<table>
<thead>
<tr>
<th>ITEM #</th>
<th>SPEC NUMBER (DATE)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>104 Specification (04-10-18)</td>
<td>Conduit, Structures &amp; Trench Specifications</td>
</tr>
<tr>
<td>2</td>
<td>1-120.1 (12-13-93)</td>
<td>Conduit Termination Dead End</td>
</tr>
<tr>
<td>3</td>
<td>1-161 (01-06-83)</td>
<td>Conduit Line Offsets, 600V &amp; 4.8kV Lines</td>
</tr>
<tr>
<td>4</td>
<td>1-165 (07-05-68)</td>
<td>Conduit Line Offsets, 34.5 &amp; 138kV Lines</td>
</tr>
<tr>
<td>5</td>
<td>1-225 (11-15-84)</td>
<td>Baffle Board</td>
</tr>
<tr>
<td>6</td>
<td>1-802 (09-13-13)</td>
<td>Precast Vault Neck &amp; Cover Details</td>
</tr>
<tr>
<td>7</td>
<td>1-802.1 (09-13-13)</td>
<td>Precast Neck Installation</td>
</tr>
<tr>
<td>8</td>
<td>1-802.2 (10-21-14)</td>
<td>Maintenance Hole/Vault Cover W/Restraining System</td>
</tr>
<tr>
<td>9</td>
<td>1-824 (06-05-80)</td>
<td>Traffic Conditions for Vents</td>
</tr>
<tr>
<td>10</td>
<td>2-210 (08-16-12)</td>
<td>Duct Mandrels</td>
</tr>
<tr>
<td>11</td>
<td>2-361 (12-07-12)</td>
<td>Ladder Installation for Vault/Maintenance-Hole</td>
</tr>
<tr>
<td>12</td>
<td>2-361.2 (11-30-12)</td>
<td>Ladder Installation for Vault &amp; Manholes (Neck greater than 4 feet)</td>
</tr>
<tr>
<td>13</td>
<td>C702-50 (01-30-13)</td>
<td>Concrete Mixtures</td>
</tr>
<tr>
<td>14</td>
<td>C721-01 thru -0.18 (09-28-12)</td>
<td>Transformer Pad General Requirements</td>
</tr>
<tr>
<td>15</td>
<td>C730-10 (07-07-11)</td>
<td>12” Standpipe Architectural Vents, Structures</td>
</tr>
<tr>
<td>16</td>
<td>E-438 (10-01-84)</td>
<td>Precast Handhole</td>
</tr>
<tr>
<td>17</td>
<td>E459 (10-05-07)</td>
<td>Precast Handhole w/Deep Recess</td>
</tr>
<tr>
<td>18</td>
<td>E499 (10-07-96)</td>
<td>Precast Handhole w/Deep Recess</td>
</tr>
<tr>
<td>19</td>
<td>E492 (10-06-96)</td>
<td>Precast Handhole 2’-0”X 3’-0”X 24” Deep Bottomless</td>
</tr>
<tr>
<td>20</td>
<td>E541 (10-08-96)</td>
<td>Precast Handhole w/Deep Recess Intersecting Type</td>
</tr>
<tr>
<td>21</td>
<td>E617 (09-16-98)</td>
<td>Fiberglass Reinforced Polymer Handhole 24”X 36”X 36”</td>
</tr>
<tr>
<td>22</td>
<td>E619 (01-15-98)</td>
<td>Fiberglass Reinforced Polymer Handhole 30”X 48”X 36”</td>
</tr>
<tr>
<td>23</td>
<td>E621 (01-15-98)</td>
<td>Fiberglass Reinforced Polymer Handhole 36”X 60”X 48”</td>
</tr>
<tr>
<td>24</td>
<td>G284 (09-24-15)</td>
<td>Precast Vaults Rectangular</td>
</tr>
<tr>
<td>25</td>
<td>G286 (11-12-13)</td>
<td>Precast Vault Parkway Type 4’-0”X 6’-6”X 7’-0”</td>
</tr>
<tr>
<td>26</td>
<td>G292 (02-28-01)</td>
<td>Precast Vault 8’X 14’X 9’-4” Panel Type</td>
</tr>
<tr>
<td>27</td>
<td>G322 (03-13-97)</td>
<td>Precast Maintenance Hole 4’-0”X 6’-6” Rectangular</td>
</tr>
<tr>
<td>28</td>
<td>G328 (03-13-97)</td>
<td>Precast Station Entrance Maintenance Hole 4.8kV Cable Lines</td>
</tr>
<tr>
<td>29</td>
<td>G334 (04-27-05)</td>
<td>Precast Maintenance Hole Rectangular Panel Type</td>
</tr>
<tr>
<td>30</td>
<td>G353 (10-09-94)</td>
<td>Underground Transformer Silo</td>
</tr>
<tr>
<td>31</td>
<td>G354 (06-06-14)</td>
<td>Precast Maintenance Hole 5’-0”X 10’-6”X 7’-0”</td>
</tr>
<tr>
<td>32</td>
<td>G384 (07-15-02)</td>
<td>Precast Maintenance Hole 6’X 10’ Panel Type 34.5kV</td>
</tr>
<tr>
<td>33</td>
<td>H168 (01-14-08)</td>
<td>Residential UG Standard Structures Placement Conduit Trench Details</td>
</tr>
<tr>
<td>34</td>
<td>H171 (09-18-12)</td>
<td>Precast Vaults 4.8kV Commercial</td>
</tr>
<tr>
<td>35</td>
<td>H172 (09-24-15)</td>
<td>Precast Vault (Intercept Tunnel Type) 34.5kV &amp; 4.8kV Commercial</td>
</tr>
<tr>
<td>36</td>
<td>H202 (06-14-13)</td>
<td>Precast Maintenance Hole 8’-0”X 16’-0” w/Terminations</td>
</tr>
<tr>
<td>37</td>
<td>H217 (10-31-96)</td>
<td>Precast Maintenance Hole Tub-Type 7’-0”X 14’-0”X 9’-0”</td>
</tr>
<tr>
<td>38</td>
<td>H226 (06-14-13)</td>
<td>Precast Vault Tub-Type 8’X 16’X 9’-6”</td>
</tr>
<tr>
<td>39</td>
<td>H242 (03-28-18)</td>
<td>Guidelines for UG Elec.Dist. Const. in Areas Where Soil Gas is Present</td>
</tr>
<tr>
<td>40</td>
<td>H244 (09-09-10)</td>
<td>Precast Maintenance Hole 7’-0” X 18’-0” W/Terminations</td>
</tr>
<tr>
<td>41</td>
<td>OA006-01 (08-13-12)</td>
<td>Power Line Clearances and Easement Drawing</td>
</tr>
<tr>
<td>42</td>
<td>UA730-01 (04-24-09)</td>
<td>12” Architectural Standpipe Vent (Polyethylene)</td>
</tr>
<tr>
<td>43</td>
<td>UB721-01 (06-11-07)</td>
<td>4’X 4’-6” Precast Pad w/Pull Box f/Padmount Transformer</td>
</tr>
<tr>
<td>44</td>
<td>UB721-02 (12-28-11)</td>
<td>4’X 7’ Precast Pad w/Handhole f/Padmount Transformer</td>
</tr>
<tr>
<td>45</td>
<td>UB721-03 (12-28-11)</td>
<td>6’X 8” Precast Pad w/Handhole f/Padmount Transformer</td>
</tr>
<tr>
<td>46</td>
<td>UB721-07 (10-27-15)</td>
<td>8’X 10’ Precast Pad w/Handhole f/Padmount Transformer</td>
</tr>
<tr>
<td>47</td>
<td>UB721-08 (12-28-11)</td>
<td>9’X 15’ Precast Pad f/Padmount Transformer</td>
</tr>
<tr>
<td>48</td>
<td>UB721-09 (12-28-11)</td>
<td>5’X 7’ Precast Pad w/Handhole f/Padmount Tfr or Padmount SF6 Switchgear</td>
</tr>
<tr>
<td>49</td>
<td>UB721-10 (12-28-11)</td>
<td>7’X 13’ Precast Pad f/Single Line Padmount Switchgear</td>
</tr>
<tr>
<td>50</td>
<td>UB721-11 (12-28-11)</td>
<td>10’X 10’-6” Precast Pad w/7’-10”X 8’-6” Opening f/Dual Line Padmount Tfr.</td>
</tr>
<tr>
<td>ITEM #</td>
<td>SPEC NUMBER (DATE)</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>51</td>
<td>UB721-12 (06-13-15)</td>
<td>Customers Metallic Fence Post Grounding In Proximity to DWP Padmount Tfr. Installation</td>
</tr>
<tr>
<td>52</td>
<td>UB721-14 (10-28-14)</td>
<td>7'X 11' Precast Pad f/Padmount SF6 Switch Gear</td>
</tr>
<tr>
<td>53</td>
<td>UB721-15 (10-28-14)</td>
<td>10'-6&quot;X 10'-6&quot; Precast Pad w/8'-9&quot;X 1'-6&quot; Opening f/Padmount SF6 Switchgear</td>
</tr>
<tr>
<td>54</td>
<td>UB721-16 (01-26-07)</td>
<td>Metal Fence Post Grounding f/Metal Perimeter Fence Installation f/Padmount Transformer</td>
</tr>
<tr>
<td>56</td>
<td>UB721-19 (10-28-14)</td>
<td>9'-0&quot;X 12'-0&quot; Precast Tfr. Pad w/4'-0&quot;X 3'-6&quot;Wall Opening f/Corr. Precast Cable Trench</td>
</tr>
<tr>
<td>57</td>
<td>UB721-20 (05-20-11)</td>
<td>Precast Cable Trench Box f/Corr. 9’X 12’ Precast Tfr. Pad w/Handhole</td>
</tr>
<tr>
<td>58</td>
<td>UB721-21 (05-11-11)</td>
<td>Wall Mounted Three Hour Rated Fire Barrier 4000AMP &amp; 5000AMP Service (Crouse-Hinds)</td>
</tr>
<tr>
<td>59</td>
<td>UB721-22 (05-09-11)</td>
<td>Wall Mounted Three Hour Rated Fire Barrier 4000AMP &amp; 5000AMP Service (Nelson Firestop)</td>
</tr>
<tr>
<td>60</td>
<td>UB721-24 (10-28-14)</td>
<td>Precast Cable Transition Box and Roof Slab Det. f/Cable Ent. Cab.</td>
</tr>
<tr>
<td>61</td>
<td>UB721-26 (02-12-15)</td>
<td>Exploded View of Precast 9’X12’ PM TFR Pad/Cable Trench/Transition Box &amp; Fire Barrier</td>
</tr>
<tr>
<td>62</td>
<td>UB721-27 (05-11-11)</td>
<td>Wall Mounted Three Hour Rated Fire Barrier 3000AMP Service (Crouse-Hinds)</td>
</tr>
<tr>
<td>63</td>
<td>UB721-28 (05-09-11)</td>
<td>Wall Mounted Three Hour Rated Fire Barrier 3000AMP Service (Nelson)</td>
</tr>
<tr>
<td>64</td>
<td>UB721-29 (09-18-12)</td>
<td>Minimum Overall Spatial Clearances F/Precast Padmount Construction</td>
</tr>
<tr>
<td>65</td>
<td>UB721-30 (10-28-14)</td>
<td>7’X11’ Precast Pad for Padmount Solar Vista 201 SF6 Switchgear</td>
</tr>
<tr>
<td>66</td>
<td>UB721-31 (10-28-14)</td>
<td>10’-6”X 10’-6” Precast Pad w/8’-9”X1’-6” Opening f/Padmount Solar Vista SF6 Switchgear</td>
</tr>
<tr>
<td>67</td>
<td>UB721-32 (09-07-12)</td>
<td>Clearance f/Water Facilities in the Vicinity of Pad-Mounted Equipment and Vaults</td>
</tr>
<tr>
<td>68</td>
<td>UB721-33 (11-14-12)</td>
<td>4’-6”X 5’-0” Precast Pad w/Pull Box f/Padmount Transformer</td>
</tr>
<tr>
<td>69</td>
<td>UB721-36 (07-17-15)</td>
<td>8’X 8’ Precast Pad W/Pull Box for Temporary Service Installation Only</td>
</tr>
<tr>
<td>70</td>
<td>UB730-01 (01-21-09)</td>
<td>General Standard Details f/Conduit Construction</td>
</tr>
<tr>
<td>71</td>
<td>UB730-02 (02-17-15)</td>
<td>Minimum Clearances F/Precast Vault Location on Private Property</td>
</tr>
<tr>
<td>72</td>
<td>UB745-01 (11-16-92)</td>
<td>Pole Riser Encased 2” Conduit Bend</td>
</tr>
<tr>
<td>73</td>
<td>UB745-02 (02-14-94)</td>
<td>Pole Riser 2” Galvanized Bend</td>
</tr>
<tr>
<td>74</td>
<td>UB745-03 (11-04-93)</td>
<td>Pole Riser Encased, 3” and Above Conduit Bends</td>
</tr>
<tr>
<td>75</td>
<td>UB745-04 (11-04-93)</td>
<td>Pole Riser Encased, 3” and Above Galvanized Bends</td>
</tr>
<tr>
<td>76</td>
<td>UB745-06 (02-09-99)</td>
<td>Pole Riser W/Standoff Bracket Encased, 3” and Above Conduit Bends</td>
</tr>
<tr>
<td>77</td>
<td>UB745-07 (06-30-11)</td>
<td>Pole Riser w/Standoff Bracket Galvanized, 3” and Above Conduit Bends</td>
</tr>
<tr>
<td>78</td>
<td>UB980-09 (02-25-15)</td>
<td>Grounding Festoon Grounding for Metallic Rolling Gates</td>
</tr>
<tr>
<td>79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>85</td>
<td></td>
<td></td>
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<tr>
<td>86</td>
<td></td>
<td></td>
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<tr>
<td>87</td>
<td></td>
<td></td>
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<tr>
<td>88</td>
<td></td>
<td></td>
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<tr>
<td>89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>93</td>
<td></td>
<td></td>
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<tr>
<td>94</td>
<td></td>
<td></td>
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<tr>
<td>95</td>
<td></td>
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<tr>
<td>96</td>
<td></td>
<td></td>
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<tr>
<td>97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# CONTENTS

<table>
<thead>
<tr>
<th>SECTION</th>
<th>CONTENT</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>GENERAL PROVISIONS</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>TRENCH EXCAVATION</td>
<td>7</td>
</tr>
<tr>
<td>C</td>
<td>SUBSTRUCTURES</td>
<td>10</td>
</tr>
<tr>
<td>D</td>
<td>SUBSTRUCTURE VENT INSTALLATION</td>
<td>16</td>
</tr>
<tr>
<td>E</td>
<td>MAINLINE AND SERVICE CONDUIT</td>
<td>18</td>
</tr>
<tr>
<td>F</td>
<td>STREET LIGHT CONDUIT</td>
<td>24</td>
</tr>
<tr>
<td>G</td>
<td>SUBSTRUCTURE BACKFILL (VLTS., M.H.’S AND H.H.’S)</td>
<td>25</td>
</tr>
<tr>
<td>H</td>
<td>CONDUIT TRENCH BACKFILL</td>
<td>28</td>
</tr>
<tr>
<td>I</td>
<td>SURVEY REQUIREMENTS</td>
<td>31</td>
</tr>
<tr>
<td>J</td>
<td>CONTRACTOR’S RESPONSIBILITIES</td>
<td>32</td>
</tr>
<tr>
<td>I-I</td>
<td>CONDUIT INSTALLATION</td>
<td>34</td>
</tr>
<tr>
<td>II</td>
<td>REFERENCE TABLES</td>
<td>45</td>
</tr>
</tbody>
</table>
A. GENERAL PROVISIONS

1(a). All underground substructures and conduits, in which the Department of Water and Power (Department) installs and maintains cables, and any other associated distribution system components shall be constructed in accordance with:

a. For installation on private property: The Department's Electric Service Requirements (ESR) and the Los Angeles Department of Building and Safety (LADBS) requirements, latest editions, where applicable.


All construction shall also comply with the Department's Construction Standards, the Department's Standard Drawing H-168, latest revision, where applicable, and all the requirements specified herein.

1(b). All underground substructures and conduits placed in known methane gas areas (as identified by the Department of Building and Safety or the Developer), shall also satisfy the requirements of the Department’s Standard Drawing(s) H-242 and I-802.2, latest revisions.

2(a). On-site inspection: The Department shall be notified at least two (2) full business days prior to the start of construction. On-site inspections performed by the Department Representative will be made between the hours of 10:00 am and 2:00 pm Monday through Friday.

2(b). Special inspection: Special inspection, outside the normal business days and/or hours may be arranged by notifying the Department at least five (5) full business days in advance of the date the inspection will be required. The Contractor shall pay any premium time charges that may be incurred by the Department representative. The premium time paid may include travel time.
2(c). **Emergency inspection:** Only in case of an emergency, the contractor may request special inspection, if available, without advance notification. The contractor will be required to sign a written agreement obligating them to pay for any premium time charges incurred as a result of the requested special inspection. Final acceptance of the project may be delayed if the Department does not receive reimbursement for the premium charged.

2(d). **Inspection offices:** Contact the Department at the telephone number noted on the construction drawing(s) or marked plot plan(s).

3(a). All conduits shall be as specified on the construction drawings.

3(b). Any conduit or conduit duct-bank (a group of two or more conduits) that will only house cables intended to carry loads of less than 600 volts shall not be encased in concrete, unless requested by the Department Representative or as otherwise noted on the construction drawing(s).

3(c). Any conduit or conduit duct-bank that will house at least one (1) 600 volts or higher voltage cables shall be encased in concrete (330-C-1700 or equal). For residential tracts and private properties only, any conduit or group of conduits belonging to another utility and sharing the same trench (Joint Trench) with LADWP conduit(s) shall not be encased in concrete and shall comply with subsection E-4 for Joint Trench.

3(d). All Polyvinyl Chloride (PVC) conduits shall be encased burial type EB-35 for concrete encased applications and direct burial type DB-120 for direct-buried applications. All PVC bends shall be type DB-120 and encased whenever they are used in conjunction with type EB-35 conduits. The specified PVC conduit types represent the minimum requirements; they can be replaced with stronger conduit when approved by the Department Representative (see subsection 3(i) herein).

3(e). All PVC conduits shall be made available for visual inspection and approval by the Department representative prior to installation. The Department representative may also request laboratory testing of any PVC conduit in addition to the visual inspection. In such a
case, the contractor shall submit one 7’-0” long or two 4’-0” long PVC conduit samples with the same run numbers and one coupling or bell end attached, to:

Los Angeles Dept. of Water and Power
Electrical Conduit and Material Testing
1630 North Main St. Bldg. #7
Los Angeles, CA 90012

Please allow five (5) days for test results. Where the conduit fails to meet the visual requirements or the American Society of Testing and Materials (ASTM) F512, Standard Specification for Smooth-Wall PVC Conduits and Fittings for Underground Installation, the Contractor shall be responsible for the replacement of the substandard conduit with acceptable conduit.

3(f). All conduit used for above ground construction shall be PVC schedule 40, PVC schedule 80, or metallic conduit as specified on the construction drawing(s) or marked plot plan(s).

3(g). All metallic conduits shall be hot-dipped galvanized rigid steel conduit (GRC). GRC may be used for all low-voltage service conditions. GRC shall be used where low-voltage service conduit will remain exposed or may be subject to damage. Use of GRC conduit will also be required if requested by the Department representative or if such use is called out on the construction drawings. Hot-dipped galvanized intermediate metallic conduit (IMC) may be used as an alternate to GRC, except where exposed to traffic. Running-thread type connections are not permitted. All metallic conduits shall be grounded.

3(h). Fiberglass conduit may be used for mainline or service conduit only if specified in the construction drawings or if requested by the Department representative. All fiberglass conduits shall be heavy wall with ultra violet (UV) protection and shall use gasket or epoxy sealed joints.

3(i). Smooth wall coilable high-density schedule 40 or 80 PVC conduit shall be used for Horizontal Directional Drilling (HDD) if such use is approved by the Department Representative (See Subsection E-22 for HDD requirements).
3(j). All the conduit types used in any continuous run shall be of uniform type and size. Exceptions to this provision will be made for PVC bends which require type DB-120, and when a run crosses steeply sloping terrain or non-compacted fill areas. Exceptions will also be made if indicated on the construction drawings, or if requested by the Department representative. See Subsection E-8 for non-compacted fill and Subsection E-9(a) for sloping terrain conduit type requirements.

4. All excavations and backfill shall be done in accordance with Sections “B”, “G” and “H” of this Specification and:

a. **For installation on private property:** The Department of Water and Power Underground Construction Standard Drawing H-168, latest revision.

b. **For installation in public property:** The Los Angeles Municipal Code, Chapter VI, Article 2, Section 62.00-62.05 and SSPWC, Part 3, Section 306, Underground Conduit Construction, as modified herein.

5. When concrete encased or direct buried conduit is specified, concrete encasement and/or backfill shall not be made until the conduit has been inspected and approved by the Department representative. **If the conduit is encased or the trench is backfilled before the conduit has been inspected and approved by the Department, the contractor shall be required to re-expose the conduit for inspection if backfilled or remove and replace the conduit if encased, at the contractor’s expense.**

6(a). All pre-cast concrete substructures shall comply with the Department's Standard Specification P-178, latest revision. In addition, all pre-cast and poured-in-place substructures placed in public property shall be subject to approval by the Department of Public Works. All concrete substructures placed in private property shall be approved by the Department of Building and Safety. Certificates of approval and/or a building permit may be required from the Contractor for any pre-cast or poured-in-place concrete substructure.
6(b). Any pre-cast concrete manufacturer interested in providing pre-cast concrete products to the Department shall have their pre-cast concrete manufacturing plant, fabrication procedures, and all applicable products inspected and approved before the manufacturer and/or distributor may participate in any Department pre-cast concrete substructure(s) bid.

6(c). The design, calculations, and shop drawings of any pre-cast concrete substructure shall be approved by the Department prior to fabrication. All materials used for the fabrication of pre-cast concrete substructures shall be reviewed, tested and approved by the Department.

7. For concrete mix design requirements, refer to Appendix II, Table 1.

8. The total elapsed time between the initial addition of water to concrete at the batch plant and placement of concrete at the job site shall not exceed 90 minutes, unless approved by the engineer. If multiple batches of concrete are required, they shall be poured sequentially. Under conditions contributing to quick setting of the concrete, the engineer may reduce the total elapsed time permitted.

9. The contractor shall notify the Department of Public Works, Bureau of Contract Administration, prior to excavation, backfilling, and compacting fills for any excavations done on public property.

10. For protection and restoration of existing improvements, all conduit and substructure installation in public property shall meet the requirements of SSPWC, Part 1, Section 7-9, Protection and Restoration of Existing Improvements, and applicable sections of the “Brown Book”, City of Los Angeles Department of Public Works (formerly Standard Plan S-610), latest revision.
B. **TRENCH EXCAVATION**

1(a). **General:** The Contractor shall notify Dig-Alert at 811, at least two (2) full working days prior to start of any excavation.

1(b). The Contractor shall perform trench excavation to the lines and grades shown on the drawings and as specified herein. If deviations from the drawing alignment are found to be necessary, they must be approved by the Department.

2. **Trench excavation:** Trench excavation shall meet the requirements of SSPWC, Part 3, Section 306-1.1 Trench Excavation, except as modified herein and excluding Sections 306-1.1.3, Maximum and Minimum Width of Trench, and 306-1.1.5, Removal and Replacement of Surface Improvements.

3(a). **Exploration:** The contractor shall explore for the location and depth of all existing underground infrastructures and mainline utilities such as sewers, storm drains, gas, telephone, water, other electric facilities, etc. If an unknown utility is found, the contractor shall note its location on the as-built plan.

3(b). Underground utility service connections are not shown on the Department’s construction drawings. The Contractor shall assume that every property parcel is being served by a utility service connection for, but not limited to, telephone, water, gas, sewer, cable television, and electric power.

3(c). The Contractor, at the Contractor’s expense, shall determine the location and actual depth of all known utilities, including service connections and other substructures shown on the construction drawings far enough in advance of the actual conduit construction to facilitate decisions concerning the necessity for conduit to go either over or under these substructures in accordance with **Subsection 3.4** of Appendix I.

3(d). The Contractor should expect abnormal substructure depths at all roadway intersections.
4(a). **Underground Utilities or Substructures:**
Underground utilities or substructures encountered during the trench excavation shall be temporarily or permanently supported as shown on the drawings or as required by the owner of the substructures. Damage to underground utilities or substructures shall be repaired at the contractor’s expense.

4(b). Interfering portions of abandoned pipes, culverts, and conduits shall be cut, removed, and disposed of in accordance with the applicable regulations (refer to SSPWC, Part 3, Section 306-5, Abandonment of Conduits and Structures). Open ends of such pipes, culverts or conduits shall be securely closed by a plug or wall of 2000 psi concrete (See Appendix II, Table 1, **ITEM 9**) no less than 6 inches thick.

5. **Trench width for conduit construction:** The trench width shall be a maximum of 30 inches unless otherwise specified on the drawings or as approved by the Department representative.

6. **Removal of Surface Improvements:** Bituminous pavement, concrete pavement, curbs, sidewalks, or driveways removed in or adjacent to public streets in connection with construction, shall be removed in accordance with SSPWC, Part 3, Section 300-1.3, Removal and Disposal of Materials, except as modified herein.

   a. Pavement shall first be saw cut before removing.

   b. Sidewalk shall be cut at scoring lines.

   c. The Contractor shall place and maintain temporary resurfacing and striping on all excavations in paved streets and sidewalks. The maintenance of temporary resurfacing shall continue until permanent resurfacing is placed.

7. **Classification:** All excavated materials of whatever nature shall be considered unclassified.
8. **Unsuitable Soil:** Where soft, spongy, unstable, or other similarly unsuitable sub-grade material is encountered upon trenching operations for installation of conduit or for placement of pre-cast concrete substructures, the contractor shall remove the unsuitable sub-grade material to a depth as ordered by the Engineer. Any void thus created shall be refilled with crushed rock, meeting the gradation requirements of SSPWC, Part 2, Section 200-1.2, for 3/4-inch crushed aggregate. After placement, the rock shall be tamped or vibrated as needed to achieve a minimum 90% compaction. The contractor may be required to provide compaction report(s) prepared by a certified testing laboratory. The material compaction test(s) shall be in accordance with Sand-Cone Method, ASTM D1556, and Modified Proctor Compaction Test, ASTM D1557.

9. **Bracing Excavations (Trench Shoring):** Excavations shall be braced in accordance with SSPWC, Part 3, Section 306-1.1.6.
C. VAULTS, MAINTENANCE HOLES, SUBSURFACE TRANSFORMER ENCLOSURES, HANDHOLES, AND TRANSFORMER PADS

1(a). All pre-cast concrete substructures (vaults, maintenance holes, hand-holes and transformer pads) shall comply with the Department's specifications and standards and shall be subject to inspection by the Department representative prior to, during, and after placement operations.

1(b). Unless other prior arrangements have been made with the Department representative, pre-cast concrete substructures shall not be placed until they have been inspected and approved by the Department representative.

1(c). Each pre-cast concrete substructure delivered to a construction site shall have a quality assurance repair report from the manufacturer. This report will be provided to the Department representative at their request.

1(d). Pre-cast concrete substructures may be rejected at any time prior to the final installation of cables or equipment and/or final acceptance of the project for non-compliance regardless of any prior approvals.

2. All pre-cast concrete structures shall be installed not less than seven (7) calendar days after the date the concrete, of which they are constructed, is poured.

3. All pre-cast concrete sections of substructures shall have paint markings stenciled on the inside and outside of each section. The stenciled markings shall indicate the manufacturer's name, identification number, date of pour and the designation "DWP/FA-CN" (FA= Fly Ash, CN= Calcium Nitrate) or “DWP/F-CN-SC” (F= Fly Ash, CN= Calcium Nitrate, SC= Self-Consolidating Concrete). Also, the manufacturer's name, the year, and the designation “FA-CN" or “F-CN-SC” shall be cast inside of each piece of the substructure. All markings shall be clear, legible, and durable.
4(a). All walls and the roof section of poured-in-place vaults and maintenance holes must be constructed with one continuous monolithic pour and must be waterproof. The floor may be poured separately and must be waterproof. Poured-in-place vaults and maintenance holes shall rest on 6" of compacted crushed 1" rock, Type A, meeting the requirements of SSPWC, Part 2, Sections 200-1.2 and 200-1.4 and shall have the sump sealed.

