# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GENERAL PROVISIONS</td>
<td>8</td>
</tr>
<tr>
<td>1.01</td>
<td>GENERAL</td>
<td>8</td>
</tr>
<tr>
<td>1.02</td>
<td>PLANS AND SPECIFICATIONS</td>
<td>8</td>
</tr>
<tr>
<td>1.03</td>
<td>PURPOSE AND DEFINITIONS</td>
<td>8</td>
</tr>
<tr>
<td>1.04</td>
<td>CONSTRUCTION PLANS</td>
<td>9</td>
</tr>
<tr>
<td>1.05</td>
<td>GENERAL CONSTRUCTION NOTES</td>
<td>10</td>
</tr>
<tr>
<td>1.06</td>
<td>AGREEMENTS AND BONDS</td>
<td>23</td>
</tr>
<tr>
<td>1.07</td>
<td>CONTROL OF WORK</td>
<td>23</td>
</tr>
<tr>
<td>1.07.01</td>
<td>Sanitation Facilities</td>
<td>23</td>
</tr>
<tr>
<td>1.07.02</td>
<td>Cleanliness of Street</td>
<td>23</td>
</tr>
<tr>
<td>1.07.03</td>
<td>Project Appearance</td>
<td>24</td>
</tr>
<tr>
<td>1.07.04</td>
<td>Areas for Contractor Use</td>
<td>24</td>
</tr>
<tr>
<td>1.07.05</td>
<td>Work Safety</td>
<td>24</td>
</tr>
<tr>
<td>1.07.06</td>
<td>Confined Spaces</td>
<td>25</td>
</tr>
<tr>
<td>1.07.07</td>
<td>Record Drawings</td>
<td>25</td>
</tr>
<tr>
<td>1.07.08</td>
<td>Sound Control Requirements</td>
<td>25</td>
</tr>
<tr>
<td>1.08</td>
<td>CONTROL OF MATERIALS</td>
<td>26</td>
</tr>
<tr>
<td>1.08.01</td>
<td>Disposal of Material</td>
<td>26</td>
</tr>
<tr>
<td>1.08.02</td>
<td>Compaction and Testing</td>
<td>26</td>
</tr>
<tr>
<td>1.08.03</td>
<td>Inspection and Acceptance of Work</td>
<td>27</td>
</tr>
<tr>
<td>1.09</td>
<td>LEGAL RELATIONS AND RESPONSIBILITIES</td>
<td>27</td>
</tr>
<tr>
<td>1.09.01</td>
<td>Insurance</td>
<td>27</td>
</tr>
<tr>
<td>1.09.02</td>
<td>Indemnification</td>
<td>27</td>
</tr>
<tr>
<td>1.09.03</td>
<td>Public Safety</td>
<td>28</td>
</tr>
<tr>
<td>1.09.04</td>
<td>Preservation of Property</td>
<td>29</td>
</tr>
<tr>
<td>1.09.05</td>
<td>Permits and Licenses</td>
<td>30</td>
</tr>
<tr>
<td>1.09.06</td>
<td>Working Days and Hours of Work</td>
<td>30</td>
</tr>
<tr>
<td>1.09.07</td>
<td>Flood Evacuation</td>
<td>31</td>
</tr>
<tr>
<td>1.10</td>
<td>CONSTRUCTION DETAILS</td>
<td>31</td>
</tr>
<tr>
<td>1.10.01</td>
<td>Order of Work</td>
<td>31</td>
</tr>
</tbody>
</table>
1.10.02 Water Pollution Control................................................................. - 32 -
1.10.03 Pre-Construction Meeting......................................................... - 37 -
1.10.04 Obstructions .............................................................................. - 37 -
1.10.05 Utilities....................................................................................... - 39 -
1.10.06 Maintaining Traffic ................................................................... - 39 -
1.10.07 Finishing Work........................................................................... - 41 -
1.10.08 Dust Control............................................................................... - 41 -
1.10.09 Clearing and Grubbing ............................................................... - 41 -
1.10.10 Earthwork .................................................................................. - 42 -
1.10.11 Grading Permits......................................................................... - 43 -
1.10.12 Licenses and Permits ................................................................. - 43 -

2 - DRAINAGE STANDARDS ............................................................................................... - 44 -

2.01 GENERAL ....................................................................................................... - 44 -
2.02 DESIGN CRITERIA...................................................................................... - 44 -
2.03 DRAINAGE ANALYSIS AND CALCULATIONS............................... - 45 -
2.03.01 Storm Drainage Analysis ............................................................ - 45 -
2.03.02 Stormwater Drainage Calculations.............................................. - 47 -
   A. Rational Method .................................................................................. - 48 -
   B. Napa Charts ........................................................................................ - 50 -
   C. HEC Hydrology Modeling .................................................................. - 50 -
2.03.03 Hydrology / Hydraulics................................................................. - 51 -
2.04 DRAINAGE STRUCTURES.......................................................................... - 52 -
2.05 OPEN CHANNEL DESIGN ................................................................. - 53 -
2.06 BENCH DRAINS AND DIVERSION DITCHES .................................... - 53 -
2.07 LEVEES ................................................................................................... - 54 -
2.08 SLOPE PROTECTION............................................................................... - 54 -
2.09 STRUCTURE OPERATION CRITERIA.................................................. - 54 -
2.10 DETENTION.................................................................................................. - 54 -
2.10.01 Purpose .......................................................................................... - 54 -
2.10.02 Introduction .................................................................................... - 55 -
2.10.03 Concepts and Definitions.............................................................. - 56 -
   A. Detention and Retention .................................................................... - 56 -
   B. On-site Storage ................................................................................... - 56 -
2.10.04 Principles and Policies................................................................. - 58 -
A. Avoiding Detrimental Effects ................................................................. - 58 -
B. On-site Storage ........................................................................................ - 58 -

2.10.05 Hydrologic Evaluation .................................................................. - 58 -
A. Objective Outflows ................................................................................. - 59 -
B. Outflow Control ...................................................................................... - 59 -
C. Duration .................................................................................................. - 59 -

2.10.06 Detention Tanks and Vaults ............................................................ - 59 -
A. Design Requirements ............................................................................. - 59 -
B. Materials and Structural Stability .............................................................. - 60 -

2.10.07 Control Structures .......................................................................... - 60 -

2.12 DRAINAGE EASEMENTS ................................................................. - 61 -

2.13 SPECIAL PROVISIONS ................................................................... - 62 -
2.13.01 Asphalt Placement ........................................................................ - 62 -
2.13.02 Crack Sealing of Trench Patch ......................................................... - 63 -
2.13.03 Trenching, Boring, Backfill and Compaction ................................. - 63 -
2.13.04 Cover Requirements ...................................................................... - 65 -
2.13.05 Reinforced Concrete Pipe (RCP) ...................................................... - 66 -
2.13.06 Cast in Place Pipe (CIPP) ................................................................. - 66 -
2.13.07 Video Inspection ........................................................................... - 67 -
2.13.08 Vertical Grade / Standing Water Allowance .................................... - 68 -
2.13.09 Caps/Stoppers ............................................................................... - 68 -

2.14 STORMWATER QUALITY ................................................................. - 69 -
2.14.01 POST CONSTRUCTION SITE DESIGN MEASURES ..................... - 69 -

2.15 MISCELLANEOUS ITEMS ................................................................. - 70 -
2.15.01 Creek Setbacks ............................................................................. - 70 -
2.15.02 Fencing .......................................................................................... - 70 -
2.15.03 Service Roads ................................................................................ - 70 -

2.16 CHARTS, FIGURES, AND TABLES .................................................... - 72 -
2.16.01 Charts ............................................................................................ - 72 -
Chart 2.1 Flow in Triangular Gutter Sections ........................................... - 74 -
Chart 2.2 Isohyetal Map of Napa City .......................................................... - 75 -
2.16.02 Figures ............................................................................................ - 76 -
Figure 2.1 City of Napa Discharge vs. Drainage Area ............................... - 78 -
Figure 2.2 Residential Area 10-Year Peak Flow - 0 to 80 Acres ................ - 79 -
Figure 2.3 Commercial Area 10-Year Peak Flow - 0 to 80 Acres .............. - 80 -
Figure 2.4 Rural Area 10-Year Peak Flow - 0 to 80 Acres................................. - 81 -
Figure 2.5 Residential Area 100-Year Peak Flow - 0 to 80 Acres ..................... - 82 -
Figure 2.6 Commercial Area 100-Year Peak Flow - 0 to 80 Acres............... - 83 -
Figure 2.7 Rural Area 100-Year Peak Flow - 0 to 80 Acres............................... - 84 -
Figure 2.8 Tc+R and Area Relationship for Napa.............................................. - 85 -
Figure 2.9 Bank and Shore Protection............................................................... - 86 -
Figure 2.10 Salvador Drainage Basin............................................................... - 87 -

2.16.03 Tables......................................................................................................... - 88 -
Table 2.1 Criteria & Methods to Estimate Discharge........................................ - 90 -
Table 2.2 Rainfall Depth - Duration .................................................................. - 91 -
Table 2.3 Rainfall Intensity - Duration............................................................... - 92 -
Table 2.4 Runoff Coefficient for Rational Method............................................. - 93 -

3 - STREET STANDARDS .................................................................................................... - 94 -

3.01 STREET DESIGN CRITERIA.................................................................................. - 94 -
3.01.01 Definitions................................................................................................... - 94 -
  A. Arterial .......................................................................................................... - 94 -
  B. Collector ......................................................................................................... - 94 -
  C. Local Streets .................................................................................................. - 94 -
3.01.02 General..................................................................................................... - 94 -
3.01.03 Street Design Criteria Table................................................................. - 95 -
3.01.04 Vertical Alignment................................................................................... - 97 -
3.01.05 Horizontal Alignment ........................................................................... - 97 -
3.01.06 Pavement Structural Section (Streets)............................................... - 99 -
  A. Pavement Structural Section Design............................................................. - 99 -
  B. Geotechnical Report (Pavement Structural Section Data)............................ - 99 -
3.02 DRIVEWAYS AND PARKING FACILITIES...................................................... - 102 -
3.02.01 Definitions and Regulations.................................................................... - 102 -
3.02.02 Two-Way Service .................................................................................. - 102 -
3.02.03 Design Criteria....................................................................................... - 103 -
3.03 DRIVEWAY & PRIVATE STREET CONNECTIONS TO PUBLIC STREETS ... - 105 -
3.04 FIRE DEPARTMENT ACCESS.......................................................................... - 105 -
3.04.01 General................................................................................................... - 105 -
3.04.02 Fire Access Requirements (For Building Construction)...................... - 107 -
3.05 STREET SPECIAL PROVISIONS...................................................................... - 108 -
3.05.01 Existing Facilities ........................................................................................................... - 108 -
3.05.02 Aggregate Base ............................................................................................................. - 109 -
3.05.03 Asphalt Concrete ......................................................................................................... - 109 -
  General ................................................................................................................................. - 109 -
  Description ............................................................................................................................ - 109 -
  Materials ............................................................................................................................... - 109 -
  Storing, Proportioning and Mixing Materials ....................................................................... - 112 -
  Subgrade, Prime Coat, Paint Binder (Tack Coat) ................................................................. - 121 -
  Spreading and Compacting Equipment .............................................................................. - 122 -
  Miscellaneous ....................................................................................................................... - 127 -
3.05.04 Miscellaneous Concrete Construction ........................................................................... - 127 -
3.05.05 Signs and Pavement Markers ...................................................................................... - 128 -

4 - LANDSCAPING STANDARDS ................................................................................................. - 130 -
4.01 PUBLIC RIGHT-OF-WAY STREET TREE PLANTING ..................................................... - 130 -
4.02 PUBLIC RIGHT-OF-WAY LANDSCAPE SPECIFICATIONS ........................................... - 131 -
  4.02.01 General Requirements ............................................................................................... - 131 -
  4.02.02 Required Inspection Points ....................................................................................... - 131 -
  4.02.03 Site Preparation and Grading .................................................................................... - 131 -
  4.02.04 Irrigation Piping and Electrical Systems .................................................................. - 132 -
    A. Materials ...................................................................................................................... - 132 -
    B. Installation ................................................................................................................... - 132 -
  4.02.05 Central Control System Specifications ...................................................................... - 134 -
    A. General ...................................................................................................................... - 134 -
    B. Products .................................................................................................................... - 134 -
    C. Execution of Work .................................................................................................... - 136 -
    D. Equipment Supplier Support ..................................................................................... - 137 -
  4.02.06 Landscaping Materials ............................................................................................... - 137 -
  4.02.07 Soil Preparation ......................................................................................................... - 138 -
  4.02.08 Soil Conditioning ....................................................................................................... - 138 -
  4.02.09 Tree Staking (Other than Street Trees) ..................................................................... - 139 -
  4.02.10 Planting .................................................................................................................. - 139 -
  4.02.11 Establishing Maintenance Period ............................................................................ - 140 -
  4.02.12 Maintenance ........................................................................................................... - 140 -
4.03 TREE PRESERVATION STANDARDS ................................................................................ - 141 -
4.03.01 Purpose .................................................................................................... - 141 -
4.03.02 Construction Inspection and Supervision ............................................. - 141 -
4.03.03 Protection Within Drip Line of Individual Trees.................................... - 141 -
4.03.04 Grade Changes .................................................................................... - 142 -
4.03.05 Underground Construction .................................................................... - 144 -
4.03.06 Pruning Requirements ......................................................................... - 144 -
4.03.07 Additional Recommended Procedures ................................................. - 145 -
4.03.08 Fertilization .......................................................................................... - 145 -
4.03.09 Mulching ............................................................................................... - 145 -
4.03.10 Pest Control .......................................................................................... - 146 -
4.03.11 Disease Control .................................................................................... - 146 -
4.03.12 Reference .............................................................................................. - 146 -
4.03.13 Planting Under Existing Trees ............................................................... - 146 -

