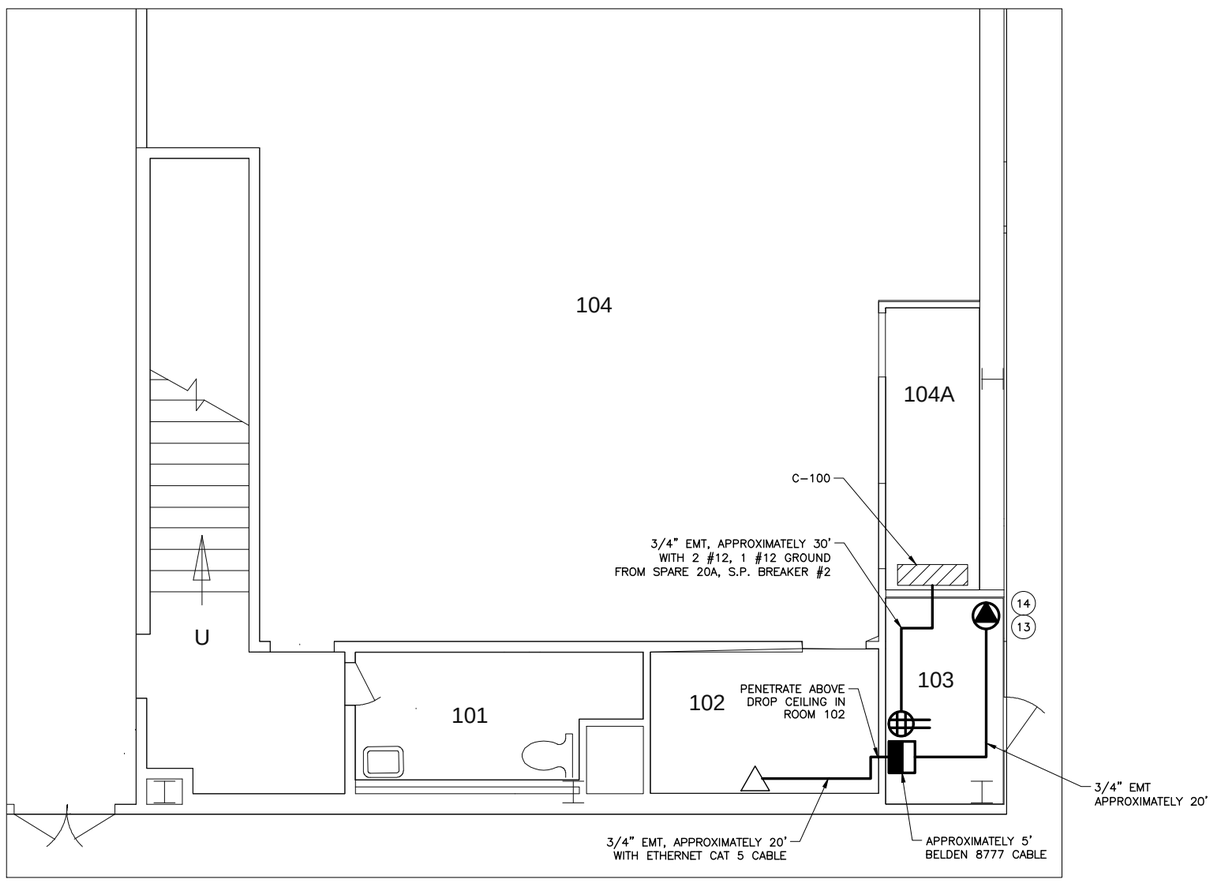
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	1	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
2	1	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
3	2	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
4	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	13	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 30' OF CABLE [6]	FLEXIM	FSQ-NNNTS-000
5	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	14	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
6	4	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	15		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
7	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
8	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					
9	1	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231					

LEGEND

- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATION.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
5. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
6. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1222B, ROOM 103 OVERVIEW

B-1222B, ROOM 103 EQUIPMENT LOCATION

REVISIONS								REVISIONS							
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD		DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	

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APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
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			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ±; X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1222B ROOM 103 OVERVIEW

BUILDING NO. 1222B | SIZE D | DRAWING NO. 1296839 | LATEST REV. .

SHEET NO. 4-E613

PARTS LIST

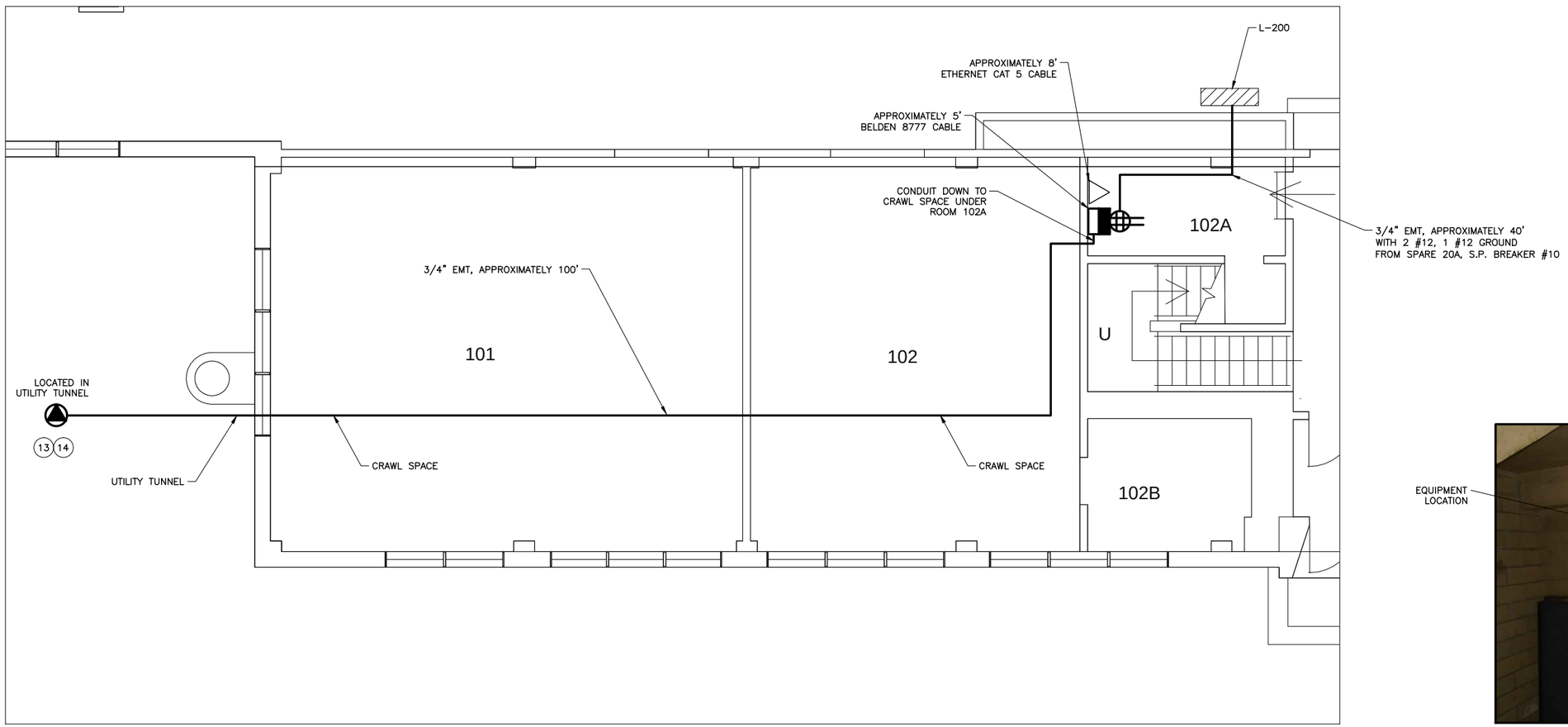
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	1	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
2	1	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
3	2	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
4	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	13	1	(PAIR) TYPE P CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 110' OF CABLE [6]	FLEXIM	FSP-NNNTS-000
5	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	14	1	PERMALOCK TYPE P MOUNTING TRACK	FLEXIM	MOU-PLM-DS-SSK2
6	2	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	15		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
7	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
8	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					
9	1	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231					

LEGEND

- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATION.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
5. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
6. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1225, ROOM 102A OVERVIEW

B-1225, ROOM 102A EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
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			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1225 ROOM 102A OVERVIEW

BUILDING NO. 1225 | SIZE D | DRAWING NO. 1296840 | LATEST REV. -

SHEET NO. 4-E614

PARTS LIST

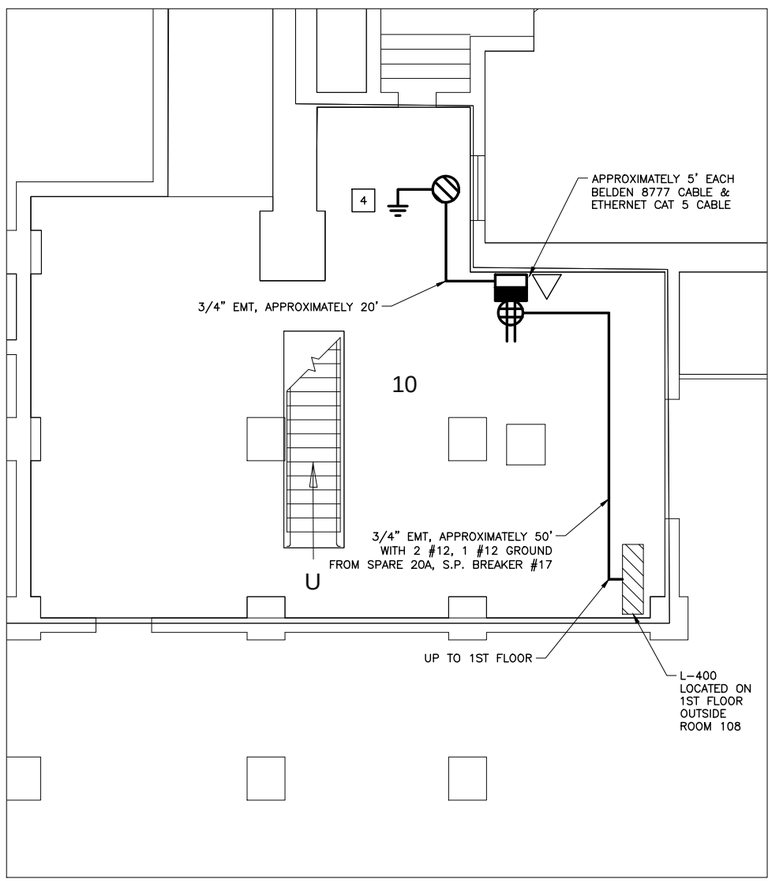
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	2	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	2	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
2	2	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11	2	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
3	4	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-4 CONNECTORS	GEPCO	CT504HD
4	1	ELECTROMAGNETIC FLOW METER WITH REMOTE MOUNT TRANSMITTER (APPROXIMATELY 25' OF CABLE) [7]	ONICON	F-3100	13		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
5	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	14	1	(PAIR) TYPE P CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 50' OF CABLE [7]	FLEXIM	FSP-NNNTS-000
6	2	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	15	1	PERMALOCK TYPE P MOUNTING TRACK	FLEXIM	MOU-PLM-DS-SSK2
7	4	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	16		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
8	2	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
9	12'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					