4(b). All poured-in-place vaults, maintenance holes, hand-holes, and pad construction shall be inspected and approved during the different stages of construction and before concrete is ordered. The extra engineering and inspection work, over and above that required for pre-cast products, shall be paid for in advance by the contractor.

5. Pre-cast concrete vaults, maintenance holes, Underground Transformer Silos (Silos) and hand-holes shall be set on well compacted soil with 6 inch minimum depth of tamped/compacted crushed aggregate base, meeting the requirements of SSPWC, Subsection 200-2.2 and all sumps and floor knockouts (other than those which facilitate the installation of ground rods) shall be left sealed.

6. Pre-cast transformer pad hand-holes shall be set on 6 inches of compacted 1" crushed rock, type A or concrete aggregate No.3, type B base, meeting the requirements of SSPWC, Part 2, Sections 200-1.2 and 200-1.4.

7. All vaults, maintenance holes, hand-holes, and Silos shall be placed in areas where the substructures are not subjected to surcharges other than backfill around the substructure. Adjacent retaining walls, foundations, or footings must be designed such that their loading does not affect the structural integrity of the Department’s substructures. Designs likely to create additional surcharge must be approved by the Department of Building and Safety and shall require acceptance by the Department.

8. Chipping or core drilling of any pre-cast concrete substructure, except at designated knockout locations, shall not be allowed unless the Contractor has the approval of the Department’s Substructure Standards Engineer.
9. No foreign substructure or utility line shall enter any part of any Department substructure.

10. All substructures, except transformer pads and hand-holes, shall be designed and fabricated to provide a dry and watertight installation. Any through-holes used for lifting shall be filled with non-shrink grout capable of reaching a minimum strength of 4500 psi in 28 days, except that the lifting holes in the removable cover shall be plugged with an appropriate diameter neoprene plug. Mastic tape is not required on transformer pad and hand-hole installations.

11. When pre-cast concrete substructures are located in high water table areas, the Department representative may require that two layers of mastic tape be placed at all the joints and gaps between the pre-cast substructure panels or sections. Pre-cast concrete substructures, if required, shall be water proofed with a moisture barrier of an asphaltic type approved by the City of Los Angeles with a published Los Angeles Research Report (LARR) or approved equal. Coating shall be applied by the coating manufacturer to the outside surface of the substructure at the precast manufacturer’s plant and to the joints during field installation. All waterproofing shall be applied in accordance with the waterproofing manufacturer’s recommendations for the field conditions present.

12(a). Substructures shall not be set in an area where excess surface or landscaping water accumulates. Use of electric sump pumps to drain the excess water is not allowed.

12(b). The grading around all substructures shall be configured in such a way that all surface water will be drained away from the substructures.

12(c). The landscaping and grading plans around the substructures shall be checked and approved by the Department engineer for acceptable drainage and avoidance of potential water collection areas prior to the start of construction.
13. The required clearance for vaults, maintenance holes, hand-holes and Silos away from any building, building projection, or overhang (such as a balcony), shall be a minimum of two (2) feet from the vertical projection of the closest wall of the substructure. Adequate clearances shall remain in place to facilitate future maintenance, repairs and the replacement of the substructure. For the clearance requirements around transformer pads see the Department’s Standard Drawing No. C-721-01(01 thru 08).

14(a). All substructures located on private property shall be accessible to the Department’s trucks by means of a clear and unobstructed path from the street to the structure with a minimum width of 12 feet. Minimum vertical clearance above the path shall be 14 feet. The path paving must be capable of withstanding truck weights of 24 tons.

14(b). If the path requires any turns by the Department trucks, the minimum required clearances might be increased to allow for adequate curve radiiuses and clear areas for the trucks to make the turn. Consult the Department engineer when such a situation is anticipated.

14(c). Plantings such as trees, plants and shrubs on or around the Department substructures shall allow access to the substructure for maintenance. Trees shall be planted at least five (5) feet clear to all sides of the substructure. Trees and plants shall be planted so that their growth does not apply unintended pressure causing possible damage to the Department substructure. Any planting area that is not in compliance with these requirements is to be removed without notice at the owner’s expense.

15. Head castings, Silos, hand-hole covers and transformer pads shall be set to final or required level by the contractor prior to completing the final grading of adjacent unpaved areas.

16. In public property, final grade of the substructure shall meet the approval of the construction inspector of the City of Los Angeles Department of Public Works, Bureau of Contract Administration, and must also be acceptable to the Department.
17. Vault and maintenance hole castings shall be adjusted to grade in accordance with the Department’s Standard Drawings 1-802 and 1-802.1, latest revision.

18. All vaults and maintenance holes shall have a minimum of 18 inches of cover below gutter grade of city streets, 42 inches of cover below the finished grade of state streets or highways and a maximum of 4'-0" of cover below any finished grade (See Appendix II, TABLE 2). Any variance from these limits will require the approval of the Department Substructure Standards Engineer unless otherwise noted on the construction drawings.

19. A maximum of one 12 inch or smaller adjustment ring is allowed for adjusting each hand-hole to grade. Any variance from this limit will require the approval of the Department Substructure Standards Engineer.

20(a). All substructure frames and covers located in parking areas shall be adjusted to match required grade. The grade shall be set such that the surrounding surface, immediately adjacent to the structure and for a distance of three feet minimum (measured perpendicular to the edge of the structure), can be sloped away at a rate of 1/2 inch per 10 feet of run. The contractor shall set the structure to the required grade prior to completing the final paving.

20(b). All substructure frames and covers located in areas where sidewalk will be constructed or parkway areas which will be paved shall be adjusted to the level of a string line extending from the top of the curb to surface level at the property line. Any area less than 18 inches wide which occurs between any top surface edge of the substructure frames and covers in planted parkway areas and any adjacent paved surface shall be filled in with a 3 inch thick layer of concrete. The concrete used shall be a sidewalk mix proportioned in accordance with SSPWC.

20(c). All substructure frames and covers located in planter areas (not accessible to pedestrian traffic) shall be adjusted such that their top surface is two (2) inches above final grade of the surrounding ground.

20(d). Silos and hand-holes installed in unpaved and planter areas shall have a concrete collar constructed as shown on the Department's Standard Drawing H-168, latest revision.
21. All water and debris must be removed from completed vaults, maintenance holes, Silos, hand-holes, and transformer pad hand-holes prior to final acceptance.

22. All gaps exceeding 1/8 inch between ends of conduits, which have been glued into place, and the abutment step in plastic terminators cast into substructure end and sidewalls, shall be filled with red body putty (Bondo) or equivalent, and made smooth to the satisfaction of the Department representative. Construction grout is not an acceptable substitute for Bondo.

23. The contractor shall install 5/8-inch diameter by 8 foot long, 304 Stainless Steel clad grounding rods in each substructure. The number and location of grounding rods shall be as shown on the Department standard drawings or as requested by the Department representative.

24. The substructure ladder and hanging hardware assembly shall be installed on the same side as oncoming vehicular traffic unless otherwise instructed by the department representative. In the event that the direction of oncoming traffic is not immediately apparent or more than one traffic direction is possible, the department representative will determine the side the ladder and hardware shall be installed.

25. Any existing substructure owned by the Department, or in which the Department maintains cables and/or equipment, shall not be opened unless specifically authorized by and in the presence of the Department representative. The Contractor shall follow all federal, state and local safety regulations when entering any structure.
D. SUBSTRUCTURE VENT INSTALLATION

1. All vent pipes and accessories shall be 12-inch diameter PVC sewer pipe in accordance with ASTM D3034, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings, latest revision.

2. There shall not be more than one 90-degree bend in any vent pipe installation, unless approved by the Department Representative.

3. Vent outlets shall be located in the closest sidewalk or planter area to the substructure. Piping for single vent should not exceed 30 feet in length, unless approved by the Department Representative.

4. Vent outlet covers shall be installed with a minimum separation of 4’-0” from center to center.

5. All vent outlet covers located in pedestrian sidewalks, planter areas, or unimproved areas shall be the architectural standpipe type in accordance with the Department’s Standard Drawing No. C730-10, latest revision.

6. In the event that the standpipe type cover can only be installed next to the curb face and there is a possibility of damage due to vehicular traffic, the Department’s Representative may require flush mount traffic type vent covers to be installed in accordance with the Department’s Standard Drawing No. C730-09, latest revision.

7(a). All vent outlet covers to be located in driveways or subject to vehicular traffic shall be flush mount traffic type in accordance with the Department’s Standard Drawing No. C730-09. They shall also meet the location requirements of the Department’s Standard Drawing No. 1-824.

7(b). Flush mount traffic type vent outlet covers shall be used only when the standpipe type vent cover has to be placed at a distance of more than 30 feet from the structure or an excessive number of bends would be required to locate the vent outlet cover in a non-traffic location.
8. All flush mount type vent outlet covers if allowed by the Department Representative, shall be placed away from any water runoff and if they are located in planter or unimproved areas, they shall be placed two inches above the surrounding finished grade.
E. MAIN LINE AND SERVICE CONDUIT

1. Electric conduits shall be of the size and type (or approved equivalent) noted on construction drawings.

2. All cut or damaged ends of duct shall be cut, chamfered, and de-burred in accordance with Appendix I, Section 3, Conduit Installation.

3. For installations on residential property:
   a. The edge of all main line conduit encasement shall be placed a minimum of two (2) feet outside the property line(s), unless otherwise specified.
   b. Service conduits shall be extended one foot inside of the front property line and three (3) feet inside from the side property line. The open end of the conduit shall be closed with a plug or cap in accordance with SUBSECTION 11.3 of Appendix I unless otherwise specified.

4(a). Joint Trench: Joint Trenches with telephone, communication, and cable TV companies are allowed in residential tracts and on private properties only if approved by the Engineer. A joint trench is not to be allowed whenever a Department conduit or conduit duct-bank is intended to carry at least one (1) 34,500 volts cable.

4(b). Joint Trench shall be constructed in accordance with the Department’s Standard Drawing H-168, latest revision.

4(c). There shall be a minimum clearance of 12 inches vertically and/or horizontally between the Department conduit in direct buried or the Department conduit concrete encasement in encased buried construction and other joint utilities. Other users of a joint trench may require additional depth for cover and/or separation. Joint utilities cannot be in the same Department conduit(s) concrete encasement.
5. Trench bottom shall be smooth, level, compacted, and free from debris.

6. Minimum conduit bend radius shall be in accordance with Appendix II, TABLE 3, Conduit Bend Radius Specifications.

7. No field bends shall be made without the approval of the Department representative unless shown on the construction drawings. All field bends shall be made in accordance with Appendix I, SUBSECTION 3.4.

8. Non-metallic conduit shall not be placed in a non-compacted fill area unless encased in concrete with rebar reinforcement. Four No.4 continuous rebar, grade 60 ksi, shall be placed, one in each corner of the concrete envelope, parallel to the conduit run with a minimum concrete cover over rebar of 1.5 inches.

9. Conduit installation in sloping terrain where any 40-foot section of the conduit run exceeds 30-degrees from horizontal:

   a. Direct Buried: The conduit shall be metallic for the entire sloped portion and a minimum of 10 feet beyond the top of the slope. Baffle boards are required to retain backfill in accordance with Department’s Standard No. 1-225.

   b. Encased Buried: The conduit shall be concrete encased and rebar reinforced for the entire sloped portion and a minimum of 10 feet beyond the top of the slope (check with Standards Engineer for reinforcement detail). Baffle boards are required to place the concrete in sloped trenches in accordance with Department’s Standard No. 1-225.

10. Minimum cover over conduit in Direct Buried or over the concrete encasement in Encased Buried conduit shall be in accordance with Appendix II, TABLE 2, Minimum Depth Specification for conduit and substructure Installations.
11. **Clearance requirements:**

11(a). When crossing other existing utilities, provide a minimum clearance of 6 inches between the conduits in direct buried, or the conduit concrete encasement in encased buried construction.

11(b). When paralleling other existing utilities there shall be a minimum clearance of 12 inches between the conduit and the existing utility in direct buried, or the conduit concrete encasement and the existing utility in encased buried construction.

11(c). Plants and shrubs near the Department conduit(s) shall be at a minimum clearance of five (5) feet. Trees shall be at a minimum clearance of five from their mature drip line. Plants, shrubs, and trees shall be planted so that their growth does not apply unintended pressure causing possible damage to the Department conduit(s). Any planting area that is not in compliance with these requirements is to be removed without notice at the owner’s expense.

12. **Crossing Existing Utilities** - When crossing existing utilities the following conditions shall be met:

12(a). The conduit section(s) as shown on the construction drawings may be constructed over the existing utilities if the minimum cover (See Appendix II, *Table 2*) and clearance requirements (see subsections E-11) are met. Otherwise conduit(s) shall be constructed under existing underground utilities, or as otherwise noted on the construction drawings.

12(b). All conduit sections crossing under or over existing underground utilities shall be constructed without the aid of segments or bends unless their use is approved by the Department representative prior to construction.
13. **Joining to Existing Dead-End Conduits:**

13(a). The dimensions shown on the construction drawings for the locations and depths of existing dead-end conduits, which are to be joined, are approximate.

13(b). Where new conduit is required to be joined to an existing dead-end conduit, the Contractor shall determine in advance of construction, the actual location and depth of the joining ends of all conduits. The Contractor, at the Contractor's expense, shall attempt to locate the existing dead-ends within a search area delineated by a circle of six (6) foot radius centered on the dead-end location indicated on the plans. If the indicated dead-ends cannot be located within the prescribed search area, the Department representative should be consulted for further direction.

13(c). The Contractor shall chamfer and de-burr the existing conduit dead-ends. Prior to the joining of the conduits, the Contractor shall clean and swab that portion of the existing conduits located between the joining end and the closest existing substructure. All cleaning, swabbing, and joining operations shall be performed in presence of the Department representative, unless otherwise approved by the representative. See **SUBSECTION 21** herein for pulling tape requirements.

14. All conduits that are required to be dead-ended for future connections shall be constructed in accordance with Department’s Standard Drawing No. 1-120.1, latest revision.

15. To reduce segregation, metal or rubber tremie chutes shall be used to deposit concrete, 330-C-1700 (See Appendix II, **TABLE 1**), for conduit encasement where the free fall to the bottom of the trench exceeds eight (8) feet.

16. All types of direct buried conduit tie-ins entering substructure walls shall be grouted into the walls and concrete encased for a minimum distance of 18 inches outside of the substructure walls.
17. Prior to final resurfacing over the conduit duct-bank a cylindrical mandrel as specified in Department’s Standard Drawing No. 2-210 shall be drawn by hand through each completed duct (*in both directions*) *without any mechanical assistance*. The Contractor shall be responsible for removing any obstacles found or replacing any duct section through which the mandrel will not pass. Replaced or repaired conduit shall be made available for inspection before encasement in concrete, shading with sand, or backfilling. All conduits in that duct bank shall be re-mandrelled after encasement or backfilling.

18. All conduits shall be free of water. The contractor, to the satisfaction of the Department representative, shall repair any leakage through conduit. Replaced or repaired conduit shall be made available for inspection before encasement in concrete, shading with sand, or backfilling.

19. All completed ducts shall be swabbed to remove all foreign material.

20. All ducts shall be capped or plugged at both ends immediately after the completion of installation and again after swabbing and mandrelling, in accordance with Appendix I, **Subsection 11.3**.

21. **Pulling Tape General Condition:**

21(a). Install flat, woven multi-fiber polyester ribbon, minimum 3/8-inch nominal width and 1250-pound minimum tensile strength pulling tape in all ducts. The pulling tape shall be printed with the rated tensile strength and sequential footage markings with legible and stable print (no rub off). Fasten each tape to plugs on each end with 5'-0" minimum slack.

21(b). The tape shall be in one continuous length through each duct with no cuts, splices, or ties allowed.
21(c). Where the conduit is required to be joined to an existing duct-bank, the Contractor shall extend and install the tape in accordance with 21(b) into the existing duct-bank. A Department representative shall be present prior to opening or entering any substructure. The Contractor shall follow all federal, state, and local safety regulations.

22. When Horizontal Directional Drilling (HDD) for direct buried conduit installation is specified on the construction drawings or, under special conditions, is approved by the Department representative, the HDD shall be completed in accordance with the City of Los Angeles HDD policy Special Order No. 015-1102. The contractor shall obtain City of Los Angeles approval for all HDD installations made in public streets (Special City permit may be required).
F.  STREET LIGHT CONDUIT

1. Contractor shall confirm the street light service points with the Bureau of Street Lighting Inspector before street light conduit is installed.

2. Street light service conduits (not including mainline street light) shall be placed in the same trench with other electric conduits where practical.

3. When street light conduit is in a separate trench, cover over conduit shall be in accordance with Appendix II, TABLE 2, Minimum Depth Specification for conduit and substructure Installations, as applicable.

4. For installation in non-residential areas: Street light conduit shall be dead-ended 12 inches behind curb face.

5. For installation in residential areas: Street light service conduit should be located under proposed sidewalks and will normally be placed 2 feet from the front property lines.
G. VAULTS, MAINTENANCE HOLES, AND HANDHOLES BACKFILL REQUIREMENT

This section covers the backfill requirements for vaults, maintenance holes, and hand-holes, which will be herein referred to as structures. For transformer pad backfill requirements refer to the Department’s standard drawings No. UB721 series.

Backfill around new and existing structures shall be considered structure backfill in accordance with the requirements of SSPWC, Part 3, Section 300-3, Structure Excavation and Backfill (Excluding Sections 300-3.2 and 300-3.6), except as modified herein:

1. When a structure is to be located in a dedicated city street, whether it is subject to vehicular traffic or not, structure backfill shall be slurry concrete class 100-E-100 (See Appendix II, TABLE 1), in accordance with SSPWC, Part 2, Section 201-1, Table 201-1.1.2(A) for Trench Backfill.

2. When a structure will be located in public property, but is not in a dedicated city street and is not subject to vehicular traffic, the structure backfill shall be pervious backfill (consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations thereof, with 100% passing the 3/4 inch size sieve), meeting the requirements of SSPWC, Part 3, Section 300-3.5.2, Pervious Backfill, and also:

   a. Jetting shall be used to densify the backfill material in accordance with the requirements of SSPWC, Part 3, Section 306-1.3, Backfill and Densification.

   b. Backfill materials shall be placed evenly in two (2) foot maximum depth horizontal layers or lifts.

   c. Backfill densified through jetting shall meet the minimum relative compaction requirements outlined in SSPWC, Part 3, Section 306-1.3.5, Jetted Bedding and Backfill Compaction Requirements, or as otherwise noted by the permitting agency.
d. The contractor shall provide compaction report(s) taken at every compacted layer, and as directed by the Department representative, prepared by a certified testing laboratory. The soil compaction test(s) shall be in accordance with Sand-Cone Method, ASTM D1556, and Modified Proctor Compaction Test, ASTM D1557.

3. When a structure is to be located in the State of California Right-of-Way, whether it is subject to vehicular traffic or not, structure backfill shall be a Caltrans approved mix for 2-sack cement slurry (See Appendix II, Table 1), unless otherwise specified in the Caltrans permit.

4. When a structure is to be subjected to vehicular traffic and is located under a paved roadway, parking lot, private property driveway, or in an easement area, the structure backfill shall be slurry concrete class 100-E-100 (See Appendix II, Table 1), in accordance with SSPWC, Part 2, Section 201-1 for Trench Backfill.

5. When a structure is to be located under a new roadway or parking lot in public or private property, subjected to vehicular traffic, and the entire roadway or parking lot (including the area over the structure) will be compacted and paved in accordance with SSPWC, the structure backfill shall meet the requirements of SECTION G-2 of this Division.

6. When a structure is to be located in an unimproved area in private or public property and will be subject to vehicular traffic, structure backfill shall meet the requirements of SSPWC, Part 3, Section 306-1.3, for Backfill and Densification, and also:

a. Sand meeting the requirements of SSPWC, Part 2, Section 200-1.5.5, Sand Gradations, for Mortar, shall be used to backfill the excavated area.

b. Jetting shall be used to densify the sand after the placement of the structure. Jetting shall be in accordance with the
requirements of SSPWC, Part 3, Section 306-1.3.3, Jetted Backfill.

c. Sand shall be placed evenly in two (2) foot maximum thick horizontal layer or lifts.

d. Backfill densified through jetting shall meet the minimum relative compaction requirements outlined in SSPWC, Part 3, Section 306-1.3.5, Jetted Bedding and Backfill Compaction Requirements, or as otherwise noted by the permitting agency.

e. Contractor shall provide compaction report(s) providing results of test taken at every other compacted layer, or as directed by the Department representative. The report shall be prepared by a certified testing laboratory. The soil compaction test(s) shall be in accordance with Sand-Cone Method, ASTM D1556, and Modified Proctor Compaction Test, ASTM D1557.

f. Where jetting is not allowed by governing agencies (such as Los Angeles Department of Public Works or State Department of Transportation), backfill shall meet the requirements of SECTION G-1 or G-3 of this Division.

7. When a structure is to be located in private property or in an easement area, and not subject to vehicular traffic, structure backfill shall meet the requirements of SECTION G-2 of this Division.

8. When any portion of a structure is to be located in a planter area, structure backfill shall be as specified in this section except the upper 12 inches of backfill within the planter area, which shall meet the requirements of SSPWC, Part 2, Section 212-1, Landscape Materials.
H. CONDUIT TRENCH BACKFILL REQUIREMENT

1. The Backfill as specified herein shall not be placed until at least two (2) hours after placement of concrete encasement in encased buried conduit, unless otherwise approved by the Department representative.

2. When a trench is to be located in a dedicated city street and resurfacing is required whether it is subject to vehicular traffic or not, backfill shall be slurry concrete class 100-E-100 (See Appendix II, TABLE 1) in accordance with SSPWC, Part 2, Section 201-1, Table 201-1.1.2(A) for Trench Backfilling.

3. When a trench is to be located in an unimproved area in public property, backfill shall meet the requirements of SSPWC, Part 3, Section 306-1.3, Backfill and Densification, except as modified herein:

   a. Backfill shall be sand or sand cement slurry up to a minimum of four (4) inches above any direct buried conduit.

   b. In no case shall the remainder of backfill over the direct buried conduit installation have rocks or particles greater than 1/2 inch in diameter. Screening or other suitable means may be required at the discretion of the Department representative.

   c. Suitable native backfill materials shall be placed evenly in eight (8) inch thick horizontal layers and shall be moistened and compacted.

   d. Backfill over the top of concrete encased conduit shall not be mechanically compacted by means of tamping rollers, sheepsfoot rollers, pneumatic tire roller, vibrating rollers, or other mechanical tampers until a minimum of 10 calendar days after encasement.

   e. Sand backfill shall meet the requirements of SSPWC for mortar (See SSPWC Part 2,
Section 200-1.5.5) and shall be placed evenly in two (2) foot thick maximum horizontal layers or lifts. Jetting can be used to densify the sand after concrete encasement.

f. Jetting shall be in accordance with the requirements of SSPWC, Part 3, Section 306-1.3.3.

g. The Contractor shall provide compaction report(s) for test taken at every 50-foot linear interval for each compacted layer, and/or as directed by the Department representative. A certified testing laboratory shall prepare the report. The soil compaction test(s) shall be in accordance with Sand-Cone Method, ASTM D1556, and Modified Proctor Compaction Test, ASTM D1557.

4. When the trench is to be located in a State of California Right-of-Way, whether it is subject to vehicular traffic or not, backfill shall be a Caltrans approved mix for 2-sack cement slurry (See Appendix II, TABLE 1), unless otherwise specified in the Caltrans permit.

5. When conduit is to be subjected to vehicular traffic and is located under a paved roadway, parking lot, private property driveway, or in an easement area, the conduit trench backfill shall be slurry concrete class 100-E-100 (See Appendix II, TABLE 1), in accordance with SSPWC, Part 2, Section 201-1 for Trench Backfill.

6. When conduit is to be located under a new roadway or parking lot in public or private property, subjected to vehicular traffic, and the entire roadway or parking lot (including the area over the conduit) will be compacted and paved in accordance with SSPWC, the conduit trench backfill shall meet the requirements of SECTION H-3 of this Division.

7. When conduit is to be located in private property or in an easement area not subjected to vehicular traffic, the conduit trench backfill shall meet the requirements of SECTION H-3 of this Division.
8. When any portion of a trench is to be located in a planter area, backfill shall be as specified in the sections above, except for the upper 12 inches of backfill within the planter area, which shall meet the requirements of SSPWC, Part 2, Section 212-1, Landscape Materials.
I. SURVEY REQUIREMENTS

For installation on public property:

1. Prior to construction, the contractor shall have the entire construction area and the limits of excavation as specified in the construction drawings laid out by a land surveyor licensed in the State of California.

2. The Contractor shall maintain all survey marks required to complete the construction. The contractor’s surveyor shall be required to replace missing or damaged survey marks.

3. The Contractor shall provide a copy of the surveyor's field notes to the Department representative on the first day of construction, unless otherwise approved.
J. CONTRACTOR'S RESPONSIBILITIES

1. Conduit Installation and Approval Requirements:

   1(a). The contractor shall be responsible for the construction of the conduit system and installation of the substructures in accordance with the direction of the Department Representative and the latest revisions of the following: Specification 104, Standard Drawing H-168, and the conduit construction drawings.

   1(b). No underground conduit system and substructure installation is considered approved by the Department until the installation of all cables and equipment as designed by the Department engineer and installed by the Department crews are successfully completed.

   1(c). Final approval will be withheld until all sidewalks, required retaining walls, and final paving are completed.

2. Due to extenuating circumstances, the Department may install cable or equipment before final approval, subject to all of the following:

   a. The circumstances warrant this sequence of work in the opinion of the Department.

   b. The Developer agrees in writing to pay the Department for any costs incurred to make the installation acceptable after all final paving, sidewalks, and retaining walls are completed.

   c. Adequate precautions are taken to protect the facilities. Examples include sidewalks around substructures and post barricades.

   d. Final resurfacing shall be inspected and approved by the City of Los Angeles and/or the State of California (as jurisdiction applies) and shall be acceptable to the Department.
3. Prior to the start of construction, the Contractor shall coordinate with the City of Los Angeles and/or State of California Department of Transportation (as jurisdiction applies) to obtain approval of any and all traffic control measure(s) which will be employed. A copy of such measure(s) and approval(s) shall be submitted to the Department no less than three (3) calendar days before the commencement of work.

4. The Contractor shall obtain a second permit from the State of California Department Of Transportation, if so required, for construction of an electrical underground distribution system within the State’s right-of-way.

5. The Contractor shall be responsible for the preservation of Survey Monuments and Bench Marks in accordance with SSPWC, Part 1, Section 2-9, Surveying, as modified by the City of Los Angeles “Brown Book”.
1. **SCOPE**

This standard provides installation instructions for polyvinyl chloride (PVC) and fiberglass conduit and fittings.

2. **GENERAL SPECIFICATIONS**

2.1 All PVC encased buried (EB), or direct buried (DB) conduit used for underground construction shall be manufactured in accordance with ASTM F 512, Standard Specification for Smooth Wall PVC Conduit and Fittings for Underground Installation.

2.2 All PVC Schedule 40 or 80 conduit used in the construction shall be manufactured in accordance with UL-651, UL Standard for Safety PVC Conduit and Fittings, and/or NEMA TC 2, Electrical PVC Conduit.

2.3 All PVC fittings and accessories (reducers, adapters, caps, etc.) shall be manufactured in accordance with ASTM F 512.

2.4 All PVC expansion joints shall be Schedule 40 with tapered joints which are sealed with either gaskets or o-rings, and must have 12 inch minimum expansion potential. Expansion joints must be belled at both ends.

2.5 All fiberglass conduits shall be heavy wall (HW) type, reinforced thermosetting resin conduit (RTRC), manufactured in accordance with the latest applicable UL/CSA/NEMA standards, unless otherwise noted or approved by the Department Representative. Conduit joints will be either gasket or epoxy sealed.
2.6 All fiberglass expansion joints shall be HW type, manufactured in accordance with the latest applicable UL/CSA/NEMA standards, with gasket or o-ring sealed tapered joints, unless otherwise approved by the Department Representative.

3. **PVC CONDUIT INSTALLATION**

The contractor shall be responsible for the proper installation of the conduit system. The following provisions apply:

3.1 **Preparation:**

a. The spigot ends of all factory made bends and straight conduit shall be chamfered in accordance with DIAGRAM “A”.

b. The contractor must make certain that all foreign matter has been wiped clean from the joining portions of both pieces to be joined before joints are assembled.

c. Insertion of conduit (when dry) should not be over 3/4 of the way into the fitting.