5 - WATER DISTRIBUTION SYSTEM STANDARDS ......................................................... - 147 -
5.01 WATER DESIGN .......................................................................................... - 147 -
5.01.01 Distribution System ................................................................................ - 147 -
5.01.02 General Design Guidelines .................................................................... - 147 -
5.01.03 Ductile Iron Pipe and Fittings ................................................................. - 148 -
5.01.04 Valves ..................................................................................................... - 148 -
5.01.05 Fire Hydrants .......................................................................................... - 148 -
5.01.06 Water Service Laterals .......................................................................... - 148 -
5.01.07 Water Meters .......................................................................................... - 149 -
5.01.08 Backflow Prevention Devices ................................................................. - 149 -
5.01.09 Special Study Areas ................................................................................ - 150 -

5.02 WATER SPECIAL PROVISIONS ..................................................................... - 150 -
5.02.01 General .................................................................................................. - 150 -
5.02.02 Distribution Mains .................................................................................. - 151 -
5.02.03 Water Services ........................................................................................ - 152 -
5.02.04 Materials ............................................................................................... - 152 -
5.02.05 Excavation and Backfill ........................................................................ - 155 -
5.02.06 Water Line Installation .......................................................................... - 155 -
5.02.07 Pressure Testing ...................................................................................... - 156 -
5.02.08 Bacteriological Tests .............................................................................. - 157 -
5.02.09 Chlorinating and Flushing ...................................................................... - 157 -
5.02.10 City-Owned Facilities ........................................................................................................... - 158 -
5.02.11 Construction Water ............................................................................................................. - 158 -
5.02.12 Water Conservation ........................................................................................................... - 159 -
5.02.13 Figures .............................................................................................................................. - 159 -

Figure 5.1 Upper Zone Water Map ......................................................................................... - 161 -

Figure 5.2 Checklist for Water Main Disinfection and Sampling ........................................ - 162 -
1 - GENERAL PROVISIONS

1.01 GENERAL

All infrastructure improvements that are subject to the review and approval authority of the City of Napa shall conform to the design criteria set forth in these City Standard Specifications, as well as the City Standard Plans (which are hereby incorporated by reference into these City Standard Specifications).

1.02 PLANS AND SPECIFICATIONS

All construction work shall be done in accordance with the Standard Specifications of the State of California Department of Transportation, latest edition, Standard Plans of the State of California Department of Transportation, latest edition, the City of Napa Standard Specifications, latest edition, and the City of Napa Standard Plans, latest edition. In case of conflict between the Standard Specifications of the State of California Department of Transportation or the Standard Plans of the State of California Department of Transportation and the City of Napa Standard Specifications or the City of Napa Standard Plans, the City of Napa Standard Specifications and the City of Napa Standard Plans shall take precedence over and be used in lieu of such conflicting portions.

1.03 PURPOSE AND DEFINITIONS

When in the Standard Specifications of the State of California Department of Transportation or the Standard Plans of the State of California Department of Transportation (Standard Specifications), or in any documents or instruments where the Standard Specifications govern, or in the City Standard Plans and City Standard Specifications the following terms or nouns are used, the intent and meaning shall be interpreted as follows:


Department or Department of Transportation - Department of Public Works of the City of Napa, California.

Director - Director of Public Works of the City of Napa, State of California, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

Engineer - The Director of Public Works of the City of Napa, California, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

Laboratory - The established laboratory authorized by the Engineer to test materials and work involved in the contract.

agency, Office, or officer shall be interpreted to refer to the City or its corresponding agency, office, or officer.


Standard Specifications - The latest edition of the Standard Specifications of the State of California, Department of Transportation. Any reference therein to the State of California or a State agency, Office, or officer shall be interpreted to refer to the City or its corresponding agency, office, or officer acting under this contract.

State or Owner - The City of Napa, California, a legal entity organized and existing in the County of Napa, State of California.

Transportation Building - Sacramento - City Hall, City of Napa, State of California.

Contractor - The person or persons, firm, partnership, corporation, or combination thereof, private or public, who are performing construction work on private developments that are regulated by the City, or on City streets or other City-owned property.

City Manager - The person/s appointed to that position by the City Council.

Developer - The person or persons, firm, partnership, corporation, or combination thereof, private or public, who are responsible for work performed on private developments that are regulated by the City, or on City streets or other City-owned property.

Caltrans – California Department of Transportation.

1.04 CONSTRUCTION PLANS

Complete construction plans and specifications for all proposed and required improvements, including any necessary dedications and easements, shall be submitted to the City Engineer for review and approval and must be approved prior to the start of construction. The plans and specifications are to be prepared by a Registered Civil Engineer. Additional information may be required including, but not limited to, drainage calculations, geotechnical report, material tests, and right-of-way descriptions.

If alterations or revisions to the plans are required, they shall be properly designed and shown on the plans by the engineer. The plans shall not be considered approved until the City Engineer has signed the approval block on the plans. All construction shall be based on approved plans. There shall be no changes made to a set of approved plans unless such changes or additions are resubmitted to the City Engineer for approval.

In approving a set of plans the City Engineer is approving only those features that do not conflict with State Law, the Napa Municipal Code, these Standard Specifications, conditions of approval of the project, and accepted good engineering practice. It is the design engineer’s responsibility to ensure that the plans meet all of the above criteria. The City Engineer is not obligated to review the plans before approval but does have the authority to do so. Errors, omissions or conflicts which may have been overlooked by the City during plan check are subject to correction and redesign by the design engineer at any time they are discovered prior to acceptance of the completed work or release of bond by the City.
1.05 GENERAL CONSTRUCTION NOTES

The following notes are required on all plans for public improvements. Additional site-specific notes may be added as necessary.

City of Napa General Construction Notes

1. All workmanship and materials for both on-site and off-site improvements shall conform to the most recent edition of the City of Napa Public Works Department (Public Works) Standard Specifications and addendums, and/or the 2015 edition (or most recent) of the State of California (Caltrans) Standard Specifications, Standard Plans, and the geotechnical report and all the notes shown. The contractor shall have a copy of all documents available at the job site at all times. All on site improvements shall be inspected and certified by the Engineer of Record. Improvements in the public right of way shall be inspected by Public Works.

2. The developer/contractor shall contact the Construction Division at 707-257-9520 to schedule a preconstruction meeting prior to the commencement of any and all work. During the duration of the project, rolling 3-week lookahead schedules will be required to be submitted weekly.

3. The contractor and all subcontractors must call underground service alert (USA north 811 or 1-800-227-2600) prior to the start of any work on the project site. Each contractor shall submit a copy of their USA tag to the City for verification. The contractor shall also call any company or agency for service locations who are not a member of underground service alert. Contractor shall be responsible for the verification of all existing utilities in the field. Locations of utilities and underground facilities shown are approximate and for general information only. The contractor is responsible for removing USA markings after the completion of construction from the public right of way.

4. The developer/contractor shall coordinate all necessary utility inspections, scheduling and relocations with the appropriate utility companies.

5. All work shall be in accordance with the prevailing governing agency. For discrepancies between these plans and those agencies’ regulations and Standard Plans, agency requirements shall prevail.

6. The developer/contractor shall provide a minimum of two – 24 hour a day emergency telephone numbers of the person(s) who can respond to the project.

7. All materials shall be furnished and installed by the developer/contractor unless otherwise noted on the plans.
8. Developer/contractor shall conform to existing streets, surrounding landscape and other improvements with a smooth transition in paving, curbs, gutters, sidewalks, grading, etc., and to avoid any abrupt or apparent changes in grades or cross slopes, low spots or hazardous conditions.

9. Unnecessary, long term plating of a street shall not be allowed. Trench plates shall not be placed in the travel way for a period greater than two weeks without prior approval. Prior to excavating, a written plan that specifies the duration the plates will remain in the travelled way and the reasoning for the extended duration shall be submitted to public works for approval. Trench plates installed on highly travelled streets may be required to be set flush with the existing asphalt concrete. Plates shall be skid resistant, pinned and welded.

10. For all construction activities that occur on adjacent property including but not limited to: grading, fencing, retaining walls, tree trimming, storm drainage, or any other type of work, the developer/contractor shall provide the City a right-of-entry/temporary construction easement signed by the owner of record of the affected/adjacent property prior to start of construction.

11. Construction activities throughout the entire duration of the project shall be limited to the hours of 7:00 a.m. to 7:00 p.m., Monday through Friday. There will be no startup of machines nor equipment prior to 8:00 a.m. nor past 6:00 p.m., Monday through Friday; no delivery of materials nor equipment prior to 7:30 a.m. nor past 6:00 p.m., Monday through Friday; no cleaning of machines nor equipment past 6:00 p.m., Monday through Friday; no servicing of equipment past 6:00 p.m., Monday through Friday; and when requested/approved in writing, construction on weekends or legal holidays shall be limited to the hours of 8:00 a.m. to 4:00 p.m., unless a permit shall first have been secured from the City Manager, or designee, pursuant to section 8.08.050 of the Napa Municipal Code. The City Manager, or designee, shall grant such permit:

A. For emergency work;
B. Other work, if work and equipment will not create noise that may be unreasonably offensive to neighbors as to constitute a nuisance; or
C. If necessary to protect the public health, safety, and welfare.

All muffler systems on construction equipment shall be properly maintained. All construction equipment shall not be placed adjacent to developed areas unless said equipment is provided with acoustical shielding. All construction and grading equipment shall be shut down when not actively in use.

If an inspector is required to be onsite for work outside of the Monday through Friday work hours, the contractor shall request from the City, in writing, 72 hours prior to the work, for approval. If prior written notice is not provided, the request will be denied and construction work may not be performed. Additional fees
may be charged for work outside of the Monday through Friday work hours. The City reserves the right to deny all work outside of the Monday through Friday work hours.

Developer/contractors will be given one (1) warning for work starting prior to or after the work hours stated above. After the first warning is given, any violations of time will result in an automatic five (5) working day shutdown of the entire project.

No staging or deliveries in the public right of way unless approved per written request.

The City Engineer, planning commission or City Council may impose additional limitations on working hours and noise based on the special circumstances that may be associated with a particular project.

12. The contractor shall be responsible for the protection of all existing survey monuments and control points. All monuments destroyed during construction shall be resurveyed and replaced by the contractor and at the contractor’s expense as outlined in the business and professions code, section 8771.

13. The contractor shall provide the City submittal(s) for all material to be installed within the public right of way on the project. Construction will not start prior to submittals being approved. Prior to being submitted to the City, the designer of record shall review and approve such right of way submittal.

14. Site security, perimeter controls, and site safety are the responsibility of the developer/contractor and shall be installed and maintained during all phases of construction. Temporary 6ft chain link fencing with opaque screening shall be used for site security unless another method is submitted and approved for use by the City.

**Project Acceptance Notes**

1. Prior to project acceptance, the Engineer of Record, the Surveyor of Record, and the Geotechnical Engineer of Record shall submit an engineer’s stamped certification letter to the City.

2. Prior to project acceptance all items on the deficiency list shall be corrected and signed off by all divisions.

3. Geotechnical Engineer of Record shall submit a final report and summary of testings of all testing and design changes prior to acceptance.
4. Prior to project acceptance, mylars and CAD files of accurate “record drawings” shall be submitted to the City, stamped and signed with the following:

**Record drawing**

<table>
<thead>
<tr>
<th>Date of completion:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractor:</td>
</tr>
<tr>
<td>Engineer:</td>
</tr>
<tr>
<td>Surveyor:</td>
</tr>
<tr>
<td>Geotechnical:</td>
</tr>
<tr>
<td>Engineer of Record</td>
</tr>
<tr>
<td>Stamped and signed by:</td>
</tr>
</tbody>
</table>

**Traffic Control Notes**

1. All traffic control required for construction activities shall conform to the requirements of the latest edition of the Caltrans Manual of Uniform Traffic Control Devices (MUTCD). For all lane and sidewalk closures and detours, a traffic control plan shall be submitted to the City of Napa for review and approval at least **ten working days** before the scheduled closure. The City will review all traffic control plans. Construction will not be allowed to start prior to the approval of the traffic control plan.

2. All traffic control plans shall be a CAD drawing format plan with complete details and tables. Aerial photos, hand drawn plans, and notes are not acceptable.

3. No parking signs shall be placed 48 hours prior to the work to be completed within an area of designated public parking. No parking signs shall be filled in with all pertinent information of the exact time the work is to take place. Signs shall be clear as to when the public may park in the area outside of the construction time. If work is staged or delayed, then all no parking signs shall be removed and new no parking signs shall be placed 48 hours prior to when work is ready to resume. Signs shall be placed approximately every 50’ on center.
4. Pedestrian and bike access through and/or adjacent to the project site shall remain unobstructed during the project construction or a detour route shall be established as approved by the City.

5. The contractor is required to maintain all traffic control equipment in-place during work activities and shall remove all traffic control that is not needed and return accessible travel for the public during non-work hours or days.

6. The City reserves the right to stop all work being performed for lack of traffic control or traffic control that is not per the approved traffic control plan.