LEGEND

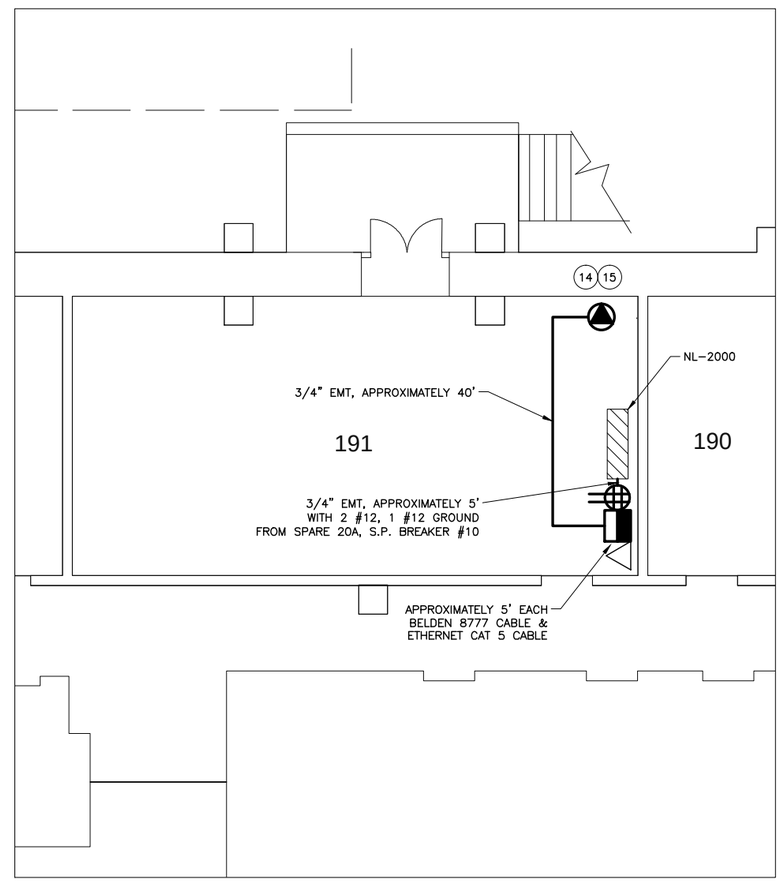
- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR
- ELECTROMAGNETIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATIONS.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. GROUND PER MANUFACTURERS RECOMMENDATIONS.
5. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
6. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
7. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1230, ROOM 10 OVERVIEW



B-1230, ROOM 191 OVERVIEW

B-1230, ROOM 191 EQUIPMENT LOCATION

B-1230, ROOM 10 EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Langley Research Center
Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005 — SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1230 ROOMS 10 AND 191 OVERVIEW

BUILDING NO. 1230 | SIZE D | DRAWING NO. 1296841 | LATEST REV. .

SHEET NO. 4-E615

PARTS LIST

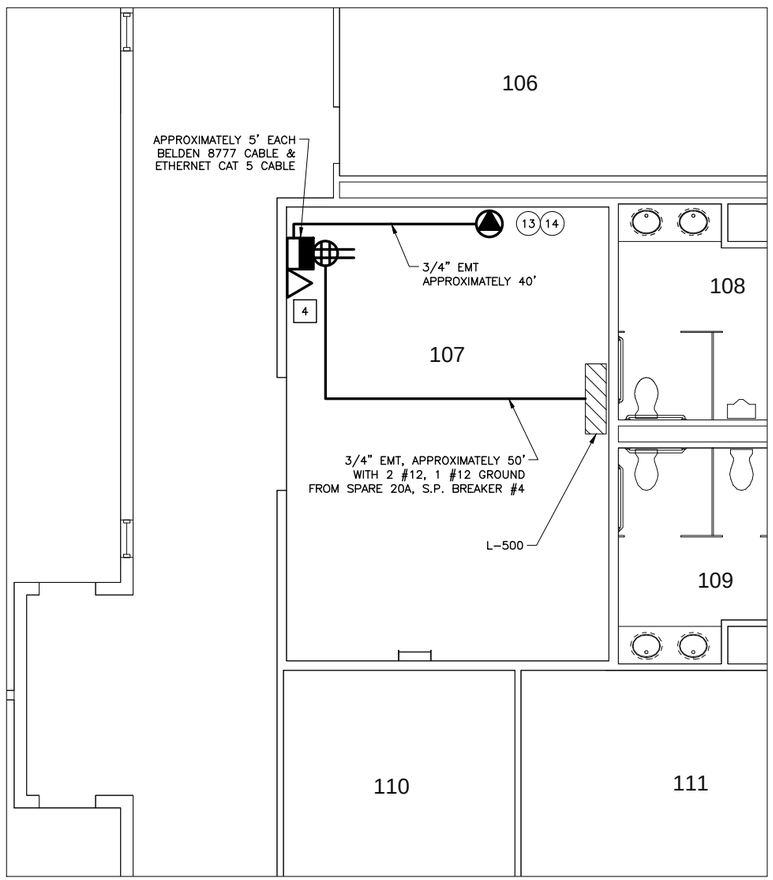
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	1	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
2	1	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
3	2	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
4	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	13	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 50' OF CABLE [7]	FLEXIM	FSQ-NNNTS-000
5	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	14	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
6	2	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	15		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
7	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
8	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					
9	1	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231					

LEGEND

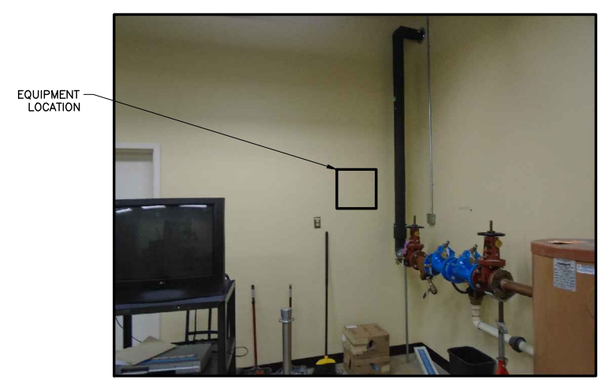
- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATION.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. NEW DATA JACK SHALL BE PROVIDED BY THE GOVERNMENT.
5. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
6. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
7. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1231C, ROOM 107 OVERVIEW



B-1231C, ROOM 107 EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1231C ROOM 107 OVERVIEW

BUILDING NO. 1231C | SIZE D | DRAWING NO. 1296842 | LATEST REV. .

SHEET NO. 4-E616

PARTS LIST

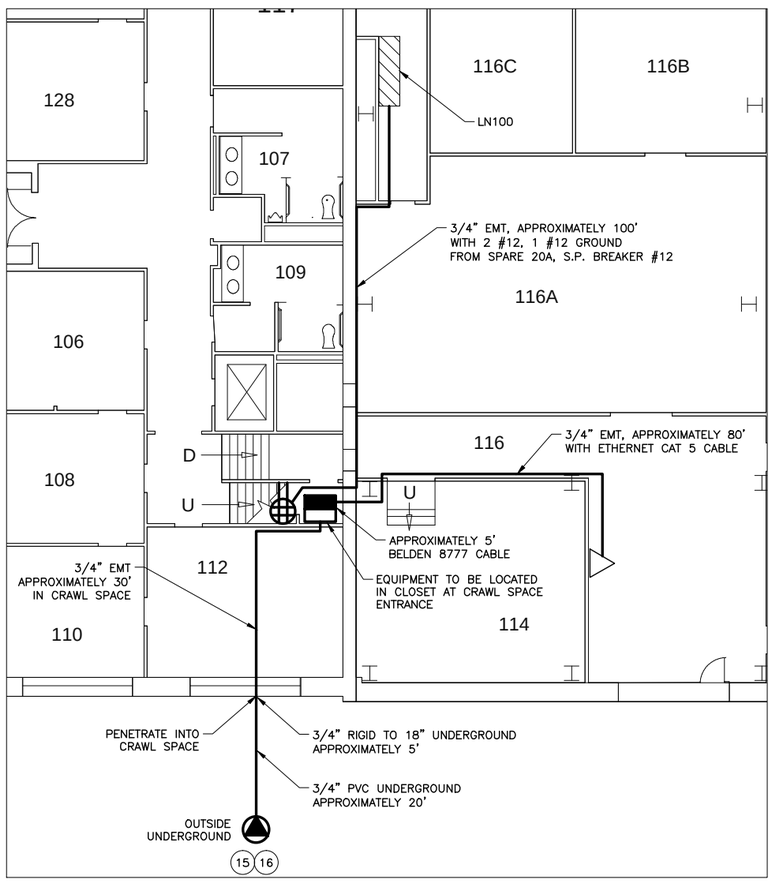
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	2	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	12'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3
2	2	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11	2	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
3	4	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12	2	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
4	1	ELECTROMAGNETIC FLOW METER WITH REMOTE MOUNT TRANSMITTER (APPROXIMATELY 10' OF CABLE) [7]	ONICON	F-3100	13		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
5	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	14		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
6	2	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	15	1	(PAIR) TYPE P CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 70' OF CABLE [7]	FLEXIM	FSP-NNNTS-000/OS
7	5	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	16	1	PERMALOCK TYPE P MOUNTING TRACK	FLEXIM	MOU-PLM-DS-SSK2
8	3	3/4" RIGID INSULATING BUSHING	ARLINGTON	RGD75	17		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
9	2	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					

LEGEND

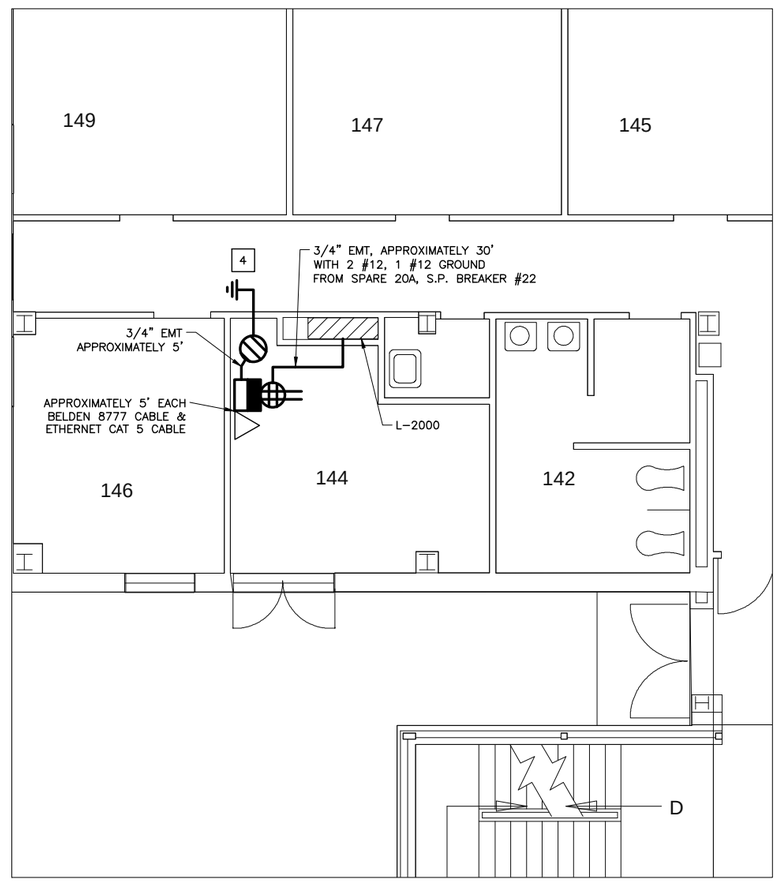
- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR
- ELECTROMAGNETIC SENSOR

NEW WORK NOTES

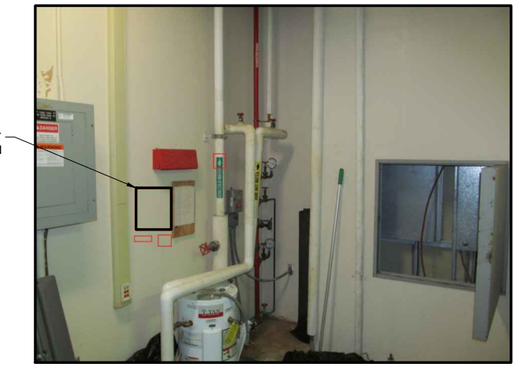
1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL AND CIVIL DRAWINGS FOR SENSOR LOCATIONS AND SITE UTILITY PLAN.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. GROUND PER MANUFACTURERS RECOMMENDATIONS.
5. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
6. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
7. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1232, ROOM 112 OVERVIEW



B-1232, ROOM 144 OVERVIEW



B-1232, ROOM 144 EQUIPMENT LOCATION

B-1232, ROOM 112 EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
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			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1232 ROOMS 112 AND 144 OVERVIEW

BUILDING NO. 1232 | SIZE D | DRAWING NO. 1296843 | LATEST REV. .