3.2 **Cutting:**

a. Use a fine tooth saw to cut conduit. The conduit must be cut square and any burrs incurred must be removed. (Use of a miter box, or other means to ensure square cutting of the conduit is recommended.)
b. All the conduit cut in the field shall be chamfered and de-burred in accordance with DIAGRAM “A”:

SECTION “A-A”

DIAGRAM “A”

3.3 Cementing Conduit:

a. Cementing of conduit shall be in accordance with ASTM D2855, Standard Practice for the Two-Step Method of Joining PVC Pipe and Piping Components with Tapered Socket, except as modified herein.

b. Cement and primer shall be applied using a manufacturer’s approved roller or swab.

c. All PVC pipes shall be wiped clean of dirt or water and cut pipe ends shall be chamfered and de-burred, prior to primer application.

d. PVC primer and cement are fast drying products. They shall be applied as quickly as is consistent with the manufacturers’ recommendations.
e. Apply primer with the applicator once to the inside of the socket, and once to the outside of the spigot end over a length equal to the depth of the socket.

f. While the primer on the spigot and socket is still wet, apply the cement with the applicator once to the inside of the socket and once to the outside of the spigot end over a length equal to the depth of the socket. The quantity of glue applied should be sufficient to wet the pipe. Excess cement on the socket should be avoided as it is wiped into the joint and tends to weaken the pipe.

g. If the primer has dried prior to applying the cement or if the cement has dried prior to joining the two pipes, both primer and the cement must be reapplied. The joint must be assembled immediately after the last cement application.

h. Slip conduit straight into the socket until it bottoms, twist approximately ¼ turn then hold the joint for 15 seconds (One (1) minute in extreme cold weather), so that the conduit does not push out of the fitting.

i. Do not twist or drive pipe after insertion is completed. No blows by hammer or by any other means shall be used to aid the assembly of the PVC conduit joints.

j. Another fitting or duct section can be added to the free end of the conduit, within two or three minutes if care is exercised in handling so that strain is not placed on the previously joined assembly.

k. Under normal circumstances, the newly joined members shall remain undisturbed for at least five minutes before they are handled. In cold or damp weather, this interval should be increased to allow for the slower evaporation of the solvent.
1. After initial set, care must be exercised in handling the conduit to prevent twisting or pulling the joint.

m. Wipe off the excess solvent that is left on the outer shoulder of the fitting after the joint is assembled. Plastic bristle brushes should not be used for this purpose.

n. Keep cement cans covered when not in use and always keep them away from excess heat and flames.

o. Solvent cement thinner may not be used for thinning cement that has thickened.

p. All discarded cement and primer cans are to be removed from the open trench and properly disposed of prior to conduit encasement and trench backfilling.

q. All cut bends of PVC conduit shall be assembled in the presence of the Department of Water and Power (Department) representative or otherwise approved by said representative.

3.4 **Conduit Bend Radius:**

a. Minimum bend radius for straight conduit that is to be cold bent in the trench is as follows:

<table>
<thead>
<tr>
<th>Conduit size IPS (Inches)</th>
<th>Minimum Radius (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>12-1/2</td>
</tr>
<tr>
<td>3 to 6</td>
<td>65</td>
</tr>
</tbody>
</table>

b. Hot bending of PVC conduit is not allowed in the field.
3.5 **Mechanical Damage Prevention Recommendations:**

a. Conduit should not be left exposed in open trench for longer than eight hours.

b. Provide support for the full length of conduit when transporting long conduit lengths.

c. Do not permit unsupported overhangs.

4. **PVC Temperature Effect Precautions**

Due to the expansion and contraction of plastic duct (1-1/2 inches per 100 feet for every 20 degrees Fahrenheit (F) change in temperature), the following precautions should be taken:

4.1 **Temperature Precautions**

a. All plastic conduit and fittings to be joined should be exposed to the same temperature conditions for a reasonable length of time before assembly.

b. Allow extra conduit footage at each tie-in for contraction when duct temperature is higher than that of the surrounding soil; or extra room for expansion if the reverse condition exists.

c. When pouring concrete over conduit in encased buried or placing backfill in direct buried, the contractor shall allow for temperature-induced movement at the free end of the conduit. This can be accomplished by pouring the concrete or placing the backfill from the center of the run (if both ends of the run are open) or starting from the tie-in point and working towards the free end. This is extremely important for concrete encasement since conduit is subject to temperature rise as concrete cures.
5. PVC CEMENT AND PRIMERS

5.1 Primer: Use a primer from the below approved list or an equivalent product. The primer shall be purple in color and must meet ASTM F656, Standard Specification for Primers for Use in Solvent Cement Joints of PVC and Fittings requirements.

<table>
<thead>
<tr>
<th>Approved DWP Primer List</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Christy’s Purple Primer</td>
</tr>
<tr>
<td>2 LSP 670P Primer</td>
</tr>
<tr>
<td>3 RectorSeal Jim PR-1L Primer</td>
</tr>
<tr>
<td>4 Weld-On P-70 Purple Primer</td>
</tr>
<tr>
<td>5 Plasti-Weld 903 Series Purple Primer for PVC</td>
</tr>
</tbody>
</table>

5.2 Cement: Use PVC pipe cement from the below approved list or an equivalent cement (Heavy body, Medium set, clear) meeting ASTM D2564, Standard Specification for Solvent Cements for PVC Systems requirements. Only clear cement shall be used unless otherwise specified by the Department Standards Engineer.

<table>
<thead>
<tr>
<th>Approved DWP Cement List</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Christy’s Clear PVC Pipe Cement</td>
</tr>
<tr>
<td>2 LSP Solvent Cements 617C PVC Cement</td>
</tr>
<tr>
<td>3 RectorSeal Gold 844L Clear PVC Solvent Cement</td>
</tr>
<tr>
<td>4 Weld-on 717 Clear PVC cement</td>
</tr>
<tr>
<td>5 Uni-Weld 1500 Series Heady Duty Clear PVC</td>
</tr>
</tbody>
</table>

6. FIBERGLASS CONDUIT WITH EPOXY CONNECTION

6.1 Fiberglass

a. Fiberglass Adhesive: All fiberglass conduits that do not use gasket sealed joints shall be installed with epoxy resin adhesive used as the binding medium in the joints.

b. Epoxy resin adhesive shall have minimum ultimate shear strength of 500 psi and a minimum joint pullout resistance of 6000 pounds in accordance with ASTM D2517, Standard Specification for Reinforced Epoxy Resin Gas Pressure Pipe and Fitting, and
D2105, Standard Test Method for Longitudinal Tensile Properties of Fiberglass Pipe and Tube, respectively.

c. Epoxy resin shall be FRE Composites, Incorporated Adhesive Kit Number 20-0164 or equal. Each kit shall contain the necessary components and instruction sheets, which shall include information regarding cure time, pot life, and other data deemed necessary by the manufacturer.

d. Epoxy shall be applied by using a putty knife or equivalent.

6.2 Fiberglass Conduit Assembly:

a. All bell and spigot ends of the fiberglass conduits shall be sanded and cleaned to remove any transit residues.

b. After sanding, cleaning, and drying the bell and spigot ends of the fiberglass conduits, a liberal and uniform coat of epoxy resin shall be applied to both the interior of the bell and the exterior of the spigot, covering a four (4) inch wide section.

c. Due to the pot life of the epoxy resin, the joint shall be assembled immediately after the last epoxy application. If the epoxy resin dries before assembly, the bell and spigot ends of the fiberglass conduits must be re-sanded and cleaned before applying any additional epoxy.

d. Slip the conduit spigot straight into the joining bell with a slight twist until it bottoms. The joint members shall be cured and left undisturbed for 30 minutes or more before they are handled and/or transferred. After this initial set, care must be exercised in handling to prevent twisting or pulling the joint.
e. An approved soft paddle may be used to aid the assembly of the fiberglass conduit joints. Partial mixing of the resin and hardener will not be allowed.

7. **DIRECT BURIED CONDUIT INSTALLATION**

7.1 There shall be a minimum of 2-inch spacing maintained between all adjacent conduits. Duct spacers or 2-inch sand layers shall be used if conduits are placed on the top of each other. Refer to **SECTION 10** of this Appendix for requirements relating to duct spacers.

7.2 The trench must be uniformly graded and the bottom shall be smooth and rock free. In the event of a rocky bottom, a 4-inch bed of sand or sand slurry will be required.

8. **ENCASED BURIED CONDUIT INSTALLATION**

8.1(a) Maintain a minimum of 2-inch spacing between adjacent conduits.

8.1(b) Maintain a minimum of 3-inch and a maximum of 6-inch concrete cover on top, bottom, and sides of a single conduit or around a group of conduits in a duct-bank.

8.1(c) For spacer specifications refer to **SECTION 10** of this Appendix.

8.2 Tie and fasten all conduits in a multi conduit run with "All-State Nylon Cable Ties", catalog No. 12050, or equivalent to prevent floating.

8.3 Whenever smaller diameter conduits are placed in spacers intended for larger size conduits, all such conduits shall be securely tied to the spacers with "All-States Nylon Cable Ties", Catalog No. 12050, or equivalent. This is to provide lateral stability to the spacers and to avoid floating of the smaller diameter conduits during the concrete encasement process.
8.4 The concrete for encasement shall not be placed until the conduit has been inspected and approved by the Department representative in accordance with Section A.5 of Specifications 104.

9. **CONDUIT FITTINGS**

9.1 Reducer couplings shall be used when changes in conduit sizes are required.

9.2 Adapter couplings shall be used to convert between different types of conduit.

9.3 Slip couplings shall be used to join conduits of the same diameter coming from opposite directions to the same point.

10. **SPACERS FOR CONDUIT INSTALLATION**

10.1 Duct spacers should be of a type recommended by conduit manufacturers and approved by the Department of Water and Power. The maximum span between duct spacers for each duct size is listed below:

<table>
<thead>
<tr>
<th>Duct Size (inches)</th>
<th>Spacing (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>4 to 6</td>
<td>6</td>
</tr>
</tbody>
</table>

10.2 All conduit spacers shall be self-supporting and shall not transmit a vertical load to any conduit.

10.3 Conduits, when installed inside a bridge cell or suspended under a bridge shall be supported by Reinforced Plastic Mortar (RPM) spacers or hangers. The dimensions and the spacing of the supports shall be in accordance with the applicable Department Standard drawing(s) G-356, H-223 or H-247, latest revisions.
11. **CONDUIT TERMINATION**

11.1 All conduit termination in ground (dead ends) shall be constructed in accordance with Department Standard Number 1-120.1, latest revision.

11.2 All DB and EB conduits shall enter vaults, maintenance holes, and handholes perpendicular to the wall and shall terminate with end bells or duct terminators (end bells or duct terminators are not required for 1, 2 and 3 inch conduits). The end bells or duct terminators shall be flush with the inside face of the knockout, and shall be rounded and smooth. No rough edges will be accepted.

11.3 Cap all free conduit ends at the dead-end points with tapered polyethylene plugs with a nipple. The tapered polyethylene plugs shall be securely taped to the PVC conduit with reinforced tape. Use Jack Moon Company, limited (JMC) Blank Duct Plugs with nipple or equivalent in place of the tapered polyethylene plugs in high water table areas, clayey soil, or as directed by the Department representative.

11.4 Cap all free conduit ends, inside precast concrete pad-mount hand-holes, with plastic plugs with a nipple.

11.5 Cap all end bells or duct terminators, inside pre-cast concrete vaults, maintenance holes and regular hand-hole substructures with JMC Blank Duct Plugs with nipple or equivalent.
## Appendix II to Specifications 104

Reference Tables
* (Revised 05-03-2019)

### Table 1: Concrete Ready-Mix Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Application</th>
<th>Mix Type</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Vaults/MH/HH/TP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Barrier Posts</td>
<td>330-C-1700 or 420-D-1700</td>
<td>C702-50</td>
</tr>
<tr>
<td>2</td>
<td>Pour in Place Structure Mix</td>
<td>DWP 3000-1.0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Concrete Collar Around Structure</td>
<td>DWP 3000-1.0</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Conduit Anchor Next to structure</td>
<td>330-C-1700 or 420-D-1700</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Fill the gap between neck rings&gt;1 ½”</td>
<td>DWP 3000-1.0</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Fill the gap between neck rings&lt;1 ½”</td>
<td>Dry Pack Grout (Non-Shrinkable)</td>
<td>ASTM C-1107</td>
</tr>
<tr>
<td>7</td>
<td>High water area. Grout on the joints and unused ground rod locations</td>
<td>Hydraulic Cement (Non-Shrinkable)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Conduit Construction</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Encasement</td>
<td>330-C-1700 or 420-D-1700</td>
<td>C702-50</td>
</tr>
<tr>
<td>9</td>
<td>Encasement- Pump Mix</td>
<td>565-E-2000P</td>
<td>SSPWC Sect 201</td>
</tr>
<tr>
<td></td>
<td><strong>Slurry Backfill</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Conduit &amp; Structures in City Streets</td>
<td>100-E-100</td>
<td>SSPWC Sect 201</td>
</tr>
<tr>
<td>11</td>
<td>Conduits &amp; Structures in State Highways</td>
<td>2-Sack Slurry</td>
<td>State Approved</td>
</tr>
</tbody>
</table>

*Note: For Job-Site Concrete Hand-Mix Specifications, See Standard Drawing No. C702-50*
<table>
<thead>
<tr>
<th>Item</th>
<th>Application Description</th>
<th>Below 600V (I)</th>
<th>Over 600V (I)</th>
<th>Vaults &amp; MH</th>
<th>Street Light Conduit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Private Property, Landsaped</td>
<td>24 inches min. clearance below finished surface</td>
<td>36 inches min. clearance below finished surface</td>
<td>18 inches min. clearance below finished surface (II)</td>
<td>24 inches min. clearance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(III)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Private Property, Paved</td>
<td>24 inches min. clearance below finished surface</td>
<td>30 inches min. clearance below finished surface</td>
<td>18 inches min. clearance below finished surface (II)</td>
<td>24 inches min. clearance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(III)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Property Line Dead Ends</td>
<td>30 inches min. clearance below gutter grade</td>
<td>30 inches min. clearance below gutter grade</td>
<td>N/A</td>
<td>24 inches min. clearance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Public Property, Paved</td>
<td>30 inches min. clearance below gutter grade</td>
<td>30 inches min. clearance below gutter grade</td>
<td>18 inches min. clearance below finished surface (II)</td>
<td>30 inches min. clearance (IV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Public Property Unpaved or Parkway</td>
<td>30 inches min. clearance below finished surface</td>
<td>36 inches min. clearance below finished surface</td>
<td>24 inches min. clearance below finished surface (II)</td>
<td>42 inches min. clearance (IV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>State Highway Paved or Unpaved</td>
<td>42 inches min. clearance below finished surface</td>
<td>42 inches min. clearance below finished surface</td>
<td>42 inches min. clearance below finished surface (II)</td>
<td>42 inches min. clearance (IV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Railroad Crossings</td>
<td>66 inches min. clearance below base of the lowest rail</td>
<td>66 inches min. clearance below base of the lowest rail</td>
<td>66 inches min. clearance below base of the lowest rail (II)</td>
<td>66 inches min. clearance below base of the lowest rail (IV)</td>
</tr>
</tbody>
</table>

**Notes:**  
All clearances are to the top of conduit in direct buried or over the concrete encasement in encased buried. All depths shall be as specified herein or as requested by the excavation permit.

I. Any conduit or conduit duct-bank that will only house cables intended to carry loads of less than 600 volts shall not be encased in concrete, unless requested by the Department Representative or as otherwise noted on the construction drawing(s). **Any conduit or conduit duct-bank that will house at least one (1) 600 volts or higher voltage cables shall be encased in concrete (330-C-1700 or equal).** For residential tracts and private properties only, any conduit belonging to another utility and sharing the same trench (Joint Trench) with LADWP conduit(s) shall not be encased in concrete and shall comply with **SUBSECTION E-4** of Specifications No. 104.

II. For substructure installations, all clearances are to the highest point on the roof of the structure and shall not exceed 48 inches.

III. This depth requirement applies to any conduit or conduit duct-bank housing 600 volts and higher voltage cables in private property except for any conduit section or conduit duct-bank within 20 feet from the outside wall of the hand-hole, transformer pad or switchgear pad not meeting this depth requirement; cover for this section(s) shall be 24 inches minimum clear below finished surface or as otherwise noted.

IV. This depth requirement is for the service conduit that serves the street lighting pull box from LADWP main line conduit system, for regular street light conduit installation please check with Bureau of Street Light or the City Inspector.
### Table 3: Conduit Bend Radius Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Application/ Description</th>
<th>Conduit Size</th>
<th>Min Radius* [ft]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Main Line in Public Property</td>
<td>All</td>
<td>12.5</td>
</tr>
<tr>
<td>2</td>
<td>Service Conduits, Public or Private Property</td>
<td>Up to 4” Dia.</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Service Conduit, Public or Private Property</td>
<td>Over 4” Dia.</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Pole Dip Sweep (Risers), Galvanized or PVC</td>
<td>Up to 4” Dia.</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Pole Dip Sweep (Risers), Galvanized or PVC</td>
<td>Over 4” Dia.</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Field Bends if Required</td>
<td>All</td>
<td>65</td>
</tr>
</tbody>
</table>

*Unless otherwise noted on the construction drawings*
NOTE: DO NOT EXTEND PLYWOOD ABOVE CONCRETE ENCASEMENT

SECTION A-A

CONDUIT TERMINATION (DEAD END)
CUSTOMER REQUIREMENTS
DIAGRAM OF CONDUIT OFFSET
SHOWING TRENCH CONTOUR AND DETAILS OF A TYPICAL DUCT

<table>
<thead>
<tr>
<th>OFFSET</th>
<th>LENGTHS A</th>
<th>LENGTHS B</th>
<th>LENGTHS C</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0'</td>
<td>9.8'</td>
<td>1.3'</td>
<td></td>
</tr>
<tr>
<td>2.5'</td>
<td>11.0'</td>
<td>1.6'</td>
<td></td>
</tr>
<tr>
<td>3.0'</td>
<td>12.2'</td>
<td>2.9'</td>
<td></td>
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<tr>
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<td>35.5'</td>
<td></td>
</tr>
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CONDUIT OFFSETS—LOW VOLTAGE LINES
(USING 12.5' RADIUS CURVED PLASTIC)

Both vertical and horizontal offsets are occasionally required in line or service conduits to pass obstructions, or to enter vaults or manholes below the normal conduit depth as in the case of side ducts to an intersection manhole. An offset of less than 2' shall be made by bending straight conduit with a minimum radius of 65' for 5' and 6' conduit, 55' for 4' conduit, and 20' for 3' conduit. Larger offsets shall be made with a curved conduit at each end of the necessary length of straight duct as shown in the accompanying diagram and table.

The required trench contour is defined by offset dimensions at 2' intervals from each end of the section. For horizontal offsets these contour data are not essential but may be used to lay out one edge of trench. The table shows the total length of the section and the length of straight conduit required in each duct for various offsets. For offsets greater than 15.5', dimensions B and C increase by 2.414' and 2.613' respectively for each foot of additional offset.
DIAGRAM OF CONDUIT OFFSET.
SHOWING TRENCH CONTOUR AND DETAILS OF A TYPICAL DUCT.

CONDUIT OFFSETS - HIGH VOLTAGE LINES
(USING 35' RADIUS CURVED FIBRE.)

VERTICAL OFFSETS OF VARYING AMOUNT ARE FREQUENTLY REQUIRED BETWEEN THE TRANSITION CONDUIT SECTION AT THE END OF A DEEP MANHOLE AND THE REGULAR SECTION AT NORMAL DEPTH, AND EITHER VERTICAL OR HORIZONTAL OFFSETS MAY BE REQUIRED AT OTHER POINTS. AN OFFSET OF LESS THAN 18' SHALL BE MADE WITH STRAIGHT FIBRE, BY ADJUSTING THE COUPLINGS AS IN MAKING A SINGLE DEFLECTION; 1-150. LARGER OFFSETS SHALL BE MADE WITH ONE OR TWO LENGTHS OF 35' RADIUS CURVED FIBRE AT EACH END OF THE NECESSARY LENGTH OF STRAIGHT FIBRE, AS SHOWN IN THE ACCOMPANYING DIAGRAM AND TABLE.

THE REQUIRED TRENCH CONTOUR IS DEFINED BY OFFSET DIMENSIONS AT 4' INTERVALS FROM EACH END OF THE SECTION. FOR CONDUIT OFFSETS OF LESS THAN 7.5' USE ONLY ONE LENGTH OF CURVED FIBRE AND THE FIRST TWO CONTOUR DIMENSIONS AT EACH END. FOR HORIZONTAL OFFSETS THE CONTOUR DATA ARE NOT ESSENTIAL, BUT MAY BE USED TO LAY OUT ONE EDGE OF THE TRENCH. THE TABLE SHOWS THE TOTAL LENGTH OF THE SECTION, AND THE LENGTHS OF STRAIGHT AND CURVED FIBRE REQUIRED IN EACH DUCT, FOR VARIOUS OFFSETS. FOR OFFSETS GREATER THAN 18' DIMENSIONS B & C INCREASE BY 2.032' & 2.264' RESPECTIVELY FOR EACH FOOT OF ADDITIONAL OFFSET.

WHERE A VERTICAL OFFSET JOINS A CONDUIT ON A RISING GRADE OF MORE THAN 5%, A HALF LENGTH OF CURVED FIBRE SHALL BE SUBSTITUTED FOR THE FULL LENGTH AT THE UPPER END OF THE OFFSET SECTION. THIS GIVES AN UPWARD SLOPE OF ABOUT 9%. ADJUSTMENT TO INTERMEDIATE OR GREATER GRADES SHALL BE MADE AT THE COUPLINGS.

CONDUIT LINE OFFSETS
138 KV & 34.5 KV LINES.
7-5-68

INDEX
BAFFLES REQUIRED WHEN TRENCH EXCAVATED IN STEEP HILLSIDE.

BAFFLES SHALL BE INSTALLED AT 5 CENTERS.
1. Frame and cover per UGCS 2-418 or 2-419. Refer to substructure standard drawing.
2. Precast vault/maintenance hole neck & cover shall be reinforced concrete and shall meet the requirements of DWP standard specifications No. P178, as last revised.
3. For weight and installation instructions, see page 1-802.1
PRECAST NECK INSTALLATION

Necking

4. Use additional 6” or 12” grade rings where necessary to bring cover to street grade.

5. All grade ring joints shall be sealed with an approved mastic and shall be grouted for bearing.

6. All excess mastic shall be removed and shall be flush to inside surface of grade rings.

Cover

7. Adjust bolts to align cover with street surface. Department mix design number DWP 3000-1.0 concrete shall be used to fill in the gap between the precast grade ring and top section. Dry pack grout shall be used in lieu of DWP 3000-1.0 concrete to fill in gaps less than 1-1/2”. Grouting of all gaps shall terminate flush to the inside surface of precast grade ring(s). Trowel inside joint gaps to a smooth finish surface.

8. A minimum of 6” up to a maximum of 12” continuous wide concrete collar with DWP 3000-1.0 concrete shall be poured around the precast grade ring and top neck section to lock the precast concrete pieces together as shown on drawing. DO NOT encase below one precast grade ring. Vibrator shall be used in placing concrete collar around cover.

| ITEM                                                      | WEIGHT(lbs)  
|-----------------------------------------------------------|---------------
| 4’ X 4’ Cover & Top Neck Section, Including Cast Iron Frame and Cover | 3600          
| 4’ X 5’ Cover & Top Neck Section, Including Cast Iron Frame and Cover | 4200          
| 4’ X 4’ - 12” Neck Extension                              | 1600          
| 4’ X 4’ - 6” Neck Extension                               | 800           
| 4’ X 5’ - 12” Neck Extension                              | 2400          
| 4’ X 5’ - 6” Neck Extension                               | 1200          

NOTE: WEIGHT MAY VARY WITH MANUFACTURER
Note:
This standard shall be implemented in all underground vaults and maintenance holes to be installed in areas which have been identified by the Los Angeles Department of Building and Safety (LADBS) or the developer as "Methane Zones" and "Methane Buffer Zones", unless otherwise approved by the Department Standards Engineer.

MAINTENANCE HOLE/VAULT COVER WITH RESTRAINING SYSTEM

1-802.2 J.A.
REV. 10/21/14
NOTEs:
1. KEEP VENT HEADS OUT OF FLOW LINES, DEPRESSIONS, AND TRAVELED AREAS IN PUBLIC STREETS.

2. TRAFFIC VENTS SHOULD NOT BE CALLED FOR IN ALLEYS OR PRIVATE DRIVEWAYS USED FOR THE INGRESS OR EGRESS TRAFFIC FOR CONDOMINIUMS, APARTMENTS, ETC., EXCEPT UNDER UNUSUAL CIRCUMSTANCES. DESIGNS CALLING FOR TRAFFIC VENTS IN ALLEYS OR DRIVEWAYS MUST BE APPROVED BY THE ENGINEER OF SUBSTRUCTURE DESIGN.

3. TRAFFIC VENTS SHOULD BE USED ONLY WHEN THE CONVENTIONAL VENT HEAD ASSEMBLY WOULD HAVE TO BE EXTENDED MORE THAN 30'-0" TO LOCATE VENT HEAD IN NON-TRAFFIC LOCATION. (SEE UGCS 1-821 & 1-821.1)
**GROUP** | **DUCT** | **MANDREL**
--- | --- | ---
| **SIZE** | **RADIUS BEND** | **MATERIAL** | **DIMENSION**
|  |  |  | **A** | **B** | **C** | **D**
1 | 2" | 2' | * | 3" | 1 3/4" | 1 3/8" | 3/16"
2 | 3" | 2' | * | 4 1/2" | 2 5/8" | 2 1/4" | 3/16"
3 | 3 1/2" | 3' | * | 5" | 3 1/8" | 2 3/4" | 3/16"
4 | 4" | 3' | * FOR 3"G.C. | 5 1/2" | 3 1/2" | 3" | 1/4"
5 | 5" | 4' | * FOR 4"G.C. | 6 1/2" | 4 1/2" | 4" | 1/4"
6 | 6" | 5' | * | 7" | 5 1/2" | 5 1/8" | 3/16"
7 | 8" | 5' | * FOR SCH 40 | 7" | 7" | 3/8" | 7" | 3/16"
8 | 2" | 10' | * | 5" | 1 3/4" | 1 3/6" | 3/16"
9 | 3" | 10' | * | 6" | 2 3/4" | 2 3/8" | 3/16"
10 | 3 1/2" | 10' | * | 7" | 3 1/4" | 2 7/8" | 3/16"
11 | 4" | 10' | * | 8" | 3 3/4" | 3 3/8" | 3/16"
12 | 5" | 12.5' | * | 8 1/2" | 4 3/4" | 4 3/8" | 3/16"
13 | 6" | 12.5' | * | 9" | 5 3/4" | 5 3/8" | 3/16"
14 | 8" | 12.5' | * FOR SCH 40 | 9" | 7 5/8" | 7 1/4" | 3/16"

* SEAMLESS STEEL TUBING OR EQUIVALENT
† TOLERANCE = ± 1/32"
2 WASHERS AND 2 NUTS REQ'D.
THREADED BOTH ENDS
†"X21"ROD

NOTES:
1. THIS DRAWING SHOWS THE STANDARD LADDER INSTALLATION WITH A 4 FOOT MAXIMUM NECK. IF THIS NECK DIMENSION EXCEEDS 4 FEET THEN LADDER SHOULD BE INSTALLED PER UGCS 2-361.2

2. OFFSET BASE OF LADDER 2 FEET MINIMUM FROM VERTICAL.

3. LADDER AND HANGING HARDWARE TO BE MILD STEEL, GALVANIZED AFTER FABRICATION.

4. SEE UGCS 2-362 FOR LADDER DETAILS.

PLAN VIEW
(BOTTOM VIEW)

SIDE VIEW

FRONT VIEW

LADDER INSTALLATION FOR VAULTS/MANHOLES

INDEX
NOTES:
1. THIS LADDER INSTALLATION SHOULD BE USED WHEN DIMENSION "Y" EXCEEDS 48 INCHES (4 FT.). "Y" DIMENSION SHALL NOT BE GREATER THAN 72 INCHES (6 FT.).
2. OFFSET BASE OF LADDER SHOULD BE AS CALCULATED, 24 INCHES (2 FT.) MINIMUM FROM VERTICAL.
3. LADDER AND HANGING HARDWARE TO BE MILD STEEL, GALVANIZED AFTER FABRICATION.