7. The contractor is required to maintain all temporary pavement delineation until the permanent pavement delineation is placed. All permanent traffic striping shall be laid out and cat-tracked. The City shall have a minimum of ten working days to approve the striping layout and cat-tracking.

**Recycling and Waste Removal Notes**

1. All plans for non-residential development will comply with the solid waste and recycling enclosure standards prescribed by City Council resolution R2008-185 or as it may be updated by subsequent council action. Current enclosure standards can be found at www.cityofnapa.org/recycle.

2. During the construction & demolition period of the project, the contractor shall comply with all provisions of the City of Napa’s Construction & Demolition Debris (C&DD) recycling ordinance contained in chapter 15.32 of Napa Municipal Code. The C&DD recycling ordinance requires site separation and recycling (or composting) for designated recyclable materials such as clean wood, concrete, metal, yard waste and other salvageable materials, and requires that all projects exceeding 5000 square feet or $100,000 in project valuation achieve a minimum level of 50% diversion from landfill disposal. All qualifying project applicants must submit a waste reduction and recycling plan (WRRP) and have the WRRP approved by the City before a City building or demolition permit is issued. Also, the City will determine compliance or non-compliance with approved WRRP and City’s C&DD ordinance before a certificate of occupancy or temporary certificate of occupancy is issued by the City. A City determination of non-compliance for a given project may result in a fine as prescribed in the City’s C&DD ordinance. Details on the City’s C&DD ordinance, including a frequently asked questions (FAQ) summary, can be found at www.cityofnapa.org/recycle.
Electrical Construction Notes

1. All City electrical & communications conduits installed, to include trenching, and conduit placement shall be inspected by the City of Napa Electrical Division prior to backfill, conduits shall be minimum 24-inches deep in the clear from finished grade.

2. 12mm wide, polyester fiber detectable pulling tape, with printed markings sequentially every foot, along with one, 22 awg detectable solid copper wire attached shall be required in all empty conduits.

3. Exact locations of all street light and traffic signal standards, pedestals and cabinets shall be determined by City of Napa Public Works/Electrical Division prior to installation. Signal and lighting standards shall be at least 3 feet from face of curb unless otherwise specified.

4. Pull boxes shall be placed in sidewalk areas or other locations to be determined by City of Napa Electrical Division. Pull boxes shall not be placed in driveway approaches, vehicle traffic lanes, or in sidewalk handicapped ramp areas.

5. All traffic signal heads shall be 12-inches and have a louvered backplate and tunnel visors.

6. All cobra head luminaires shall be supplied with a twist lock photo cell receptacle unless otherwise specified.

7. Street light and traffic signal related equipment and components shall be per 2015 Caltrans Standard Specifications unless otherwise noted on the improvement plans which will also list equipment and components specific to City of Napa standards.

8. All lighting, to include traffic signal and street lights shall be L.E.D. As approved by the City.

9. All materials required to be removed & salvaged, shall be delivered to City of Napa Corporation Yard at 770 Jackson Street without damage.

10. Contact City of Napa Electrical Division at 707-257-9588, 48 hrs in advance for all inspections and/or delivery of equipment.
Street Section and Sidewalk Construction Notes

1. Areas to be developed shall be cleared of vegetation, trees, tree roots, debris and any remnants of foundations or abandoned utilities. The area shall be stripped of the upper soils containing organic matter. All contaminated material shall be disposed of according to the guidelines of the Environmental Protection Agency (EPA).

2. All Class II aggregate base shall be sampled and tested for sieve analysis, r-value, sand equivalent and maximum density within 10 days of submitting the submittal to the City for approval. The City shall receive the submittal a minimum of five working days prior to scheduled use.

3. All hot mix asphalt (HMA) shall be sampled within 6 months of planned pavement and submitted to the City for approval with the correct mix design and maximum density prior to placement. Contractor to verify data used for testing prior to placement of HMA.

4. All trench backfill shall be tested Per ASTM D1557 by the geotechnical engineer for compaction. If the trench backfill is more than 24-inches deep, compaction testing shall be completed as each lift of fill is placed and compacted. Each lift of material shall not exceed 12-inches in depth. Prior to paving, all trenches shall be tested, and all test results shall be submitted to the City. All test results, both passing and failing shall be shown and provided to the City. The City reserves the right to request additional field testing to be performed.

5. The subgrade shall be scarified, processed and compacted to a minimum of 95% relative compaction per ASTM D1557/ASTM D6938, and shall be firm and unyielding. Proof-rolling of the finished subgrade shall be performed by the contractor using a fully loaded 3-axle water truck and reviewed and approved by the City prior to placement of additional materials. Proof-rolling shall be observed by the contractor’s licensed geotechnical engineer and the City Inspector. The developer’s/contractor’s licensed geotechnical engineer shall provide an appropriate method in writing to stabilize the areas of deflection – Attention is directed to the City-approved “Yielding Subgrade” specification. All compaction shall be tested with a nuclear gage.

6. The Class II aggregate base structural section shall be moisture conditioned and compacted to a minimum of 95% relative compaction per ASTM D1557/ASTM D6938, firm and unyielding. Proof-rolling of the finished aggregate section shall be performed by the contractor using a fully loaded 3-axle water truck and reviewed and approved by the City of Napa construction inspector prior to placement of asphalt concrete. Proof-rolling shall be observed by the contractor’s licensed geotechnical engineer and the City Inspector. The developer’s/contractor’s licensed geotechnical engineer shall provide an
appropriate method to stabilize the areas of deflection. All aggregate base compaction shall be tested with a nuclear gage.

7. HMA shall be tested for compaction per Caltrans Cal 375 test, minimum 95% compaction required.

8. The project shall comply with the geotechnical report recommendations and the approved plans. The geotechnical report shall be onsite and available to reference.

9. Any changes to the street structural section shall be submitted in writing by the licensed Geotechnical Engineer of Record, to the City, prior to the work being performed for approval. Geotechnical technicians do not have the authority to make changes in the field.

10. The developer/contractor shall provide a curb to curb resurfacing of the existing street pavement whenever a street is cut, either by a longitudinal or transverse cut, for utility or other improvement installations, regardless of limits of overlay shown on the plans. The resurfacing shall extend a sufficient distance beyond any cut to ensure a smooth transition and shall consist of a full 2-inch deep grind for the entire area and a 2-inch asphalt concrete overlay placed. Street resurfacing will be required for all cuts resulting from improvements that include but are not limited to pavement widening, curb and gutter, storm drain, water, sewer, signal, lighting, and other utilities for the project. The limits of the overlay may be extended beyond the project frontage of the parcel and/or 10 feet on either side of the trench to cover all the utility trench cuts at the discretion of the City after all underground infrastructure has been installed.

11. All manhole and boxes shall be lowered prior to performing any street grinding and overlay.

12. All manholes and boxes shall be raised to grade after all paving is competed. The asphalt concrete shall be circle cut to full depth of the asphalt concrete for all manholes and boxes. Jack hammering asphalt to raise iron will not be allowed. Use of sack mix shall not be allowed.

13. All new concrete shall be dowelled to existing concrete on a minimum of 24-inches centers with #4 rebar and imbedded 4-inches deep. If concrete is placed in sections or phases, the new concrete shall be dowelled together.

14. Any PCC curb placed on top of existing or new asphalt concrete shall be epoxy-dowelled on 24-inches centers and glued down to the surface.

15. Any concrete placed that becomes tagged, defaced, cracked or damaged shall be replaced prior to project acceptance. Spot patching repairs of concrete is not allowed. Any permanent reference point marks made into concrete is not
allowed. If done, entire section of concrete from joint to joint shall be removed and replaced.

16. All survey monument(s) shall be installed prior to final sign-off of the project as shown on the improvement plans or final map.

**Landscape, Irrigation and Tree Notes**

1. All trees within the public right-of-way must be protected from construction damage. A tree protection plan for said protection must be submitted and approved by the City via authorized signature, before work begins. Plans shall incorporate ANSI A 300 (part 5) – 2012 Best Practices as well as companion publication: Managing Trees During Construction, second edition. It is recommended a professional arborist be retained for this purpose. Monitoring of plans pre construction, during construction and post construction phases is necessary.

2. Prior to any other site work, protective fencing shall be installed a minimum of one foot beyond the canopy drip line of any tree to be saved. The fence should be sturdy, highly visible and solidly anchored to the ground. The fencing shall remain in place continuously during all phases of construction. This tree protection zone (TPZ) shall be posted with warning signs in English and Spanish to alert equipment operators and contractors about the protected status of the TPZ. Signs should contain contact information for the contractor.

3. Activities within the TPZ that compact the soil or physically damage the tree shall be avoided or mitigated.

4. Removal or pruning of any protected native tree, significant tree or tree within the public right-of-way requires a permit from the City of Napa Parks and Recreation Services Department unless it is approved via authorized signature on the development plans. Trees removed shall be completely removed and cut to grade. Trees to be removed shall be posted 3 days prior indicating that it will be removed, and the removal has been approved as part of an approved development project.

5. Street trees shall be planted within the street right-of-way per City Standard Plan T-1, T-2 and T-5 at developer’s expense. Any street tree spacing shown on the plan is approximate. Contractor shall contact the City’s Parks and Recreation Services Department 707-257-9529, after all driveways and utilities are installed. City tree division staff shall mark locations of trees required. A list of tree varieties approved for planting is available at the Parks and Recreation Services Department Office or on the City website.
**Stormwater Notes**

1. Contractor shall meet the requirements of discharging to a public storm drainage system as required to ensure compliance by the City with all state and federal laws and regulations related to storm water as stipulated in the Clean Water Act. Contractor shall meet the requirements of the National Pollutant Discharge Elimination System (NPDES) permit in effect prior to completion of project construction for storm water discharges from the Municipal Stormwater System operated by the City of Napa. Contractor shall comply with the Stormwater Pollution Prevention Plan (SWPPP) (project > 1 acre) and/or Erosion and Sediment Control Plan (ESCP) (projects <1 acre) and the Stormwater Control Plan (SCP) submitted by developer as part of its application as (modified and) approved by the director of Public Works or City Engineer.

**Storm Drainage Notes**

1. All storm drains within the City right of way shall be designed using rubber gasket reinforced concrete pipe (RCP). All RCP shall be Class III, unless the depth of the pipe requires a stronger pipe.

2. All connections made to intersecting storm drain lines shall be made at a manhole or drain inlet. Direct connections to stormdrain lines are not allowed.

3. If, by special design, plastic pipe is approved for installation of storm drainage systems, water stops shall be installed.

4. Storm drain lines shall not be installed exceeding the maximum deflection of each joint. In no case, shall the rubber gaskets be exposed. If the deflection exceeds the allowable limit per the pipe manufacture, a manhole or junction box must be installed.

5. A 60-inch manhole shall be used for all stormdrain lines larger than 36-inches or where two or more storm drain lines are intersecting at a manhole.

6. All storm drain systems shall be videotaped at the completion of subgrade or prior to placement of HMA.

7. Provide stormwater conveyance system stenciling and signage for both private development and public right of way.

   A. Provide concrete stamping, or equivalent, of all stormwater conveyance system inlets and catch basins within the project area with prohibitive language (e.g. “no dumping drains to Napa River”).
B. Post signs and prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks with the project area, trailheads, parks, building entrances, and bioretention facilities.

**Fire Department Notes**

1. The City of Napa Fire Department requires that a fire hydrant be in service within 250 feet of the furthest point of construction prior to the stockpiling of combustible materials or the beginning of construction.

2. If the streets or access roads in a development are not paved from October 15th through April 15th, the City requires that a temporary all access weather access road be provided.

3. In accordance with the City of Napa Standard Specifications and Standard Plans, Section 3.04.02 “Fire Access Requirements (for Building Construction)”.
   Temporary all weather construction phase Fire Department access route structural sections shall consist of a minimum of 12-inches of base rock material over either: (1) a lime treated subgrade, or (2) a subgrade covered with fabric in accordance with the following design criteria:

   A. Subgrade is defined as the native soil at the bottom of the access route structural section, excavated to the lines and grades shown on the project grading plan, and provided with a discharge for the collected storm water runoff, as approved by the City Engineer.

   B. Base rock shall be class ii aggregate base compacted to at least 95% relative compaction.

   C. Base rock shall be placed only on a firm and unyielding (compacted to at least 95% relative compaction) excavated and drained subgrade.

   D. Lime treated subgrades shall be designed in accordance with the recommendations of a geotechnical engineer and compacted to at least 95% relative compaction.

   E. Fabric shall be a ground stabilization fabric such as Mirafi 600X or equivalent.

   F. Fire Department access shall be a minimum 20 feet in width and provided so that a 150 foot length of hose can be extended from the parked fire vehicle to all points along the exterior perimeter of all structures.
G. Alternate all weather access road sections may be proposed by a geotechnical engineer and submitted to the Public Works director for approval. Approval of the Public Works director and fire marshal is required for alternate all weather access roads.

**Sewer Notes**

1. All sanitary sewer improvements shall be constructed per the current version of Napa Sanitation Districts (NSD) sanitary sewer and recycled water standards.

**Water Notes**

1. **Construction details:** Refer to City of Napa Standard Specifications and Plans.

2. **Water-sewer separation:** Water-sewer (or water-recycled water) separation shall comply with all California Department of Health Services requirements. Parallel construction: 10 feet of horizontal separation. Perpendicular construction: water mains at least 1 foot above sewer and recycled water lines.