SHEET NO. 4-E617

PARTS LIST

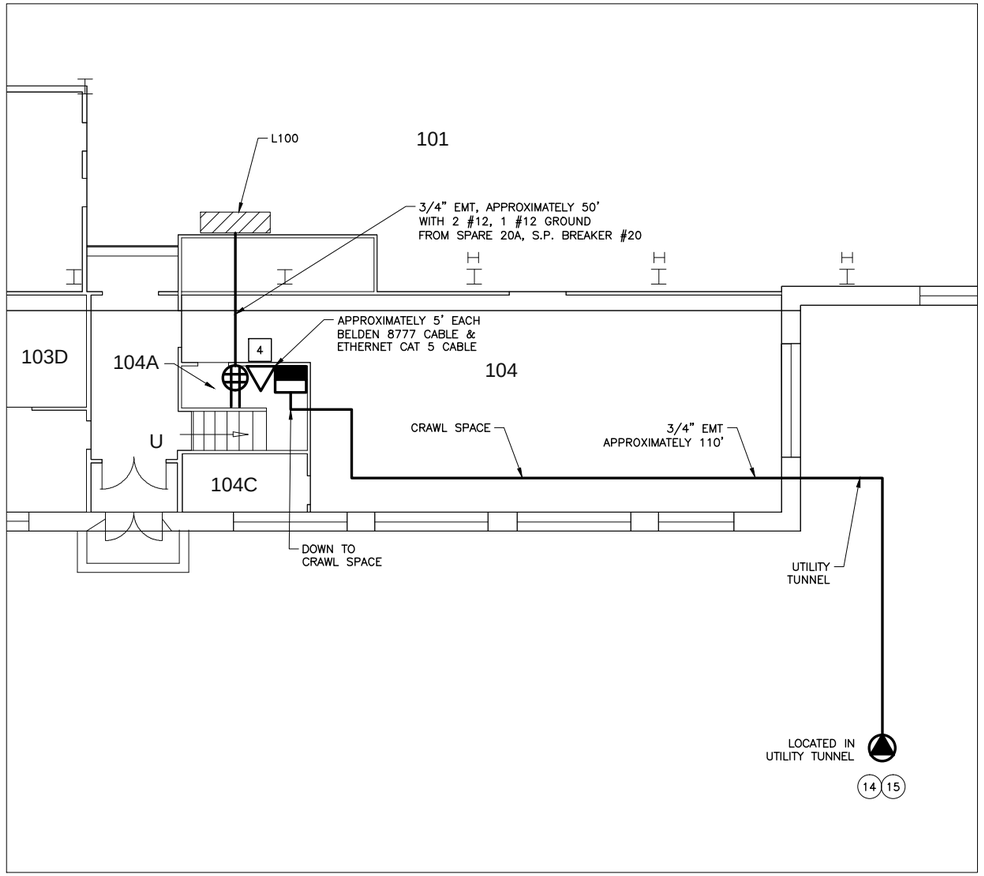
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	2	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	2	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
2	2	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11	2	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
3	4	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
4	1	ELECTROMAGNETIC FLOW METER WITH REMOTE MOUNT TRANSMITTER (APPROXIMATELY 55' OF CABLE) [9]	ONICON	F-3100	13		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
5	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	14	1	(PAIR) TYPE P CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 120' OF CABLE [9]	FLEXIM	FSP-NNNTS-000
6	2	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	15	1	PERMALOCK TYPE P MOUNTING TRACK	FLEXIM	MOU-PLM-DS-SSK2
7	4	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	16		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
8	2	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
9	12'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					

LEGEND

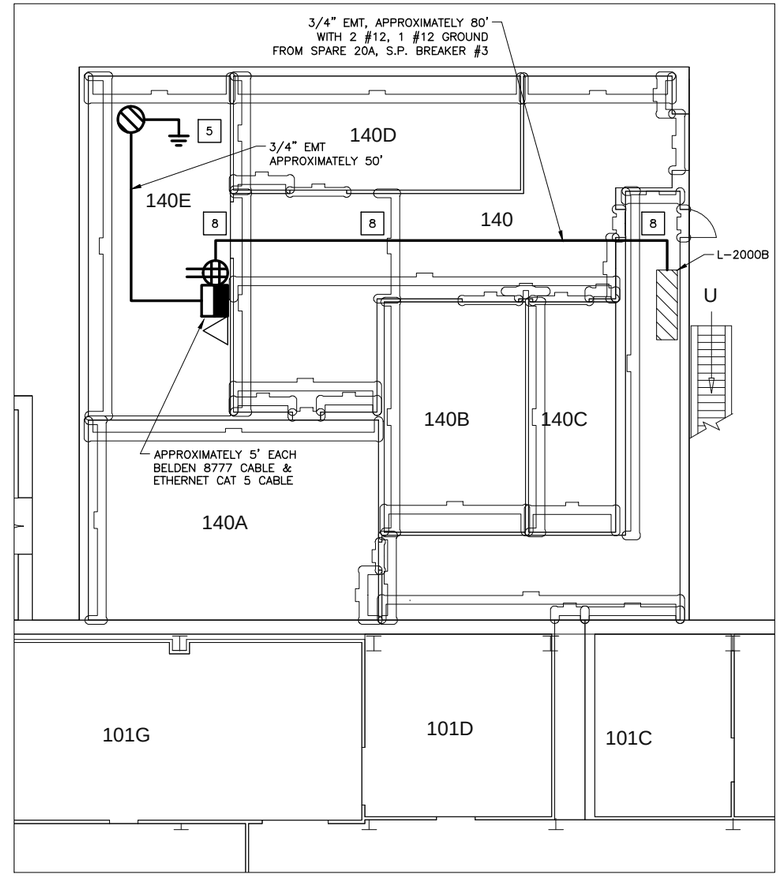
- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR
- ELECTROMAGNETIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATIONS.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. NEW DATA JACK SHALL BE PROVIDED BY THE GOVERNMENT.
5. GROUND PER MANUFACTURERS RECOMMENDATIONS.
6. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
7. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
8. NEED SECURITY APPROVAL TO PENETRATE WALLS IN "LIMITED" ACCESS ROOM 140 AND "SECURE" ACCESS ROOM 140E.
9. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1232A, ROOM 104A OVERVIEW



B-1232A, ROOM 140E OVERVIEW

B-1232A, ROOM 140E EQUIPMENT LOCATION

B-1232A, ROOM 104A EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
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			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

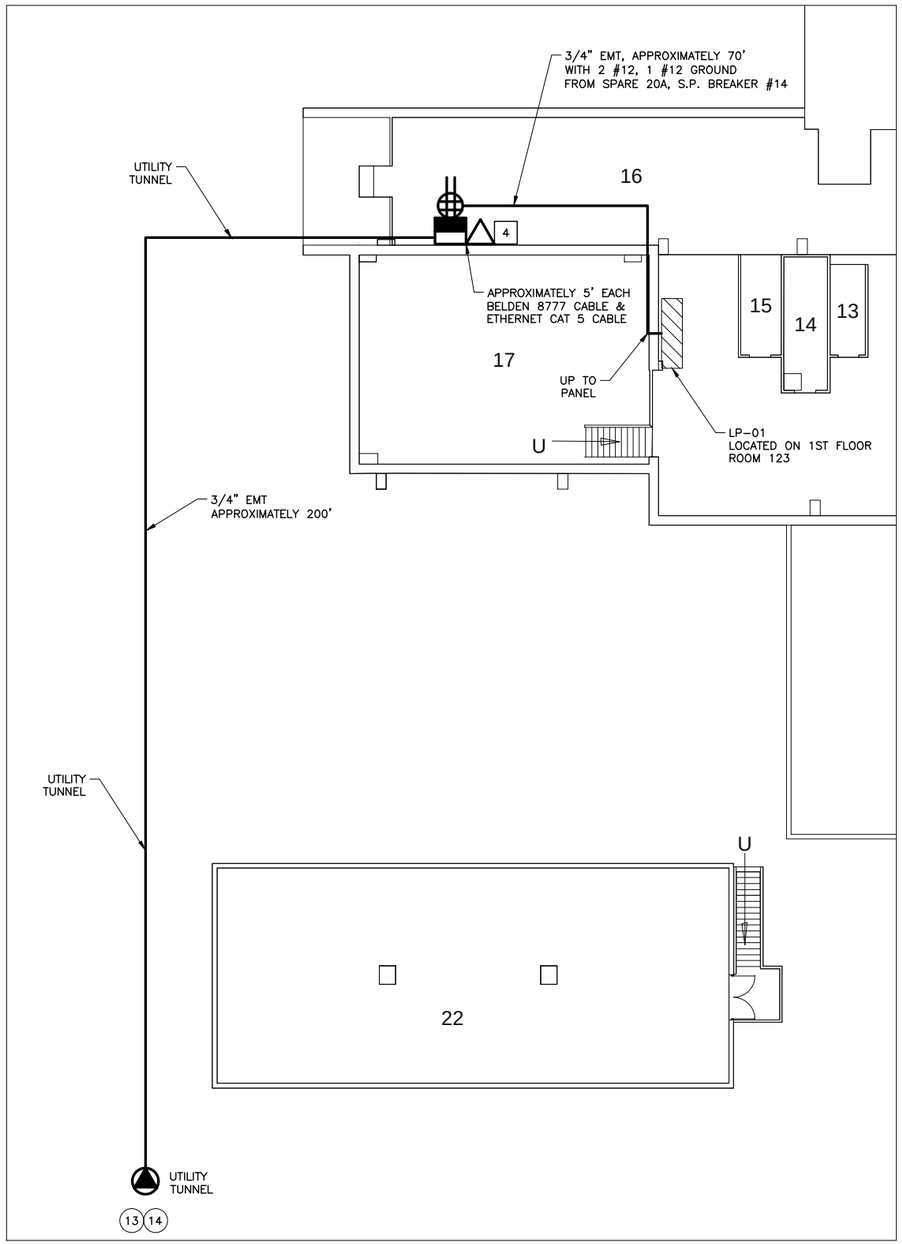
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1232A ROOMS 104A AND 140E OVERVIEW

BUILDING NO. 1232A | SIZE D | DRAWING NO. 1296844 | LATEST REV. .

SHEET NO. 4-E618



B-1236, ROOM 16 OVERVIEW

B-1236, ROOM 16 EQUIPMENT LOCATION

LEGEND

- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENOSR LOCATION.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. NEW DATA JACK SHALL BE PROVIDED BY THE GOVERNMENT.
5. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
6. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
7. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.