DETAIL "B"

DETAIL "C"

DETAIL "D"

NOTES:
FIELD MEASURE VALUES FOR "N", "Y" & "C". VALUES FOR "A" & "B" ARE CALCULATED AS SHOWN.

DETAIL "A"

LADDER INSTALLATION FOR VAULTS/MANHOLES (NECK GREATER THAN 4 FEET)
The following specifications are for use in the underground conduit and maintenance hole system.

### READY MIX CONCRETE

<table>
<thead>
<tr>
<th>Application</th>
<th>Department’s Mix Designation</th>
<th>Minimum Compressive Strength (PSI@ 28 Days)</th>
<th>Maximum Size of Aggregate (Inches)</th>
<th>Maximum Slump (Inches)</th>
<th>Cement (Minimum Pounds Per Cubic Yard)</th>
<th>Combined Aggregate Grading (SSPWC 201-1.3.2(A))</th>
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<td>Pour-in-Place Structure Mix, Concrete Collar Around Structure and Fill Gap between Neck Rings &gt; 1-1/2”</td>
<td>DWP 3000-1.0</td>
<td>3000</td>
<td>1</td>
<td>5</td>
<td>583</td>
<td>C</td>
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<tr>
<td>Conduit Encasement, Conduit Anchors and Barrier Posts</td>
<td>330-C-1700 or 420-D-1700</td>
<td>1700</td>
<td>1</td>
<td>6</td>
<td>330</td>
<td>C</td>
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<tr>
<td></td>
<td></td>
<td>1700</td>
<td>3/8</td>
<td>6</td>
<td>420</td>
<td>D</td>
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</table>

### CONCRETE MIXTURES AT JOB SITE

(For Small Repairs)

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<tr>
<th>Application</th>
<th>Minimum Compressive Strength (PSI@ 28 Days)</th>
<th>Proportion By Loose Dry Volume</th>
<th>Concrete Aggregate (SSPWC 200-1.4(B))</th>
<th>Maximum Slump (Inches)</th>
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<td>Portland Cement Type II (SSSPWC 201-1.2.1)</td>
<td>Concrete Sand (SSSPWC 200-1.5.5(A))</td>
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<tr>
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<td>1700</td>
<td>1</td>
<td>3</td>
<td>5</td>
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</tbody>
</table>

The ingredients shall be accurately measured and shall be mixed with a minimum amount of water to produce a concrete having satisfactory workability. Each batch shall be mixed in a machine mixer for not less than 2 minutes after all ingredients are in the mixer.

Where small amounts of concrete are mixed without machine mixer, the ingredients must be thoroughly mixed dry. Then add a minimum amount of water and mix until thoroughly mixed to the workable consistency. This should only be done for small repair jobs or filling in recesses.

Formerly: 2-125
1. **Purpose of General Requirements:**
These requirements apply to all transformer pads (T.P.’s) except as noted on the T.P. drawings and not to Customer Station Design Group jobs and 34.5kV switch pads. Installations that do not comply with these requirements may be presented to Power Distribution Standards engineering for review and consideration.

2. **Transformer Pad Installation Requirements:**
The Department will provide a drawing giving the T.P. installation details.

3. **Transformer Pad Layout:**
   
   **A. Transformer Pad Locations:**
   All T.P.’s shall be installed in an unobstructed and leveled location in accordance with the requirements as noted below. There shall be no building projection underneath the T.P. or the required clearance area, such as a subterranean parking structure, basements, or building footings. Additionally, there shall be no foreign pipes, structures, retaining wall, or fence footings in the required clearance area, above or below grade.

   **B. Required Clearances:**
   1. Transformer pads shall have a 3ft minimum workspace clearance as shown in Figure 1, except as otherwise noted. All clearances must be on the property served.
   2. The footprint of architectural projections such as awnings, overhangs and/or balconies shall be considered part of the buildings floor area. Transformer pads, and the required clearance, shall be placed outside of these footprints. For minimum vertical clearance see Table 1 on page C721-01.5. Projections that are located above the minimum vertical clearance in Table 1 are exempt from these requirements.
   3. Plantings such as trees, plants and shrubs shall be outside of the required 3ft clearance on all sides of the T.P. and allow for access to the transformer for maintenance. Trees shall be placed so their growth does not inhibit replacement of the transformer during their lifetime. Light posts and other items shall not be in the required 3ft workspace nor inhibit placement or maintenance of the transformer.
C. Minimum Clearance To Openings (Other Than Natural Garage Vents)

Figure 1.

1. Transformer pads shall be placed at least 10ft radially from all doors (including garage access, meter room door), windows (fixed or operable), fire escapes and egress paths. The intent is to provide a safe path of travel around and away from the transformer. This measurement shall be taken from the closest perimeter of the opening to the closest edge of the T.P. at ground level. (Note: Recessing the window or door beyond the surface of the building does not mitigate the opening).

2. Forced air intakes and/or exhaust vents (such as, but not limited to garage ventilation) must also meet the 10ft clearance rule as stated above.

3. Exception: garage openings (excluding doors) with natural ventilation vents are not subject to the 10ft radial clearance.

* Projection to ground considered as floor area. Use as reference for required clearance area.
Switch Gear Location in Proximity of Transformer Pad

“D” = the depth of the switch gear. “L” = the length of the exterior door.

Switch gear doors that may impede safe egress will require at least 2ft of space beyond the door swing as indicated above (Fig. 2). Consult with DWP design engineer or Electric Service Representative (ESR) for clarification.

D. Visibility Obstructions at Uncontrolled Intersections:
At uncontrolled intersections transformer pads shall be placed outside of the visibility triangles to ensure the safe operation of motor vehicles (Fig. 3).
E. Transformer Pad Placed at or above Street Level in Proximity of Retaining Walls, Fences, & Buildings:

* Handrail shall be in compliance with the City of Los Angeles Handrail Standard S-463 latest revision and shall extend to the limits of the workspace.

** A minimum 5’-0” clearance is required when a 4’ x 5’-6” precast pad is installed.

*** A minimum 8’-0” operating clearance is required in front of pad.
4. Transformer Pad Accessibility:

A. Truck Accessibility:

Transformer pads must be accessible to Department trucks by a permanent, clear, and unobstructed path with a minimum 12ft in width and 14ft in height leading to a staging area along any side of the T.P. If the path to the T.P. contains any turns or uneven terrain, the minimum requirements of 12ft & 14ft previously described may need to be increased. Consult the department engineer when such situations occur. Trucks must be able to approach the T.P. so the side of the truck will be no more than 3ft from any one edge.

B. Staging Area

1. A staging area, as depicted in Figure 7 page C721-01.5, shall be provided for department trucks to access the transformer. The staging area shall meet the size specified in the design matrix provided.
2. The staging area, and access to it, must be maintained on the customer’s private property.
3. The path and the staging area shall be designed to withstand highway loading requirements. Any substructure or underground facility that is located under the path or the staging area shall be designed for a minimum crane and transformer weight, as shown in Table 1 on page C721-01.5, with the load being concentrated on 1 to 4 outriggers.

C. Design:

To avoid any design complications, the Department, at early stages of design, shall approve the preliminary location of the path and staging area. The following items shall be submitted to the Department prior to installation of any DWP equipment:

1. Three drawings (8 1/2” x 11”) showing the path and staging area.
2. A letter releasing the DWP of all liability from any damages incurred to access path and/or staging area as a result of work done by DWP.
3. In the event that there are underground substructures located under the path or the staging area, a letter signed by the owner and a registered structural (civil) engineer accepting responsibility for the design shall also be submitted with the drawings.
TABLE 1

*For Guidance only. Does not apply to all transformers, refer to DWP Design Engineer and marked print.
5. **Other Considerations:**

   **A. Protection:**

   All T.P.’s, especially when located near traffic or parking areas, shall be protected by non-removable barrier posts, unless otherwise specified by the Department engineer. Field evaluation shall be made by the Department ESR for each installation. Unless approved by the Department ESR, walls may not be used in place of barrier posts. Refer to the figures below for barrier post construction details. For barrier post layout, see T.P. drawings. Use 330-C-1700 or 420-D-1700 or 520-C-2500 for concrete mix design for barrier post anchor and fill. See Underground Construction Standards Drawing 2-125 for equivalent strength hand mix specification.

---

**NON-REMOVABLE BARRIER POST**

**FIGURE 8**

**REMOVABLE BARRIER POST**

**FIGURE 9**
B. Landscaping and Other Obstructions:
Transformer Pad surroundings and screening are permitted with the compliance of required clearance (see page C721-01, 3B) and accessibility requirements (see page C721-01.4, 4A). Plants, shrubs and other items shall not obstruct the required work space as shown in Figures 1 (on page C721-01.1) and 4, 5, & 6 (on page C721-01.3), nor obstruct access to the T.P. Plantings that interfere with access or workspace may be removed without notice at the customers expense.

C. Inspection:
All material and workmanship are subject to inspection by the Department. Notify the Department ESR two (2) business days in advance of construction. Inspection will be provided free of charge during normal working hours. Charges may be incurred for lost-time inspections.

D. Excavation on Private or Public Property:
Contractors shall notify Underground Service Alert (8-1-1) for substructure locating at least 48 hours prior to any excavation on private or public property.

E. Hazardous Locations:
The T.P. shall be placed outside of classified hazardous locations as defined in Chapter 5-Special Occupancies of the National Electric Code (NEC), i.e. Article 514 on Gasoline Dispensing and Service Stations describes various location requirements.

Transformer Pad Clearances to Fuel Tanks and Associated Equipment

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>A/G Tank</th>
<th>U/G Tank</th>
<th>Dispenser</th>
<th>Fill Pipes</th>
<th>Generators, Self Contained</th>
<th>Piping</th>
<th>Pumps</th>
<th>Vents</th>
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<td>20 - 50ft*</td>
<td>20 - 25ft**</td>
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<td>20ft</td>
<td>20ft</td>
<td>5ft R</td>
</tr>
</tbody>
</table>

*For tanks over 2,000 gallons
**Over 500 Lbs. stored

TABLE 2

F. Noise Considerations:
Some T.P. installations require additional clearance from the pad to adjacent residential property lines to comply with the Los Angeles City Noise Ordinance. Consult with Department design engineer and refer to C721-01.8 for guidelines.

G. Other DWP Specifications:
- DWP ‘P’, ‘H’, or ‘G’ drawing, job construction details
- UB721-XX - Actual T.P. specification drawing
- UB721-XX Switch Pad specification drawing
- UB721-12, UB721-16, Fence Grounding Requirements
- H-242, Methane Area, UG construction guidelines
- H-168, specification drawing, UG residential structure placement and trench design
- Spec. 104, UG conduit and substructure specifications
- DWP Electric Service Requirements
- Etc.
This guide is for use in determining acceptable locations for padmounted transformers in residential zones.

Instructions:
1. Determine the probable minimum ambient night-time sound level by using the typical location values on the chart.
2. Determine the size of the PM transformer to be installed.
3. Locate the point on the curve where the appropriate horizontal ambient sound level line intersects the transformer curve and project downward to determine the minimum distance in feet from the transformer case to adjacent residential property line.
4. If the padmount must be located nearer to an adjacent property then the minimum distance, additional noise mitigation measures may be needed including sound attenuating walls.

Notes:
- The minimum distance refers to the distance to the nearest residential property not including the property where the padmounted transformer is being installed.
- As required, specified customer or Department-provided ambient sound level test may be used instead of the typical values shown.
12" STANDPIPE DETAIL
Vents, Structures

NOTES:
1. Vent pipes & fittings shall be PVC sewer pipe manufactured in accordance with ASTM D3034 and the Department’s Standard Specification No.152. All pipes and fittings shall be joined using PVC primer & solvent cement and they shall be watertight.
2. Vents shall be located on Department construction drawings. Minimum center to center spacing of vent heads shall be 48 inches. Any deviation from the location given on the construction drawings shall be approved by the Department Representative.
3. Vent outlets shall be located in the nearest sidewalk or planter area to the substructure. Piping for single vent should not exceed 30 feet in length. There shall not be more than one 90-degree bend in any single vent pipe installation, unless approved by the Department Representative.
4. Use 20 inch diameter Sonotube or equal for standpipe installations that require concrete forming. Install 4-#3 bars evenly spaced around the pipe. Provide 2 inch concrete cover to all reinforcing bars. Concrete encasement mix shall be 330-C-1700 or equal.
HANDHOLE SETTING DETAIL IN AN UNPAVED AREA WHERE THERE ARE NO SIDEWALKS

STEEL FRAME FOR RH COVER

CONCRETE COLLAR

NOTES:

PT.21 - ASSEMBLY - HANDHOLE SHALL BE REINFORCED CONCRETE AND SHALL MEET THE REQUIREMENTS OF DMP SPECIFICATIONS P9. AS LAST REVISED.

 installations - ALL HANDHOLES SHALL MEET THE ADDITIONAL INSTALLATION REQUIREMENTS OF DMP UNDERGROUND CONDUIT AND SUBSTRUCTURE SPECIFICATION NO. 104 SH尖 LAST REVISED.  

PT.23 - TOP SECTION - SHALL BE CAST WITH RESPECTIVE SIZED FRAME PER UGCS 2-400. 

PT.24 - COVER - SHALL BE REINFORCED PLASTIC MORTAR (RPM) COVER UNLESS OTHERWISE SPECIFIED. RPM - CONCRETE TEXTURED FOR NON-TRAFFIC USE ONLY, PER UGCS 2-401.

STEEL PARKWAY - FOR NON-TRAFFIC, NON-PEDESTRIAN AREAS ONLY, PER UGCS 2-402 FOR G-1 AND UGCS 2-403 FOR G-2.

STEEL TRAFFIC - FOR AREAS SUBJECT TO VEHICULAR TRAFFIC, PER UGCS 2-404 FOR G-1 AND UGCS 2-405 FOR G-2.

PT.25 - BASE MATERIAL SHALL BE CRUSHED AGGREGATE BASE, #5 CONCRETE AGGREGATE, OR 1" CRUSHED ROCK.

PT.26 - THE INSTALLING CONTRACTOR SHALL INSTALL ONE GROUNDING ROD IN THE 1" O.D. FLOOR KNOCKOUT IN EITHER CORNER OF HANDHOLE UNLESS DIRECTED OTHERWISE BY THE DEPARTMENT ENGINEER OR REPRESENTATIVE. GROUND ROD TO BE GROUTED IN.

DETAIL "A" 

CLEAN OUT HOLE AT EACH BOLT 

JOINT DESIGN VARIES WITH MANUFACTURER. 

GROUP A B C 
1 24" 36" 60" 
2 30" 48" 11" 

PULL IRON IN EACH END WALL (SEE UGCS 2-340) 

KNOCKOUT EACH END 
G-1 = 11" x 11" 
G-2 = 14" x 14" 

1" DIAMETER THROUGH HOLE KNOCKOUT FOR GROUNDING ROD INSTALLATION WITH CAST-IN DOUBLE MEMBRANE PLASTIC PLUGS (TOTAL 2 IN OPPOSITE CORNERS) 

9" x 16" KNOCKOUT 2 ON EACH SIDE 

6" MINIMUM DEPTH COMPACTED AND LEVEL BASE MATERIAL
INDEX

1. HANDBOHE SHALL BE REINFORCED CONCRETE AND SHALL MEET THE REQUIREMENTS OF DWP SPECIFICATIONS P178, AS LAST REVISED.
2. TOP SECTION - SHALL BE CAST WITH RESPECTIVE SIZED FRAME PER UCCS 2-400.
3. COVER - SHALL BE REINFORCED PLASTIC MORTAR (RPM) COVER UNLESS OTHERWISE SPECIFIED.
4. RPM - CONCRETE TEXTURED FOR NON-TRAFFIC USE ONLY, PER UCCS 2-401.
5. STEEL PARKWAY - FOR NON-TRAFFIC, NON-PEDESTRIAN AREAS ONLY, PER UCCS 2-402.
6. STEEL TRAFFIC - FOR AREAS SUBJECT TO VEHICULAR TRAFFIC, PER UCCS 2-404.
7. BASE MATERIAL - SHALL BE CRUSHED AGGREGATE BASE, #5 CONCRETE AGGREGATE, OR 1" CRUSHED ROCK.
8. INSTALLATION - ALL HANDBOLES SHALL MEET THE ADDITIONAL INSTALLATION REQUIREMENTS OF DWP UNDERGROUND CONDUIT AND SUBSTRUCTURE SPECIFICATION NO. 104, AS LAST REVISED.

DETAIL "A"

- 6" MINIMUM BASE MATERIAL.
- GROUND ROD 5/8" DIA X 8", 304 SST CLAD (NOT SUPPLIED WITH HANDBOHE)
- THE INSTALLING CONTRACTOR SHALL INSTALL ONE GROUNDING ROD IN EITHER CORNER OF HANDBOHE UNLESS DIRECTED OTHERWISE BY THE DEPARTMENT ENGINEER OR REPRESENTATIVE.

HANDHOLE SETTING DETAIL IN AN UNPAVED AREA WHERE THERE ARE NO SIDEWALKS

- 1/2 BOLT FURNISHED WITH FRAME.
- CLEAN OUT HOLE (4 PLACES)
- JOINT DESIGN VARIES WITH MANUFACTURER

NOTES:

- IF 5/8" IS GREATER THAN 2" USE DWP-3 CONCRETE. IF 5/8" IS LESS THAN 2" DUCT MAY BE USED, IN PAVED AREA. SUCH AS IN SIDEWALKS. THE 6" CONCRETE COLLAR MAY BE ELIMINATED.
NOTES:
1. INSTALLATION - HANDHOLES SHALL MEET THE ADDITIONAL INSTALLATION REQUIREMENTS OF DWP UNDERGROUND CONDUIT AND SUBSTRUCTURAL SPECIFICATION NO. 104, AS LAST REVISED.
2. NAME OF MANUFACTURER AND DATE OF MANUFACTURE SHALL BE STAMPED ON THE INSIDE OF BOX AND COVER.

PT. 21 - ASSEMBLY - HANDHOLE SHALL BE FIT TO FRAME FRAME

PT. 23 - TOP SECTION - SHALL BE FIT TO W/BOLT LOCATIONS AS PER USES 2/400

PT. 24 - COVER - SHALL BE REINFORCED PLASTIC MORTAR COVER UNLESS OTHERWISE SPECIFIED.

PT. 25 - BASE MATERIAL SHALL BE 1/2" MAXIMUM CRUSHED AGRGATE BASE.

PT. 26 - THE INSTALLING CONTRACTOR SHALL INSTALL ONE GROUNDING ROD TO THE IN EITHER CORNER OF HANDHOLE BOX AS SHOWN UNLESS DIRECTED OTHERWISE BY THE DEPARTMENT ENGINEER OR REPRESENTATIVE. GROUND ROG TO BE CURED IN.

CITY OF LOS ANGELES
DEPARTMENT OF WATER AND POWER
DISTRICT ENGINEERING & SERVICES SECTION
Design: S. A. P. C. D. O. S. J. Garcia
Check: S. C. B. A. L. M. A. J. Garcia
Approved: J. N. M. D. C. 0. W. 0. 0. 0.

FIBERGLASS REINFORCED
POLYMER HANDHOLE
24" X 36" X 36"

E-617 SHEET 1 OF 1
IF d IS GREATER THAN 2" USE DWT-3 CONCRETE. IF d IS LESS THAN 2" GROUT MAY BE USED. IN PAVED AREA SUCH AS IN SIDEWALKS, THE 4" CONCRETE COLLAR MAY BE ELIMINATED.

TOP VIEW

SECTION "A-A"

NOTES:
1. INSTALLATION - HANDHOLE SHALL MEET THE ADDITIONAL INSTALLATION REQUIREMENTS OF DWT-3, UNDERGROUND CONDUIT AND SUBSTRUCTURE SPECIFICATION NO. 104, AS LAST REVISED.
2. NAME OF MANUFACTURER AND DATE OF MANUFACTURE SHALL BE STAMPED ON THE INSIDE OF BOX AND COVER.

PT.21 - ASSEMBLY - HANDHOLE SHALL BE FPB WITH STEEL TORSION FRAME AND POLYMER CONCRETE COVER.

PT.24 - COVER SHALL BE REINFORCED PLASTIC WATERFRONT UNLESS OTHERWISE SPECIFIED.

PT.25 - POLYMER CONCRETE EXTERIOR CONCRETE LUMBER COVER.

SECTION "B-B"

HANDHOLE SETTING DETAIL IN AN UNPAVED AREA WHERE THERE ARE NO SIDEWALKS

REV. NO. DATE REVISION DESCRIPTION NPW FAT NO.

CITY OF LOS ANGELES DEPARTMENT OF WATER AND POWER DISTRIBUTION ENGINEERING & SERVICES SECTION

DESIGN: DRAFTING: J. GARCIA CHECKER:"

APPROVED DATE: 01/15/98

E-621 SHEET 1 OF 1

FIBERGLASS REINFORCED POLYMER HANDHOLE 36" X 60" X 48"
**INDEX**

**TOP CAP SECTION**

1. Place 6 inches of crusher run base material in excavation and level.
2. Assemble transformer enclosure with transformer support, lower assembly in excavation.
3. Place the top cap section of transformer enclosure and let it rest on the main body section.
4. Place backfill material (sand) up to within 3 inches of the bottom of the top cap section. (Backfill material must be placed and compacted evenly around the body section of the enclosure.
5. Place additional crusher run base material inside transformer enclosure and level to top of transformer support base.
6. Remove top cap section and place backfill material (sand) as to bring the top of top cap section 2 inches above the finished grade.
7. Install ground rod as shown.
8. This enclosure is for installation in non-traffic areas only.

**REQUIREMENTS FOR FABRICATION**

1. Body and top cap shall be constructed of lightweight, ultraviolet ray-resistant fiberglass reinforced plastic.
2. Tamper vent shall be constructed of nonmetallic, nonflammable material, puncture proof to a 1/4 inch wood dowel.
3. Body, top cap, tamper vent, and grating shall be permanently marked with the manufacturer's name or trademark.
4. Tamper shields and grates shall be dimensionally interchangeable between manufacturers.

### INSTALLATION PROCEDURE

<table>
<thead>
<tr>
<th>ITEM</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Place 6 inches of crusher run base material in excavation and level.</td>
</tr>
<tr>
<td>2</td>
<td>Assemble transformer enclosure with transformer support, lower assembly in excavation.</td>
</tr>
<tr>
<td>3</td>
<td>Place the top cap section of transformer enclosure and let it rest on the main body section.</td>
</tr>
<tr>
<td>4</td>
<td>Place backfill material (sand) up to within 3 inches of the bottom of the top cap section. (Backfill material must be placed and compacted evenly around the body section of the enclosure.)</td>
</tr>
<tr>
<td>5</td>
<td>Place additional crusher run base material inside transformer enclosure and level to top of transformer support base.</td>
</tr>
<tr>
<td>6</td>
<td>Remove top cap section and place backfill material (sand) as to bring the top of top cap section 2 inches above the finished grade.</td>
</tr>
<tr>
<td>7</td>
<td>Install ground rod as shown.</td>
</tr>
<tr>
<td>8</td>
<td>This enclosure is for installation in non-traffic areas only.</td>
</tr>
</tbody>
</table>

### REQUIREMENTS FOR FABRICATION

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2. Tamper vent shall be constructed of nonmetallic, nonflammable material, puncture proof to a 1/4 inch wood dowel.
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4. Tamper shields and grates shall be dimensionally interchangeable between manufacturers.
INDEX

ELEVATION
E-491 G-1 & G-2
E-492 G-1 & G-2

VENT LOCATION TABLE

VENT LOCATION

PART

WEST LOCATION TO BE USED

DIMENSION "W"

MINIMUM WIDTH

MIN. GAP FROM E

WIN. PARKWAY WIDTH FOR D/B INSTALLATION IS 3'-0"

14" X 14" END WALL KNOCKOUT
2-4" & 6-3" CONDUITS
E-491, G-1 (2'-6"
E-541 G-1 (2'-6"
E-541 G-1 (2'-6"
1/2"
1/2"
1/2"
1/2"

18" X 26½" END WALL KNOCKOUT
4-5", 3-3" & 2-3" CONDUITS
E-491 (3' X 5' X 3'-10"

11" X 11" END WALL KNOCKOUT
2-4" & 3-3" CONDUITS
E-491, G-1 (2'-3"
E-541 G-1 (2'-3"

8" X 11" END WALL KNOCKOUT
6-3" CONDUITS
E-491 (2'-3"
E-541 G-1 (2'-3"

service ducts

2-4" & 6-3" CONDUITS
E-491, G-1 (2'-6"
E-541 G-1 (2'-6"
E-541 G-1 (2'-6"
1/2"
1/2"
1/2"
1/2"

11" X 11" END WALL KNOCKOUT
2-4" & 3-3" CONDUITS
E-491, G-1 (2'-3"
E-541 G-1 (2'-3"

ELEVATION
TYPICAL VAULT VENT INSTALLATION
HL-11 G-286

NOTES:
1. ALL STRUCTURAL PLACEMENTS AND DETAILS ARE STATED IN INSTALLATION, ON THE DRAWING OR OTHERWISE SPECIFIED ON CONSTRUCTION DRAWINGS.
2. SEE SPECIFICATION ON AN Curve K 1 TO 10 CONDUITS, HANG OVER A CONDUIT TERMINATION OR TERMINATION IS TERMINATED WITH END BELLS OR DUCT TERMINATORS.
3. CITY OWNED OR PRIVATE STREET LIGHTING CONDUIT SYSTEM IS NOT ALLOWED IN ORNAMENTAL MUSEUM.
4. ANY STRUCTURES OR VENT SPOUTS AND COVER LOCATED IN PROPERTY AREAS OR WITHIN 10 FT. OF PROPERTY LINE SHALL BE DESIGNED IN ACCORDANCE WITH THE PROPER STRUCTURAL REQUIREMENTS FOR USE.
(NO CONSTRUCTION ZONE RESTRICTIONS, APPLIES TO BOTH SIDES OF POLE OR PROPERTY LINE)

REQUIREMENTS FOR CRANE CLEARANCES
CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS DIVISION OF OCCUPATIONAL SAFETY AND HEALTH - TITLE 8 REGULATIONS SUB-CHAPTER 4, CONSTRUCTION SAFETY ORDERS ARTICLE 15. CRANES AND DERRICKS IN CONSTRUCTION

HTTP://WWW.DIR.CA.GOV/TITLE8/S84A15.HTML

CALIFORNIA PUBLIC UTILITIES COMMISSION: GENERAL ORDER 95
HTTP://DOCS.CPUC.CA.GOV/PUBLISHED/GRAFPHC/13352.PDF

LADWP RULES GOVERNING WATER AND ELECTRIC SERVICE: ELECTRIC SERVICE REQUIREMENTS MANUAL T-4#1 & 42#3 (PAGE 218)
HTTPS://WWW.LADWP.COM/CS/IOCPPL71DCSERVICE=GET_FILEADDCQNAME=AD17DWPWEB5172007635&REVISIONSELECTMETHOD=LATESTRELEAS

NOTES:
1. OBTAIN APPROVAL IN ADVANCE FROM THE DEPARTMENT OF WATER AND POWER FOR CONSTRUCTION. BOTH PERMANENT AND TEMPORARY, (I.E. SCAFFOLDING, CRANES, PATIOS, STRUCTURES, POOLS, SPAS, ETC) WITHIN THE SHADY 5 O R RADIAL CLEARANCE DESCRIBED ABOVE IN PROXIMITY TO POLES AND OVERHEAD WIRES.

2. POLES MAY BE LOCATED ON ADJACENT PROPERTIES WITH ONLY CONDUCTORS/WIRES OVERHANGING PROPERTY WHERE CONSTRUCTION IS TAKING PLACE.

3. OBTAIN APPROVAL IN ADVANCE FROM THE DEPARTMENT OF WATER AND POWER FOR CONSTRUCTION IN A POWER OR WATER UTILITY EASEMENT RIGHT-OF-WAY, BOTH RECORDED AND UNRECORDED.

4. INQUIRIES SHOULD BE MADE TO:
DEPARTMENT OF WATER & POWER
REAL ESTATE BUSINESS UNIT - ROOM 1031
111 NORTH HOPE ST.
LOS ANGELES, CA. 90012
(213)367-0562 REAL ESTATE RECORDS SECTION

REV. NO. REV. DATE NO. APP. TAT NO. APV. TD 

08/13/12 JD
DELETED CALLOUT. REVISED NOTE 4.
(RELOCATED/ADDED LIM. AND COLORS)

06/12/12 JD 
REVISED PCU CRANE CLEARANCES NOTE

11/07/05 H.Y. 
REVISED NOTES & ADDED NO CONSTRUCTION ZONE 12 ABOVE PRIMARY WIRES.