3. **Existing water facilities:** Contractor shall locate by excavation all existing water facilities prior to any construction activities. If conflicts arise, an alternate design must be submitted to the City for approval.

4. **Obstructions:** Trees, foundations, or other permanent structures shall not be installed within 10 feet of any water facility. No obstructions (sign post, mail box, wall, fence, etc.) Shall be installed within 3 feet of any water facility. See Standard Plan W-18 for additional requirements.

5. **Construction water:** Water supplied from the City of Napa system shall be taken through a metered service or fire hydrant meter. Fire hydrant meters shall be obtained by applying at the revenue/collections division in City hall at 955 School Street, Napa, (707-257-9508).

6. **Inspection:** Public water facilities up to and including the water meter shall be inspected by the Water Division inspector (contact 707-257-9521 to schedule inspection). All water facilities between the water meter up to and including the backflow device shall be inspected by the Water Division backflow prevention specialist (contact 707-257-9544 to schedule inspection). All new water facilities shall be tested and inspected prior to activation.

7. **Water service interruption:** Contractor shall be responsible for notifying affected water customers a minimum of 48 hours (2 business days) in advance. All valves shall be operated by City personnel. Contractor shall schedule all water service interruptions by calling 707-257-9544.
8. **Joint deflection:** Maximum deflection at pipe joints shall not exceed 3° with a maximum offset of 10-inches per 18 foot length (minimum radius = 345ft) or as set forth by manufacturer specifications or installation procedures.

9. **Corrosion protection:** Ductile iron pipe shall be cathodically protected in accordance with the City of Napa Standard Specifications, plans and special provisions. All bolts, studs, washers, nuts, etc. Shall be stainless steel minimum grade 304ss with teflon coated nuts or City approved equal.

10. **Valves:** Valves shall be installed as shown in the approved plans and comply with City of Napa standard plan W-9. All water service valves shall be placed immediately after the tee or hot tap.

11. **Fire hydrants:** Fire hydrant installations shall comply with City of Napa Standard Plan W-8. Fire hydrant(s) not in service shall be completely covered.

12. **Services:** Water service installations shall comply with applicable City of Napa Standard Plans. Fire service meters shall be installed on all fire services with private fire hydrants. All hot-taps to existing mains shall be conducted by the City at the contractor's expense. A water system shutdown shall be required in all cases where the proposed water service is the same size as the existing pipeline supplying the proposed water service(s).

13. **Backflow devices:** Backflow prevention devices shall be installed on all new services and comply with City of Napa Standard Plans W-5, W-6, and W-7. Meter installations shall not occur until all backflow(s) have been certified and tested.

14. **Backfill:** Water main trench backfill shall comply with City of Napa Standard Plan W-13A.

15. **Tie-ins:** New tie-ins to existing City water mains shall be conducted under City inspection only after pressure testing, chlorination, and bacteriological testing is complete. All hot-taps to existing mains shall be conducted by the City at the contractor’s expense. A water system shutdown shall be required in all cases where new pipeline tie-ins are the same size or greater (i.e. size-on-size).

16. **Meter installation(s) and water service activation:** Meter installation(s) shall occur upon receipt of the parcel address(es) and responsible billing party. All pressurized services shall be considered active and billable.

17. **Pressure:** Contractor shall install pressure regulators on all water service connections (customer side) where pressures exceed 80 pounds per square inch (psi).

18. **Documentation and record drawing:** All new water system installations shall be gps surveyed within 5 business days of installation. Contractor shall schedule all surveys by calling 707-257-9521. Record drawings shall be submitted within 20 business days after water system activation.
1.06 AGREEMENTS AND BONDS

The Developer shall enter into an agreement with the City for constructing on-site and off-site improvements, in accordance with approved plans and profiles. The agreement shall be secured by a faithful performance bond or cash deposit in an amount equal to one hundred percent (100%) of the contract price, and a bond to guarantee payment of all claims for labor and material furnished, in an amount equal to fifty percent (50%) of the contract price. Agreement bonds shall be on the City of Napa forms available at the Public Works Department, or on a substantially similar form as approved by the City Attorney.

In conjunction with the submittal of bonds, the Developer shall furnish the following information: (a) the original, or a certified copy, of the unrevoked appointment, power of attorney, bylaws, or other instrument entitling or authorizing the person who executed the bonds to do so; (b) a certified copy of the certificate of authority of the insurer issued by the Insurance Commissioner of the State of California; and (c) a certificate pursuant to CCP 995.640(a) from the clerk of Napa County that the certificate of authority of the insurer has not been surrendered, revoked, canceled, annulled, or suspended, or, in the event that it has, that renewed authority has been granted.

The agreement shall specify that the proposed improvements will be completed within a certain time limit and if the proposed improvements are not satisfactorily completed within the time limit, the City shall complete the improvements and the faithful performance or cash bond shall be forfeited.

The final acceptance of the work will be contingent upon your guaranty which may be either an extension of the original Faithful Performance Bond or a separate Maintenance Bond in the amount of five percent (5%) of the final Contract price in favor of the City. Should you not file said bond as required herein, the City may retain the remaining five percent (5%) of the final Contract price as a cash bond for said one (1) year period.

1.07 CONTROL OF WORK

1.07.01 SANITATION FACILITIES

The Contractor shall conform to the requirements of Section 13.16.070 of the Napa Municipal Code, requiring the maintenance of not less than one chemical toilet, approved by the Health Officer, on the premises, for each twenty (20) employees or fractional part thereof working at a construction job site, unless specifically exempt from this requirement by the Engineer. Alternate sanitary facilities if suitably located and adequately available may be substituted for the facilities required by Section 13.16.070, subject to approval of the Engineer.

1.07.02 CLEANLINESS OF STREET

The Contractor may be directed by the Engineer to use commercial street-sweepers for streets. Attention is directed to Section 12.16.100 of the Napa Municipal Code which reads:

Vehicles Spilling Loads: It is unlawful for any person to use any vehicle for the conveyance or removal of dirt, gravel, rock or other material without having the same so constructed and loaded as to prevent contents thereof from being scattered or deposited upon the streets over which said vehicles may be driven.
1.07.03 PROJECT APPEARANCE

The Contractor shall maintain a neat appearance of work. In areas visible to the public, the following shall apply:

1. When practicable, broken concrete and debris developed during clearing and grubbing shall be disposed of concurrently with its removal. If stockpiling is necessary, a written request shall be provided by the Contractor or Developer to the City and the material shall be removed or disposed of within a time frame approved by the Engineer.

2. Contractor shall furnish trash bins for debris from structure construction. Debris shall be placed in trash bins daily. Contractor shall secure Engineers approval of trash bin location prior to placement of trash bins. The City does not guarantee that a trash bin can be located within the project limits.

3. Forms or falsework that are to be re-used shall be stacked neatly concurrently with their removal. Forms and falsework that are not to be re-used shall be disposed of concurrently with their removal.

1.07.04 AREAS FOR CONTRACTOR USE

Attention is directed to Section 5-1.32, "Areas of Use," of the Standard Specifications and these City Standard Specifications.

Overnight storage and staging of materials within the right of way will not be allowed unless approved in writing by the Engineer. Any staging areas used by the Contractor shall be subject to the provisions of "Water Pollution Control", of these City Standard Specifications. Use of the Contractor's staging areas shall be at the Contractor's own risk and the City shall not be held liable for any damage or loss of materials or equipment located within such areas.

The highway right of way shall be used only for purposes that are necessary to perform the required work. The Contractor shall not occupy the right of way, or allow others to occupy the right of way, for purposes which are not necessary to perform the required work.

Temporary storage of equipment and materials on the parcels adjacent to the right of way will be subject to the approval of the Engineer on a parcel-by-parcel basis. The Contractor shall fence each of the parcels approved for construction use with 6' high temporary chain link fencing completely covered with opaque black mesh screening. The Contractor shall maintain the fencing continuously. Use of the Contractor's work areas and other City-owned property shall be at the Contractor's own risk, and the City shall not be held liable for any damage to or loss of materials or equipment located within such areas.

1.07.05 WORK SAFETY

The Contractor shall assume sole and complete responsibility for job site conditions for the duration of the project including, but not limited to, the safety and health conditions on the work site. This requirement shall apply continuously and shall not be limited to normal working hours. Contractor shall comply with all applicable provisions of law including the standards, rules, regulations and orders established by the California Division of Industrial Safety. Contractor shall furnish and use safety devices and safeguards and shall adopt and use practices, means, methods, operations, and processes which are reasonably adequate to render the work site safe and healthful. Contractor shall take all steps necessary to
ensure that any hazardous condition is corrected promptly either by the Contractor or by assigning such responsibility to the appropriate subcontractor and ensuring that the corrections are completed. The City, design engineer, construction manager and the officers, agents or employees, shall not have charge of or responsibility for construction or safety means, methods, techniques, procedures, as these are solely the responsibility of Contractor.

1.07.06 CONFINED SPACES

For any work that is to take place in a confined space, the Contractor shall comply with all CAL/OSHA regulations concerning entry into confined spaces. Confined space for the purpose of this Article shall mean the interior of storm drains, sewers, vaults, utility pipelines, manholes, reservoirs, and any other such structure which is similarly surrounded by confining surfaces so as to permit the accumulation of dangerous gases or vapors.

Tests for the presence of combustible or dangerous gases shall be made with an approved device immediately prior to a worker entering a confined space and at intervals frequent enough to ensure a safe atmosphere during the time a worker is in such a structure. A record of such tests shall be kept at the job site.

Sources of ignition, including smoking, shall be prohibited in any confined space until after the atmosphere within the confined space has been tested and found safe.

No employee shall be permitted to enter or remain within a confined space until such confined space is free of concentrations of harmful gases, and lack of oxygen, unless the employee is wearing suitable and approved respiratory equipment.

Confined spaces that contain or that have last been used as containers of toxic gases, light oils, hydrogen sulfide, corrosives, or poisonous substances, shall, in every case, be tested by means of approved devices or chemical analysis before being entered without wearing approved respiratory equipment.

Reservoirs, vessels, or other confined spaces having openings or manholes in the side as well as in the top shall be entered from the side openings or manholes when practicable.

1.07.07 RECORD DRAWINGS

Using colored ink, the Contractor shall make changes on a set of clean prints of the project plans and submit to the Engineer for review. Indicate all changes and revisions to the original design that affect the permanent structures/facilities. Reference underground utilities to semi-permanent or permanent physical objects. Reference water, sewer, telephone, and electrical lines to corners of buildings and survey markers.

Prior to acceptance of the work, based on the Contractor’s record drawings described above, the Developer shall submit to the Engineer one (1) set of printed As-Built drawings and one (1) set of As-Built Drawings in an electronic format approved by the Engineer.

1.07.08 SOUND CONTROL REQUIREMENTS

Sound control shall conform to the provisions in Section 14-8, "Noise and Vibration," of the Standard Specifications and these City Standard Specifications.
The noise level from the Contractor's operations, between the hours of 9:00 p.m. and 6:00 a.m., shall not exceed 86 dBA at a distance of 50 feet. This requirement shall not relieve the Contractor from responsibility for complying with local ordinances regulating noise level.

The noise level requirement shall apply to the equipment on the job or related to the job, including but not limited to trucks, transit mixers or transient equipment that may or may not be owned by the Contractor. The use of loud sound signals shall be avoided in favor of light warnings except those required by safety laws for the protection of personnel.

1.08 CONTROL OF MATERIALS

1.08.01 DISPOSAL OF MATERIAL

Disposal of material shall conform to Section 5-1.20B(4) “Contractor-Property Owner Agreement” of the Standard Specifications and these City Standard Specifications.

The Contractor shall make arrangements for disposing of materials outside the street right-of-way. Disposable material shall not be stockpiled in the street beyond the normal working hours. Material shall not be disposed of in any of the following areas:

- Within the floodway of the City of Napa or the County of Napa.
- Within the normal channel of any river, creek, stream, ditch, canal, swale or other water course and within the portions of the adjacent flood plain of same as are required to efficiently carry the flood flow, as determined by the Engineer.

Prior to any disposal of material, the Contractor shall obtain written permission from the owner of the proposed disposal site and provide a copy of said written permission to the City.

Whenever any material disposal location is visible from a public street, the disposal area shall be left in a neat and uniform manner to the satisfaction of the Engineer.

If the disposal site is within the City of Napa city limits, Contractor shall submit to the Engineer an approved grading permit and plan prior to disposing of the material. Grading permits are issued by the City of Napa, Building Inspection Division.

If the disposal site is located outside of the city limits, a grading permit from the affected agency as well as written permission from the owner of the disposal site shall be provided to the Public Works Department prior to commencement of the work.

1.08.02 COMPACTION AND TESTING

Attention is directed to Section 6-2, "Quality Assurance", of these City Standard Specifications. Compaction of all earthwork materials shall be in accordance with Section 19-5, “Compaction,” of the Standard Specifications and these City Standard Specifications.

A geotechnical firm shall be employed by Developers to observe the grading, trench backfill, and placement of aggregate base. A sufficient number of compaction tests shall be performed to ensure that the subgrade, trench backfill, aggregate base rock and asphalt concrete is installed and compacted in accordance with City Specifications. A summary report of the work performed, and the test results shall be submitted to the City. Proof roll to be accepted by the Engineer confirming firm and unyielding soils./materials.
If accepted aggregate base becomes saturated and/or disturbed, the subgrade must again be proof-rolled and testing soils and AB may be required. All tests shall be per ASTM 1557 methodology. AC testing per Caltrans 2006 Standard Specifications, 95% minimum compaction.