PARTS LIST

ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB
2	1	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150
3	2	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W
4	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC
5	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13
6	2	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75
7	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA
8	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3
9	1	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
10	1	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
13	1	(PAIR) TYPE M CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 220' OF CABLE [7]	FLEXIM	FSM-NNNTS-000
14	1	PERMALOCK TYPE M MOUNTING TRACK	FLEXIM	MOU-PLM-DS-SSK3
15		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

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ENG./DES.	P. GILDEA	07/30/15
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PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
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			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ±; X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

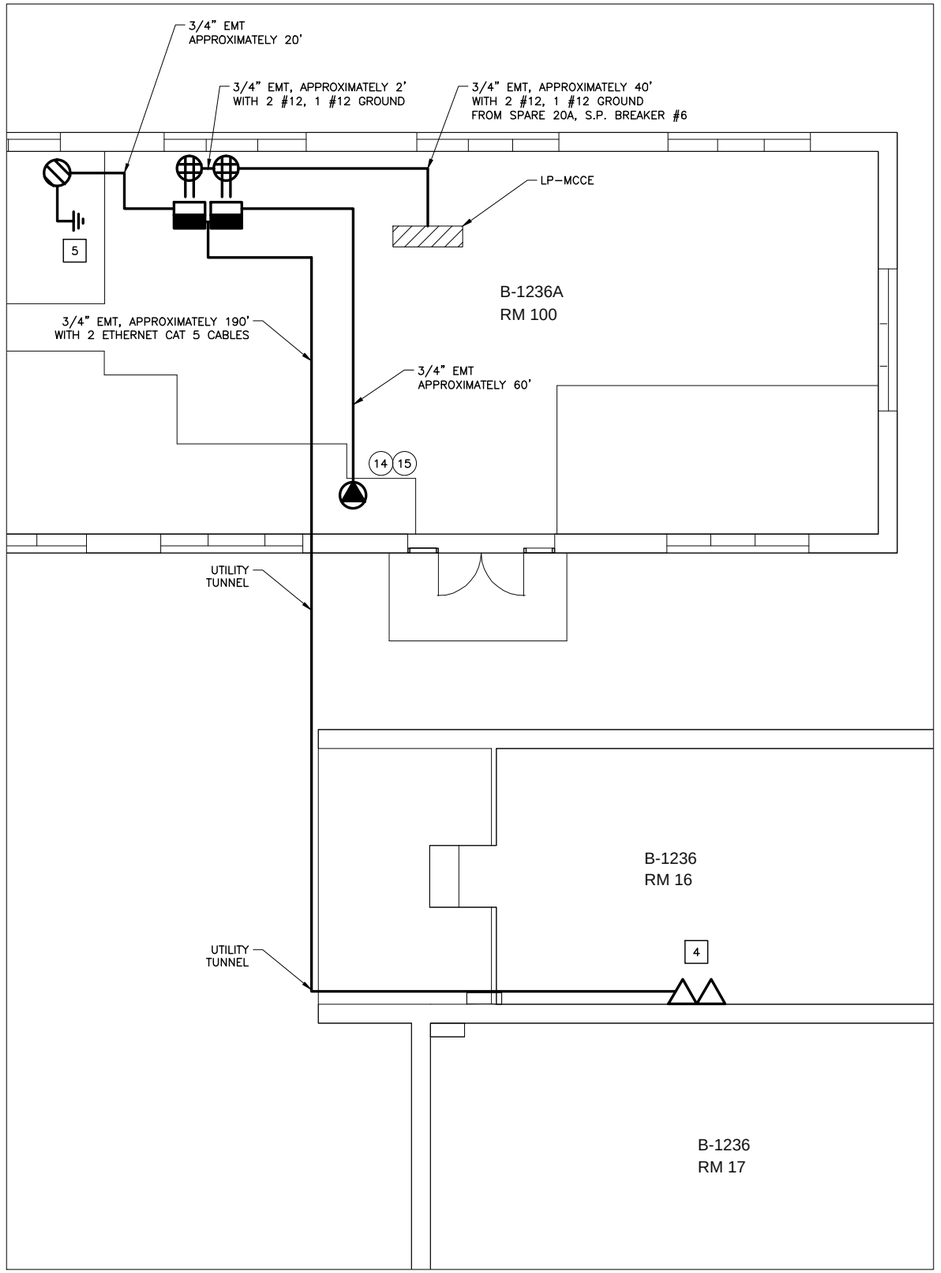
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1236 ROOM 16 OVERVIEW

BUILDING NO. 1236 | SIZE D | DRAWING NO. 1296845 | LATEST REV. -

SHEET NO. 4-E619



B-1236A, ROOM 100 OVERVIEW

B-1236, ROOM 16 DATA JACK LOCATION

B-1236A, ROOM 100 EQUIPMENT LOCATION

LEGEND

- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR
- ELECTROMAGNETIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATIONS.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. NEW DATA JACKS SHALL BE PROVIDED BY THE GOVERNMENT.
5. GROUND PER MANUFACTURERS RECOMMENDATIONS.
6. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
7. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
8. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.

PARTS LIST

ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	2	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB
2	2	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150
3	4	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W
4	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC
5	1	ELECTROMAGNETIC FLOW METER WITH REMOTE MOUNT TRANSMITTER (APPROXIMATELY 25" OF CABLE) [8]	ONICON	F-3100
6	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13
7	6	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75
8	2	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA
9	12'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3
10	2	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
11	2	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
12		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
13		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
14	1	(PAIR) TYPE P CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 70' OF CABLE [8]	FLEXIM	FSP-NNNTS-000
15	1	PERMALOCK TYPE P MOUNTING TRACK	FLEXIM	MOU-PLM-DS-SSK2
16		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Langley Research Center
Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1236A ROOM 100 OVERVIEW

BUILDING NO. 1236A | SIZE D | DRAWING NO. 1296846 | LATEST REV. -

SHEET NO. 4-E620

PARTS LIST

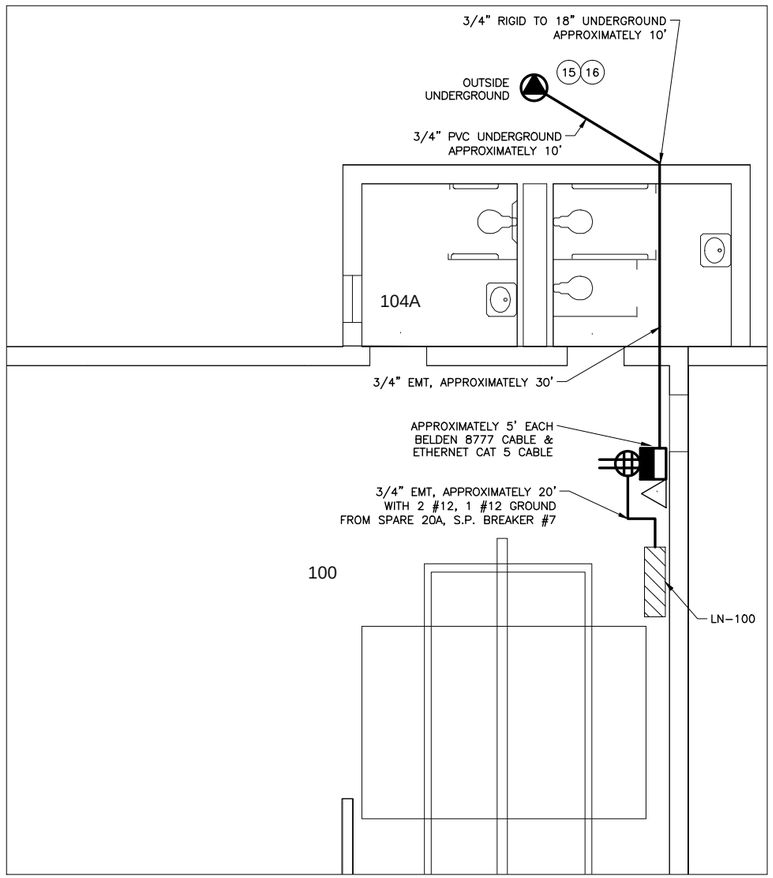
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	2	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	12'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3
2	2	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11	2	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
3	4	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12	2	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
4	1	ELECTROMAGNETIC FLOW METER WITH REMOTE MOUNT TRANSMITTER (APPROXIMATELY 25' OF CABLE) [7]	ONICON	F-3100	13		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
5	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	14		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
6	2	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	15	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 60' OF CABLE [7]	FLEXIM	FSQ-NNNTS-000/OS
7	3	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	16	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
8	1	3/4" RIGID INSULATING BUSHING	ARLINGTON	RGD75	17		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
9	2	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					

LEGEND

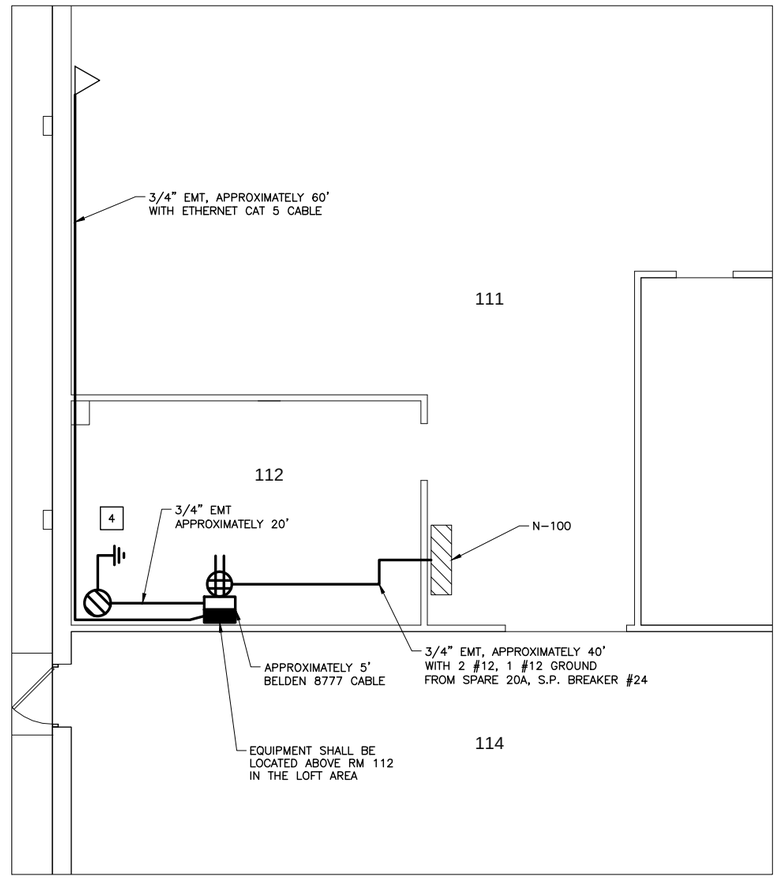
- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR
- ELECTROMAGNETIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL AND CIVIL DRAWINGS FOR SENSOR LOCATIONS AND SITE UTILITY PLAN.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. GROUND PER MANUFACTURERS RECOMMENDATIONS.
5. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
6. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
7. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1237, ROOM 100 OVERVIEW



B-1237, ROOM 112 LOFT OVERVIEW

B-1237, ROOM 112 LOFT EQUIPMENT LOCATION

B-1237, ROOM 100 EQUIPMENT LOCATION

REVISIONS															
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1237 ROOMS 100 AND 112 LOFT OVERVIEW

BUILDING NO. 1237 | SIZE D | DRAWING NO. 1296847 | LATEST REV. .