CITY OF LOS ANGELES
DEPARTMENT OF WATER AND POWER
DISTRIBUTION ENGINEERING & SERVICES SECTION

CONSTRUCTION IN PROXIMITY TO OVERHEAD POWER LINES

DESIGN ROBERT ALLEN
DRAFTING J. GARCIA

MARVIN MOON
CHECKER WAYNE YEDDO

APPROVED MARVIN MOON
DATE 09-26-05
AIR VENT OPENING
4 AT EACH LEVEL
(24x) SEE DETAIL

SEE DETAIL A

125 SQ. INCHES
MINIMUM OPEN AREA.

AIR VENT OPENING

DETAIL A

NOTES:
1. MATERIAL: POLYETHYLENE.
2. COLOR: SANDSTONE OR GRANITE.
3. DIMENSION TOLERANCE +/- 1/16".

△ (ARMORCAST CATALOG NO. P6002712)
INDEX

SECONDARY, SERVICE, OR ST. LT. DUCTS ON RIGHT SIDE

BARRIER POST AS REQUIRED SEE "PROTECTION", PAGE C721-03

1'-0" 4'-6" 5'-0"

4"-0"

1" COIL INSERT

OPTIONAL DRAFT

OUTPUT

PRIMARY DUCTS ON LEFT SIDE

12" x 24" OPENING

3'-6"

3'-6"

3'-6"

3'-6"

9" TYP.

NOTES:

1. FOR LOCATION REQUIREMENTS AND BARRIER DETAIL, SEE PAGES C721-01, 02, & 03. CONSTRUCTION DRAWING WILL SPECIFY THE LOCATION, TYPE, AND SIZE OF CONDUCTS ENTERING HANDHOLE.

2. IF GALVANIZED CONDUIT IS USED, EXPOSED ENDS ARE TO BE THREADED AND FITTED WITH GROUND BUSHINGS.

3. TRANSFORMER PAD SHALL BE REINFORCED CONCRETE AND SHALL MEET THE REQUIREMENTS OF DW&G SPECIFICATION NO. P-178 AS LAST REVISED, EXCEPT ARTICLE 4 FOR PAD HANDHOLE AND ARTICLE 3 (C) (1) AND ARTICLE 4 FOR PAD SLAB. MINIMUM REQUIRED DESIGN LOADING FOR PAD SLAB SHALL BE:
   LIVE LOAD = 100 lbs./sq. ft.
   DEAD LOAD = 850 lbs./sq. ft.
   IMPACT = NONE

4. ALL STRUTS SHALL BE HOT DIP GALVANIZED CONTINUOUS CONCRETE INSERTS AND SHALL BE FLUSH WITH CONCRETE SURFACE.

5. INSTALL ALL GROUND WIRE IN THE EARTH 1'-6" BELOW THE FINISH GRADE. CONNECT GROUND WIRE (PT. 22) TO 4 GROUND RODS (PT. 21). EXTEND WIRE ENDS FROM A COMMON GROUND ROD INTO HANDHOLE FROM BOTTOM COIL 6' OF EACH WIRE INTO THE HANDHOLE. ALL CONNECTIONS SHALL BE WELDED USING EXOTHERMIC WELDING (PT. 25) (CADWELD, THERMOWELD, OR EQUAL).
WEIGHT OF THE HEAVIEST SECTION 3,100 LBS.

1. FOR GENERAL REQUIREMENTS, SEE UCSS STD. NO. C721-01(SHEETS). CONSTRUCTION DRAWING WILL SPECIFY THE LOCATION, TYPE, AND NUMBER OF CONDUITS TO BE INSTALLED IN HANDHOLE.

2. COVER SHALL BE PROVIDED WITH NON-CORROSIVE FASTENING DEVICE ON THE CENTER LINE OF EACH SIDE (4 SIDES) SUCH THAT A TOOL SHALL BE REQUIRED FOR ITS REMOVAL. COVER SHALL BE HOT DIP GALVANIZED. COVER AND BOLTS SHALL BE FLUSH WITH CONCRETE SURFACE. THE FRONT COVER SHALL BE GALVANIZED AFTER LADWP LOGO IS BIEDEWELDING IN PLACE. PROVIDE "OPEN END STAR P35T INSERTS GALVANIZED AFTER LADWP LOGO IS BEADWELDING IN PLACE. PROVIDE "OPEN END STAR P35T INSERTS"

3. TRANSFORMER PAD SHALL BE REINFORCED CONCRETE AND SHALL MEET THE REQUIREMENTS OF DW&P SPECIFICATION NO. P-178 AS LAST REVISED EXCEPT ARTICLE 4 FOR PAD HANDHOLE AND ARTICLE 3(C)(1) AND ARTICLE 4 FOR PAD SLAB. MINIMUM REQUIRED DESIGN LOADING FOR PAD SLAB SHALL BE:

- LIVE LOAD: 100 LBS/SQ. FT.
- DEAD LOAD: 850 LBS/SQ. FT.

4. INSTALL ALL GROUND WIRE IN THE EARTH 1'-6" BELOW THE FINISH GRADE. CONNECT GROUND WIRE (PT.22) TO 4 GROUND RODS (PT.21). EXTEND WIRE ENDS FROM A COMMON GROUND ROD INTO HANDHOLE THROUGH 2" DIA. SCH 40 PVC CONDUIT. GROUT HOLES WHERE WIRE ENTERS THE HANDHOLE. COIL 9' OF EACH WIRE INTO THE HANDHOLE. ALL CONNECTIONS SHALL BE WELDED USING EXOTHERMIC WELDING (PT.25) (CADWELD, THERMOWELD, OR EQUAL).

5. ALL STRUTS SHALL BE HOT DIP GALVANIZED CONTINUOUS CONCRETE INSERTS AND SHALL BE FLUSH WITH CONCRETE SURFACE.

INDEX

<table>
<thead>
<tr>
<th>NO.</th>
<th>QTY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>4</td>
<td>GROUND ROD 5/8&quot; x 8' 304 SST CLAD</td>
</tr>
<tr>
<td>22</td>
<td>60'</td>
<td>WIRE BARE TINNED 2/0 CU, SEE NOTE 4</td>
</tr>
<tr>
<td>23</td>
<td>32</td>
<td>5&quot; DIA. DOUBLE MEMBRANE TERMINATION</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>3/4&quot; DIAMOND PLATE COVER, SEE NOTE 2</td>
</tr>
<tr>
<td>25</td>
<td>5</td>
<td>EXOTHERMIC WELD, SEE NOTE 4</td>
</tr>
<tr>
<td>26</td>
<td>2</td>
<td>2&quot; DIA. SCH 40 PVC CONDUIT CAPPED AT OUTSIDE WALL</td>
</tr>
<tr>
<td>27</td>
<td>2</td>
<td>11/2&quot; x 11/2&quot; x 44&quot; LONG 12 GAUGE STRUT (UNISTRUT P3200 SERIES)</td>
</tr>
</tbody>
</table>

NOTES:

- ALL STRUTS SHALL BE HOT DIP GALVANIZED CONTINUOUS CONCRETE INSERTS AND SHALL BE FLUSH WITH CONCRETE SURFACE.
- COVER SHALL BE PROVIDED WITH NON-CORROSIVE FASTENING DEVICE ON THE CENTER LINE OF EACH SIDE (4 SIDES) SUCH THAT A TOOL SHALL BE REQUIRED FOR ITS REMOVAL. COVER SHALL BE HOT DIP GALVANIZED. COVER AND BOLTS SHALL BE FLUSH WITH CONCRETE SURFACE. THE FRONT COVER SHALL BE GALVANIZED AFTER LADWP LOGO IS BEADWELDING IN PLACE. PROVIDE "OPEN END STAR P35T INSERTS GALVANIZED AFTER LADWP LOGO IS BEADWELDING IN PLACE. PROVIDE "OPEN END STAR P35T INSERTS"

- TRANSFORMER PAD SHALL BE REINFORCED CONCRETE AND SHALL MEET THE REQUIREMENTS OF DW&P SPECIFICATION NO. P-178 AS LAST REVISED EXCEPT ARTICLE 4 FOR PAD HANDHOLE AND ARTICLE 3(C)(1) AND ARTICLE 4 FOR PAD SLAB. MINIMUM REQUIRED DESIGN LOADING FOR PAD SLAB SHALL BE:
  - LIVE LOAD: 100 LBS/SQ. FT.
  - DEAD LOAD: 850 LBS/SQ. FT.

- INSTALL ALL GROUND WIRE IN THE EARTH 1'-6" BELOW THE FINISH GRADE. CONNECT GROUND WIRE (PT.22) TO 4 GROUND RODS (PT.21). EXTEND WIRE ENDS FROM A COMMON GROUND ROD INTO HANDHOLE THROUGH 2" DIA. SCH 40 PVC CONDUIT. GROUT HOLES WHERE WIRE ENTERS THE HANDHOLE. COIL 9' OF EACH WIRE INTO THE HANDHOLE. ALL CONNECTIONS SHALL BE WELDED USING EXOTHERMIC WELDING (PT.25) (CADWELD, THERMOWELD, OR EQUAL).

- ALL STRUTS SHALL BE HOT DIP GALVANIZED CONTINUOUS CONCRETE INSERTS AND SHALL BE FLUSH WITH CONCRETE SURFACE.
1. For general requirements, see UGCS STD. NO. C721-01(ALL SHEETS). CONSTRUCTION DRAWING WILL SPECIFY THE LOCATION, TYPE, AND NUMBER OF CONDUITS TO BE INSTALLED IN HANDHOLE. DRAWING WILL SPECIFY THE LOCATION, TYPE, AND NUMBER OF CONDUITS TO BE INSTALLED IN HANDHOLE.

2. Install all ground wire in the earth 1'-6" below finish grade. Connect the ground wire (PT. 22) with an exothermic weld (PT. 25), (Cadweld, Thermweld, or equal) to 4 ground rods (PT. 21). Extend wire ends from a common ground rod into handhole through 2" dia. SCH 40 PVC conduit. Grout holes where wires enter handhole. Coil 9 ft. of each wire in handhole.

3. Covers shall be provided with non-corrosive fastening device on the center line of each side (4 sides) such that a tool shall be required for its removal. Covers shall be hot dip galvanized, covers and bolts shall be flush with concrete surface. The front cover shall be galvanized after LADWP logo is beadwelded in place. Provide 1" open end star P35T inserts with through hole or clean out for each bolt.

4. Transformer pad shall be reinforced concrete and shall meet the requirements of LADWP SPECIFICATION NO. F-178 AS LAST REVISED EXCEPT Article 4 for pad handhole and Article 4. Transform Pad shall be placed at least 6" away from barrier post locations, dimensions entered on layout. If no barrier posts are required, grounding rods & joint layouts are required. Grounding rods & joint layouts are required.

5. All struts shall be hot dip galvanized continuous concrete inserts and shall be flush with concrete surface.

6. This drawing provides specific information for pad mount transformer placement. See "Protection Against Grounding" as required.
REVISED BARRIER POST LOCATIONS AND DIMENSIONS.

EHP 05/05/11

REV. DATE

TYP.

8" 03/19/91

TYP. 22 721-07

REV. NO.

TYP. 8" TYP.

REV. NO.

TYP. 4'-0"

TYP. 3'-6"

TYP. 2'-0"

TYP. 6"

TYP. 24 " DIAMOND PLATE COVER. SEE NOTE 2

EHP

NOTES:

1. FOR GENERAL REQUIREMENTS, SEE UGCS STD. NO. C721-01 (ALL SHEETS). CONSTRUCTION DRAWING WILL SPECIFY THE LOCATION, TYPE AND NUMBER OF CONDUITS TO BE INSTALLED IN HANDHOLE.

2. COVERS SHALL BE PROVIDED WITH NON-CORROSIVE FASTENING DEVICE ON THE CENTER LINE OF EACH SIDE (4 SIDES) SUCH THAT A TOOL SHALL BE REQUIRED FOR ITS REMOVAL. COVERS SHALL BE MADE OF GAUTANIZED STEEL. COVERS AND BOLTS SHALL BE FLUSH WITH CONCRETE SURFACE. THE FRONT COVER SHALL BE GALVANIZED AFTER FRAP (LOGO) IS READ WELDED IN PLACE. If applicable, provide 1/4" OPEN END STAR POST INSERTS WITH THROUGH HOLE OR CLEAN OUT FOR EACH BOLT.

3. TRANSFORMER PAD SHALL BE REINFORCED CONCRETE AND SHALL MEET THE REQUIREMENTS OF DW&P SPECIFICATION NO.P-178 AS LAST REVISED EXCEPT ARTICLE 4 FOR PAD SLAB. MINIMUM REQUIRED DESIGN LOADING FOR PAD SLAB SHALL BE

- LIVE LOAD= 100 LBS/SQ. FT.
- DEAD LOAD= 1600 LBS/SQ. FT.

4. ALL STRUTS SHALL BE HOT DIP GALVANIZED, CONTINUOUS CONCRETE INSERTS AND SHALL BE FLUSH WITH CONCRETE SURFACE.

5. INSTALL ALL GROUND WIRE IN THE EARTH 1'-6" BELOW THE FINISH GRAGE. CONNECT GROUND WIRE (PT.22) TO 4 GROUND RODS (PT.21). EXTEND WIRE ENDS FROM A COMMON GROUND ROD INTO HANDHOLE THROUGH 2 DIA. SCH 40 PVC CONDUIT. GROUND RODS WHERE ENTER INTO HANDHOLE, COIL 3' OF EACH WIRE INTO THE HANDHOLE. ALL CONNECTIONS SHALL BE WELDED USING EXOTHERMIC WELDING (PT.25). (CADWELD, THERMOWELD, OR EQUAL).

6. BACKFILL WITH NATURAL MATERIAL AND PERFORM 90% COMPACTION. AS AN ALTERNATIVE BACKFILL WITH SLURRY-CEMENT CLASS 100-E-100 BACKFILL. BACKFILL UNDER OVERHANG SHALL ONLY BE SLURRY-CEMENT.

WEIGHT OF THE HEAVIEST SECTION 9,100 LBS.

COVER DETAIL

HANDHOLE

SECTION B-B

OPPOSITE SIDE WALL IS IDENTICAL

8' X 10' PRECAST PAD WITH HANDHOLE

FOR PADMOUNT TRANSFORMER

POWER DISTRIBUTION DESIGN STANDARDS
DEPARTMENT OF WATER AND POWER
CITY OF LOS ANGELES

DRAWING NUMBER

UB721-07

NOTES:

1. FOR GENERAL REQUIREMENTS, SEE UGCS STD. NO. C721-01 (ALL SHEETS). CONSTRUCTION DRAWING WILL SPECIFY THE LOCATION, TYPE AND NUMBER OF CONDUITS TO BE INSTALLED IN HANDHOLE.

2. COVERS SHALL BE PROVIDED WITH NON-CORROSIVE FASTENING DEVICE ON THE CENTER LINE OF EACH SIDE (4 SIDES) SUCH THAT A TOOL SHALL BE REQUIRED FOR ITS REMOVAL. COVERS SHALL BE MADE OF GAUTANIZED STEEL. COVERS AND BOLTS SHALL BE FLUSH WITH CONCRETE SURFACE. THE FRONT COVER SHALL BE GALVANIZED AFTER FRAP (LOGO) IS READ WELDED IN PLACE. If applicable, provide 1/4" OPEN END STAR POST INSERTS WITH THROUGH HOLE OR CLEAN OUT FOR EACH BOLT.

3. TRANSFORMER PAD SHALL BE REINFORCED CONCRETE AND SHALL MEET THE REQUIREMENTS OF DW&P SPECIFICATION NO.P-178 AS LAST REVISED EXCEPT ARTICLE 4 FOR PAD SLAB. MINIMUM REQUIRED DESIGN LOADING FOR PAD SLAB SHALL BE

- LIVE LOAD= 100 LBS/SQ. FT.
- DEAD LOAD= 1600 LBS/SQ. FT.

4. ALL STRUTS SHALL BE HOT DIP GALVANIZED, CONTINUOUS CONCRETE INSERTS AND SHALL BE FLUSH WITH CONCRETE SURFACE.

5. INSTALL ALL GROUND WIRE IN THE EARTH 1'-6" BELOW THE FINISH GRAGE. CONNECT GROUND WIRE (PT.22) TO 4 GROUND RODS (PT.21). EXTEND WIRE ENDS FROM A COMMON GROUND ROD INTO HANDHOLE THROUGH 2 DIA. SCH 40 PVC CONDUIT. GROUND RODS WHERE ENTER INTO HANDHOLE, COIL 3' OF EACH WIRE INTO THE HANDHOLE. ALL CONNECTIONS SHALL BE WELDED USING EXOTHERMIC WELDING (PT.25). (CADWELD, THERMOWELD, OR EQUAL).

6. BACKFILL WITH NATURAL MATERIAL AND PERFORM 90% COMPACTION. AS AN ALTERNATIVE BACKFILL WITH SLURRY-CEMENT CLASS 100-E-100 BACKFILL. BACKFILL UNDER OVERHANG SHALL ONLY BE SLURRY-CEMENT.

WEIGHT OF THE HEAVIEST SECTION 9,100 LBS.
1. FOR GENERAL REQUIREMENTS, SEE UGCS STD. NO. C721-01 (ALL SHEETS). CONSTRUCTION DRAWING WILL SPECIFY THE LOCATION, TYPE AND NUMBER OF CONDUITS TO BE INSTALLED IN HANDHOLE.

2. INSTALL ALL GROUND WIRE IN THE EARTH 1'-6" BELOW THE FINISH GRADE. CONNECT GROUND WIRE (PT. 21) TO 4 GROUND RODS (PT. 22) TO 4 GROUND RODS FROM A COMMON GROUND ROD INTO HANDHOLE THROUGH 2" DIA. SCH 40 PVC CONDUIT. GROUT HOLES WHERE WIRES ENTER HANDHOLE.

3. COVERS SHALL BE PROVIDED WITH NON-CORROSIVE FASTENING DEVICE ON THE CENTER LINE OF EACH SIDE (4 SIDES) SUCH THAT A TOOLS SHALL BE REQUIRED FOR ITS REMOVAL. COVERS SHALL BE HOT DIP GALVANIZED, COVERS AND BOLTS SHALL BE FLUSH WITH CONCRETE SURFACE. THE FRONT COVER SHALL BE GALVANIZED AFTER LAWD WIRE IS BEADWELDED IN PLACE. PROVIDE 1/2" OPEN END STAR P35T INSERTS WITH THROUGH HOLE OR CLEAN OUT FOR EACH BOLT.

4. TRANSFORMER PAD SHALL BE REINFORCED CONCRETE AND MEET THE REQUIREMENTS OF DWP SPECIFICATION NO. P-178 AS LAST REVISED EXCEPT ARTICLE 4 FOR PAD SLAB. MINIMUM REQUIRED DESIGN LOADING FOR PAD SLAB SHALL BE:

   - LIVE LOAD = 100 LBS/SQ. FT.
   - DEAD LOAD = 1600 LBS/SD. FT.
   - IMPACT = NONE

5. ALL STRUTS SHALL BE HOT DIP GALVANIZED CONTINUOUS CONCRETE INSERTS AND SHALL BE FLUSH WITH CONCRETE SURFACE.

6. BACKFILL WITH NATURAL MATERIAL AND PERFORM 90% COMPACTION. AS AN ALTERNATIVE BACKFILL MATERIAL AND PERFORM 90% COMPACTION. AS AN ALTERNATIVE BACKFILL WITH SLURRY-CEMENT CONCRETE CLASS 100-E-100 BACKFILL. BACKFILL UNDER OVERHANG SHALL ONLY BE SLURRY-CEMENT.

7. A TOOL SHALL BE REQUIRED FOR ITS REMOVAL. COVERS SHALL BE HOT DIP GALVANIZED. COVERS AND BOLTS SHALL BE FLUSH WITH CONCRETE SURFACE. THE FRONT COVER SHALL BE HOT DIP GALVANIZED.

8. HANDHOLE AND ARTICLE 3 (C) (1) AND ARTICLE 4 FOR PAD SLAB. MINIMUM REQUIRED

9. TRANSFORMER PAD SHALL BE REINFORCED CONCRETE AND MEET THE REQUIREMENTS OF DWP SPECIFICATION NO. P-178 AS LAST REVISED EXCEPT ARTICLE 4 FOR PAD SLAB. MINIMUM REQUIRED DESIGN LOADING FOR PAD SLAB SHALL BE:

   - LIVE LOAD = 100 LBS/SQ. FT.
   - DEAD LOAD = 1600 LBS/SD. FT.
   - IMPACT = NONE

10. ALL STRUTS SHALL BE HOT DIP GALVANIZED CONTINUOUS CONCRETE INSERTS AND SHALL BE FLUSH WITH CONCRETE SURFACE.

11. BACKFILL WITH NATURAL MATERIAL AND PERFORM 90% COMPACTION. AS AN ALTERNATIVE BACKFILL WITH SLURRY-CEMENT CONCRETE CLASS 100-E-100 BACKFILL. BACKFILL UNDER OVERHANG SHALL ONLY BE SLURRY-CEMENT.

12. 03/20/09 3 TYP. A

13. 1'-0" TYP.

14. 5'-4" TYP.

15. 9" TYP.

16. 3'-0" TYP.

17. 3'-8" TYP.

18. 3'-10" TYP.

19. 9" TYP.

20. 1'-0" TYP.

21. 4'-0" TYP.

22. 1'-0" TYP.

23. 03/20/09 3 TYP. A

24. 1'-0" TYP.

25. 4'-0" TYP.

26. 1'-0" TYP.

27. 8" TYP.

28. 8" TYP.

29. 8" TYP.

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90. 8" TYP.
1. FOR GENERAL REQUIREMENTS, SEE UGCS STD. NO. C721-01(ALL SHEETS). CONSTRUCTION DRAWING WILL SPECIFY THE LOCATION, TYPE, AND NUMBER OF CONDUITS TO BE INSTALLED IN HANDHOLE.

2. COVERS SHALL BE PROVIDED WITH NON-CORROSIVE FASTENING DEVICE ON THE CENTER LINE OF EACH SIDE (4 SIDES) SUCH THAT A TOOL SHALL BE REQUIRED FOR ITS REMOVAL. COVERS AND BOLTS SHALL BE FLUSH WITH CONCRETE SURFACE. THE FRONT COVER SHALL BE GALVANIZED AFTER LADEWP LOGO IS BEAD- WELDED IN PLACE. PROVIDE 1/2" OPEN END STAR P35T INSERTS WITH THROUGH HOLE TO BE Recessed 1/2" into concrete to prevent rusting.

3. TRANSFORMER PAD SHALL BE REINFORCED CONCRETE AND SHALL MEET THE REQUIREMENTS OF DW&P OR CLEAN OUT FOR EACH BOLT.

4. ALL STRUTS SHALL BE HOT DIP GALVANIZED CONTINUOUS CONCRETE INSERTS AND SHALL BE IMPACT = NONE. DEAD LOAD = 850 LBS/SQ. FT. LIVE LOAD = 100 LBS/SQ. FT.

5. INSTALL ALL GROUND WIRE IN THE EARTH 1'-6" BELOW THE FINISH GRADE. CONNECT GROUND WIRE (PT.22) TO 4 GROUND RODS (PT.21). EXTEND WIRE ENDS FROM A COMMON GROUND ROD INTO HANDHOLE THROUGH 2" DIA. SCH 40 PVC CONDUIT. GROUT HOLES WHERE WIRES ENTER HANDHOLE. COIL 9' OF EACH WIRE INTO THE HANDHOLE. ALL CONNECTIONS SHALL BE BEADWELDED IN PLACE. PROVIDE 1/2" DIAMOND PLATE COVER, SEE NOTE 2

6. BACKFILL WITH SLURRY-CEMENT CONCRETE CLASS 100-E-100 BACKFILL. AS AN ALTERNATIVE BACKFILL WITH SLURRY-CEMENT CONCRETE CLASS 100-E-100 BACKFILL.
LAYOUT OF REQUIRED WORKSPACE PERIMETER

(FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-09)

REPLACED K.O.'S W/ 5" DIA. TERMINATORS.

REVISION DESCRIPTION

REV. NO. DESCRIPTION

JD 05/05/11 REPLACED K.O.'S W/ 5" DIA. TERMINATORS.

REV. DATE

APPD.

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5' x 7' PRECAST PAD WITH HANDHOLE
FOR PADMOUNT TRANSFORMER OR
PADMOUNT SF6 SWITCHGEAR

5' x 7' PRECAST PAD
1. For general requirements, see UGCS STD. NO. C721-01(ALL SHEETS). Construction drawing will specify the location, type, and number of conduits to be installed in handhole.

2. Install all ground wire in the earth 1'-6" below the finish grade. Connect ground wire (PT. 21) to a ground rod (PT. 21). Extend wire ends from cadweld tee connection (PT. 25) into handhole through 2" dia. 5C4 PVC conduit. Ground rods where wires enter handhole. Coil 12' of each wire into the handhole. All connections shall be welded using exothermic welding (PT. 25). Handle, thermit or equal.

3. Cover shall be provided with 6-1/2" non-corrosive pentahedron head bolts. Provide 1/2" open end plastic inserts with through hole or clean out for each bolt. Cover and bolts shall be flush with concrete surface. Cover shall be hot dip galvanized after ladwp logo is beadwelded in place.

4. Switchgear pad shall be reinforced concrete and shall meet the requirements of DW&P SPECIFICATION NO. P-178 as last revised except Article 4 for pad handhole and Article 3(c)(1) and Article 4 for pad slab. Minimum required design loading for pad slab shall be:
   - Live load = 100 lbs/50 ft.
   - Dead load = 400 lbs/50 ft.
   - Impact = none

5. Backfill with natural material and perform 90% compaction. As an alternative backfill with slurry-cement concrete class 100-1-100 backfill.

6. Compacted crushed rock 1", grade A or concrete aggregate mix, grade B (SSPC, subsections 200-1.2 & 200-1.4).

7. Weight of the heaviest section 16,600 lbs.
LAYOUT OF REQUIRED WORKSPACE PERIMETER

(FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE CT21-07)
1. FOR GENERAL REQUIREMENTS, SEE UGCS STD. NO. C721-01(ALL SHEETS). CONSTRUCTION DETAILS, LOCATION, TYPE, AND NUMBER OF CONDUITS TO BE INSTALLED IN HANOHOLE.

2. INSTALL ALL GROUND WIRE IN THE EARTH 1'-6" BELOW THE FINISH GRADE. CONNECT GROUND WIRE (PT. 22) TO 4 GROUND RODS (PT. 21). EXTEND WIRE FROM CADWELD TEE CONNECTION (PT. 25) INTO HANOHOLE THROUGH 2¨ DIA. SCH 40 PVC CONDUIT. GROUT HOLE WHERE WIRE ENTERS HANOHOLE. COIL 32' OF EACH WIRE INTO THE HANOHOLE. ALL CONNECTIONS SHALL BE WELDED USING EXOTHERMIC WELDING (PT. 25). CADWELD, THERMOWELD, OR EQUAL.


4. BACKFILL WITH NATURAL MATERIAL AND PERFORM 90% COMPACTION. AS AN ALTERNATIVE BACKFILL WITH SLURRY-CEMENT CONCRETE CLASS B10-1-100 BACKFILL. WEIGHT OF THE HEAVIEST SECTION IS 20,300 LBS.

NOTES:

1. FOR GENERAL REQUIREMENTS, SEE UGCS STD. NO. C721-01(ALL SHEETS). CONSTRUCTION DETAILS.

2. INSTALL ALL GROUND WIRE IN THE EARTH 1'-6" BELOW THE FINISH GRADE. CONNECT GROUND WIRE (PT. 22) TO 4 GROUND RODS (PT. 21). EXTEND WIRE FROM CADWELD TEE CONNECTION (PT. 25) INTO HANOHOLE THROUGH 2¨ DIA. SCH 40 PVC CONDUIT. GROUT HOLE WHERE WIRE ENTERS HANOHOLE. COIL 32' OF EACH WIRE INTO THE HANOHOLE. ALL CONNECTIONS SHALL BE WELDED USING EXOTHERMIC WELDING (PT. 25). CADWELD, THERMOWELD, OR EQUAL.