**1.08.03 INSPECTION AND ACCEPTANCE OF WORK**

The City Engineer, or a duly authorized representative, shall at all times have access to the work during its construction. All completed work, and all materials furnished within the public right-of-way shall be subject to inspection and approval by the City Engineer, or a duly authorized representative. Work and materials not meeting the requirements of the approved plans and specifications shall be made good, and unsuitable work or materials may be rejected. All work which has been rejected shall be remedied or removed and replaced in an acceptable manner. When the work has been completed, the City Engineer will make a final inspection.

All work performed outside of an existing or future public right-of-way shall be inspected and certified by the Engineer of Record that all work completed meets the requirements of the approved plans and specifications.

The Public Works Department is responsible for the overall coordination of the inspection process and is the primary inspector for certain portions of private developments. The Parks and Recreation Department is responsible for inspecting landscaping and irrigation projects that will be maintained by the City. The Community Development Department, Planning Division is responsible for inspecting landscaping and irrigation projects that will be maintained by private property owners and homeowners or similar associations.

When the City has made the final inspection and determined that the work has been completed in all respects in accordance with the plans and specifications, and the Engineer of Record has certified that all work under their review has been completed in all respects and in accordance with the plans and specifications, the City Engineer will formally accept the improvements. The Developer (for private projects) or the contractor (for City of Napa capital improvement projects) shall then guarantee all materials and workmanship against defects for a period of one year from the date of final acceptance of all work performed.

**1.09 LEGAL RELATIONS AND RESPONSIBILITIES**

**1.09.01 INSURANCE**

Section 7-1.06 “Insurance” of the Standard Specifications is amended to read as follows:

_The Developer shall provide and or maintain insurance in accordance with the most current requirements of the City of Napa Risk Manager._

**1.09.02 INDEMNIFICATION**

Section 7-1.05 “Indemnification” of the Standard Specifications is amended to read as follows:

_Hold Harmless: The Developer shall be solely responsible and save City harmless for all matters relating to the payment of Developer employees and agents, including_
compliance with social security, withholding and all other regulations governing such matters.

**Indemnification:** Developer hereby warrants that the design and construction of required improvements will not adversely affect any portion of adjacent properties and that all work will be performed in a proper manner and in accordance with all applicable laws and regulations. To the full extent permitted by law, Developer agrees to indemnify, defend, release and save harmless City, its officers and employees from and against any and all claims, suits, liabilities, actions, damages, penalties or causes of actions by any person including Developer, owner, their employees and agents for (a) any personal injury, death, or damage to property from any cause whatsoever in whole or in part arising out of or in connection with this Agreement or the actions and obligations hereunder or approval of Developer's project, and (b) any failure to comply with all applicable laws and regulations, including, without limitations, any requirement regarding payment of prevailing wages. This indemnification shall extend, without limitation, to injuries to persons and damages or taking of property resulting from the design or construction of the subdivision or its improvements and to adjacent property owners as a consequence of diversion of waters or design or construction of public drainage systems, streets or other public projects. Developer shall so indemnify City regardless of City's passive negligence, City's approval of plans or City's inspection, approval or acceptance of the improvements and notwithstanding any limitation on the amount or type of damages or compensation payable by or for Developer under Workers' Compensation, disability, or other employee benefit acts, the acceptance of insurance certificates required under this Agreement, or the terms, applicability, or limitations of any insurance held by Developer. The provisions of this paragraph shall continue to bind the parties after acceptance/approval of the works of improvement by City and release of all security.

**1.09.03 PUBLIC SAFETY**

The Contractor shall provide for the safety of traffic and the public in conformance with the provisions in Section 7-1.04, "Public Safety," of the Standard Specifications and these City Standard Specifications.

The Contractor shall install temporary railing (Type K) between a lane open to public traffic and an excavation, obstacle or storage area when the following conditions exist:

1. **Excavations** - The near edge of the excavation is twelve (12) feet or less from the edge of the lane, except:
   a. Excavations covered with sheet steel or concrete covers of adequate thickness to prevent accidental entry by traffic or the public.
   b. Excavations less than one (1) foot deep.
   c. Trenches less than one (1) foot wide for irrigation pipe or electrical conduit, or excavations less than one foot in diameter.
   d. Excavations parallel to the lane for the purpose of pavement widening or reconstruction.
   e. Excavations in side slopes, where the slope is steeper than 1:4 (vertical : horizontal).
   f. Excavations protected by existing barrier or railing.

2. **Temporarily Unprotected Permanent Obstacles** - The work includes the installation of a fixed obstacle together with a protective system, such as a sign structure together with
protective railing, and the Contractor elects to install the obstacle prior to installing the protective system; or the Contractor, for the Contractor's convenience and with permission of the Engineer, removes a portion of an existing protective railing at an obstacle and does not replace such railing complete in place during the same day.

3. **Storage Areas** - Material or equipment is stored within 12 feet of the lane and the storage is not otherwise prohibited by the provisions of the Standard Specifications and these City Standard Specifications.

The approach end of temporary railing (Type K), installed in conformance with the provisions in this section "Public Safety" and in Section 7-1.04, "Public Safety," of the Standard Specifications, shall be offset a minimum of 15 feet from the edge of the traffic lane open to public traffic. The temporary railing shall be installed on a skew toward the edge of the traffic lane of not more than one foot transversely to 10 feet longitudinally with respect to the edge of the traffic lane. If the 15 foot minimum offset cannot be achieved, the temporary railing shall be installed on the 10 to 1 skew to obtain the maximum available offset between the approach end of the railing and the edge of the traffic lane, and an array of temporary crash cushion modules shall be installed at the approach end of the temporary railing.

Temporary railing (Type K) shall conform to the provisions in Section 12-3, "Temporary Traffic Control Devices," of the Standard Specifications. Temporary railing (Type K), conforming to the details shown on 2015 Standard Plan T3A and T3B, may be used.

Temporary crash cushion modules shall conform to the provisions in Section 12-3.22 "Temporary Crash Cushion Module" of the Standard Specifications.

Except for installing, maintaining and removing traffic control devices, whenever work is performed or equipment is operated in the following work areas, the Contractor shall close the adjacent traffic lane:

<table>
<thead>
<tr>
<th>Approach Speed of Public Traffic (Posted Limit)</th>
<th>Work Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 45 Miles Per Hour</td>
<td>Within 6 feet of a traffic lane</td>
</tr>
<tr>
<td>35 to 45 Miles Per Hour</td>
<td>Within 3 feet of a traffic lane</td>
</tr>
</tbody>
</table>

The lane closure provisions of this section shall not apply if the work area is protected by permanent or temporary railing or barrier.

When traffic cones or delineators are used to delineate a temporary edge of a traffic lane, the line of cones or delineators shall be considered to be the edge of the traffic lane, however, the Contractor shall not reduce the width of an existing lane to less than 10 feet without written approval from the Engineer.

When work is not in progress on a trench or other excavation that required closure of an adjacent lane, the traffic cones or portable delineators used for the lane closure shall be placed off of and adjacent to the edge of the traveled way. The spacing of the cones or delineators shall be not more than the spacing used for the lane closure.

Suspected loads or equipment shall not be moved nor positioned over public traffic or pedestrians.

**1.09.04 PRESERVATION OF PROPERTY**
Attention is directed to Section 5-1.36, "Property and Facility Preservation," of the Standard Specifications and these City Standard Specifications.

1. **Plants**
   a. Existing trees, plants, shrubs, lawns, other landscaping, irrigation equipment, and other private property that are not shown on the plans as to be removed, and are injured or damaged by reason of the Contractor's operations, shall be replaced by the Contractor. The minimum size of tree replacement shall be 24 inch box and the minimum size of shrub replacement shall be 15 gallon container. Replacement ground cover plants shall be from flats and shall be planted 12 inches on center. Replacement of Carpobrotus ground cover plants shall be from cuttings and shall be planted 12 inches on center. Replacement planting shall conform to the requirements in Section 20.3.01C(4), "Replacement Plants," of the Standard Specifications. The Contractor shall water replacement plants in conformance with the provisions in Section 20.3.01C(3), "Watering," of the Standard Specifications.

   b. Damaged or injured plants shall be removed and disposed of outside the highway right of way in conformance with the provisions in Section 20.3.01C(4), "Replacement Plants," of the Standard Specifications. At the option of the Contractor, removed trees and shrubs may be reduced to chips.

   c. Replacement planting of injured or damaged trees, shrubs and other plants shall be completed prior to acceptance of the work and shall conform to the provisions in Section 20.3.02, "Planting Plants," of the Standard Specifications.

2. **Monuments**
   a. The Contractor shall be responsible for the protection of all existing survey monuments and control points. All monuments destroyed during construction shall be resurveyed and replaced at the Contractor's expense as outlined in the Business and Professions Code, Section 8771.

   b. In the event the Contractor's operations destroy any of the Engineer's survey control points, the Contractor shall replace such control points at their expense, subject to verification by the Engineer. The cost of any such verification of the Engineer's survey control points will be deducted from any moneys due or to become due the Contractor.

1.09.05 **PERMITS AND LICENSES**

Attention is directed to Section 5-1.20B “Permits, Licenses, Agreements and Certification” of the Standard Specifications and these City Standard Specifications.

The Contractor shall provide any and all licenses and permits required by the Work. The Contractor shall abide by any and all Federal, State, County and City Laws and Rules affecting the work and shall maintain all required protection for property, employees and the public and insurance in connection with same, for all of which the Contractor shall bear necessary expense.

1.09.06 **WORKING DAYS AND HOURS OF WORK**

Attention is directed to Section 8-1.05 “Time” of the Standard Specifications.
Section 1-1.07 “Definitions” of the Standard Specifications defines a working day. Construction activities throughout the entire duration of the project shall be limited to the hours of 7:00 a.m. to 7:00 p.m., Monday through Friday. There shall be no start up of machines nor equipment prior to 8:00 a.m., Monday through Friday; no delivery of materials nor equipment prior to 7:30 a.m. nor past 5:00 p.m., Monday through Friday; no cleaning of machines nor equipment past 6:00 p.m., Monday through Friday; no servicing of equipment past 6:45 p.m., Monday through Friday; and construction on weekends or legal holidays shall be limited to the hours of 8:00 a.m. to 4:00 p.m., unless the contractor submits a written request and that request is approved by the City Manager, or their designee, pursuant to section 8.08.025 & 8.08.050 of the City Municipal Code. If the request to work outside of the designated hours is approved, the Contractor may be required to pay the cost of providing inspection services for the work being performed. If inspection services are not available for the requested change, the City Engineer may deny the request.

All muffler systems on construction equipment shall be properly maintained.

All construction equipment shall not be placed adjacent to developed areas unless said equipment is provided with acoustical shielding

All construction and grading equipment shall be shut down when not actively in use.

The City Engineer, Planning Commission or City Council may impose additional limitations on working hours and noise based on the special circumstances that may be associated with a particular project. In which case, the more stringent limitations shall apply.

1.09.07 FLOOD EVACUATION

Contractor shall be prepared to evacuate the construction site during a Flood Watch issued by the National Weather Service. The Contractor shall, upon 10 hours notification by the Engineer that the National Weather Service has issued a Flood Warning for the Napa River or Napa Creek, evacuate the construction site. Evacuation shall include removal of all vehicles, equipment, tools, materials, personnel, stockpiled material (including earthwork), trash, etc. Removal shall mean relocation to an area outside the limits of the flood plain, or to an onsite area acceptable to the Engineer, if such an area exists above expected flood elevations. Bridge falsework and constructed permanent improvements only may remain in place. In no event shall the Contractor allow any manmade object or substance to enter or contaminate the floodwaters.

The Contractor shall conduct such a flood evacuation whenever so notified by the Engineer, and as many times as requested prior to final acceptance of the project.

1.10 CONSTRUCTION DETAILS

1.10.01 ORDER OF WORK

Order of work shall conform to the provisions in Section 4, “Scope of Work,” and Section 5 “Control of Work” of the Standard Specifications and these City Standard Specifications.

Prior to beginning any excavation, the Contractor shall pothole all buried utilities and other man-made objects throughout the proposed area of work, check for conflicts, and provide the pothole data and written notice of any suspected conflicts between existing and proposed facilities to the Engineer. Said pothole data and written notice shall be provided
not less than fourteen (14) days prior to beginning any such excavation. For longer facilities such as buried pipelines, the Contractor shall pothole at an adequate number of locations, as approved by the Engineer, to determine or verify the type, profile, size, and material of the facility.

Prior to saw cutting of existing curb, gutter, sidewalk, and/or driveway for removal and up to the time the new improvements are opened to the public, the Contractor shall erect and maintain necessary signs and barricades as required in the sections titled “Maintaining Traffic” and “Public Safety,” of these City Standard Specifications.

1.10.02 WATER POLLUTION CONTROL

Water pollution control work shall conform to the provisions in the Napa Municipal Code, Chapter 8.36, "Stormwater Quality Control," and these City Standard Specifications.

The goal of these requirements is to prevent the pollution of storm water runoff from construction projects by keeping pollution out of storm drains, reducing the exposure and discharge of materials and wastes to storm water, and by reducing erosion and sedimentation. Storm drains discharge runoff directly to creeks and the river without treatment.