SHEET NO. 4-E621

PARTS LIST

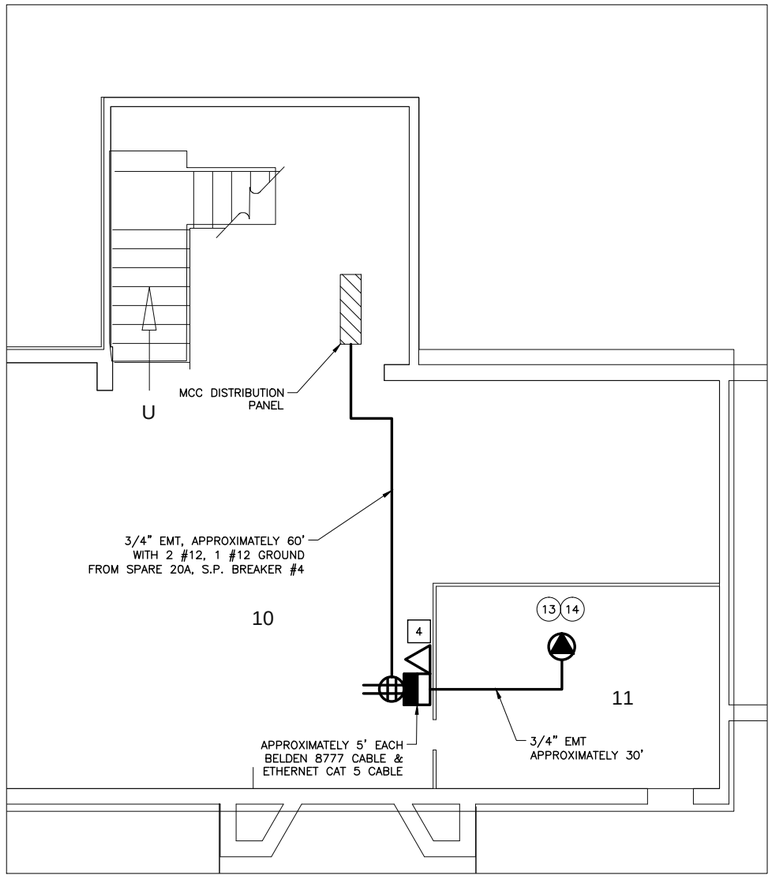
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	1	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
2	1	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
3	2	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
4	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	13	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 40' OF CABLE [7]	FLEXIM	FSQ-NNNTS-000
5	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	14	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
6	2	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	15		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
7	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
8	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					
9	1	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231					

LEGEND

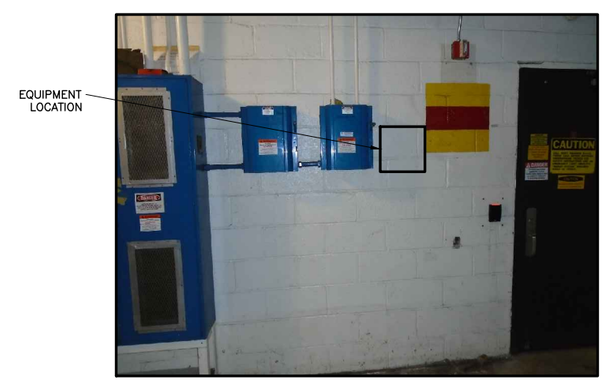
- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATION.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. NEW DATA JACK SHALL BE PROVIDED BY THE GOVERNMENT.
5. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
6. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
7. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1244, ROOM 10 OVERVIEW



B-1244, ROOM 10 EQUIPMENT LOCATION

REVISIONS															
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005 — SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE

FOR DRAWING INDEX SEE DRAWING 1296804

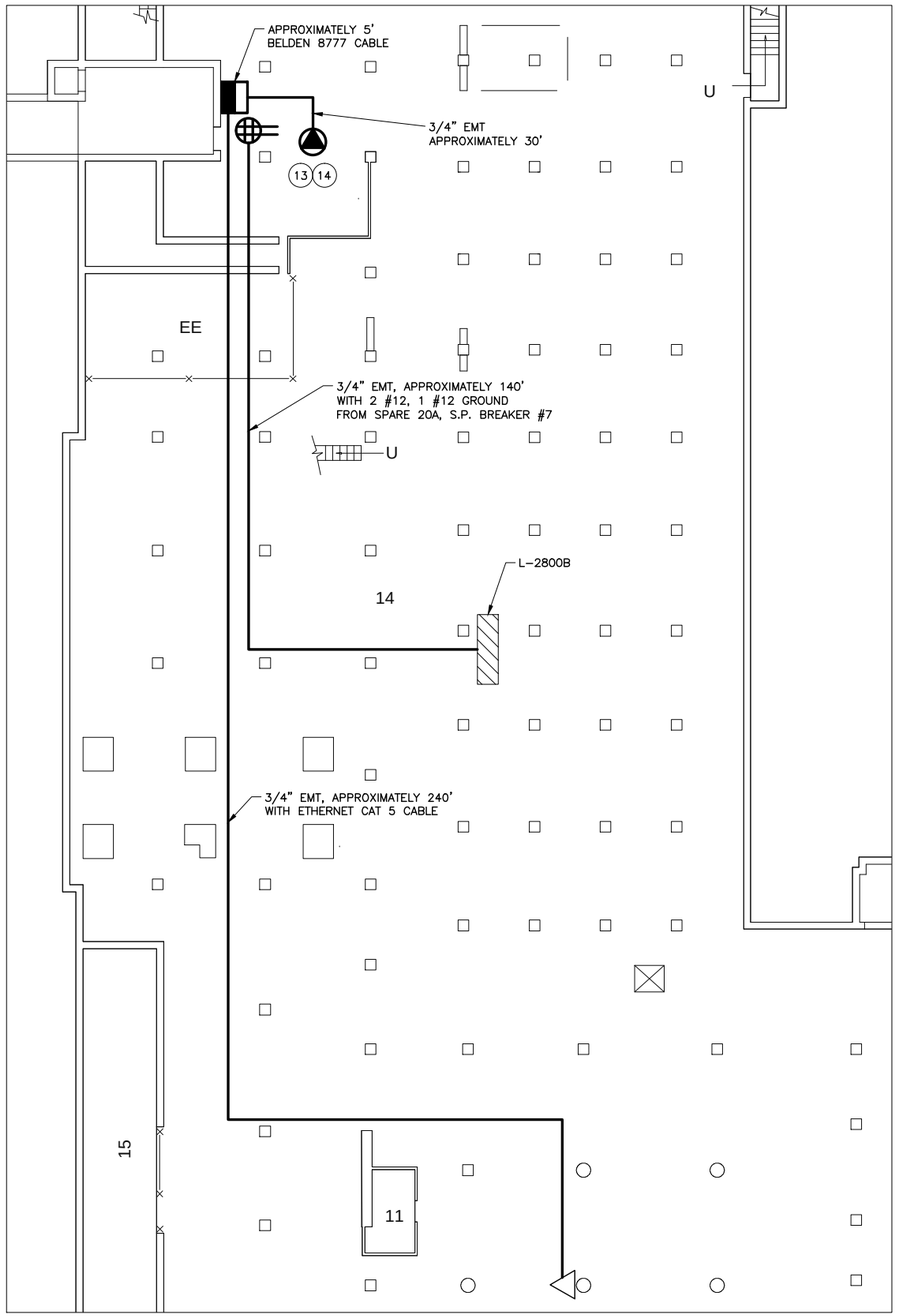
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1244 ROOM 10 OVERVIEW

BUILDING NO. 1244 | SIZE D | DRAWING NO. 1296848 | LATEST REV. .

SHEET NO. 4-E622



B-1247B, ROOM 14 OVERVIEW

B-1247B, ROOM 14 EQUIPMENT LOCATION

LEGEND

- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATION.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
5. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
6. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.

PARTS LIST

ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB
2	1	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150
3	2	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W
4	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC
5	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13
6	4	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75
7	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA
8	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3
9	1	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
10	1	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
13	1	(PAIR) TYPE M CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 40' OF CABLE [6]	FLEXIM	FSM-NNNTS-000
14	1	PERMALOCK TYPE M MOUNTING TRACK	FLEXIM	MOU-PLM-DS-SSK3
15		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1247B ROOM 14 OVERVIEW

BUILDING NO. 1247B | SIZE D | DRAWING NO. 1296849 | LATEST REV. .

SHEET NO. 4-E623

PARTS LIST

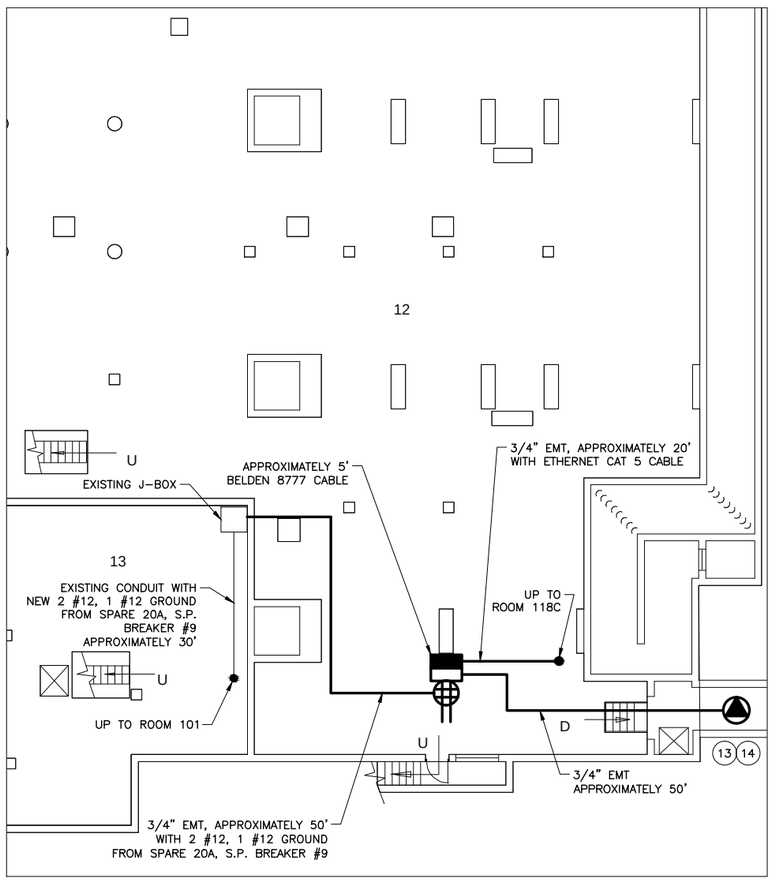
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	1	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
2	1	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
3	2	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
4	1	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	13	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 60' OF CABLE [6]	FLEXIM	FSQ-NNNTS-000
5	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	14	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
6	4	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	15		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
7	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
8	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					
9	1	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231					