4. BACKFILL WITH NATURAL MATERIAL AND PERFORM 90% COMPACTION. AS AN ALTERNATIVE BACKFILL WITH SLURRY-CEMENT CONCRETE CLASS C10-1-100 BACKFILL. WEIGHT OF THE HEAVIEST SECTION IS 20,300 LBS.

NOTES:

1. FOR GENERAL REQUIREMENTS, SEE UGCS STD. NO. C721-01(ALL SHEETS). CONSTRUCTION DETAILS.

2. INSTALL ALL GROUND WIRE IN THE EARTH 1'-6" BELOW THE FINISH GRADE. CONNECT GROUND WIRE (PT. 22) TO 4 GROUND RODS (PT. 21). EXTEND WIRE FROM CADWELD TEE CONNECTION (PT. 25) INTO HANOHOLE THROUGH 2¨ DIA. SCH 40 PVC CONDUIT. GROUT HOLE WHERE WIRE ENTERS HANOHOLE. COIL 32' OF EACH WIRE INTO THE HANOHOLE. ALL CONNECTIONS SHALL BE WELDED USING EXOTHERMIC WELDING (PT. 25). CADWELD, THERMOWELD, OR EQUAL.


4. BACKFILL WITH NATURAL MATERIAL AND PERFORM 90% COMPACTION. AS AN ALTERNATIVE BACKFILL WITH SLURRY-CEMENT CONCRETE CLASS B10-1-100 BACKFILL. WEIGHT OF THE HEAVIEST SECTION IS 20,300 LBS.
LAYOUT OF REQUIRED WORKSPACE PERIMETER

(For padmount egress orientation, refer to underground standard page C721-08)

10'-0" x 10'-6" PRECAST PAD

10'-0" x 10'-6" PRECAST PAD
**METALLIC FENCE WITH CONNECTED GROUNDING SYSTEM AND NON-CONDUCTIVE FENCE SECTION (CASE 1A)**

- **MIN. 6' OF NON-CONDUCTIVE FENCE**
- **20' MIN.**
- **GROUND ROD AT FENCE POST (AS REQUIRED)**
- **CUSTOMER GROUNDING SYSTEM**
- **2/0 TINNED CU CABLE, M.C. 34-08-152 (GROUNDING TIE)**
- **FLEXIBLE BRAID**
- **MERICAN GATE**
- **BARRIER POST**
- **GROUND ROD (TYP)**

**NOTE:**
- Non-conductive fence material can consist of vinyl, fiberglass, composite, PVC, or other insulating medium.

**METALLIC FENCE WITH CONNECTED GROUNDING SYSTEM AND ISOLATED FENCE SECTION (CASE 1B)**

- **MIN. 6' OF CONDUCTIVE FENCE**
- **20' MIN.**
- **GROUND ROD AT FENCE POST (AS REQUIRED)**
- **CUSTOMER GROUNDING SYSTEM**
- **2/0 TINNED CU CABLE, M.C. 34-08-152 (GROUNDING TIE)**
- **FLEXIBLE BRAID**
- **METAL GATE**
- **BARRIER POST**
- **GROUND ROD (TYP)**

**NOTE:**
- Isolated fence section shall be ungrounded and must be isolated from fence posts and from anything grounded such as fence footing. Isolation to be provided by either a proper insulator or a minimum 4' air gap.
- A proper insulator shall provide the necessary mechanical support of the isolated fence section and shall have the following minimum electric all properties:
  - Dry flashover: 35kV for 1 minute
  - Wet flashover: 15kV (Horiz.) 12kV (Vert) for 10 seconds
- For example: Impulse NC LLC, Catalog No. 022482-2000

**CUSTOMERS METALLIC FENCE POST GROUNDING IN PROXIMITY TO DWP PADMOUNT TRANSFORMER INSTALLATION**
METALLIC FENCE WITH SEPARATE GROUNDING SYSTEMS (CASE 2)

Notes:
- Chain link fence is shown for reference only. These standards also apply to wrought iron or any other electrically conductive fences.

Customer's Metallic Fence
- Electrically conductive fences wrought iron or any other standards also apply to chain link fence is shown for reference only.

Preferred Method of Post Grounding
- Exothermic weld
- 2/0 tinned Cu cable (M.C. 34-08-152)

Alternative Method of Post Grounding
- Flexible braid
- See note 8 on sheet 2

Note:
- WROGHT IRON OR ANY OTHER ELECTRICALLY CONDUCTIVE FENCES
NOTES:

1. THE CUSTOMER'S FENCE SHALL BE CONNECTED TO THE DWP TRANSFORMER PAD GROUNDING SYSTEM IF THE SHORTEST DISTANCE FROM THE TRANSFORMER PAD TO THE FENCE IS 6 FEET OR LESS (CASE 1).

2. THE CUSTOMER'S FENCE GROUNDING SYSTEM SHALL BE SEPARATE FROM THE DWP TRANSFORMER PAD GROUNDING SYSTEM IF THE SHORTEST DISTANCE FROM THE TRANSFORMER PAD TO THE FENCE IS MORE THAN 6 FEET BUT NOT MORE THAN 20 FEET (CASE 2).

3. IF THE SHORTEST DISTANCE FROM THE DWP TRANSFORMER PAD TO THE CUSTOMER'S FENCE IS MORE THAN 20 FEET, THE CUSTOMER'S FENCE IS NOT REQUIRED TO BE GROUNDED.

4. THE CUSTOMER'S FENCE OUTSIDE THE PRESCRIBED AREA IS NOT REQUIRED TO BE GROUNDED.

5. THE CUSTOMER SHALL INSTALL A GROUND ROD EVERY 15 FEET ALONG THE PERIMETER FENCE IN THE PRESCRIBED AREA.

6. THE PREFERRED METHOD OF CONNECTING THE FLEXIBLE BRAID TO THE GATE POSTS IS BY MAKING EXOTHERMIC CONNECTIONS. ONLY WHEN THE WALLS OF GATE POSTS ARE TOO THIN TO ALLOW EXOTHERMIC CONNECTIONS, THEN USE SUITABLE GROUND CLAMPS MADE OF TINNED ELECTRIC COPPER, THE CLAMPS SHALL BE PREFabRICATED WITH JUMPERS AND PIGTAILS, OR PIGTAILS ONLY, EXOTHERMICALLY WELDED TO THE LUGS.

7. FOR PRECAST CONCRETE PAD AND BARRIER POST INSTALLATION, REFER TO THE APPROPRIATE UB721 SERIES DRAWING.

8. ASSUME METAL-TO-METAL CONTACT BETWEEN THE GROUND CLAMP AND THE METAL POST BY REMOVING PAINT OR NON-CONDUCTIVE COATING. PAINT COATING CAN BE APPLIED AFTER ASSEMBLY.
NOTES:

1. FOR GENERAL REQUIREMENTS, SEE UGDC STD. NO. CT21-01. ALL SHEETS; CONSTRUCTION DRAWING WILL SPECIFY THE LOCATION, TYPE, AND NUMBER OF CONDUTS TO BE INSTALLED IN WOMB OF STRUCTURE.

2. INSTALL ALL GROUND WIRE IN THE EARTH 1'-0" BELOW THE FINISH GRADE. CONNECT GROUND WIRE TO A GROUND ROG. FILLED, EXTEND WIRE FROM CADWELD TERMINATION POINT TO 4 GROUND ROGS 3'-0". TERMINAL WITHIN 5'-0" OF EACH GROUND ROG. GROUND WIRE TOBeNull MUST BE 3'-0" X 7'-0" X 6" THICK PRECAST PAD. INSTALL COVER AND BOLTS FLUSH WITH CONCRETE SURFACE. COVER SHALL BE WELDED TO BAR, CONNECT GROUND WIRE TO 4 GROUND ROGS (PT. 21). EXTEND WIRES TO 4 GROUND ROGS TO 4 GROUND ROGS (PT. 21).

3. COVER SHALL BE PROVIDED WITH 6" NON-CORRODIBLE TITANIUM BOLTS. PROVIDE 1 OPEN END PLASTIC INSERTS WITH THREADED HOLE OR CLEAN OUT COVER IN HOLE. COVER SHALL BE PLACED AT LEAST 6" FROM THE FACE OF THE PAD.

4. SWITCHGEAR PAD SLAB MEET THE REQUIREMENTS OF DW&P SPECIFICATION NO. P-178 AS LAST REVISED EXCEPT ARTICLES 3(C)(1) AND 4 FOR PAD HANDHOLE PART. MINIMUM REQUIRED DESIGN LOADING FOR PAD SLAB SHALL BE ELEV. LOAD 1 SD 1000# (150). ELEV. LOAD 1 SD 1000# (150). ELEV. LOAD 1 SD 1000# (150). ELEV. LOAD 1 SD 1000# (150).

5. ALL STRUTS SHALL BE WELDED CONTINUOUS CONCRETE INSERTS AND SHALL BE EXTENDED AT LEAST 6" FROM THE FACE OF THE PAD. FILL HOLE WITH SLURRY-CEMENT CONCRETE CLASS 100-E-100 BACKFILL.

6. BACKFILL WITH NATURAL MATERIAL AND PERFORM 90% COMPACTION. AS AN ALTERNATIVE, BACKFILL WITH CRUSHED CONCRETE INSERTS AND PERFORM 90% COMPACTION.

7. IMPACT = NONE, LIVE LOAD = 100 LBS/SQ. FT.

8. WEIGHT AND DIMENSIONS VARY WITH MANUFACTURER. PRIOR TO EXCAVATION, STRUCTURE APPROVED BY THE DEPARTMENT REPRESENTATIVE. SAFETY AND PROTECTION REQUIREMENTS APPLY TO THE STRUCTURE.

9. 3'-0" X 7'-0" X 6" THICK PRECAST PAD IS A PART OF THE PRECAST ASSEMBLY. INSTALL COVER AND BOLTS FLUSH WITH CONCRETE SURFACE. COVER SHALL BE PLACED AT LEAST 6" FROM THE FACE OF THE PAD.

10. ALL CONDUTS SHALL BE COVERED WITH CONCRETE INSERTS AND SHALL BE EXTENDED AT LEAST 6" FROM THE FACE OF THE PAD.

11. WEIGHT OF THE HEAVIEST SECTION 17,100 LBS.

12.hetto FOR HALL OF STRUCTURE.

13. The dimensions and notes provided in the drawing are subject to change without notice. Always refer to the most current version of the plans and specifications for the latest information.
LAYOUT OF REQUIRED WORKSPACE PERIMETER

(For padmount egress orientation. Refer to underground standard page C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7' X 11' PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
FOR PADMOUNT SF6

FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
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SWITCH GEAR
FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

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FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
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DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

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DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 SWITCH GEAR

SWITCH GEAR
FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MAXIMUM OVERALL SPACIAL CLEARANCES, SEE STANDARDS DRAWING C721-10.

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

7’ X 11’ PRECAST PAD
FOR PADMOUNT SF6 Switchgear
LAYOUT OF REQUIRED WORKSPACE PERIMETER

(FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE: FOR MINIMUM OVERALL SPATIAL CLEARANCES SEE STANDARD DRAWING UB721-29.
Fence to be 9-gauge 2" square mesh galvanized chain link. Fence height to be 6'-0".

Ground rods per DWP Std. UB721-08. Note 2. Cadweld connection.

Cable tails per DWP Std UB721-08, Notes 2 & 3.

Detail A
Fence post grounding

Detail B
Fence post & gate grounding

 Bare Cu wire for ground grid will vary depending on the pad size. See appropriate UB drawing for specific ground grid wire & type. 2/0 Cu typical per station design and construction standard 40-10-05.
OPTION 1, TRIANGULAR CONFIGURATION

SUGGESTED CONFIGURATIONS OF SEPARATELY DERIVED SUPPLEMENTAL GROUND GRID

CROSSES BELOW 4/0 CU GROUND GRID WIRE

GROUND RODS (3)
M.C. 32-72-615

MIN. 12'

4/0 CU GROUND GRID WIRE

500 MCM BARE CU COPER CONDUCTOR
TRIANGLE PERIMETER

500 MCM CLP PJ COPPER CONDUCTOR
INSULATED WIRE

GROUNDED PLATES LOWER UPPER

VAULT

500 MCM CLP PJ COPPER CONDUCTOR
DWP PERSONNEL WILL USE THE SAME TYPE OF CONDUCTOR TO BOND THE TWO PLATES TOGETHER INSIDE THE VAULT

REFER TO RESPECTIVE PAD MOUNT DRAWING FOR PAD PERIMETER GROUND PLANE.
THE PAD AND SUBSTRUCTURE DRAWINGS ARE UNDER DWP STANDARD DRAWINGS UB721 SERIES

INSULATED WIRE COPPER CONDUCTOR
500 MCM 500MCM CLP PJ

GROUNDING PLATE M.C.32-72-615
GROUND ROD (3)

TRIANGLE PERIMETER COPPER CONDUCTOR
500MCM BARE CU

MIN. 12'

CROSSES BELOW 4/0 CU GROUND GRID WIRE

SUGGESTED CONFIGURATIONS OF SEPARATELY DERIVED SUPPLEMENTAL GROUND GRID
OPTION 2, LINEAR CONFIGURATION

SUGGESTED CONFIGURATIONS OF SEPARATELY DERIVED SUPPLEMENTAL GROUND GRID

NOTES:
1. THESE SKETCHES ARE FOR INFORMATION ONLY. THE CONTRACTOR SHALL FURNISH A COMPLETE SET OF DRAWINGS OF THE CONSTRUCTION TO DWP.
2. PROVIDE THREE GROUND ELECTRODES EACH TO BE ¾" X 8’ CU ROD, ¾" X 8’ CU PIPE, ½" X 4’ ELECTROPLATED ROD, OR †" X †’ CU CLAD STEEL ROD.
3. INSTALL ALL GROUND CABLES IN THE EARTH, 1'-6" MINIMUM BELOW THE GRADE OR CONCRETE SLAB OR ASPHALT, AND CONNECT TO THE GROUND RODS.
4. THE SEPARATELY DERIVED SUPPLEMENTAL GROUND GRID AND THE CONNECTION TO IT WILL BE GIVEN PRELIMINARY APPROVAL PENDING FINAL APPROVAL BASED ON ACCEPTABLE RESISTANCE MEASUREMENTS OF 5 OHMS OR LESS TAKEN BY DWP.
GENERAL INFORMATION:

THE DEPARTMENT OF WATER AND POWER (DWP) WILL NOT EQUIP THE TRANSFORMER PAD UNTIL THE REQUIREMENTS OF THESE DRAWINGS HAVE BEEN COMPLETED AND APPROVED BY DWP DESIGN ENGINEER.

IT IS EXPECTED THAT IT WILL TAKE DWP APPROXIMATELY ONE MONTH FROM THE TIME THE PAD WAS APPROVED AND A DWP DESIGN ENGINEER TO BUILD BOTH THE ON-SITE AND OFF-SITE FACILITIES NECESSARY TO PROVIDE THE PERMANENT ELECTRIC SERVICE TO THIS PROJECT.

IT IS THE RESPONSIBILITY OF THE OWNER OR DESIGN REPRESENTATIVE TO INFORM DWP IN WRITING OF THE MOST ACCURATE INSTALLMENT SERVICE DATE AT LEAST THREE MONTHS PRIOR TO THE SERVICE DATE. CHANGES IN SERVICE DATE MUST BE SUBMITTED IN WRITING TO THE DESIGN ENGINEER. FAILURE TO DO SO COULD DELAY ELECTRIFICATION OF THE STRUCTURE.

2 INSTALLATION AND INSPECTION SHALL BE IN ACCORDANCE WITH DWP UNDERGROUND CONDUIT REQUIREMENTS DRAWING PREPARED FOR THIS PROJECT. CONTRACTOR TO CONTACT THE DWP DESIGN ENGINEER TO OBTAIN A COPY OF THE CONDUIT REQUIREMENTS DRAWING PREPARED FOR THIS PROJECT.

TRANSFORMER PAD SHALL MEET THE ADDITIONAL INSTALLATION REQUIREMENTS OF DWP UNDERGROUND CONDUIT AND STRENGTH SPECIFICATION NO. 164 AND DWP POWER DISTRIBUTION DIVISION CONSTRUCTION STANDARDS NO. CB72-01 (ALL SHEETS) AS LAST REVISED WITH THE EXCEPTIONS NOTED HEREIN.

REQUIREMENTS FOR FABRICATION:

TRANSFORMER PAD SHALL BE REINFORCED CONCRETE AND SHALL MEET THE REQUIREMENTS OF DWP SPECS NO. 178 AS LAST REVISED EXCEPT ARTICLE 3 FOR PAD HANDLER AND ARTICLE 3 (C) (1) AND ARTICLE 4 FOR PAD LAB. MINIMUM REQUIRED DESIGN LOADING FOR PAD SLAB SHALL BE:

- LIVE LOAD = 500 LBS/SD/Ft
- DEAD LOAD = 4000 LBS/SD/Ft

ALL PULL IRONS PER UCC 1-205 SHALL BE SO PLACED AS TO WITHSTAND A WORKING LOAD OF 20,000 LBS/SD/Ft., UNLESS OTHERWISE SPECIFIED.

MANUFACTURER TO DELIVER PREFABRICATED TRANSFORMER PAD TO JOB SITE AND SUPPLY SPREADER BAR FOR UNLOADING. DWP OR INSTALLING CONTRACTOR TO PROVIDE MEANS FOR UNLOADING AND SETTING PRECAST UNITS. COVER SHELTS SHALL BE PROVIDED WITH NON-CORROSIVE FASTENING DEVICE ON THE CENTER LINE OF EACH SIDE WALLS TO SUPPORT STRUCTURES, AND MISCELLANEOUS HARDWARE OF THE PRECAST TRANSFORMER PAD. BONDING WIRE SHALL CONSIST OF EITHER 1-4/0 BARE COPPER (M.C. 34-08-154) OR 2-2/0 BARE COPPER (M.C. 34-08-152).

SELECT A LOCATION FREE OF SUBSTRUCTURES, CLEAR OF OVERHEAD OBSTRUCTIONS THAT WOULD INTERFERE WITH THE ROOF OF A LARGE CRANE AND MAKE WORKINGスペース FOR A CRANE TO UNLOAD THE SECTION FROM A TRUCK IN THE EXCAVATION. STRUCTURE SHALL BE SET ON A COMPACTED LEVEL BED OF CRUSHED AGGREGATE BASE.

THE ENCLOSURE SHALL BE LOCATED SO DWP WILL HAVE SUBSTRUCTURES, CLEAR OF OVERHEAD OBSTRUCTIONS THAT WOULD INTERFERE WITH THE ROOF OF A LARGE CRANE AND MAKE WORKINGスペース FOR A CRANE TO UNLOAD THE SECTION FROM A TRUCK IN THE EXCAVATION. STRUCTURE SHALL BE SET ON A COMPACTED LEVEL BED OF CRUSHED AGGREGATE BASE.

THE ENCLOSURE SHALL BE LOCATED SO DWP WILL HAVE ACCESS FOR CONSTRUCTION OR FOR MAINTENANCE TRUCKS AND EQUIPMENT, AND HAVE IMMEDIATE ACCESS FOR MAINTENANCE. REPAIRS, AND SWITCHING 24 HOURS A DAY. MATERIALS WILL BE UNLOADED AND STORED WITHIN 24 HOURS OF ARRIVAL.

IN THE ABSENCE OF COLD WATER PIPING SYSTEM MAIN, 2" MINIMUM, OR GROUND SUBSTITUTE SPECIFIED BY A DWP DESIGN ENGINEER. IN THE ABSENCE OF COLD WATER PIPING SYSTEM connecT THE 500 KCMIL INSULATED STRANDED COPPER CABLE (PT. 23) TO A CONTINUOUS METALLIC UNDERGROUND GROUND GRID EXCEPT WHERE THERE ARE POWER LINES, FENCES, AND OTHER SUBSTRUCTURES OR CABLES FOREIGN TO THE ENCLOSURE.

THE WALL OF ANY BUILDING ADJACENT TO THE ENCLOSURE SHALL BE OF REINFORCED CONCRETE, 3-4" ON CONCRETE BICCH WITH A MINIMUM FIRE RESISTANCE OF THREE HOURS AND SHALL HAVE NO OPENINGS ABOVE THE WALL IN THE DESIGNATION TEN FEET OF THE ENCLOSURE.

THE ENCLOSURE SHALL BE LOCATED SO DWP WILL HAVE ACCESS FOR CONSTRUCTION OR FOR MAINTENANCE TRUCKS AND EQUIPMENT, AND HAVE IMMEDIATE ACCESS FOR MAINTENANCE. REPAIRS, AND SWITCHING 24 HOURS A DAY. MATERIALS WILL BE UNLOADED AND STORED WITHIN 24 HOURS OF ARRIVAL.

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THE WALL OF ANY BUILDING ADJACENT TO THE ENCLOSURE SHALL BE OF REINFORCED CONCRETE, 3-4" ON CONCRETE BICCH WITH A MINIMUM FIRE RESISTANCE OF THREE HOURS AND SHALL HAVE NO OPENINGS ABOVE THE WALL IN THE DESIGNATION TEN FEET OF THE ENCLOSURE.

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6' CORNER ASSEMBLY

GROUP 3 - LEFT &
GROUP 4 - RIGHT

PLAN VIEW 6' CORNER ASSEMBLY

(LEFT ASSEMBLY IS A MIRROR IMAGE)
SECTION "A-A"

"ROUND BARS @ 12" O.C.

EQ. SPACED @ †"

(11) 1" X ¼" X ¾" X 53¼" LONG CHANNEL
EQ. SPACED @ ½" SIGN

(10) 1" X 1" X ¾" X 53¼" LONG ANGLE
EQ. SPACED @ ½"

DETAIL "3"

CABLE TRENCH BOX GRATE
(TO BE GALVANIZED AFTER FABRICATION)

DETAIL "C"

SLOTTED HOLE SEE DETAIL "C"

1/4" PLATE

1/8" DIA

(2) 13¼" X 1¼" FB. X 17½" LONG ANGLE

PLUG OPENING WELD FROM BACK-SIDE

ASSEMBLY

UB721-20 SHEET 5 OF 7
(1) 1\(\frac{1}{8}\)" X 1\(\frac{1}{4}\) FB. X 5\(\frac{1}{2}\)" LONG
(1) 1\(\frac{1}{8}\)" X 1\(\frac{1}{4}\) FB. X 5\(\frac{1}{2}\)" LONG
(1) 1\(\frac{1}{8}\)" X 1\(\frac{1}{4}\) FB. X 7\(\frac{1}{2}\)" LONG
(1) 1\(\frac{1}{8}\)" X 1\(\frac{1}{4}\) FB. X 30" LONG

「ROUND BARS @ 12" O.C.

PLAN VIEW RIGHT

DETAI L "A"

PLAN VIEW LEFT

DETAI L "B"

SIDE VIEW

ANGLED CABLE TRENCH BOX GRATE
(TO BE GALVANIZED AFTER FABRICATION)

PRECAST CABLE TRENCH BOX
(VARIOUS SIZE AND TYPE)
FOR CORRESPONDING 9'X12'
PRECAST TRANSFORMER PAD
W/HANOHOLE

CITY OF LOS ANGELES
DEPARTMENT OF
WATER AND POWER
INSTRUCTION ENGINEERING & SERVICES SECTION

PREPARED: JIM ANGELO
CHECKED: E.H. PERDING
APPROVED: 03/10/11

UB721-20 SHEET 6 OF 7
REMOVABLE BEAM ASSEMBLY

(RIGHT BEAM SHOWN-LEFT BEAM IS MIRROR IMAGE)

GALVANIZE AFTER FABRICATION

TO BE INSTALLED FOR SHIPMENT

DETAIL "4"

ANGLE BOLTED TO END CAP

(TO BE GALVANIZED AFTER FABRICATION)

NOTES:
1. C3 X 4.1 STEEL CHANNEL X 71 1/4" LONG.
2. 4" X 50 1/2" X 5/8" DIAMOND PLATE.
3. (11) 3" X 1" X 1/4" FB.
4. (1) 1 5/8" CENTER HOLE.
5. (1) 2 1/2" X 50 1/2" X 3/4" FB.
6. 2" X 2" X 5/8" ANGLE X 50 1/2" LONG.
7. 1 1/2"-13 NOT WELDED TO UNDERSIDE OF CHANNEL (4)

DETAIL "6"

END CAP BOLT ON

(LEFT ASSEMBLY IS A MIRROR IMAGE)

REQUIREMENTS FOR FABRICATION AND INSTALLATION

TRENCH BOX SHALL BE REINFORCED CONCRETE AND SHALL MEET THE REQUIREMENTS OF DWP STANDARD SPECIFICATIONS NO. P178, AS LAST REVISED AND AS MODIFIED HEREON.

STRUT AND BOLT INSTALLATION SHALL WITHSTAND A MINIMUM SHEAR LOAD OF 300 LBS/FT AND A PULL OUT LOAD OF 150 LBS/BOLT. MAXIMUM SPACING REQUIRED IS 16" O.C. AND 3" FROM EACH END OF STRUT. UNLESS OTHERWISE NOTED.

ALL STRUTS SHALL BE HOT DIP GALVANIZED CONTINUOUS CONCRETE INSERTS AND SHALL BE FLUSH WITH CONCRETE SURFACE. ALL STRUTS SHALL BE OF SIZE 1 1/2" X 1 1/2" X 1/2" DIAM. UNISTRUT PS200 SERIES.

MANUFACTURER TO DELIVER PREFABRICATED TRENCH BOX TO JOB SITE AND SUPPLY SPREADER BAR FOR UNLOADING. DWP OR INSTALLING CONTRACTOR SHALL PROVIDE MASKING FOR UNLOADING AND SETTING PRECAST UNITS.

SELECT A LOCATION FREE OF SUBSTRUCTURES, CLEAR OF OVERMEOSSING OBLSTRUCTIONS THAT WOULD INTERFERENCE WITH THE BOOM OF A CRANE AND HAVE AMple WORKING ROOM FOR A CRANE TO UNLOAD THE SECTION FROM A TRUCK INTO THE EXCAVATION.

DO NOT REMOVE ANY FLOOD KNOCKOUT.

TRENCH BOX SHALL BE SET ON A COMPACTED LEVEL BED OF CRUSHED AGGREGATE BASE.

TRENCH BOX SHALL BE REJECTED IF ANY PORTION OR KEY WAY, 12" OR LONGER, IS MISSING OR DAMAGED.

TRENCH BOX SECTION SHALL BE SET WITH SEALING COMPOUND APPROVED BY THE DWP UNDERGROUND ENGINEER AND SUPPLIED WITH TRENCH BOX.

BACKFILL SHALL BE NATURAL MATERIAL COMPACTED TO 90% AS AN ALTERNATIVE, BACKFILL SHALL BE 100-6-100 SAND CEMENT SLURRY, OR AS SPECIFIED IN DWP UNDERGROUND CONDUIT AND SUBSTRUCTURE SPECIFICATION NO. 104, AS LAST REVISED.

WEIGHT AND ALL OUTSIDE DIMENSIONS VARY WITH MANUFACTURER. VALUES GIVEN ARE LARGEST SHOWN ON MANUFACTURER'S DRAWINGS. PRIOR TO EXCAVATION, THE STRUCTURE INSTALLER SHALL OBTAIN THE MINIMUM REQUIRED EXCAVATION SIZE FROM THE MANUFACTURER SUPPLYING THE STRUCTURE.

ALL TRENCH BOXES SHALL MEET THE ADDITIONAL INSTALLATION REQUIREMENTS FOR DWP UNDERGROUND CONDUIT AND SUBSTRUCTURE SPECIFICATION NO. 104. AS LAST REVISED.

LADWP SHALL BOND THE STAINLESS STEEL FIRE BARRIER MOUNTING PLATE FROM THE TRANSITION BOX TO THE METALLIC STRUT BRACKET HARDWARE IN THE CABLE TRENCH. THEN FROM THE CABLE TRENCH TO THE METALLIC HARDWARE OF THE PRECAST TRANSFORMER PAD, BONDING WIRE SHALL BE CONSIST OF EITHER 1-4/0 BARE STRANDED COPPER WIRE (M.C. 34-08-154) OR 2-2/0 BARE STRANDED COPPER WIRES (M.C. 34-08-152).

DETAILED TRENCH BOX SECTIONS SHALL BE SET WITH SEALING COMPOUND APPROVED BY THE DWP UNDERGROUND ENGINEER AND THE MANUFACTURER TO DELIVER PREFABRICATED TRENCH BOX UNLESS OTHERWISE NOTED.