The following requirements shall be met on all projects within the City of Napa:

**GENERAL**

1. Non hazardous Material / Waste Management
   a. Designated Area - The CONTRACTOR shall propose designated areas of the project site and any staging areas, for approval by the ENGINEER, suitable for material delivery, storage, and waste collection that, to the maximum extent practicable, are near construction entrances and away from catch basins, gutters, drainage courses and creeks.
   b. Granular Material
      1. The CONTRACTOR shall store granular material at least ten feet away from catch basin and curb returns.
      2. The CONTRACTOR shall not allow granular material to enter the storm drains or creeks.
      3. When rain is forecast within 24 hours or during wet weather, the ENGINEER may require the CONTRACTOR to cover granular material with a tarpaulin and to surround the material with sand bags.
   c. Dust Control
      1. The CONTRACTOR shall use reclaimed water to control dust on a daily basis or as directed by the ENGINEER.
   d. Street Sweeping
      1. At the end of each working day or as directed by the ENGINEER, the CONTRACTOR shall clean and sweep roadways and on-site paved areas of all materials attributed to or involved in the work. The CONTRACTOR shall not use water to flush down streets in place of street sweeping.
   e. Recycling
(1) The CONTRACTOR shall recycle aggregate base material, asphalt concrete, and Portland cement concrete.

(2) In addition, to the maximum extent practicable, the CONTRACTOR shall reuse or recycle any useful construction materials generated during the project providing the material complies with State and Federal regulations.

f. Disposal

(1) At the end of each working day, the CONTRACTOR shall collect all scrap, debris, and waste material, and dispose of such materials properly.

(2) The CONTRACTOR shall inspect dumpsters for leaks and contact trash hauling contractors to replace or repair dumpsters that leak.

(3) The CONTRACTOR shall not discharge water on-site from cleaning dumpsters.

(4) The CONTRACTOR shall arrange for regular waste collection before dumpsters overflow.

2. Hazardous Material / Waste Management

a. Storage

(1) The CONTRACTOR shall label and store all hazardous materials, such as pesticides, paints, thinners, solvents, and fuels; and all hazardous wastes, such as waste oil and antifreeze; in accordance with the City of Napa Hazardous Materials Storage Ordinance and all applicable State and Federal regulations.

(2) The CONTRACTOR shall store all hazardous materials and all hazardous wastes in accordance with secondary containment regulations, and it is recommended that these materials and wastes be covered, as needed to avoid potential management of collected rain water as a hazardous waste.

(3) The CONTRACTOR shall keep an accurate, up-to-date inventory, including Material Safety Data Sheets (MSDSs), of hazardous materials and hazardous wastes stored on-site, to assist emergency response personnel in the event of a hazardous materials incident.

b. Usage

(1) When rain is forecast within 24 hours or during wet weather, the ENGINEER may prevent the CONTRACTOR from applying chemicals in outside areas.

(2) The CONTRACTOR shall not over-apply pesticides or fertilizers and shall follow material manufacturer’s instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals. Over-application of a pesticide constitutes a “label violation” subject to an enforcement action by the Napa County Agriculture Department.

c. Disposal

(1) The CONTRACTOR shall arrange for regular hazardous waste collection to comply with time limits on storage of hazardous wastes.

(2) The CONTRACTOR shall dispose of hazardous waste only at authorized and permitted Treatment, Storage, and Disposal Facilities, and use only licensed hazardous waste haulers to remove the waste off-site, unless quantities to be transported are below applicable threshold limits for transportation specified in State and Federal regulations.
3. Spill Prevention and Control
   a. The CONTRACTOR shall keep a stockpile of spill cleanup materials, such as rags or absorbents, readily accessible on-site.
   b. The CONTRACTOR shall immediately contain and prevent leaks and spills from entering storm drains, and properly clean up and dispose of the waste and cleanup materials. If the waste is hazardous, the CONTRACTOR shall handle the waste as described in section A.2.c above.
   c. The CONTRACTOR shall not wash any spilled material into streets, gutters, storm drains, or creeks and shall not bury spilled hazardous materials.
   d. The CONTRACTOR shall report any hazardous materials spill to City of Napa Dispatch at (707) 257-9223.

4. Vehicle / Equipment Cleaning
   a. The CONTRACTOR shall not perform vehicle or equipment cleaning on-site, in any staging area or in the street using soaps, solvents, degreasers, steam cleaning equipment, or equivalent methods.
   b. The CONTRACTOR shall perform vehicle or equipment cleaning, with water only, in a designated, bermed area that will not allow rinse water to run off-site or into streets, gutters, storm drains, or creeks.

5. Vehicle / Equipment Maintenance and Fueling
   a. The CONTRACTOR shall perform maintenance and fueling of vehicles or equipment in a designated, bermed area or over a drip pan that will not allow run-on of storm water or runoff of spills.
   b. The CONTRACTOR shall use secondary containment, such as a drip pan, to catch leaks or spills any time that vehicle or equipment fluids are dispensed, changed, or poured.
   c. The CONTRACTOR shall keep a stockpile of spill cleanup materials, such as rags or absorbents, readily accessible on-site.
   d. The CONTRACTOR shall clean up leaks and spills of vehicle or equipment fluids immediately and dispose of the waste and cleanup materials as hazardous waste, as described in section A.2.c above.
   e. The CONTRACTOR shall not wash any spilled material into streets, gutters, storm drains, or creeks and shall not bury spilled hazardous materials.
   f. The CONTRACTOR shall report any hazardous materials spill to City of Napa Dispatch at (707) 257-9223.
   g. The CONTRACTOR shall inspect vehicles and equipment arriving on-site for leaking fluids and shall promptly repair leaking vehicles and equipment. Drip pans shall be used to catch leaks until repairs are made.
   h. The CONTRACTOR shall recycle waste oil and antifreeze, to the maximum extent practicable.
   i. The CONTRACTOR shall comply with Federal, State, and City requirements for aboveground storage tanks.

6. Contractor Training and Awareness
a. The CONTRACTOR shall train all employees/subcontractors on the storm water pollution prevention requirements contained in these Specifications.

b. The CONTRACTOR shall inform subcontractors of the storm water pollution prevention contract requirements and include appropriate subcontract provisions to ensure that these requirements are met.

c. The CONTRACTOR shall post warning signs in areas treated with chemicals.

**ACTIVITY-SPECIFIC REQUIREMENTS**

The following requirements shall be met on all projects within the City of Napa that include the listed activities.

1. **Dewatering Operations**
   
a. **Sediment Control**
   
   (1) The CONTRACTOR shall route water through a control measure, such as a sediment trap, sediment basin, or Baker tank to remove settleable solids prior to discharge to the storm drain system.

   (2) Approval of the control measure shall be obtained in advance from the ENGINEER.

   (3) Filtration of the water following the control measure may be required on a case-by-case basis.

   (4) If the ENGINEER determines that the dewatering operation would not generate an appreciable amount of settleable solids, the control measure requirement in (1) above may be waived.

   (5) The CONTRACTOR shall reuse water for other needs, such as dust control or irrigation, to the maximum extent practicable.

b. **Contaminated Groundwater**

   (1) If the project is within an area of known groundwater contamination, then water from dewatering operations shall be tested prior to discharge. If the water quality meets Regional Water Quality Control Board (RWQCB) standards, then it may be discharged to the storm drain. If the water quality meets City of Napa Municipal Code section 8.36, then it may be discharged to the sanitary sewer with prior approval from the Napa Sanitation District. Otherwise, the water shall be treated or hauled off-site for proper disposal.

   (2) If the project is not within an area of known groundwater contamination, then monitoring shall only be required if directed by the ENGINEER. The CONTRACTOR shall follow section A.2.a above, if contamination is found.

   (3) If the project is found to be within an area of groundwater contamination not identified by the City in the project specifications, a change order shall be negotiated to cover additional work performed by the CONTRACTOR pursuant to 4-1.03D “Extra Work” of the Standard Specifications.

2. **Paving Operations**
   
a. **Project Site Management**

   (1) When rain is forecast within 24 hours or during wet weather, the ENGINEER may prevent the CONTRACTOR from paving.
(2) The ENGINEER may direct the CONTRACTOR to protect drainage courses by using control measures, such as earth dike, straw waddles, and sand bag, to divert runoff or trap and filter sediment.

(3) The CONTRACTOR shall place drip pans or absorbent material under paving equipment when not in use.

(4) The CONTRACTOR shall cover catch basins and manholes when paving or applying seal coat, tack coat, slurry seal, or fog seal.

b. Paving Waste Management

(1) The CONTRACTOR shall not sweep or wash down excess sand placed as part of a sand seal or to absorb excess oil into gutters, storm drains, or creeks. Instead, the CONTRACTOR shall either, collect the sand and return it to the stockpile, or dispose of it in a trash container. The CONTRACTOR shall not use water to wash down fresh asphalt concrete pavement.

3. Saw Cutting

a. During saw cutting, the CONTRACTOR shall cover or barricade catch basins using control measures, such as filter fabric, straw bales, sand bags, and fine gravel dams, to keep slurry out of the storm drain system. When protecting a catch basin, the CONTRACTOR shall ensure that the entire opening is covered.

b. The CONTRACTOR shall shovel, absorb, or vacuum saw cut slurry and pick up the waste prior to moving to the next location or at the end of each working day, whichever is sooner.

c. If saw cut slurry enters catch basins, the CONTRACTOR shall remove the slurry from the storm drain system immediately.

4. Contaminated Soil Management

a. On all projects involving grading or excavation, the CONTRACTOR shall look for contaminated soil as evidenced by site history, discoloration, odor, differences in soil properties, abandoned underground tanks or pipes, or buried debris. If the project is not within an area of known soil contamination and no evidence of soil contamination is found, then testing of the soil shall only be required if directed by the ENGINEER. The CONTRACTOR shall follow points 4.b and 4.c below if contamination is found.

b. If the project is within an area of known soil contamination or evidence of soil contamination is found, then soil from grading or excavation operations shall be tested. The soil shall be managed as required by the Napa County Environmental Health Department or other agency.

c. If the project is found to be within an area of soil contamination not identified by the City in the project specifications, a change order shall be negotiated to cover additional work performed by the CONTRACTOR pursuant to 4-1.03D “Extra Work” of the Standard Specifications.

5. Concrete, Grout, and Mortar Waste Management

a. Material Management - The CONTRACTOR shall store concrete, grout, and mortar away from drainage areas and ensure that these materials do not enter the storm drain system.

b. Concrete Truck/Equipment Wash Out
(1) The CONTRACTOR shall not wash out concrete trucks or equipment into streets, gutters, storm drains, or creeks.

(2) The CONTRACTOR shall perform washout of concrete trucks or equipment off-site or in a designated area on-site where the water will flow onto dirt or into a temporary pit in a dirt area. The CONTRACTOR shall let the water percolate into the soil and dispose of the hardened concrete in a trash container. If a suitable dirt area is not available, then the CONTRACTOR shall collect the wash water and remove it off-site.

6. Earthwork - The CONTRACTOR shall maximize the control of erosion and sediment by using the BMPs for erosion and sedimentation in the California Storm Water Best Management Practice Handbook – Construction Activity.

1.10.03 PRE-CONSTRUCTION MEETING

A Pre-Construction Meeting will be held prior to the commencement of work. The Engineer will designate the time and place. The Prime Contractor (and major sub-contractors as required) must attend the meeting. The Contractor’s representative at this conference shall include all major superintendents for the work and may include major subcontractors.

At, or prior to, this meeting the Prime Contractor must submit:

1. A copy of their City of Napa business license.

2. A letter or memorandum designating the authorized representative who shall have authority to represent and act for the Contractor during the entire work period.

3. A letter or memorandum designating two 24-hour emergency contact persons and their telephone numbers.

4. A project schedule.

5. A Traffic Control Plan per the City of Napa “Traffic Control Plan Preparation Guidelines for Contractors”.

1.10.04 OBSTRUCTIONS

Attention is directed to Section 5-1.36D, "Non-Highway Facilities," and Section 15, "Existing Facilities," of the Standard Specifications and these City Standard Specifications.

A traffic control plan, prepared in accordance with the California Supplement of the Manual of Uniform Traffic Control Devices shall be submitted as part of the improvement plan set.

Flagging, signs, and all other traffic control devices furnished, installed, maintained, and removed when no longer required shall conform to the provisions in Section 12, "Temporary Traffic Control," of the Standard Specifications and these general provisions.

Type II retroreflective sheeting shall not be used on construction area sign panels.
The Contractor shall notify the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to commencing excavation for construction area sign posts. The regional notification centers include, but are not limited to, the following:

<table>
<thead>
<tr>
<th>Notification Center</th>
<th>Telephone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underground Service Alert-Northern California</td>
<td>1-800-227-2600</td>
</tr>
<tr>
<td>(USA)</td>
<td></td>
</tr>
</tbody>
</table>

Excavations required to install construction area signs shall be performed by hand methods without the use of power equipment, except that power equipment may be used if it is determined there are no utility facilities in the area of the proposed post holes.

Sign substrates for stationary mounted construction area signs shall be fabricated from materials that are approved by the City Engineer.

The Contractor may be required to cover certain signs during the progress of the work. Signs that are no longer required or that convey inaccurate information to the public shall be immediately covered or removed, or the information shall be corrected. Covers for construction area signs shall be of sufficient size and density to completely block out the complete face of the signs. The retroreflective face of the covered signs shall not be visible either during the day or at night. Covers shall be fastened securely so that the signs remain covered during inclement weather. Covers shall be replaced when they no longer cover the signs properly.