LEGEND

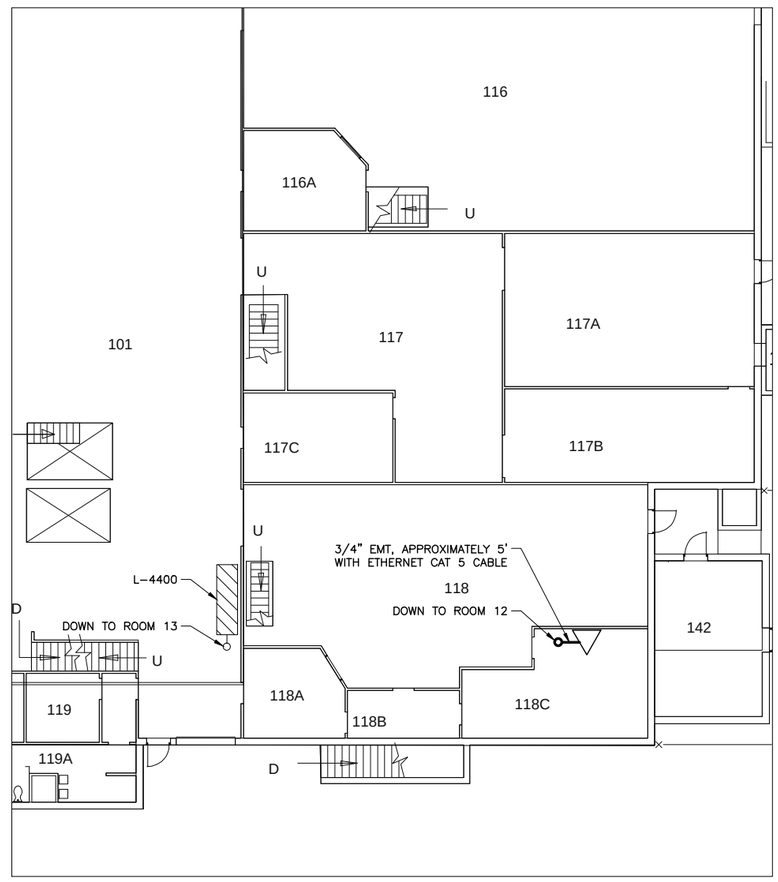
- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATION.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
5. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
6. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1247D, ROOM 12 OVERVIEW



B-1247D, 1ST FLOOR OVERVIEW

B-1247D, ROOM 12 EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02, X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1247D ROOM 12 OVERVIEW

BUILDING NO. 1247D | SIZE D | DRAWING NO. 1296850 | LATEST REV. -

SHEET NO. 4-E624

PARTS LIST

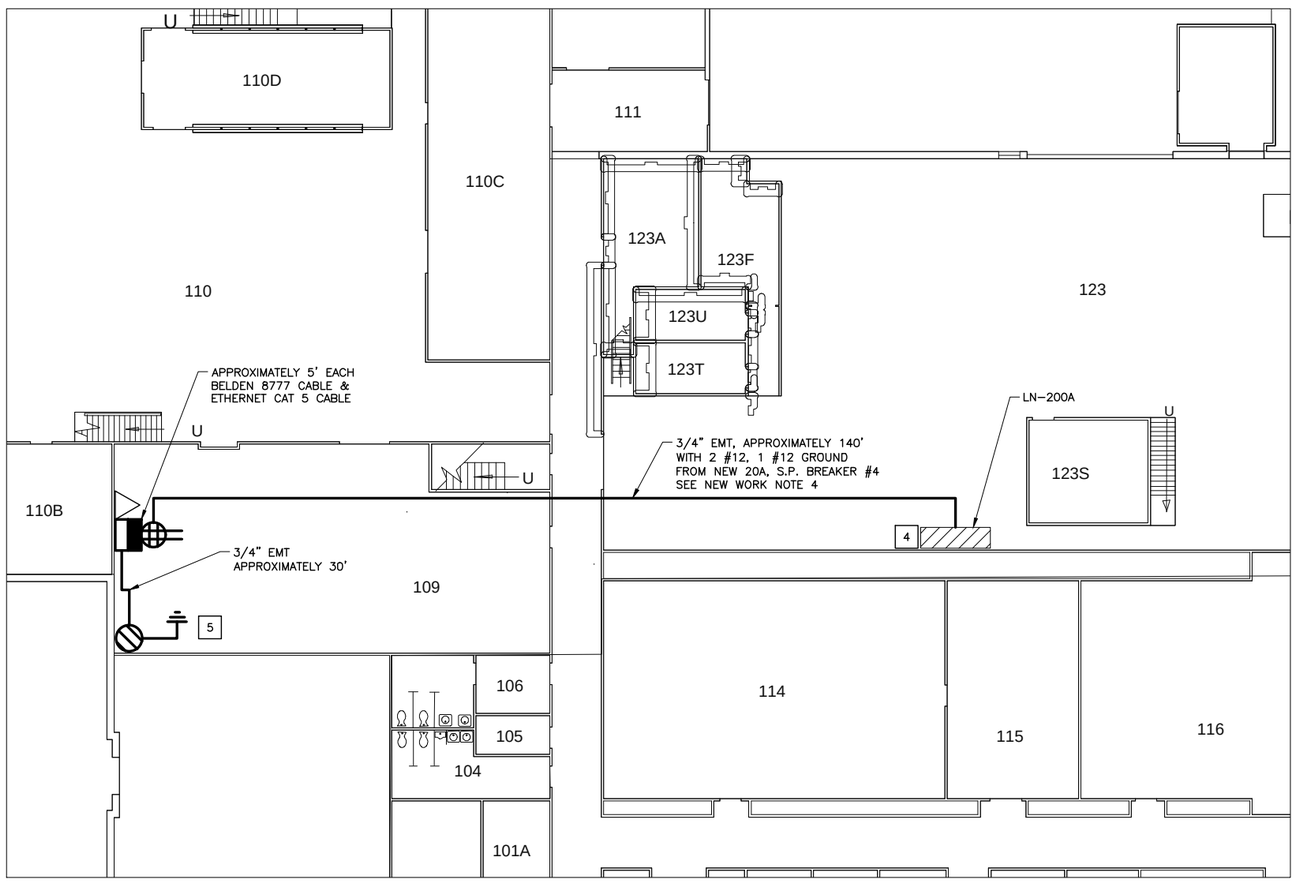
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	1	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	1	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
2	1	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
3	2	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
4	1	ELECTROMAGNETIC FLOW METER WITH REMOTE MOUNT TRANSMITTER (APPROXIMATELY 35' OF CABLE) [8]	ONICON	F-3100					
5	1	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13					
6	2	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75					
7	1	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA					
8	6'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					
9	1	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231					

LEGEND

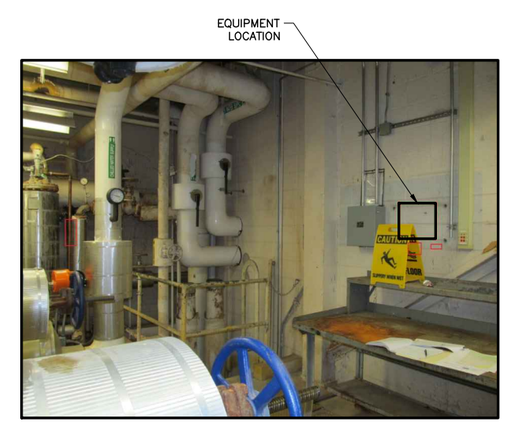
- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ELECTROMAGNETIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATION.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. REMOVE 30A S.P. BREAKER #4 IN PANEL LN-200A AND TURN OVER TO CONSTRUCTION MANAGER. FURNISH AND INSTALL NEW 20 AMP, S.P. BREAKER FOR CIRCUIT #4 IN PANEL LN-200A. BREAKER SHALL BE GENERAL ELECTRIC TYPE "THQL1120".
5. GROUND PER MANUFACTURERS RECOMMENDATIONS.
6. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
7. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
8. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1250, ROOM 109 OVERVIEW



B-1250, ROOM 109 EQUIPMENT LOCATION

REVISIONS															
DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD	DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Langley Research Center
Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS				
NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ±; X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

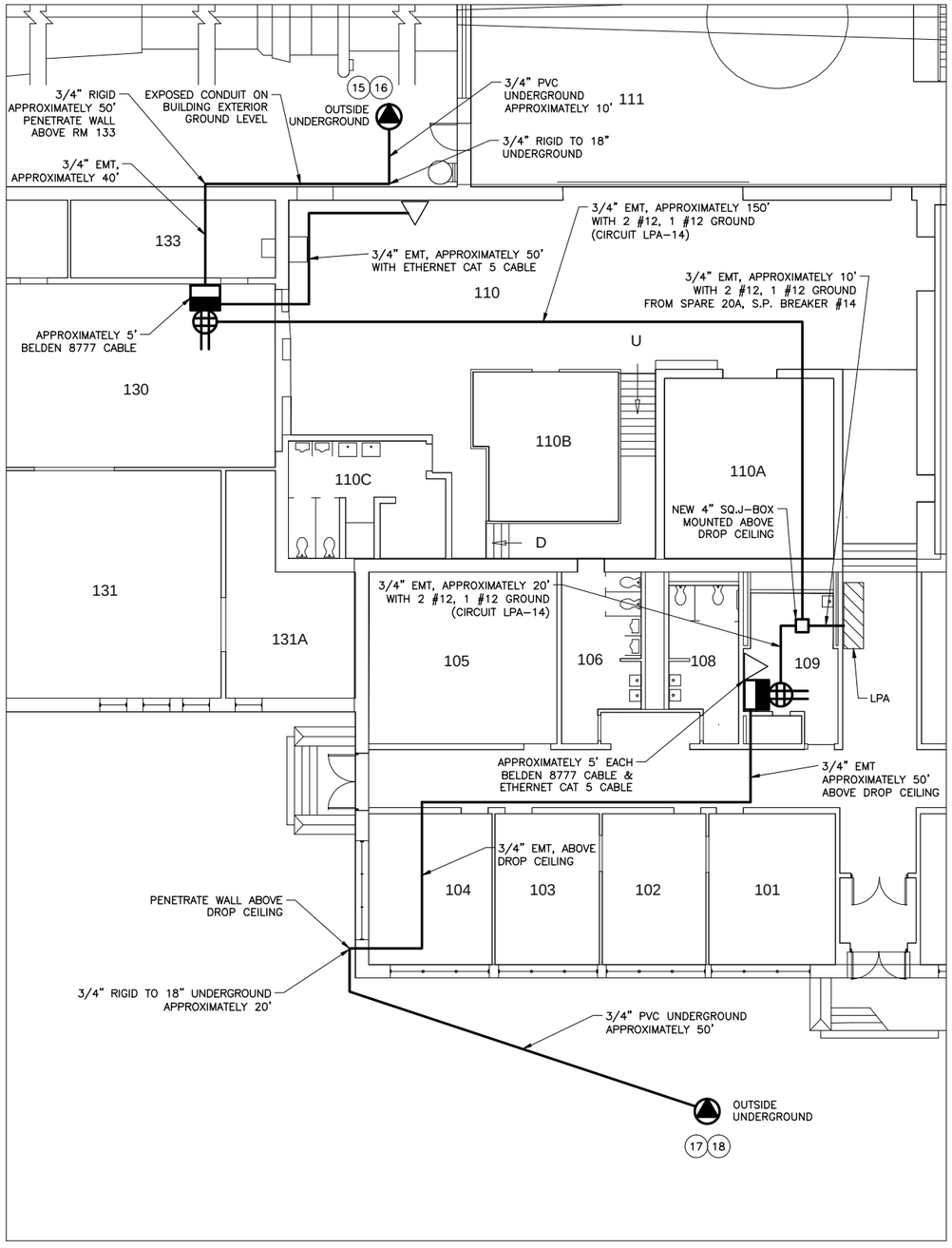
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1250 ROOM 109 OVERVIEW

BUILDING NO. 1250 | SIZE D | DRAWING NO. 1296851 | LATEST REV. .