CONCRETE INSERTS AND SHALL BE FLUSH WITH CONCRETE SURFACE. ALL STRUTS SHALL BE OF SIZE 1 1/2" X 1 1/2" X 1/2" DIAM. UNISTRUT PS200 SERIES.

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NOTES:
1. (1) C3 X 4.1 STEEL CHANNEL X 71 1/4" LONG.
2. 4" X 50 1/2" X 5/8" DIAMOND PLATE.
3. (11) 3" X 1" X 1/4" FB.
4. (1) 1 5/8" CENTER HOLE.
5. (1) 2 1/2" X 50 1/2" X 3/4" FB.
6. 2" X 2" X 5/8" ANGLE X 50 1/2" LONG.
7. 1 1/2"-13 NOT WELDED TO UNDERSIDE OF CHANNEL (4)
## Material List

<table>
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<tr>
<th>#</th>
<th>Item</th>
<th>Description</th>
<th>Part No.</th>
<th>Manufacturer</th>
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<tr>
<td>1</td>
<td>Mounting Frame</td>
<td>TWF12</td>
<td>CROUSE-HINDS</td>
<td></td>
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<td>2</td>
<td>Seal Blocking Assy. Set</td>
<td>TW303050</td>
<td>CROUSE-HINDS</td>
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<td>3</td>
<td>Plug</td>
<td>TIMS</td>
<td>CROUSE-HINDS</td>
<td></td>
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<tr>
<td>4</td>
<td>Gasket, Tecron, Roll</td>
<td>AA0205</td>
<td>NELSON</td>
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</tbody>
</table>

## SST Mounting Plate "A"

- **Material:** Stainless Steel
- **Type:** 304
- **Thickness:** 0.050"

### Notes

- **See Note 11 on Sheet 3.**

### Dimensions

- **Overall Dimensions:** 40" x 32" x 3.5"
- **Opening Dimensions:** 4.0" x 10.25" x 0.75"

### Design

- **City of Los Angeles:** Department of Water and Power
- **Walling Engineered & Services Design:**
  - **Project:** Fire Barrier
  - **Ratings:** 4000A and 5000A Service

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### Changes

- **09/17/10:** Revised dimensions
- **06/18/10:** Revised dimensions
- **07/12/10:** Revised & added notes
- **06/15/10:** Revised & added notes
- **05/11/11:** Added note 12 on Sheet 3

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### Signature

- **Jesus Attain:**
  - Approval
  - 09/17/2009

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### Additional Information

- **Revision History:**
  - **06/18/10:** Revised dimensions
  - **07/12/10:** Revised & added notes
  - **06/15/10:** Revised & added notes
  - **05/11/11:** Added note 12 on Sheet 3
NOTES:

1. THE CUSTOMER SHALL FURNISH A 3-HOUR FIRE-RATED CABLE SEALING DEVICE OR DEVICES.

2. THE CABLE SEALING DEVICE OR DEVICES SHALL INCLUDE ALL NECESSARY FITTINGS AND WALL FLANGES THAT ARE IN ACCORDANCE WITH THE REQUIREMENTS OF THE NATIONAL FIRE PROTECTION ASSOCIATION FOR CLASS "A" OPENINGS. ADDITIONALLY, ALL SUPPORTING STRUCTURES AND MISCELLANEOUS PARTS REQUIRED TO MAKE A COMPLETE INSTALLATION SHALL BE PROVIDED.

3. THE CUSTOMER SHALL INSTALL THE MOUNTING PLATE, GASKET #1 AND GASKET #2. SEE NOTES 9 AND 10.

4. DWP SHALL INSTALL THE CABLE SEALING DEVICE FROM PARTS PROVIDED BY THE CUSTOMER.

5. THE CUSTOMER SHALL PURCHASE, OWN, AND MAINTAIN THE CABLE SEALING DEVICE OR DEVICES.

6. THE CONDUCTORS FOR THIS POWER SYSTEM WILL BE FURNISHED AND INSTALLED BY DWP AND WILL CONSIST OF A MAXIMUM OF SIX 929 KCMIL COPPER CONDUCTORS PER PHASE AND THREE 929 KCMIL COPPER CONDUCTORS FOR THE NEUTRAL. THE CONDUCTORS SHALL HAVE RHH/RHW INSULATION. THE MAXIMUM DIAMETER FOR THE PHASE AND NEUTRAL CONDUCTORS SHALL BE 1.68".

7. ALL DWP CONDUCTORS SHALL TERMINATE IN A LISTED AND APPROVED 5000 AMPERE BUSSED TERMINATING ENCLOSURE.


9. INSTALL GASKET #1 BETWEEN THE 3-HOUR FIRE-RATED WALL AND THE STAINLESS STEEL MOUNTING PLATE. SEE SHEET 2 FOR GASKET DETAILS. FABRICATE THE GASKET FROM THE NELSON CATALOG #AA0235 "TECHRON" ROLLS.

10. INSTALL GASKET #2 BETWEEN THE MOUNTING PLATE AND EACH CROUSE-HINDS TF12 FRAME.

11. ANY PROCESS USED WHETHER WATER JET, PLASMA, LASER OR EQUIVALENT PROCESSES SHALL NOT PRODUCE A TOTAL PLANAR DISTORTION OF 1/16 INCH ON THE LENGTH AND WIDTH OF THE MOUNTING PLATE. IN ADDITION, ALL CUTS SHALL BE SMOOTH AND FREE OF BURRS.

12. LADWP SHALL BOND THE STAINLESS STEEL FIRE BARRIER MOUNTING PLATE FROM THE TRANSITION BOX TO THE METALLIC STRUT BRACKET HARDWARE IN THE CABLE TRENCH. THEN FROM THE CABLE TRENCH TO THE METALLIC HARDWARE OF THE PRECAST TRANSFORMER PAD. BONDING WIRE SHALL CONSIST OF EITHER 1-4/0 BARE STRANDED COPPER WIRE (M.C. 34-08-152). OR 2-2/0 BARE STRANDED COPPER WIRES (M.C. 34-08-154).
SST STEEL MOUNTING PLATE "B"

PLATE "B" DIMENSION TOLERANCE +1/32"
SEE NOTE 12 ON SHEET 3.

3/8" THICK TYPE 304 STAINLESS STEEL

GASKET #1 (NELSON)

OPENING

0.75" DIA HOLE (TYP 16 PLACES)

OPENING

0.75" DIA HOLE (TYP 16 PLACES)

CITY OF LOS ANGELES
DEPARTMENT OF WATER AND POWER

WALL MOUNTED THREE HOUR RATED FIRE BARRIER
(NELSON FIRESTOP)
4000A AND 5000A SERVICE

3/8" THICK TYPE 304 STAINLESS STEEL

GASKET #1 (NELSON)

OPENING

0.75" DIA HOLE (TYP 16 PLACES)

OPENING

0.75" DIA HOLE (TYP 16 PLACES)
1. The customer shall furnish a 3-hour fire-rated cable sealing device or devices.

2. The cable sealing device or devices shall include all necessary fittings and wall flanges that are in accordance with the requirements of the National Fire Protection Association for Class A openings. Additionally, all supporting structures and miscellaneous parts required to make a complete installation shall be provided.

3. The customer shall install the mounting plate, gasket #1, and gasket #2. See notes 9, 10, and 11.

4. DWP will install the cable sealing device from parts provided by the customer.

5. The customer shall purchase, own, and maintain the cable sealing device or devices.

6. The conductors for this power system will be furnished and installed by DWP and will consist of a maximum of six 929 kcmil copper conductors per phase and three 929 kcmil copper conductors for the neutral. The conductors shall have RHH/RHW insulation. The maximum diameter for the phase and neutral conductors shall be 1.68".

7. All DWP conductors shall terminate in a listed and approved socket amphere bussed terminating enclosure.

8. The customer’s wall opening shall align with the 24”H x 32”W opening on the last modular trench. See drawing UB721-2G.

9. Item #7 on the material list shall be fabricated to form gaskets 1 and 2.

10. Install gasket #1 between the 3-hour fire-rated wall and the stainless steel mounting plate. See Sheet 2 for gasket detail.

11. Install gasket #2 between the mounting plate and the Nelson RGM6X3T frame.

12. Any process used whether water jet, plasma, laser or equivalent processes shall not produce a total planar distortion of 1/16 inch on the length and width of the mounting plate. In addition, all cuts shall be smooth and free of burrs.

13. LADWP shall bond the stainless steel fire barrier mounting plate from the transition box to the metallic strut bracket hardware in the cable trench. Then from the cable trench to the metallic hardware of the precast transformer pad. Bonding wire shall consist of either 1-4/0 bare stranded copper wire (M.C. 34-08-154) or 2-2/0 bare stranded copper wires (M.C. 34-08-152).

Notes:

- The customer shall furnish a 3-hour fire-rated cable sealing device or devices.
- The cable sealing device or devices shall include all necessary fittings and wall flanges that are in accordance with the requirements of the National Fire Protection Association for Class A openings. Additionally, all supporting structures and miscellaneous parts required to make a complete installation shall be provided.
- The customer shall install the mounting plate, gasket #1, and gasket #2. See notes 9, 10, and 11.
- DWP will install the cable sealing device from parts provided by the customer.
- The customer shall purchase, own, and maintain the cable sealing device or devices.
- The conductors for this power system will be furnished and installed by DWP and will consist of a maximum of six 929 kcmil copper conductors per phase and three 929 kcmil copper conductors for the neutral. The conductors shall have RHH/RHW insulation. The maximum diameter for the phase and neutral conductors shall be 1.68".
- All DWP conductors shall terminate in a listed and approved socket amphere bussed terminating enclosure.
- The customer’s wall opening shall align with the 24”H x 32”W opening on the last modular trench. See drawing UB721-2G.
- Item #7 on the material list shall be fabricated to form gaskets 1 and 2.
- Install gasket #1 between the 3-hour fire-rated wall and the stainless steel mounting plate. See Sheet 2 for gasket detail.
- Install gasket #2 between the mounting plate and the Nelson RGM6X3T frame.
- Any process used whether water jet, plasma, laser or equivalent processes shall not produce a total planar distortion of 1/16 inch on the length and width of the mounting plate. In addition, all cuts shall be smooth and free of burrs.
- LADWP shall bond the stainless steel fire barrier mounting plate from the transition box to the metallic strut bracket hardware in the cable trench. Then from the cable trench to the metallic hardware of the precast transformer pad. Bonding wire shall consist of either 1-4/0 bare stranded copper wire (M.C. 34-08-154) or 2-2/0 bare stranded copper wires (M.C. 34-08-152).
TRANSITION BOX SHALL BE REINFORCED CONCRETE AND SHALL MEET THE REQUIREMENTS OF DWP STANDARD SPECIFICATIONS NO. 9178, AS LATEST REVISED AND AS MODIFIED HEREON.

ALL 1/2" INSERTS SHALL BE MADE FROM PLASTIC AND SHALL WITHSTAND A MINIMUM ROLL-OVER LOAD OF 1500 LBS/INSERT, AND A MINIMUM SHEAR LOAD OF 300 LBS/INSERT, UNLESS OTHERWISE NOTED.

STRUT AND BOLT INSTALLATION SHALL WITHSTAND A MINIMUM SHEAR LOAD OF 5000 LBS/STRUT AND A MINIMUM ROLL-OVER LOAD OF 1500 LBS/BOLT, MAXIMUM SPACING REQUIRED IF SURFACE MOUNTED IS 16" O.C. AND 3" FROM EACH END OF STRUT. UNLESS OTHERWISE NOTED, ALL STRUTS SHALL BE CONTINUOUS ROLL O.D. 1 1/4" X .062 HOT DIP GALVANIZED STEEL.

MANUFACTURER TO DELIVER PREFABRICATED TRANSITION BOX TO JOB SITE AND SUPPLY SPREADER BAR FOR UNLOADING. DWP OR INSTALLING CONTRACTOR SHALL PROVIDE HEAVY FOR UNLOADING AND SETTING PRECAST UNITS.

SELECT A LOCATION FREE OF SUBSTRUCTURES, CLEAR OF OVERHEAD OBSTRUCTIONS THAT WOULD INTERFERE WITH THE USE OF A CRANE AND HAVE AMPLE WORKING ROOM FOR A CRANE TO UNLOAD THE Transition BOX FROM A TRUCK INTO THE EXCAVATION.

TRANSITION BOX SHALL BE SET ON A COMPACTED LEVEL BED OF CRUSHED AGGREGATE BASE.

TRANSITION BOX SHALL BE REJECTED IF ANY PORTION OR KEYWAY, 1/4" OR LONGER, IS MISSING OR DAMAGED.

TRANSITION BOX SECTIONS SHALL MEET THE ADDITIONAL INSTALLATION REQUIREMENTS FOR DWP UNDERGROUND CONDUIT AND SUBSTRUCTURE SPECIFICATION NO. 104, AS LAST REVISED AND AS MODIFIED HEREON.

WEIGHT AND ALL OUTSIDE DIMENSIONS VARY WITH MANUFACTURER. PRIOR TO EXCAVATION, STRUCTURE INSTALLER SHALL OBTAIN THE MINIMUM REQUIRED EXCAVATION SIZE FROM THE MANUFACTURER SUPPLYING THE STRUCTURE.

ALL TRANSITION BOXES SHALL MEET THE ADDITIONAL INSTALLATION REQUIREMENTS FOR DWP UNDERGROUND CONDUIT AND SUBSTRUCTURE SPECIFICATION NO. 104, AS LATEST REVISED.

L揭开 AND LOC. OF 1/2" LOOP INSERTS.

NOTE: TRENCH BOX IS SHOWN FOR ILLUSTRATION ONLY; REFER TO DRAWING UB721-20 FOR TRENCH BOX INFORMATION.

INDEX

TRANSITION BOX ONLY

TRANSITION BOX ONLY

SECTION "C-C"

TRANSITION BOX ONLY

SECTION "D-D"

TRANSITION BOX ONLY

SECTION "A-A"

TRANSITION BOX ONLY

NOTE: TRENCH BOX IS SHOWN FOR ILLUSTRATION ONLY; REFER TO DRAWING UB721-20 FOR TRENCH BOX INFORMATION.

CITY OF LOS ANGELES
DEPARTMENT OF WATER AND POWER
DESIGN ENGINEERING & SERVICES SECTION

PRECAST CABLE TRANSITION BOX AND ROOF SLAB DETAIL FOR CABLE ENTRANCE CABINET

DRAWING UB721-24 SHEET 1 OF 3
CAST IN PLACE PAD (NOT A PART OF THIS DRAWING).

CUSTOMER SHALL BE RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF CAST IN PLACE PAD.

FRAME AND COVER PER UGCS 2-418 (TO BE DELIVERED W/ PRECAST ITEMS)

PAD WIDTH AS REQUIRED PER DESIGN AND FIELD CONDITIONS

* 20" MIN TO 24" MAX

* 30" MIN TO 36" MAX

PLAN VIEW

3'-6" MIN.

SWITCHBOARD WORKSPACE WIDTH

SECTION "D-D"

SECTION "E-E"

SECTION "F-F"

NOTE: TRENCH BOX IS SHOWN FOR ILLUSTRATION ONLY. REFER TO DRAWING UB721-20 FOR TRENCH BOX INFORMATION.
NOTE: GALVANIZE AFTER FABRICATION

DETAIL "B" - SUPPORT BRACKET FOR LAST GRATE
(TO BE INSTALLED FOR SHIPMENT)
NOTES:

1. LAUDP SHALL BOND THE STAINLESS STEEL FIRE BARRIER MOUNTING PLATE FROM THE TRANSITION BOX TO THE METALLIC STRUT BRACKET HARDWARE IN THE CABLE TRENCH. THEN FROM THE CABLE TRENCH TO THE METALLIC HARDWARE OF THE PRECAST TRANSFORMER PAD. BONDING WIRE SHALL CONSIST OF EITHER 1/0 BARE STRANDED COPPER WIRE (M.C. 34-08-154) OR 2-2/0 BARE STRANDED COPPER WIRES (M.C. 34-08-152).

2. PRECAST TRANSITION BOX WITH CUSTOMER POURED IN PLACE SLAB PER UB721-24 (CROUSE-HINDS) (SHOWN)

3. CUSTOMER’S CABINET

4. CUSTOMER’S CABINET

5. METER CABINET

6. PRECAST TRANSITION BOX WITH CUSTOMER POURED IN PLACE SLAB PER UB721-24 (NELSON)

7. PRECAST CABLE TRENCH PER UB721-26

8. CABINET DOORS

9. PADMOUNTED TRANSFORMER

10. PRECAST 9’X12’ TRANSFORMER PAD PER UB721-19

11. THRU-WALL FIRE BARRIER ASSEMBLY (VIEW ROTATED 180º FOR CLARITY)

12. ALLOCATE A SECURE AREA IN SWITCHBOARD CABINET FOR PROVISIONS OF FIRE BARRIER RETROFIT KIT. RETROFIT KIT SHALL BE UTILIZED WHEN UPGRADING FROM A 3000A TO 4000A OR 5000A SERVICE. RETROFIT KIT SHALL BE STORED IN A ZIP-_PRESS CLEAR, 6-MIL MINIMUM POLYETHYLENE BAG OR BAGS.
1. The customer shall furnish a 3-hour fire-rated cable sealing device or devices.

2. The cable sealing device or devices shall include all necessary fittings and wall flanges that are in accordance with the requirements of the National Fire Protection Association for class A openings. Additionally, all supporting structures and miscellaneous parts required to make a complete installation shall be provided.

3. The customer shall install the mounting plate, gasket #1 and gasket #2. See notes 9 and 10.

4. DWP shall install the cable sealing device from parts provided by the customer.

5. The customer shall purchase, own and maintain the cable sealing device or devices.

6. The conductors for this power system will be furnished and installed by DWP and will consist of a maximum of four 929 kcmil copper conductors per phase and two 929 kcmil copper conductors for the neutral. The conductors shall have RHH/RHW insulation. The maximum diameter for the phase and neutral conductors shall be 1.68".

7. All DWP conductors shall terminate in a listed and approved 3000 ampere bushed terminating enclosure.

8. The customer’s wall opening shall align with the 24" x 32" opening on the last modular trench. See drawing UB721-20.

9. Install gasket #1 between the 3-hour fire-rated wall and the stainless steel mounting plate. Fabricate the gasket from the Nelson catalog #AA0235 "Techron" rolls. See sheets 1 & 2 of drawing UB721-21.

10. Install gasket #2 between the mounting plate and each Crouse-Hinds TWF12 frame. See sheets 1 & 2 of drawing UB721-21.

11. Items 3 and 5 are spares intended for future upgrade to 5000 ampere service. Items 3 and 5 shall be bagged and placed inside the switchboard incoming section.

12. Lamp shall bond the stainless steel fire barrier mounting plate from the transition box to the metallic strut bracket hardware in the cable trench. Then from the cable trench to the metallic hardware of the precast transformer pad. Bonding wire shall consist of either 1-2/0 bare stranded copper wire (M.C. 34-08-154) or 2-2/0 bare stranded copper wires (M.C. 34-08-153).

COURSE-HINDS
TW SERIES THRU-WALL BARRIER
3000 A SERVICE

MATERIAL LIST

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<thead>
<tr>
<th>ITEM NO.</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
<th>MANUFACTURER</th>
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<td>3</td>
<td>MOUNTING FRAME</td>
<td>TWF12</td>
<td>CROUSE-HINDS</td>
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<tr>
<td>8</td>
<td>SEAL BLOCKING ASSY. SET 15BA</td>
<td>TWB30355</td>
<td>CROUSE-HINDS</td>
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<td>4</td>
<td>SBA (SEE NOTE 11)</td>
<td>TWB30355</td>
<td>CROUSE-HINDS</td>
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<tr>
<td>5</td>
<td>PLUG</td>
<td>TWP5</td>
<td>CROUSE-HINDS</td>
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<tr>
<td>6</td>
<td>PLUG (SEE NOTE 11)</td>
<td>TWP5</td>
<td>CROUSE-HINDS</td>
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<td>7</td>
<td>GASKET, TECHRON, ROLL</td>
<td>AA0235</td>
<td>NELSON</td>
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<td>4</td>
<td>BLANK</td>
<td>TWB3</td>
<td>CROUSE-HINDS</td>
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MATERIAL LIST

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<td>FRAME</td>
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<tr>
<td>2</td>
<td>6</td>
<td>END PACKING HARDWARE</td>
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<tr>
<td>3</td>
<td>6</td>
<td>COMPRESSION PLATE</td>
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<tr>
<td>4</td>
<td>18</td>
<td>STAY PLATE, ALUMINUM</td>
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<td>5</td>
<td>34</td>
<td>MODULE, BLANK 60MM</td>
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<td>6</td>
<td>14</td>
<td>MODULE, CABLE HOLDING</td>
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<td>8</td>
<td>16</td>
<td>GASKET, TECRON, ROLL 30&quot;</td>
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* SEE NOTES 9 & 10 ON SHEET 2
** SEE NOTE 11 ON SHEET 2

MULTI-CABLE TRANSIT DETAIL "1"

MULTI-CABLE TRANSIT DETAIL "2"

PHASE A
PHASE B
PHASE C
NEUTRAL

3000 AMPERE SERVICE
FIRE BARRIER FOR WALL MOUNTED

5.16" 5.16" 5.16" 5.16" 5.16"
1.13"

SEE DETAIL 1 ON SHEET 2
SEE DETAIL 1 ON SHEET 2

SEE DETAIL 2 ON SHEET 2
SEE DETAIL 2

SEE DETAIL 3 ON SHEET 2
SEE DETAIL 3

SEE DETAIL 4 ON SHEET 2
SEE DETAIL 4

.41" DIA HOLE (TYP 16 PCS)
NOTES:

1. The customer shall furnish a 3-hour fire-rated cable sealing device or devices.

2. The cable sealing device or devices shall include all necessary fittings and wall flanges that are in accordance with the requirements of the National Fire Protection Association for Class A openings. Additionally, all supporting structures and miscellaneous parts required to make a complete installation shall be provided.

3. The customer shall install the mounting plate, gasket #1, and gasket #2. See Notes 9 and 10.

4. DWP shall install the cable sealing device from parts provided by the customer.

5. The customer shall purchase, own, and maintain the cable sealing device or devices.

6. The conductors for this power system will be furnished and installed by DWP and will consist of a maximum of four 929 kcmil copper conductors per phase and two 929 kcmil copper conductors for the neutral. The conductors shall have THHN/THW insulation. The maximum diameter for the phase and neutral conductors shall be 1.68".

7. All DWP conductors shall terminate in a listed and approved 3000 ampere bussed terminating enclosure.

8. The customer's wall opening shall align with the 24"H x 32"W opening on the last modular trench. See drawing UB721-20.

9. Install gasket #1 between the 3-hour fire-rated wall and the stainless steel mounting plate. Fabricate the gasket from the Nelson catalog #AA0235 "Techron" rolls. See drawing UB721-22, Sheet 2.

10. Install gasket #2 between the mounting plate and the Nelson frame. See drawing UB721-22, Sheet 5.

11. Item 7 on the material list is the cable holding module intended for future upgrade to 5000A service. The cable holding modules shall be bagged, labeled and placed inside the switchboard incoming section.

12. DWP shall bond the stainless steel fire barrier mounting plate from the transition box to the metallic strut bracket hardware in the cable trench. Then from the cable trench to the metallic hardware of the precast transformer pad. Bonding wire shall consist of either 1-2/0 bare stranded copper wire (M.C. 34-08-1541) or 2-2/0 bare stranded copper wires (M.C. 34-08-1521).
PADMOUNT OVERALL CLEARANCE TABLE

<table>
<thead>
<tr>
<th>LADWP STD. DWG.</th>
<th>STRUCTURE SIZES</th>
<th>CLEARANCE AT GRADE</th>
<th>OVERALL CLEARANCE</th>
<th>OVERALL HEIGHT</th>
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<tr>
<td>UB721-01</td>
<td>4' X 4'-6&quot;</td>
<td>7' 3' 3' 10'</td>
<td>14'-6&quot; 70'</td>
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<tr>
<td>UB721-02</td>
<td>4' X 7'</td>
<td>3' 3' 3' 10'</td>
<td>70'</td>
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<td>UB721-09</td>
<td>5' X 7'</td>
<td>7' 3' 3' 11'</td>
<td>17' 70'</td>
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<td>UB721-03</td>
<td>6' X 8'</td>
<td>3' 3' 3' 12'</td>
<td>70'</td>
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<td>UB721-14</td>
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<tr>
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<td>7' X 11'</td>
<td>6' 6'-6&quot; 4' 20' 21' 70'</td>
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<tr>
<td>UB721-10</td>
<td>7' X 13'</td>
<td>5'-2&quot; 4'-6&quot; 8' 16' 26'-2&quot; 70'</td>
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<tr>
<td>UB721-07</td>
<td>8' X 10'</td>
<td>3' 3' 3' 14' 16' **</td>
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<td>10'-6&quot; X 10'-6&quot;</td>
<td>6' 5'-6&quot; 3' 21'-6&quot; 19'-6&quot; 100'</td>
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</tbody>
</table>

* THE FRONT "A" CLEARANCE DIMENSION MAY NEED TO BE EXTENDED TO 6'-0" FROM A WALL

** CONSULT WITH DWP ENGINEER FOR CORRECT HEIGHT REQUIREMENT

MINIMUM OVERALL SPATIAL CLEARANCES FOR PRECAST PADMOUNT CONSTRUCTION

CITY OF LOS ANGELES
DEPARTMENT OF WATER AND POWER
DEVELOPMENT ENGINEERING & SERVICES SECTION

DESIGN W. PUNCHES DRAWING J. GARCIA

W. HINKSON W. YCEDO

MIN. 20'-3" 100' MIN. 26'-2" 70'
MIN. 21'-6" 100' MIN. 26'-7" 100'
MIN. 19'-6" 100' MIN. 19'-6" 100'

07/08/11 E9751
1. For general requirements, see UGCS STD. NO. C721-01 (all sheets). Construction detail will specify the location, type, and number of conduits to be installed in handhole.

2. Install all ground wire in the earth 1'-6" below the finish grade. Connect ground wire (PT. 22) to 400/000 rods (PT. 23). Extend wires form conduits tee connection (PT. 24) into manhole through 2" dia. terminator or SCH 40 PVC conduit. Cut holes where each wire enters manhole. Cut 1/2" of each wire into the manhole. All connections shall be relaid using exothermic reeding (PT. 25). Terminators, or equivalent.

3. Cover shall be provided with 6'-1/2" non-corrosive penta head bolts. Provide 1/2" open end plastic inserts through holes of clean out. Cover shall be flush with concrete surface. Cover shall be hot dip galvanized after removal inside. Cover is bed-mixed in place. If applicable:

4. Switchgear pad shall be reinforced concrete and shall meet the requirements of DW&P specification NO. P-178 as last revised except Article 4 for pad handhole. Minimum required design loading for pad slab shall be: live load = 100 lbs/sq. ft. dead load = 400 lbs/sq. ft. impact = none

5. All struts shall be hot dip galvanized continuous concrete inserts and shall be flush with concrete surface.

6. Backfill with natural material and perform 90% compaction. As an alternative, backfill with slurry-earth concrete class 100-100 backfill.

7. 3/4" x 7"-10" x 6" thick precast pad is a part of the precast assembly. Install precast pad flush to top of prestress transfer pad. Pad shall be set on 4" min. compacted level bed of natural material or crushed aggregate base. Unless otherwise approved by the department representative.

8. Weight and dimensions vary with manufacturer. Prior to excavation, structure installer shall obtain the minimum excavation size from the manufacturer supplying the structure.
LAYOUT OF REQUIRED WORKSPACE PERIMETER
(FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10)

NOTE:
FOR MINIMUM OVERALL SPATIAL CLEARANCES,
SEE STANDARD DRAWING UB721-25.

7' X 11' PRECAST PAD
FOR PADMOUNT
SOLAR VISTA 201 SF6
SWITCHGEAR
### Notes

1. For general requirements, see UGCS STD. NO. C721-01 (ALL SHEETS). Construction drawing will specify the location, type, and number of conduits to be installed in handhole.

2. Install all ground wires in the earth 1'-6" below the finish grade. Connect ground wire to 4 gound rods (PT. 21), extend wire ends from a common ground rod into handhole through 2" dia. terminator or SCH 40 PVC conduit. Grouth holes where wires enter handhole. Size 1" of each wire into the handhole. All connections shall be neled using exothermic welding (PT. 22) (CADWELD, THERMOWELD, or equal).