The Contractor shall notify residents and property owners in writing forty-eight (48) hours (excluding weekends and holidays) prior to performing any work at the site. The notification form to be provided to residents and property owners shall be submitted to the City for review and approval. Street parking may be restricted as necessary to facilitate construction activity. “No Parking” signs, as required, shall be placed by the Contractor forty-eight (48) hours in advance of the parking restriction. “No Parking” signs shall have the following information:

- “Tow Away, No Parking”
- Date of Restriction
- Time of Restriction
- “Construction Zone”
- “Vehicles in Violation Subject to Tow at Owner’s Expense”
- “Napa Police Department: 707-257-9223”
- CVC 22658 (1); CVC 22651 (L)

“No Parking” signs shall have red letters on a white background. “No Parking” signs shall be spaced no more than thirty (30) feet apart.

In-lieu of provisions to the contrary in the Standard Specifications, the following provisions shall apply:

The cost of furnishing, installing, maintaining and removing signs, sign covers, lights, flares, temporary railing, barricades, flagmen, guards and all construction area traffic control devises shall be borne by the Contractor.
1.10.05 UTILITIES

Developers are required to determine all utilities that exist within the project-area and to contact all agencies to determine the requirements applicable to their development. The following is a list of the typical utility systems and the respective owners; there may be other utilities not listed:

- The sanitary system is owned and operated by the Napa Sanitation District.
- The gas and electricity distribution systems are owned and operated by the Pacific Gas and Electric Company.
- The telephone system is owned and operated by AT&T.
- The cable television system is owned and operated by Comcast.
- The water system is owned and operated by the City of Napa.
- The street lighting system is owned and operated by the City of Napa.

The Contractor shall limit construction operations to a maximum of 500 linear feet, including excavation, pipe laying and compacting backfill unless otherwise approved by the City Engineer. A trench which has been backfilled and has a surface of temporary paving shall not be counted in this footage. The work area shall be kept in a neat and orderly condition throughout the life of the project and material shall not be stored or placed near intersections for traffic safety.

The Contractor shall exercise care to avoid any damage to utilities during construction.

The Contractor shall contact the City of Napa Water Division (707-257-9521) and Electrical Division (707-257-9588), Comcast, Napa Sanitation District, Pacific Gas and Electric Company, AT&T, and Underground Service Alert (USA) (811 or 1-800-227-2600), (and any other potentially impacted public or private utility companies) a minimum of 48 hours before underground construction is performed, to ascertain the location of the existing underground utilities within the project area unless City Encroachment Permit specifies otherwise. Contractor is responsible for blacking out U.S.A. markings after the completion of construction.

Any damage to underground utility lines or laterals will be Contractor’s responsibility to repair, or to pay for the repairs if the utilities decide to make the repairs with their own forces.

1.10.06 MAINTAINING TRAFFIC

Attention is directed to Sections 7-1.03, "Public Convenience," 7-1.04, "Public Safety," and 12, "Temporary Traffic Control," of the Standard Specifications and to the provisions in "Public Safety" of these City Standard Specifications. Nothing in these City Standard Specifications shall be construed as relieving the Contractor from the responsibilities specified in Section 7-1.04 of the Standard Specifications.

Lane closures shall conform to the provisions in section "Traffic Control System for Lane Closure" of these City Standard Specifications.

The Contractor shall provide for the safe and orderly movement of traffic at all times during construction. On all streets, one lane in each direction shall be maintained at all times. Temporary street closures or providing only one lane for both directions may be approved
by the Engineer provided adequate circulation is maintained and/or adequate flagmen and signage satisfactory to the Engineer is provided. Any lane closures shall be limited to the hours of 9:00 AM to 3:00 PM unless approved by the Engineer.

No street closures will be allowed unless directed by the Engineer. If the Contractor desires a street closure, the Contractor shall submit a written request, accompanied with a traffic control plan, to the Engineer for review and approval. The request shall state the reason, locations, and times for the closure, and shall be submitted a minimum of five (5) working days prior to the request.

The Engineer shall approve or deny the request within three (3) working days after the receipt of the request. If approved, the Contractor shall notify the Police and Fire Department of the City, the Division of Forestry and Fire Protection (CalFire), local ambulance services, the V.I.N.E. Bus Service, Napa Recycling and Waste Services, Napa Valley Unified School District Transportation Department and the U.S. Post Office in writing, forty-eight (48) hours in advance of all street closures and keep the Fire Department posted at all times regarding available access to the streets. The Contractor shall also notify United Parcel Service (UPS), Federal Express and other mail delivery services of planned street closures and the current schedule.

No street closures will be allowed overnight.

The Contractor shall furnish, install, maintain, and remove barricades, lights and signs as required, and shall provide flagmen and other facilities to safeguard adequately the general public (including vehicles, bicycles and pedestrians) and the work as may be deemed necessary by the Engineer.

The Contractor shall take extra care to minimize disruption to the adjacent residences/businesses during the progress of work. The Contractor shall provide access to all residences and/or businesses at all times during the progress of the work. The Contractor shall phase the work to ensure that access to each residence and business is provided at all times. Commercial driveways shall be provided with at least ten (10) feet wide of unobstructed opening at all times.

Subject to the coordination with and approval of property owners and approved in advance by the Engineer in writing, temporary closure of driveways may be allowed. However, in no case shall a driveway remain closed for more than six hours unless otherwise authorized by the Engineer. Prior to closure of driveways, the Contractor shall coordinate and notify the property owner or resident at least twice of such closure. Closure notices shall be given to the property owner or resident twenty-four (24) hours and one (1) hour prior to each closure. A copy of the closure notice shall be furnished to the Engineer for review and approval prior to each closure.

The Contractor shall file, with the City Engineer and Police Department, the name and telephone number of their representative (provide minimum two contacts) to be notified after normal working hours and on weekends, in case of emergency. This information shall be provided at the Preconstruction Meeting. If a preconstruction meeting is not held, it shall be provided to the City prior to the start of work.

The Contractor shall submit, at least five (5) days prior to the initial on-site work, a traffic control plan which conforms to all requirements of these City Standard Specifications and Standard Specifications. This plan shall include all lane closures, construction area signs, detours, and parking prohibitions. Traffic control plans shall conform to the most current edition of the “California Manual on Uniform Traffic Control Devices for Streets and Highways”. No work shall commence prior to the submittal and approval of a satisfactory
traffic control plan. A traffic control plan shall not be deemed satisfactory unless it conforms to the requirements of the aforementioned manual and has been reviewed and approved by the Engineer.

At the end of each working day, if a difference in excess of 0.15-foot exists between the elevation of the existing pavement and the elevation of any excavation within 8 feet of the traveled way, material shall be placed and compacted against the vertical cuts adjacent to the traveled way. During excavation operations, native material may be used for this purpose. The material shall be placed to the level of the elevation of the top of the existing pavement and tapered at a slope of 4:1 or flatter to the bottom of the excavation.

1.10.07 FINISHING WORK

Finishing Work shall conform to the requirements of Section 22, “Finish Roadway,” of the Standard Specifications and these City Standard Specifications.

Filling and grading, with soil backfill, between the curb and sidewalk and filling, grading, and shaping behind the curb and sidewalk, and within the project area shall be considered as part of this section.

Cleanup of the roadway of all construction debris at the end of each workday shall be included as part of this section.

1.10.08 DUST CONTROL

Attention is directed to Section 10-5 “Dust Control,” Section 14-11.04 “Dust Control,” and Section 18 “Dust Palliatives,” of the Standard Specifications and these City Standard Specifications.

The Contractor shall be familiar with and comply with all monitoring, reporting, notifications, and control requirements of agencies having jurisdiction over air quality.

The Contractor shall prevent the formation of an airborne dust nuisance by watering work areas as required until the project is completed and accepted. The amount of water used shall not be excessive to cause soil and/or water run-off outside the boundaries of the working area. If soil run-off occurs, the Contractor shall immediately notify the Engineer and identify the area where run-off occurred. The Contractor shall provide polyethylene sheeting to place underneath and over any stockpiled soil. The stockpile shall be covered daily after completion of work or as required by the City’s Municipal Stormwater requirements for construction. The sheeting shall be adequately weighted or secured to keep the sheeting in place during non-work periods. The Public Works Director may require work to be suspended if dust control is inadequate.

1.10.09 CLEARING AND GRUBBING

Clearing and grubbing shall conform to the provisions in Section 17-2, "Clearing and Grubbing," of the Standard Specifications and these City Standard Specifications.

Vegetation shall be cleared and grubbed only within the excavation and embankment slope lines.
At locations where there is no grading adjacent to a bridge or other structure, clearing and grubbing of vegetation shall be limited to 5 feet outside the physical limits of the bridge or structure.

Existing vegetation outside the areas to be cleared and grubbed shall be protected from injury or damage resulting from the Contractor's operations.

Activities controlled by the Contractor, except cleanup or other required work, shall be confined within the graded areas of the roadway.

Nothing herein shall be construed as relieving the Contractor of the Contractor's responsibility for final cleanup of the highway as provided in Section 4-1.13, "Cleanup," of the Standard Specifications.

Vegetable growth from clearing and grubbing operations may be disposed of in embankments in conformance with the provisions in "Earthwork" of these City Standard Specifications.

1.10.10 EARTHWORK

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these City Standard Specifications.

Amend Section 19-5.03B "Relative Compaction (95 Percent)" by adding the following:

  In addition, contractor shall obtain complete stabilization of subgrade material with no rolling or deflection of the subgrade. This proof-rolling is determined by passing a loaded 3 axle water truck, cement truck or similar vehicle over the completed subgrade without the material rolling, deflecting more than ¼” or cracking perpendicular to the path of travel. Proof-rolling shall be observed by a City inspector.

  Compaction testing shall conform to ASTM 1557.

  If accepted subgrade becomes saturated and/or disturbed or more than five working days pass between acceptance of the material and placement of the upper layer, the subgrade must again be proof-rolled and retesting will be required. The cost of the retesting shall be borne by the Contractor.

  Upon engineer's approval of the subgrade, placement of the aggregate base material may proceed.

Surplus excavated material shall become the property of the Contractor and shall be disposed of in conformance with these standards and the provisions in Section 5-1.20B(4), "Contractor-Property Owner Agreement," of the Standard Specifications.

If the Contractor elects to dispose of materials at locations other than those where arrangements have been made by the Department, or, if material is to be disposed of and the Department has not made arrangements for disposal of the material, the Contractor shall make arrangements for disposing of the materials outside the highway right of way and shall pay all costs involved.

Before disposing of any material outside the highway right of way, the Contractor shall furnish to the Engineer satisfactory evidence that the Contractor has entered into agreements with the property owners of the site involved and has obtained the permits, licenses and clearances.

When any material is to be disposed of outside the highway right of way, and the Department has not made arrangements for disposal of the material, the Contractor shall
first obtain written authorization from the property owner on whose property the
disposal is to be made and the Contractor shall file with the Engineer the authorization or
a certified copy thereof together with a written release from the property owner absolving
the State from any and all responsibility in connection with the disposal of material on
the property.

Before any material is disposed of on the property, the Contractor shall obtain written
permission from the Engineer to dispose of the material at the location designated in the
authorization.

Where a portion of the existing paved or concrete surfacing is to be removed, the outline
of the area to be removed shall be cut on a neat line with a power-driven saw to a
minimum depth of 0.20 foot before removing the surfacing.

Yielding Subgrade:

“Yielding Subgrade” is defined as subgrade that exhibits potential failure. Determination of a
yielding subgrade shall be determined by the Engineer on-site. When yielding subgrade is
encountered the Contractor shall over-excavate 12” below finish sub grade. Place Mirifi 2XT
Geogrid (or approved equivalent) on over-excavated subgrade Install 12” of 1 ½” class 2
aggregate base at 95% compaction. Install layer of Mirifi 500x (or approved equivalent) at
top of 1 ½” class 2 AB. Install ¾” class 2 aggregate base section per plan.

1.10.11 GRADING PERMITS

A grading permit shall not be issued for grading work on any property prior to a project
application, or while a project application for the property is under consideration by the City.

Following project approval by the City, as defined herein, and final approval of the grading
plan(s) by the Public Works Director, upon request of the applicant, a separate grading
permit may be issued by the Chief Building Official prior to issuance of a building permit or
approval of the Final Subdivision Map/Parcel Map.

- For subdivisions, project approval is final approval by the City Council of the
  Tentative Subdivision Map.

- For projects requiring use permits, project approval is expiration of the statutory
  appeal period with no appeal having been filed, or final approval of the use permit by
  the City Council.

Upon a finding of no significance by the Public Works Director, a grading permit may be
issued for minor work, the first two paragraphs of this section notwithstanding.

For all grading permits that include the off-haul of more than 50 cubic yards of material, the
contractor is to provide a written description of the disposal concept and a copy of any
permits issued to allow the placement of that material at the destination site.

1.10.12 LICENSES AND PERMITS

Any and all licenses and permits required shall be provided by the Contractor. The
Contractor shall abide by any and all Federal, State, County and City laws and rules
affecting the work and shall maintain all required protection for property, employees and the
public and insurance in connection with same, for all of which the Contractor shall bear
necessary expense.
2.01 GENERAL

These standards are intended to ensure that watercourse and surface water laws are complied with and that runoff from storms up to the 100-year return frequency are conveyed through storm facilities and disposed of in a manner that protects public and private improvements from flood hazards. Storm drainage improvements shall be designed to serve the ultimate development level as defined in the current City General Plan and the current Storm Drainage Master Plan. Improvements shall comply with California drainage law by not causing damage to other property from construction, diversion, or inducing flooding.