SHEET NO. 4-E625



B-1265, ROOMS 109 AND 130 OVERVIEW

B-1265, ROOM 130 EQUIPMENT LOCATION

B-1265, ROOM 109 EQUIPMENT LOCATION

LEGEND

- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL AND CIVIL DRAWINGS FOR SENSOR LOCATIONS AND SITE UTILITY PLANS.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
5. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
6. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.

PARTS LIST

ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	2	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB
2	2	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150
3	4	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W
4	2	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC
5	2	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13
6	4	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75
7	2	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA
8	12'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3
9	3	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231
10	2	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
13	1	4" SQUARE BLANK COVER	RACO	752
14	2	3/4" RIGID INSULATING BUSHING	ARLINGTON	RGD75
15	1	(PAIR) TYPE P CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 120' OF CABLE [6]	FLEXIM	FSP-NNNTS-000/OS
16	1	PERMALOCK TYPE P MOUNTING TRACK	FLEXIM	MOU-PLM-DS-SSK2
17	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 140' OF CABLE [6]	FLEXIM	FSQ-NNNTS-000/OS
18	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
19		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
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			TECH. PROJ. ENG.	
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TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE: ANGULAR ± ; X.XX (2 DECIMAL PLACES) ±.02 ; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICRONICHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1265 ROOMS 109 AND 130 OVERVIEW

BUILDING NO. 1265 | SIZE D | DRAWING NO. 1296852 | LATEST REV. .

SHEET NO. 4-E626

PARTS LIST

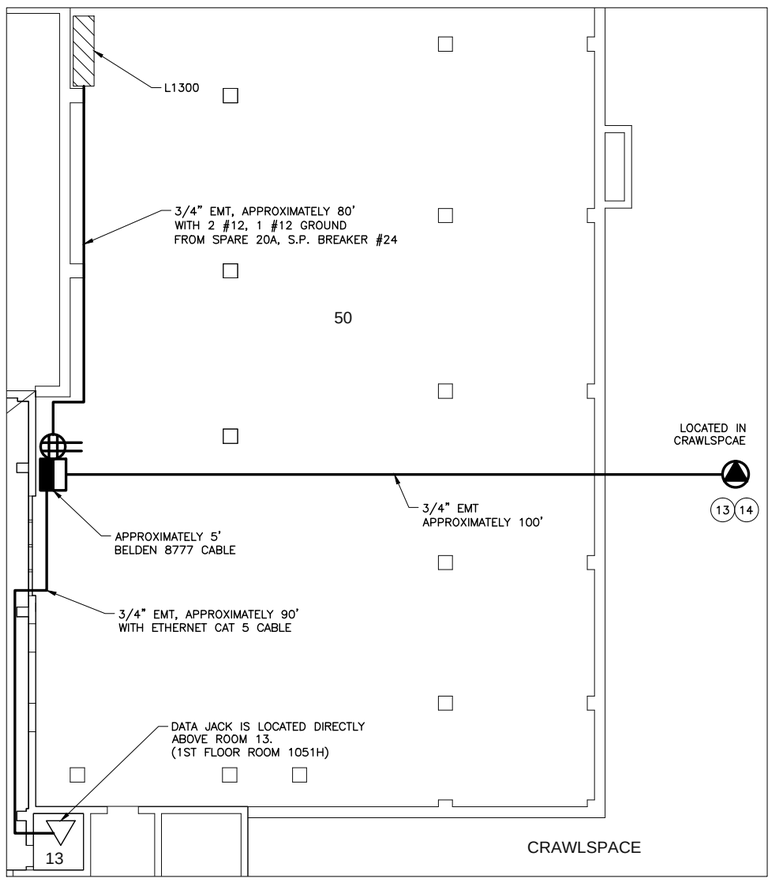
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	2	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	2	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
2	2	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
3	4	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
4	2	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	13	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 120' OF CABLE [6]	FLEXIM	FSQ-NNNTS-000
5	2	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	14	2	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
6	6	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	15	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 20' OF CABLE [6]	FLEXIM	FSQ-NNNTS-000
7	2	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA	16		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
8	12'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3					
9	2	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231					

LEGEND

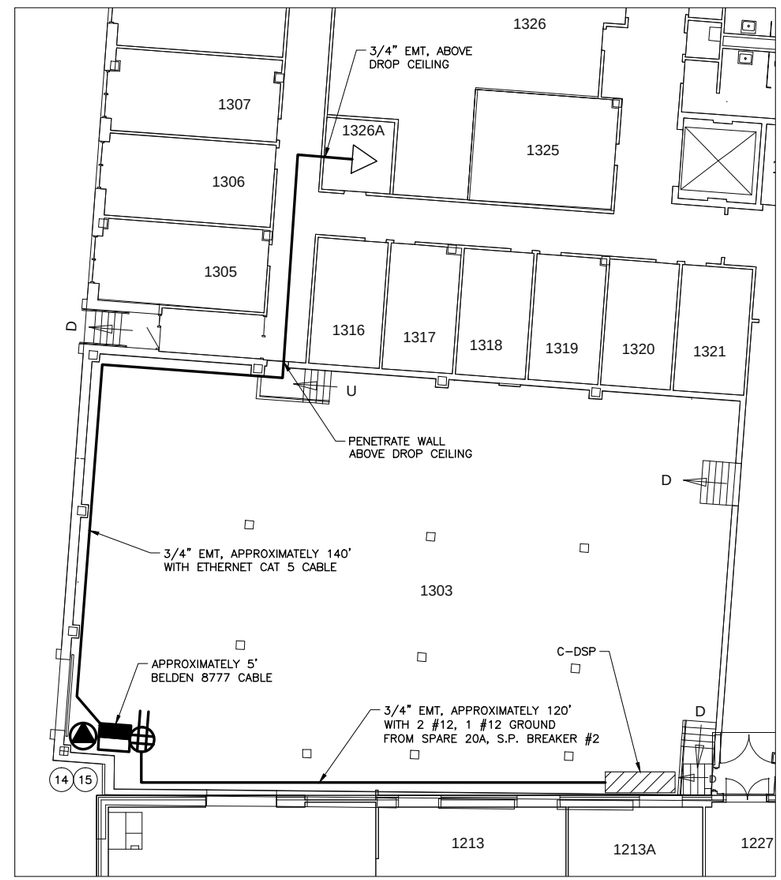
- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

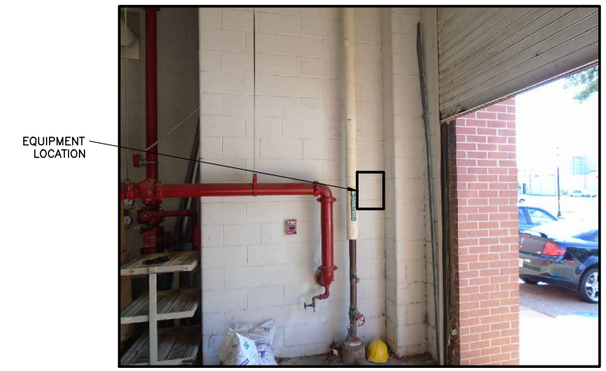
1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATIONS.
3. REFERENCE MECHANICAL DRAWING FOR EQUIPMENT/PIPING DETAILS.
4. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
5. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
6. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



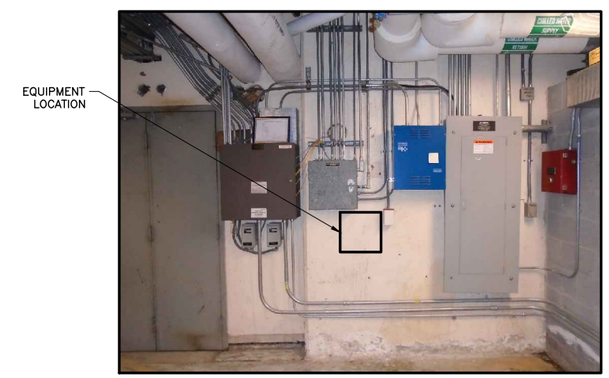
B-1268A, ROOM 50 OVERVIEW



B-1268C, ROOM 1303 OVERVIEW



B-1268C, ROOM 1303 EQUIPMENT LOCATION



B-1268A, ROOM 50 EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1268A & 1268C ROOMS 50 AND 1303 OVERVIEW

BUILDING NO. 1268 | SIZE D | DRAWING NO. 1296853 | LATEST REV. .

SHEET NO. 4-E627

PARTS LIST

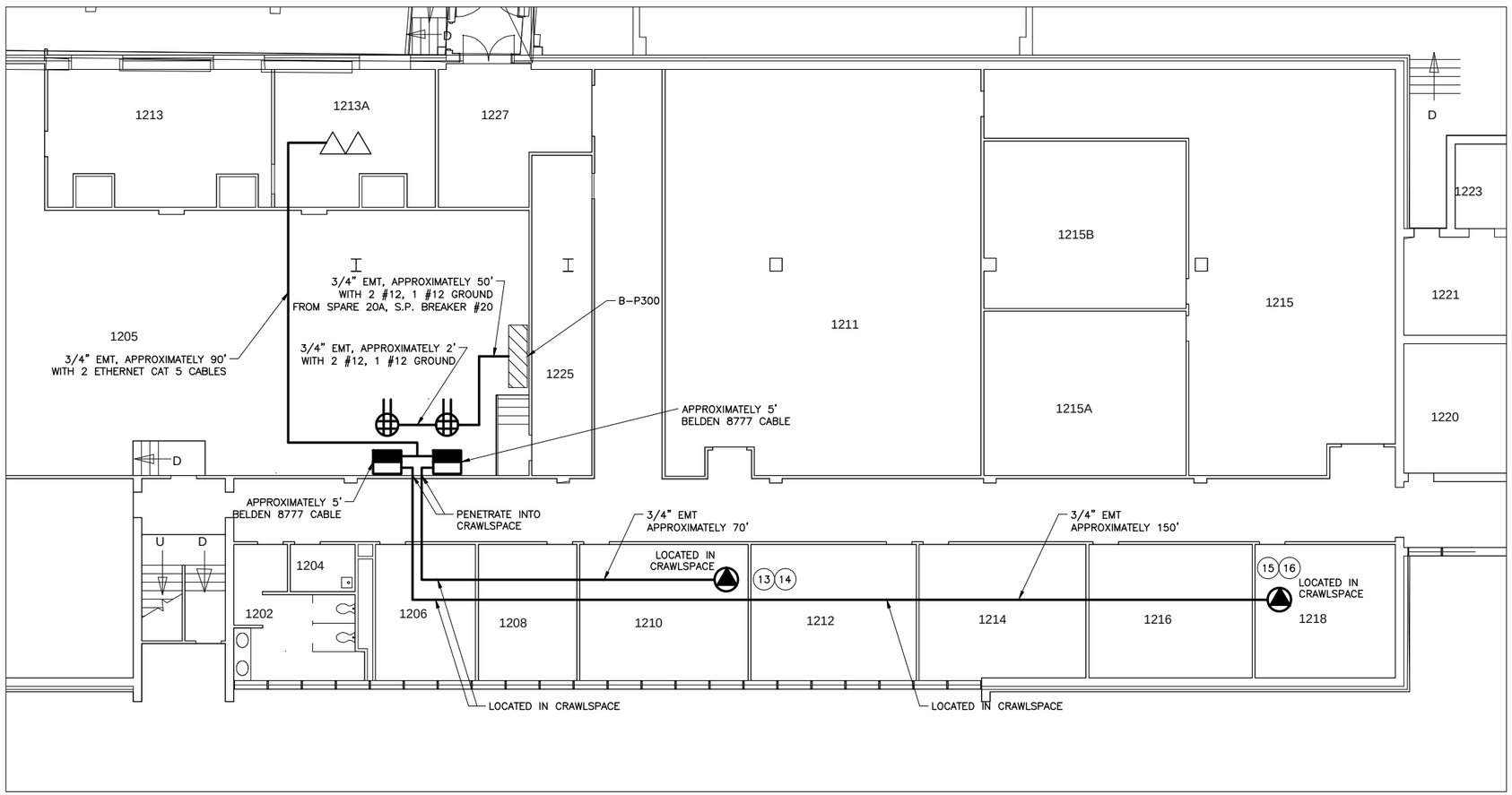
ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	2	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	2	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
2	2	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
3	4	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
4	2	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	13	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 90' OF CABLE [6]	FLEXIM	FSQ-NNNTS-000
5	2	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	14	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
6	6	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	15	1	(PAIR) TYPE M CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 170' OF CABLE [6]	FLEXIM	FSM-NNNTS-000
7	2	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA	16	1	PERMALOCK TYPE M MOUNTING TRACK	FLEXIM	MOU-PLM-DS-SSK3
8	12'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3	17		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
9	2	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231					

LEGEND

- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATIONS.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
5. REFERENCE DRAWING 1296826 FOR CONDUIT DETAILS.
6. CABLE LENGTH IS AN ESTIMATE AND WILL VARY ACCORDING TO CONDUIT INSTALLATION, CONTRACTOR SHALL DETERMINE EXACT CABLE LENGTH NEEDED FOR PROPER INSTALLATION.