3. Cover shall be provided with 14'2" non-corrosive pentahedral head bolts. Provide 14'2" open end plastic inserts with mtom plate or clean cut. Cover shall remain flush with concrete surface. Cover shall not be galvanized after LADWP logo is bead welded in place of allergy.

4. Transformer pad shall be reinforced concrete and shall meet the requirements of Shop Specification No. P-178 as last revised except Article 4 for pad mount. All shee required design load is 5#8" dia. embed for switch anchor bolts typical 8 locations.

5. 5#8" dia. embed for cabinet anchor bolts typical 2 locations.

6. 6#8" dia. embed for switch anchor bolts typical 8 locations.

7. Backfill with natural material and perform no compaction as an alternative backfill with 4#8" embed concrete Class 100-4-100 backfill. Backfill shall be a blend of natural material or crushed aggregate base. Unless otherwise approved by the department representative.

8. 2'-0" x 10'-6" attack. Precast Pad is a part of the precast assembly. Install Precast Pad flush to top of precast transformer pad. Pad shall be set on 3" compacted level bed of natural material or crushed aggregate base, unless otherwise approved by the department representative.

9. Design and dimensions vary with manufacturer. Prior to excavation, structure installer shall specify the maximum elevation of the Manufacturer Supplier's Standard.
LAYOUT OF REQUIRED WORKSPACE PERIMETER

FOR PADMOUNT EGRESS ORIENTATION, REFER TO UNDERGROUND STANDARD PAGE C721-10

NOTE:
FOR MINIMUM OVERALL SPATIAL CLEARANCES
SEE STANDARD DRAWING UB721-29.
1. CLEARANCES SHOWN ARE FOR GENERAL INSTALLATIONS. CONSULT WITH ELECTRICAL DESIGN ENGINEER TO OPTIMIZE ACTUAL CLEARANCES.

2. WATER FACILITIES MUST BE CONSTRUCTED OUTSIDE OF THE CLEARANCE ZONE. WATER PIPES MUST BE PLACED BELOW THE CONDUIT BANKS.
TYPICAL CONDUIT MIN. RADIUS BENDS: PRIMARY = 3"

SAND-CEMENT SLURRY BACKFILL SHALL BE

25
21
22
CRUSHED ROCK

DO NOT FILL WITH PULLBOX

17" x 30"

GRADE FINISH

MIN.
4"
1'-6"
3"
6"
12"
6"
2" MIN.

(1161x472) M IN.

19"

TYP.
3'-8"
3'-8"
3'-8"
11'-0"

6 '-6 "

TYP.

1'-0 "

4 '-6 "

9" TYP.

F R O N T ON LEFT SIDE

PRIMARY DUCTS

12"x24" OPENING

22

INSERT

1" COIL

OPTIONAL

1" DRAFT

OPTIONAL

T Y P.

1'-0"

25
21
27
60+/-
EXOTHERMIC WELD, SEE NOTE 5
WIRE BARE TAPPED 2/0 CU, SEE NOTE 5

WEIGHT OF THE HEAVIEST SECTION 1,550 lbs.

NOTE:
1. FOR GENERAL REQUIREMENTS, SEE UGCS STD. NO. C721-01 (ALL SHEETS). CONSTRUCTION DRAWING WILL SPECIFY THE LOCATION, TYPE, AND SIZE OF CONDUITS enterin g HANDHOLE.
2. IF GALVANIZED CONDUIT IS USED, EXPOSED ENDS ARE TO BE THREADED AND FITTED WITH GROUND BUSHINGS.
3. TRANSFORMER PAD SHALL BE REINFORCED CONCRETE AND SHALL MEET THE REQUIREMENTS OF DW&P SPECIFICATION NO. P-178 AS LAST REVISED EXCEPT ARTICLE 4 FOR PAD HANDHOLE AND ARTICLE 3 (C) (1) AND ARTICLE 4 FOR PAD SLAB. MINIMUM REQUIRED DESIGN LOADING FOR PAD SLAB SHALL BE:
   LIVE LOAD = 100 lbs./sq. ft.
   DEAD LOAD = 600 lbs./lf. @ LOAD POINTS.
   IMPACT = NONE
4. ALL STRUTS SHALL BE HOT DIP GALVANIZED CONTINUOUS CONCRETE INSERTS AND SHALL BE FLUSH WITH CONCRETE SURFACE.
5. INSTALL ALL GROUND WIRE IN THE EARTH 1'-6" BELOW THE FINISH GRADE. CONNECT GROUND WIRE (PT.22) TO A GROUND ROSS (PT.21). EXTEND WIRE ENDS FROM A COMMON GROUND ROSS INTO HANDHOLE FROM BOTTOM COIL. EACH WIRE INTO THE HANDHOLE. ALL CONNECTIONS SHALL BE WELDED USING EXOTHERMIC WELDS (PT.25) OR EQUAL.

INDEX

NO.  QTY.  DESCRIPTION

21 4  GROUND ROD 7/8" D x 8', 304 SST SOLD
22 60+/  WIRE BARE TAPPED 2/0 CU, SEE NOTE 5
25  5  EXOTHERMIC WELD, SEE NOTE 5
27 3  7/8" x 19" x 4' LONG 12 GAUGE STRUT (UNISTRUT P3200 SERIES)

TYPICAL CONDUIT MIN. RADIUS BENDS: PRIMARY = 3"

SAND-CEMENT SLURRY BACKFILL SHALL BE

25
21
22
CRUSHED ROCK

DO NOT FILL WITH PULLBOX

17" x 30"

GRADE FINISH

MIN.
4"
1'-6"
3"
6"
12"
6"
2" MIN.

(1161x472) M IN.

19"

TYP.
3'-8"
3'-8"
3'-8"
11'-0"

6 '-6 "

TYP.

1'-0"

25
21
27
60+/-
EXOTHERMIC WELD, SEE NOTE 5
WIRE BARE TAPPED 2/0 CU, SEE NOTE 5

WEIGHT OF THE HEAVIEST SECTION 1,550 lbs.

NOTE:
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22
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DO NOT FILL WITH PULLBOX

17" x 30"

GRADE FINISH

MIN.
4"
1'-6"
3"
6"
12"
6"
2" MIN.

(1161x472) M IN.

19"

TYP.
3'-8"
3'-8"
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6 '-6 "

TYP.

1'-0"

25
21
27
60+/-
EXOTHERMIC WELD, SEE NOTE 5
WIRE BARE TAPPED 2/0 CU, SEE NOTE 5

WEIGHT OF THE HEAVIEST SECTION 1,550 lbs.

NOTE:
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21
22
CRUSHED ROCK

DO NOT FILL WITH PULLBOX

17" x 30"

GRADE FINISH

MIN.
4"
1'-6"
3"
6"
12"
6"
2" MIN.

(1161x472) M IN.

19"

TYP.
3'-8"
3'-8"
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6 '-6 "

TYP.

1'-0"

25
21
27
60+/-
EXOTHERMIC WELD, SEE NOTE 5
WIRE BARE TAPPED 2/0 CU, SEE NOTE 5

WEIGHT OF THE HEAVIEST SECTION 1,550 lbs.

NOTE:
1. FOR GENERAL REQUIREMENTS, SEE UGCS STD. NO. C721-01 (ALL SHEETS). CONSTRUCTION DRAWING WILL SPECIFY THE LOCATION, TYPE, AND SIZE OF CONDUITS enterin g HANDHOLE.
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NOTES:

1. FOR GENERAL REQUIREMENTS, SEE UGCS STD. NO. C721-01 (ALL SHEETS). CONSTRUCTION DRAWING WILL SPECIFY THE LOCATION, TYPE AND MANNER OF CONDUITS TO BE INSTALLED IN HANDHOLE.


3. THE ABOVE MENTIONED PERMITS FROM BSS AND LADOT SHALL BE INCLUDED TO THE EXCAVATION (U) PERMIT (APPROVED K-RAIL CLOSURE).


5. TRANSFORMER PRECAST PAD SHALL BE SET ON A 90% COMPACTED LEVEL BED OF SOIL OR OTHER APPROVED BASE MATERIAL. THE TRANSFORMER PRECAST PAD PULL BOX SHALL BE SET ON A WELL COMPACTED SOIL WITH 6-INCH DEPTH COMPACTED CRUSHED ROCK 1", GRADE A OR CONCRETE AGGREGATE #3, GRADE B, UNLESS OTHERWISE APPROVED.

6. BACKFILL WITH NATURAL MATERIAL AND PERFORM 90% COMPACTION, AS AN ALTERNATIVE BACKFILL WITH SLURRY-CEMENT CLASS 100-E-100, UNLESS APPROVED OTHERWISE.

7. IF PRECAST PAD IS TO BE INSTALLED IN A PUBLIC SIDEWALK, THE FOLLOWING REQUIREMENTS ARE APPLICABLE.
   a. THE CONTRACTOR SHALL OBTAIN BUILDING MATERIALS PERMIT FROM THE CITY LOS ANGELES BUREAU OF STREET SERVICES (BSS). PERMIT MUST PROVIDE LANGUAGE SPECIFIC TO LADWP SPECIAL CONDITIONS.
   b. THE CONTRACTOR SHALL ONLY INSTALL THE PRECAST PAD WITHIN THE DESIGNATED ENCLOSED AREA AS OUTLINED BY THE CITY OF LOS ANGELES DEPARTMENT OF TRANSPORTION (LADOT) APPROVED PERMIT.
   c. THE ABOVE MENTIONED PERMITS FROM BSS AND LADOT SHALL BE INCLUDED TO THE EXCAVATION (U) PERMIT APPLICATION ASSOCIATED WITH PROPOSED UNDERGROUND (UG) POWER SYSTEM DESIGN.


9. CONTRACTOR MUST REMOVE ALL CONDUITS FROM THE TEMPORARY SERVICE PAD DURING DECOMMISSION. ALL CONDUIT PIPES MUST BE REMOVED, CUT AND PLUGGED IN 30-INCHES MINIMUM BELOW FINISHED GRADE. INSTALLATION OF THE TRANSFORMER PRECAST PAD SHALL MEET THE INSTALLATION REQUIREMENTS OF THE DWP UNDERGROUND CONDUIT AND SUBSTRUCTURE SPECIFICATION NO. 104, AS LAST REVISED AND AS APPLICABLE.

* INCLUDE NOTES 7, 8 & 9 TO CONSTRUCTION DRAWING.

A. THE CONTRACTOR SHALL OBTAIN BUILDING MATERIALS PERMIT FROM THE CITY LOS ANGELES BUREAU OF STREET SERVICES (BSS). PERMIT MUST PROVIDE LANGUAGE SPECIFIC TO LADWP SPECIAL CONDITIONS.

B. THE CONTRACTOR SHALL ONLY INSTALL THE PRECAST PAD WITHIN THE DESIGNATED ENCLOSED AREA AS OUTLINED BY THE CITY OF LOS ANGELES DEPARTMENT OF TRANSPORTION (LADOT) APPROVED PERMIT.

C. THE ABOVE MENTIONED PERMITS FROM BSS AND LADOT SHALL BE INCLUDED TO THE EXCAVATION (U) PERMIT APPLICATION ASSOCIATED WITH PROPOSED UNDERGROUND (UG) POWER SYSTEM DESIGN.

D. THE CONTRACTOR SHALL OBTAIN BUILDING MATERIALS PERMIT FROM THE CITY LOS ANGELES BUREAU OF STREET SERVICES (BSS). PERMIT MUST PROVIDE LANGUAGE SPECIFIC TO LADWP SPECIAL CONDITIONS.

E. THE CONTRACTOR SHALL ONLY INSTALL THE PRECAST PAD WITHIN THE DESIGNATED ENCLOSED AREA AS OUTLINED BY THE CITY OF LOS ANGELES DEPARTMENT OF TRANSPORTION (LADOT) APPROVED PERMIT.

F. THE ABOVE MENTIONED PERMITS FROM BSS AND LADOT SHALL BE INCLUDED TO THE EXCAVATION (U) PERMIT APPLICATION ASSOCIATED WITH PROPOSED UNDERGROUND (UG) POWER SYSTEM DESIGN.


H. CONTRACTOR MUST REMOVE ALL CONDUITS FROM THE TEMPORARY SERVICE PAD DURING DECOMMISSION. ALL CONDUIT PIPES MUST BE REMOVED, CUT AND PLUGGED IN 30-INCHES MINIMUM BELOW FINISHED GRADE.

1. Excavation/shoring shall comply with the requirements of "Cal-Osha" excavation trenches, earthworks, construction safety orders. Section 1504, 1539-1543 latest addition. Depth of excavation shall not exceed 20 feet.

2. The size of the structures shown on the construction drawings are the outside dimensions. The size of excavation is approximately 2' larger to accommodate the shoring installation.

3. Power poles are not a part of the utility permit and are permit exempt per LAMC.

4. Tunnel under existing curbs, gutters & driveways where possible, subject to public works inspectors approval.

Traffic control:
- Watch manual shall be used for traffic control.

Notes:
- New pavement to match the same material and thickness of the existing pavement.
- Dimension "L":
  - If dimension "L" is less than 2'-0", the entire pavement in the space between existing gutter or curbl ine (if no gutter is present) has to be removed and reconstructed.
1. The precast vault (vault) shall be installed in an unobstructed location in accordance to the requirements noted herein and as specified in the Department of Water and Power (LADWP) Specifications No. 941, as last revised. The vault location must be clear from foreign pipes, structures, retaining walls, or fence footings, subterranean parking structures, basements, or building footings. Above or below grade, the location must also be clear of overhead obstructions that would interfere with the boom of a large crane used to unload the vault sections from a truck into the excavation. The vault location and access to it must remain clear of obstructions to facilitate initial transformer installation and future vault maintenance.

2. The vault shall not be installed over any existing foreign utility or structure.

3. Clearances shown above are minimum, except as otherwise noted. Proposed installations that do not comply with these requirements may be presented to the power distribution standards engineer for review and consideration.

4. Vault casting finished grade shall be 4 feet maximum from the sidewalk finished grade and shall comply with the requirements specified in the LADWP Specifications No. 941.

5. Plantings such as trees, plants and shrubs shall be at least 5 feet clear to all sides of the vault and allow access to the vault for maintenance. Trees shall be placed so that their growth does not interfere with the vault. Planting areas that interfere with the clearance stated above on the vault access area may be removed without notice at the customer's expense.

SECTION "A-A" N.T.S.

Notes:
- The precast vault (vault) shall be installed in an unobstructed location in accordance to the requirements noted herein and as specified in the Department of Water and Power (LADWP) Specifications No. 941, as last revised. The vault location must be clear from foreign pipes, structures, retaining walls, or fence footings, subterranean parking structures, basements, or building footings. Above or below grade, the location must also be clear of overhead obstructions that would interfere with the boom of a large crane used to unload the vault sections from a truck into the excavation. The vault location and access to it must remain clear of obstructions to facilitate initial transformer installation and future vault maintenance.
- The vault shall not be installed over any existing foreign utility or structure.
- Clearances shown above are minimum, except as otherwise noted. Proposed installations that do not comply with these requirements may be presented to the power distribution standards engineer for review and consideration.
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- Plantings such as trees, plants and shrubs shall be at least 5 feet clear to all sides of the vault and allow access to the vault for maintenance. Trees shall be placed so that their growth does not interfere with the vault. Planting areas that interfere with the clearance stated above on the vault access area may be removed without notice at the customer's expense.
INDEX

(TYPICAL)

PVC SCH 40 CAP WITH PULL TAPE ATTACHED.

2½" SCHEDULE 80 PVC CONDUIT 10' LONG

2½" SCHEDULE 40 PVC COUPLING (DO NOT CEMENT)

2¼ TO 2" SCHEDULE 40 PVC REDUCER

2" SCHEDULE 40 PVC COUPLING (DO NOT CEMENT)

LIGHT DUTY STRAP TO BE NAILED ON POLE.

CONTINUOUS CONCRETE ENCASMENT (330-C-1000) 3' MINIMUM ENVELOPE

ELEVATION

DETAIL 'A'

NOTES:

A FOR CONCRETE ENCASED, 3" AND ABOVE, CONDUIT BENDS. SEE D.W.P. POLE RISER DRAWING NO. UB745-03.

B DRAWING SHOWS TYPICAL DUCT ARRANGEMENT.

C VERIFY EXACT LOCATION OF CONDUIT AT BASE OF POLE WITH THE D.W.P. INSPECTOR BEFORE CONSTRUCTING.

D DO NOT CONSTRUCT CONDUIT TO POLE PRIOR TO INSTALLATION OF NEW POLE.

E RADIUS OF CONDUIT BEND IS AS STIPULATED UNLESS SPECIFIED BY DESIGN ENGINEER ON DESIGN DOCUMENTS.

SCALE: NTS

POLE RISER ENCASED, 2" CONDUIT BEND

POWDER DISTRIBUTION DESIGN STANDARDS
DEPARTMENT OF WATER AND POWER
CITY OF LOS ANGELES

DRAWING NUMBER UB745-01
GALVANIZED CONDUIT BEND

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<th>2&quot; STREET LIGHT</th>
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<td><strong>RADIUS R</strong></td>
<td>3'-0&quot;</td>
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<td><strong>10' LONG CONDUIT</strong></td>
<td>2&quot;</td>
<td>2'1/2&quot;</td>
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<td><strong>SCH 40 PVC COUPLING</strong></td>
<td><strong>NOT REQUIRED</strong></td>
<td><strong>2'1/2&quot;</strong></td>
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<tr>
<td><strong>SCH 40 PVC REDUCER</strong></td>
<td><strong>NOT REQUIRED</strong></td>
<td><strong>2'1/2&quot; TO 2&quot;</strong></td>
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<td><strong>COUPLING</strong></td>
<td><strong>GALVANIZED TO</strong></td>
<td><strong>SCH 40 PVC TO</strong></td>
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<td><strong>2&quot; PVC MINIMUM DB100</strong></td>
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NOTES:

A  FOR 3" AND ABOVE GALVANIZED BENDS, SEE D.W.P.
POLE RISER DRAWING NO. UB745-04.

B  DRAWING SHOWS TYPICAL DUCT ARRANGEMENT.

C  VERIFY EXACT LOCATION OF CONDUIT AT BASE OF POLE WITH THE D.W.P. INSPECTOR BEFORE CONSTRUCTING.

D  DO NOT CONSTRUCT CONDUIT TO POLE PRIOR TO INSTALLATION OF NEW POLE.

E  RADIUS OF CONDUIT BEND IS AS STIPULATED UNLESS SPECIFIED BY DESIGN ENGINEER ON DESIGN DOCUMENTS.

SCALE: NTS

POLE RISER
2" GALVANIZED BEND
INDEX

(TYPICAL)

PVC SCH 40 CAP WITH PULL TAPE ATTACHED.

(DO NOT CEMENT)

SEE NOTE F.

1. SCHEDULE 80 PVC CONDUIT 1K LONG
2. SCHEDULE 40 PVC COUPLING (DO NOT CEMENT)
3. SCHEDULE 40 PVC REDUCER (WHEN REQUIRED)
4. SCHEDULE 40 PVC COUPLING (DO NOT CEMENT)
5. SCHEDULE 80 PVC NIPPLE 2 LONG TO BE CHAMFERED AT BOTH ENDS IN ACCORDANCE WITH DETAIL "B".

DETAIL 'K'

CONTINUOUS CONCRETE ENCASEMENT (1300-C 700)

3 MINIMUM ENVELOPE

DETAIL 'B'

PVC CONDUIT BEND MINIMUM DB-00

ENCASED IN CONCRETE

ELEVATION

CONDUIT BEND

<table>
<thead>
<tr>
<th>RADIUS R</th>
<th>3' WITH REDUCER</th>
<th>4' WITH REDUCER</th>
<th>5' WITH REDUCER</th>
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<tbody>
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<td>3' SCH 80</td>
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<td>5' SCH 40 PVC REDUCER</td>
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<tr>
<td>6' SCH 40 PVC COUPLING</td>
<td>3'</td>
<td>4'</td>
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</tbody>
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NOTES:

A. FOR CONCRETE ENCASED 2" CONDUIT BENDS, SEE D.W.P. POLE RISER DRAWING NO. UB745-01.

B. DRAWING SHOWS TYPICAL DUCT ARRANGEMENT. ACTUAL SIZE OF CONDUIT WILL BE SHOWN ON DESIGN DOCUMENTS.

C. VERIFY EXACT LOCATION OF CONDUIT AT BASE OF POLE WITH THE D.W.P. INSPECTOR BEFORE CONSTRUCTING.

D. DO NOT CONSTRUCT CONDUIT TO POLE PRIOR TO INSTALLATION OF NEW POLE.

E. RADIUS OF CONDUIT BEND IS AS STIPULATED UNLESS SPECIFIED BY DESIGN ENGINEER ON DESIGN DOCUMENTS.

F. WHEN MORE THAN ONE CONDUIT RISER IS ON THE POLE, EACH RISER SHALL HAVE A 10' LENGTH PVC SCH 80 CONDUIT INSTALLED. AFTER INSPECTION AND APPROVAL BY THE DEPARTMENT'S REPRESENTATIVE, ANY SPARE CONDUITS SHALL HAVE THE 10' PVC REMOVED AND REPLACED WITH A PVC SCH 40 CAP. THIS CAP IS ALSO SUBJECT TO APPROVAL BY THE DEPARTMENT'S REPRESENTATIVE. (PULL TAPE SHALL BE ATTACHED AND PVC CAP SHALL NOT BE GLUED).

SCALE: NTS

POLE RISER

ENCASED, 3' AND ABOVE, CONDUIT BENDS

DRN. A. F. 11-04-92
CWD. M. YCEDO 11-04-92
DES. ENGR. S. POOSTI
APPO. J. D. McMAHON
DEPARTMENT OF WATER AND POWER
CITY OF LOS ANGELES

DRAWING NUMBER

UB745-03

11-4-93 A. F. CHANGED NOTE (F) AND CONDUIT TABLE S.P. APPV'D
REV. NO. DATE INIT'L REVISION

POWER DISTRIBUTION DESIGN STANDARDS
INDEX

GALVANIZED CONDUIT BEND

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<tr>
<td>SCH 80</td>
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<td>SCH 40 PVC NIPPLE</td>
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<tr>
<td>PVC COUPLING</td>
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</table>

NOTES:

A. FOR 2" GALVANIZED BENDS, SEE D.W.P. POLE RISER DRAWING NO. UB745-02

B. DRAWING SHOWS TYPICAL DUCT ARRANGEMENT. ACTUAL SIZE OF CONDUIT WILL BE SHOWN ON DESIGN DOCUMENTS.

C. VERIFY EXACT LOCATION OF CONDUIT AT BASE OF POLE WITH THE D.W.P. INSPECTOR BEFORE CONSTRUCTING.

D. DO NOT CONSTRUCT CONDUIT TO POLE PRIOR TO INSTALLATION OF NEW POLE.

E. RADIUS OF CONDUIT BEND IS AS STIPULATED UNLESS SPECIFIED BY DESIGN ENGINEER ON DESIGN DOCUMENTS.

F. WHEN MORE THAN ONE CONDUIT RISER IS ON THE POLE, EACH RISER SHALL HAVE A 10' LENGTH PVC SCH 80 CONDUIT INSTALLED. AFTER INSPECTION AND APPROVAL BY THE DEPARTMENT'S REPRESENTATIVE, ANY SPARE CONDUITS SHALL HAVE THE 10' PVC REMOVED AND REPLACED WITH A PVC SCH 40 CAP. THIS CAP IS ALSO SUBJECT TO APPROVAL BY THE DEPARTMENT'S REPRESENTATIVE. (PULL TAPE SHALL BE ATTACHED AND PVC CAP SHALL NOT BE GLUED.)

---

DRN. A. F. 11-04-92
COKD. W. YCEDD 11-04-92
DES.ENG. S. POOSTI
APPD. J. D. MCMONH

POLE RISER
3" AND ABOVE GALVANIZED BENDS

POWER DISTRIBUTION DESIGN STANDARDS
DEPARTMENT OF WATER AND POWER
CITY OF LOS ANGELES

DRAWING NUMBER UB 745-04
INDEX

PVC SCH 40 CAP WITH PULL TAPE ATTACHED, (DO NOT CEMENT)

STANDOFF BRACKET

1. SCHEDULE 80 PVC CONDUIT 10 LONG
2. SCHEDULE 40 PVC COUPLING (DO NOT CEMENT)
3. SCHEDULE 40 PVC REDUCER (WHEN REQUIRED)
4. SCHEDULE 40 PVC COUPLING (DO NOT CEMENT)
5. SCHEDULE 80 PVC NIPPLE 2' LONG TO BE CHAMFERED AT BOTH ENDS IN ACCORDANCE WITH DETAIL 'B'.

SEE NOTE F.

6' WOOD BLOCKING (FOR REQUIRED STANDOFF DISTANCE AND CORRECT CONDUIT ALIGNMENT), BLOCKING TO BE REMOVED AFTER INSTALLATION OF STANDOFF BRACKET.

BUILDING FELT

PVC CONDUIT BEND MINIMUM EB-100

CONTINUOUS CONCRETE ENCASMENT (330°C-700) 3' MINIMUM ENVELOPE

COUPLING

PVC CONDUIT MINIMUM EB-35 ENCASED IN CONCRETE

ELEVATION

CONDUIT BEND

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<th>3&quot;</th>
<th>4&quot; WITH REDUCER</th>
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<th>6&quot; WITH REDUCER</th>
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<td>1 SCH 80</td>
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<td>SCH 40 - 10 LONG</td>
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<td>4'</td>
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<td>5 SCH 40 PVC REDUCER</td>
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<td>5 SCH 80 PVC NIPPLE - 2' LONG</td>
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NOTES:

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SCALE: NTS

POLE RISER WITH STANDOFF BRACKET ENCASED, 3" AND ABOVE, CONDUIT BENDS

DRANJ. GARCIA 2/6/99

CKD. W. TENDER 2/12/99

DES. ENGR. W. ATTILA

POWER DISTRIBUTION DESIGN STANDARDS

DEPARTMENT OF WATER AND POWER

CITY OF LOS ANGELES

DRAWING NUMBER UB745-06

REV. NO. DATE INIT'L REVISION APPV'D

3BP
A 2" APPROX.

DETAIL 'A'

1. SCHEDULE 80 PVC CONDUIT
   10' LONG
2. SCHEDULE 40 PVC COUPLING
   (DO NOT CEMENT)
3. SCHEDULE 40 PVC REDUCER
   (WHEN REQUIRED)
4. SCHEDULE 40 PVC COUPLING
   (DO NOT CEMENT)
5. SCHEDULE 80 PVC NIPPLE - 2' LONG

STANDOFF BRACKET

- NEW OR EXISTING POLE
- 24" APPROX.
- 6'-0" APPROX.

FINISH GRADE

ADAPTER COUPLING
PVC TO GALVANIZED

GALVANIZED CONDUIT BEND

SCALE: NTS

CITY OF LOS ANGELES
DEPARTMENT OF WATER AND POWER
DISTRIBUTION ENGINEERING & SERVICES SECTION

DESIGN
DRAFTING
OK
APPROVED
CHECKER
DATE

REV.
NO.
REV.
DATE
MISSION
PROJECT
W.O.
CONTRACT

CONDUIT BEND

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G. THE STANDOFF BRACKET SHOULD BE PLACED AWAY FROM THE CURB FACE AND TRAFFIC.
NOTES:
1. **LENGTH TO BE DETERMINED BY HEIGHT OF FENCE AND LOCATION OF FESTOONING.**
2. ***"MINIMUM CABLE REQUIRED" IS BASED ON A 36" LOOP DEPTH BETWEEN TROLLEYS PLUS AN ADDITIONAL 15 FEET FOR CONNECTING TO GROUNDING.***
3. ***LENGTH TO BE DETERMINED BY WIDTH OF GATE BEING USED.***
4. INSTALL ALL GROUND WIRE IN THE EARTH 1'-6" BELOW THE FINISH GRADE. CONNECT GROUND WIRE (PT.2) TO 2 GROUND RODS (PT.1) USING EXOTHERMIC WELDING (PT.3), (CAINED, THERMOWELD, OR EQUAL).
5. WIRE ROPE FESTOON KIT BY MCMASTERCARR TO BE USED OR EQUIVALENT.
6. TENSION BRACKET TO BE MODIFIED PER DETAILS THIS SHEET.
7. TOW ARM TO BE MODIFIED, CUT DOWN FROM 18" TO 2" WIN OR AS REQUIRED.