B-1268B, ROOM 1205 OVERVIEW

B-1268B, ROOM 1205 EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

APPROVALS		DATE
DRAWN	A. BARRY	07/30/15
ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
PROJ. MGR.	G. VOLKMAN	07/30/15
SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
			DESIGNED	
			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

TOLERANCE ON DIMENSIONS UNLESS SHOWN OTHERWISE — ANGULAR ± X.XX (2 DECIMAL PLACES) ±.02; X.XXX (3 DECIMAL PLACES) ±.005

SURFACE FINISH IN MICRONCHES RMS UNLESS SHOWN OTHERWISE √

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1268B ROOM 1205 OVERVIEW

BUILDING NO. 1268B | SIZE D | DRAWING NO. 1296854 | LATEST REV. .

SHEET NO. 4-E628

PARTS LIST

ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.	ITEM	QTY	DESCRIPTION	MANUFACTURER OR EQUAL	CATALOG NO.
1	2	DB9 FEMALE TO TERMINAL BLOCK ADAPTOR	MOXA	MINI DB9F-TO-TB	10	2	4" SQUARE, FLAT TWO-DEVICE COVER (MUDRING)	RACO	791
2	2	MOXA 485 TO ETHERNET CONVERTOR	MOXA	NPORT 6150	11		CAT 5 ETHERNET CABLE, 24AWG WITH RJ-45 CONNECTORS	GEPCO	CT504HD
3	4	DUPLEX RECEPTACLE 20A, 125V, WHITE	HUBBELL	HBL5362W	12		BELDEN 8777 6-CONDUCTOR CABLE	BELDEN	N/A
4	2	ULTRASONIC FLOW METER	FLEXIM	US-7407.SC	13	1	(PAIR) TYPE P CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 20' OF CABLE [6]	FLEXIM	FSP-NNNTS-000
5	2	DOUBLE DUPLEX (QUAD) OUTLET PROTECTOR (WHITE)	LECTRALOCK	LDM11-13	14	1	PERMALOCK TYPE P MOUNTING TRACK	FLEXIM	MOU-PLM-DS-SSK2
6	8	3/4" EMT INSULATING BUSHING	ARLINGTON	EMT75	15	1	(PAIR) TYPE Q CLAMP-ON FLOW TRANSDUCERS, EACH WITH APPROXIMATELY 20' OF CABLE [6]	FLEXIM	FSQ-NNNTS-000
7	2	20A, 125V, CORD PLUG	HUBBELL	HBL5366CA	16	1	PERMALOCK TYPE Q MOUNTING TRACK	FLEXIM	MOU-PLQ-DS-SSK2
8	12'	600V, 12-3 SOW CORD	ALLIED WIRE & CABLE	SO 12/3	17		DUAL TRIAX TRANSDUCER EXTENSION CABLE	FLEXIM	7710127-(XXX')
9	2	4" SQUARE BOX, 2-1/8" DEEP, 1/2" AND 3/4" KNOCKOUTS	RACO	231					

LEGEND

- EXISTING
- NEW WORK
- PANELBOARD
- FLOW METER
- CONVERTER
- DOUBLE DUPLEX RECEPTACLE (QUAD)
- DATA JACK
- ULTRASONIC SENSOR

NEW WORK NOTES

1. REFERENCE DRAWING 1296826 FOR WIRING DIAGRAM.
2. REFERENCE MECHANICAL DRAWINGS FOR SENSOR LOCATIONS.
3. REFERENCE MECHANICAL DRAWINGS FOR EQUIPMENT/PIPING DETAILS.
4. REFERENCE DRAWING 1296826 FOR GENERAL NOTES.
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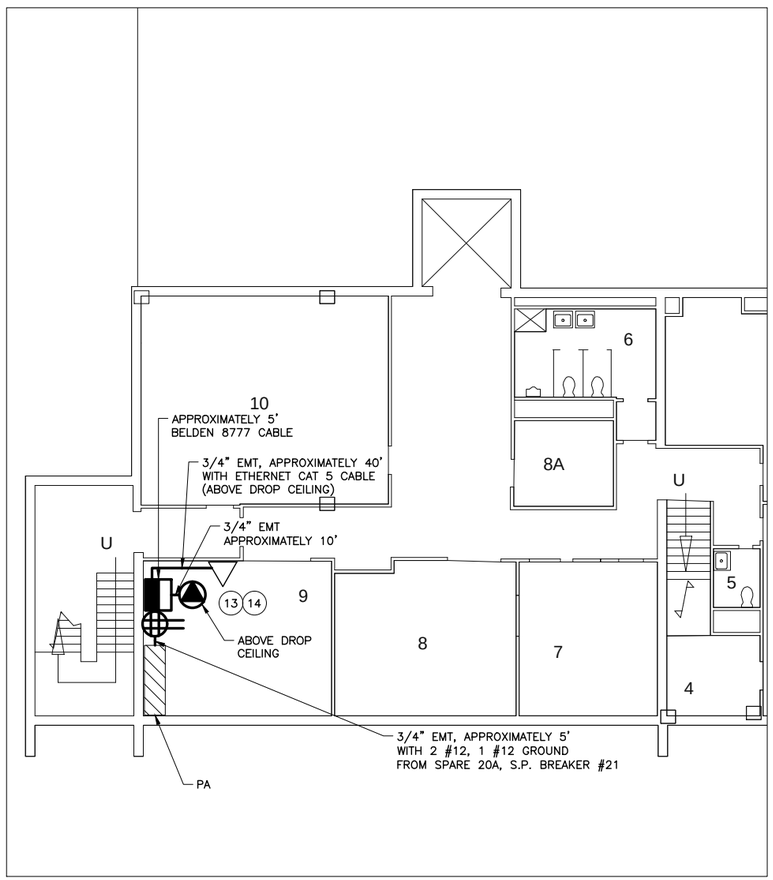
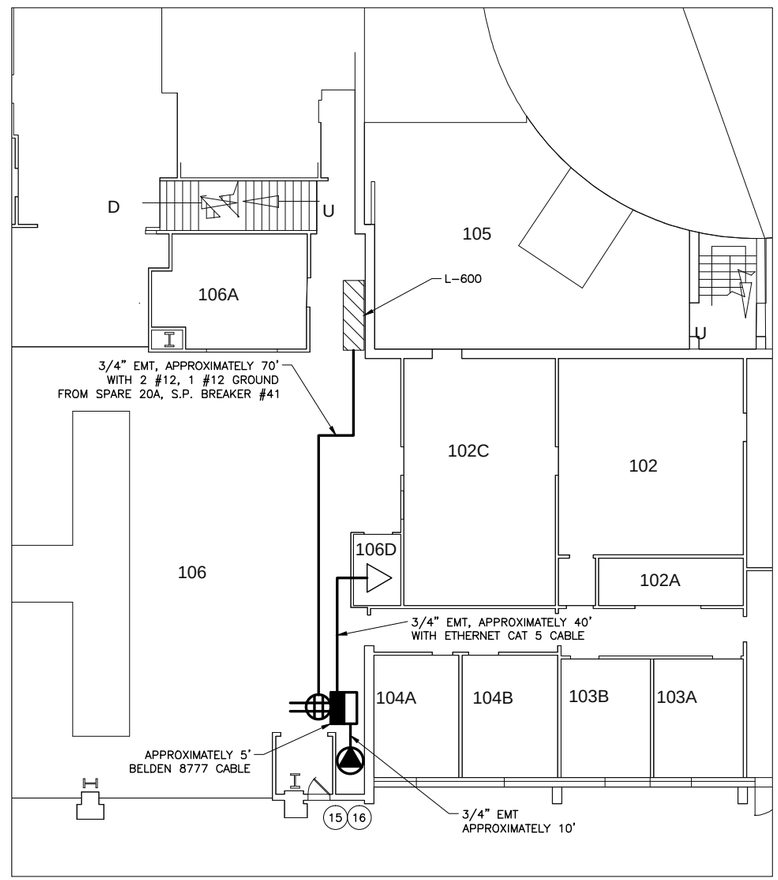
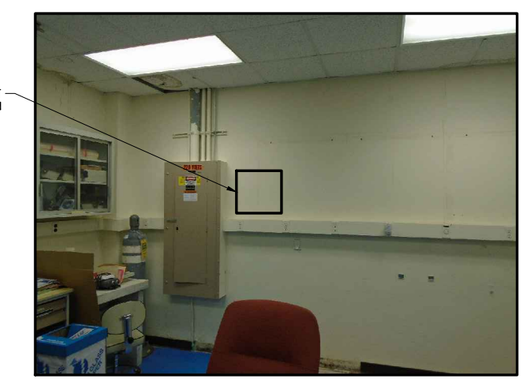


B-1293A, ROOM 9 OVERVIEW



B-1293B, ROOM 106 OVERVIEW

B-1293B, ROOM 106 EQUIPMENT LOCATION



B-1293A, ROOM 9 EQUIPMENT LOCATION

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

REVISIONS

DATE	LTR	FREQ	DESCRIPTION	BY	CHECK	APPD

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Hampton, VA 23681

WORK ORDER NO. CTN000188

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ENG./DES.	P. GILDEA	07/30/15
CHECK	C. HORNE	07/30/15
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SUPV'N.		

APPROVALS

NAME	ORGANIZATION	DATE		DATE
			DRAWN	
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			CHECKED	
			APPROVED	
			TECH. PROJ. ENG.	
			RES. PROJ. ENG.	

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SURFACE FINISH IN MICROINCHES RMS UNLESS SHOWN OTHERWISE

FOR DRAWING INDEX SEE DRAWING 1296804

NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23681-2199

PROJECT TITLE: POTABLE WATER SUPPLY PHASE 2 FY'16 MINOR CoF

DRAWING TITLE: BUILDING 1293 ROOMS 9 AND 106 OVERVIEW

BUILDING NO. 1293 | SIZE D | DRAWING NO. 1296855 | LATEST REV. -

SHEET NO. 4-E629