The diversion of natural drainage will be allowed only within the limits of a proposed improvement. All-natural drainage must leave the improved area at its original horizontal location and elevation unless a special agreement, approved by the Public Works Director or their designee, has been executed with the affected downstream property owners.

Although these standards are intended to apply to physical development within the City, the standards may not apply for all situations. Compliance with these standards does not relieve the Engineer of the responsibility to apply conservative and sound professional judgment. These are minimum standards and are intended to assist, but not substitute for competent work by design professionals. The City may, at its sole discretion due to special conditions and/or environmental constraints, require more stringent requirements than would normally be required under these standards.

A drainage system, which includes unreasonable and intensive maintenance or operational requirements as determined by the City, shall be rejected in favor of a drainage system which does not place undue burdens on the owner/operators of such system.

The Applicant may propose a deviation from the Standards. A non-standard system may take longer to review. The Applicant acknowledges these risks when submitting a non-standard system for review.

The City’s decision to grant, deny, or modify the proposed deviation shall be based upon evidence that the deviation request meets all of the following criteria:

- The proposed system will achieve the intended result through a comparable or even superior design.
- The proposed system will not adversely affect safety and/or operation.
- The proposed system will not adversely affect maintainability.
- The proposed system can reasonably be expected to provide equal or better protection to neighbors from flooding.
- The proposed system will not adversely affect water quality.

2.02 DESIGN CRITERIA

All storm drainage facilities shall be designed to provide connections to future upstream facilities that may be constructed. No development shall discharge at a rate that exceeds the capacity of any portion of the existing downstream system. Calculations for storm drainage design within the development as well as calculations for runoff generated by upstream areas within the
The water level in the drainage inlet boxes shall not exceed an elevation of 0.5 foot below gutter elevation, and the elevation in manholes or junction boxes shall not exceed an elevation 1 foot below street grade.

The allowable spread of water from the curb from 10-year storm runoff is limited by the requirement to maintain two-10-foot moving lanes of traffic for collector streets. One clear lane shall be maintained on sub collectors.

The 100-year return runoff (1% chance per year) shall be directed towards and contained within the street right of way unless a design exception is granted by the Public Works Director or their designee.

Flood waters shall be confined to streets or other approved rights-of-way by grading, levees or alternative means acceptable to the Director of Public Works.

The City Public Works Department has hydraulic data for most storm drains over 30 inches in diameter available in the City of Napa Storm Drain Master Plan.

Table 2.1 shows the recommended method and return period design criteria to estimate discharge.

In some instances, the economic consequences of drainage system failure will be such that the City shall require a higher than minimum recurrence interval to be used in the design. This determination will be made at the time of project or Tentative Map approval.

In areas where the natural relief of the ground does not preclude the possibility of the backwater elevation exceeding existing or future building floor elevations, the capacity of the drainage system shall be sufficient to ensure that the backwater resulting from a 100-year return storm will not exceed the elevation of existing building floor elevations and be a minimum of one foot below all proposed finish floor elevations.

### 2.03 DRAINAGE ANALYSIS AND CALCULATIONS

#### 2.03.01 STORM DRAINAGE ANALYSIS

Engineering calculations shall be submitted to establish the basis for the design of the drainage system. The engineering analysis shall be based on the following requirements:

- The entire drainage basin in acres including any sub-areas, the location of the project within the drainage basin in the drainage calculations. For projects less than one acre, only local drainage analysis is required.

- The grading plans provided by the Developer for review shall include the existing topography shown with contour lines labeled at one-foot intervals and extending a sufficient distance beyond the limits of the project site to indicate impacts on adjacent properties.

- The minimum pipe size for publicly maintained drainage systems shall be 18 inches in diameter.
• At intersections of pipes, the downstream pipe shall have a crown elevation that is equal to the crowns of all upstream connecting pipes unless otherwise approved by the Public Works Director or their designee.

• Pipe diameters shall not decrease in the downstream direction.

• Drainage inlets shall be located so that the maximum distance that water flows in the gutter does not exceed 500 feet.

• All catch basins shall be Type D-2, unless otherwise approved by the Public Works Director or their designee and shall be placed at the low points of the gutter on grades of less than one percent. The capacity of a D-2 catch basin is approximately one cubic foot per second per linear foot of inlet width. Where the street grade exceeds five percent or velocity exceeds five (5) fps, gallery extensions shall be required to intercept the higher velocity and/or increased gutter flow. The Caltrans Type GO catch basin shall be used only with the approval of the Public Works Director or their designee.

• GO inlets spaced 50 feet apart, centered on the low point, shall be placed at the low point of vertical sag curve locations on arterial and collector streets where there is more than 1 cfs of gutter flow at the crosswalk.

• All storm conveyance structures, unless otherwise approved by the Public Works Director or their designee, shall be designed to function without surcharging for the purposes of determining hydraulic capacity.

• Minimum velocity in pipe shall be three (3) fps and of a self-cleaning design.

• Storm drain pipe curvature shall not exceed 80% of the manufacturer’s recommendation.

• Drain inlets shall be located on tangents upstream from crosswalks and access ramps in the direction of the greater gutter flow. In certain cases, two drain inlets may be required on a corner.

• Either a manhole or a drainage inlet shall be provided every 400 feet, at angle points, and at beginning and end of horizontal curves to maintain accessibility to the underground drainage facilities.

• Minimum horizontal separation from a storm drain facility to a water line or sewer line shall be 5 feet from the outside of each pipe except at pipe crossings. Horizontal separation from other utilities shall be a minimum of four feet clear.

• Storm drain pipes, which terminate in a creek or river, will be required to have a rip rap or concrete headwall constructed in accordance with Public Works Standard Detail D-6 shown in the City of Napa Standard Plans. Flap gates are required when a storm drain pipe discharges into the Napa River/Napa Creek Flood Protection Project limits (Napa River from Imola Avenue to Trancas Street; Napa Creek from Jefferson Street to Napa River) or in other conditions where the hydraulic gradient in the waterway may cause reverse flow in the pipe, and cause flooding upstream of the inlet such as in tidally influenced waterways. Standard design detail of this flap gate is shown on Public Works Standard Detail D-11.

• Main line storm drain pipes shall not be installed in the planting area between the curb and the sidewalk. The storm drainage lines shall be installed parallel with street centerline and entirely within the curb-curb street area. The edge of the pipe closest
to the curb shall be aligned with the face of the curb and the pipe warped into the catch basin.

The following step-by-step procedure for analyzing a drainage situation is offered as a guide. Its use is optional and it should not be substituted for common sense or good judgment:

1. Determine the area in acres contributing runoff to the drainage inlet in the system.
2. Determine the coefficient of runoff for each of the drainage areas, under ultimate anticipated development. Table 2.4 should be used as a guide in this determination.
3. Determine the time of concentration independently for each drainage area. Please see section 2.03.02 for the complete time of concentration guidelines. For residential lots, the time for water to reach the gutters can be assumed to be 10 minutes.
4. Determine the rainfall intensity for each of the times of concentration determined above. Table 2.3 of these standards or the most current NOAA Point Precipitation Frequency (PF) Estimates should be used for this determination. However, when using the NOAA PF Estimates, rainfall depth should be selected from the highest probable value.
5. Maximum storm runoff for developments whose gross drainage area is 200 acres or less shall be computed using the Rational Method.
6. Determine the gutter capacity immediately upstream from each inlet and at upstream points with a flatter grade. Chart 2.1 may be used to determine the capacity of the gutter.
7. Determine the capacity of all inlets or catch basins within each of the drainage areas.
8. Determine the flow capacity of the pipe using Manning’s equation, under full flow conditions. The slope of the hydraulic grade line must be used in this equation. To determine this slope the head on the entrance to the pipe, the entrance losses, the head converted to velocity head, and the head on the outlet must all be considered.
9. If more than one inlet is contributing to the flow in a pipe, revised inlet flows must be computed based on the time of concentration to the inlet furthest upstream, plus the travel time in the pipe to the point in question.

2.03.02 STORMWATER DRAINAGE CALCULATIONS

Stormwater drainage calculations or design drawings shall include the following:

- Flow in cubic feet per second to each structure and in each pipe including the direction with arrows.
- Time of concentration at each structure. (Figure 2.8)
- Intensity of rainfall at each structure. (Table 2.3, Chart 2.2)
- All applicable existing and proposed improvements including size, material type, length and slope of each pipe proposed between structures.
- Invert elevation of each pipe structure.
- Top of structure elevation.
- Hydraulic grade line elevation at each structure.
Hydraulic gradient.
- Gutter capacity immediately upstream from each inlet and at upstream points with a flatter grade.
- Catch basin inlet capacities.
- Calculation Sheets, which include all the appropriate coefficients, acreages and other design details and also summarizes the design in a clear, concise, and professional format.
- Pipe sizes shall be determined by the following steps:
  The flow capacity of the pipe is determined using Manning’s equation, under full flow conditions. The slope of the hydraulic grade line must be used in this equation. To determine this slope, the head on the entrance to the pipe, the entrance losses, the head converted to velocity head, the head on the outlet, and tail water must all be considered.

As noted in Table 2.1, several options are available for use in estimating discharge for storm events. Table 2.2 provides the Design Depth Frequency (DDF) for selected storms and Table 2.3 shows Rainfall Intensity Duration. Rainfall information shall be adjusted.

A. Rational Method

The 10- and 100-year peak runoff shall be determined for each analysis point using the Rational Method. The Rational Method provides reasonable estimates of peak runoff for small watersheds. The method relates a peak discharge for the project site, a runoff coefficient (C), and rainfall intensity (i). Runoff coefficients were found to vary between 0.35 and 0.90 for land use and storm frequency.

The Rational Method equation has the form: \( Q = CiA \)

Where:
- \( Q \) = rate of runoff, acre-inches per hour or cubic feet per second
- \( C \) = runoff coefficient, which is the ratio of peak runoff to average rainfall intensity
- \( i \) = average rainfall intensity, inches per hour, adjust intensity using rainfall M.A.P. correction see Chart 2.2 or NOAA Point Precipitation Frequency Estimates.
- \( A \) = drainage area, acres

The Rational Method shall be applied using the procedure outlined below.

- Basic Information Preparation: Layout the proposed storm drainage system and delineate the sub-basins tributary to points of concentration for the design of inlets, junctions, pipelines, etc. delineates the land uses and runoff coefficients within each sub-basin.
- Rainfall Intensity: Average rainfall intensity, \( i \), shall be selected from Table 2.3 of these standards or the highest probable value of the most current NOAA Point Precipitation Frequency (PF) Estimates (https://hdsc.nws.noaa.gov/hdsc/pfds). Table 2.3 intensity values are based on a M.A.P. of 26 inches. Values selected from this table should be converted to a site-specific intensity using Chart 2.2.
• **Runoff Coefficient Determination:** The runoff coefficients, \(C\), for a storm having a 10-year recurrence interval are presented in City of Napa Table 2.4 by land use designation and average slope. For 25-year recurrence interval, table values shall be multiplied by 1.1; and for 100-year recurrence the table values shall be multiplied by 1.2; with the results not to exceed 1.0.

• **Time of Concentration Determination:** The time of concentration or the travel time is the time required for runoff to flow from the most upstream point of the drainage area through the conveyance system to the point of interest. The travel time is calculated by dividing the length of the conveyance system component by the corresponding velocity of flow. For typical small residential lots, the time for water to reach the gutter shall be a minimum of 10 minutes. The travel time, \(T_c\), is computed as follows:

\[
T_c = T_o + T_g + T_p + T_{ch}
\]

Where:

- \(T_o\) = overland flow time of concentration
- \(T_g\) = gutter flow travel time
- \(T_p\) = pipe flow travel time
- \(T_{ch}\) = channel flow travel time

The equation used to compute the travel time for each conveyance component is described below.

• **Overland Flow:** The kinematic wave empirical equation based upon available SCS, COE, and FAA overland flow data (Papadakis, 1987) is:

\[
T_o = \frac{0.66L^{0.50}}{S^{0.31}n^{0.38}} \cdot \frac{1}{i^{0.52}}
\]

Where:

- \(T_o\) = overland flow time of concentration, minute
- \(L\) = overland flow length, ft.
- \(n\) = roughness coefficient for overland flow
- \(S\) = average slope of flow path, ft/ft
- \(i\) = intensity of precipitation, in/hr

Use of the overland time of concentration equation requires an iterative approach: an initial estimate of the time of concentration updated by successive estimates of precipitation intensity.

• **Gutter Flow:** may be determined using Chart 2.1 of the City of Napa Standards.

• **Pipe Flow:** Manning’s equation can also be used to determine travel time of flow through pipes. Travel time is usually calculated by assuming full pipe flow. Flow velocity is calculated with the equation:

\[
v = \frac{1.49}{n} R^{0.67} S^{0.50}
\]
Where:

\[ V = \text{velocity in pipe, ft/s} \]
\[ R = \text{hydraulic radius, } D/4 \text{ for full pipe flow, ft} \]
\[ D = \text{diameter of pipe, ft} \]
\[ S = \text{slope, ft/ft} \]
\[ n = \text{Manning's "n", design value = 0.015 for concrete} \]

- **Trapezoidal Channels:** A modified Manning's equation is used for open channel flow to derive the velocity for trapezoidal grass-lined channels. The following assumptions were made in the derivation of the modified equation:
  1. Channel side slopes are 3:1.
  2. Channel bottom width equals the depth.
  3. Top width is seven times the bottom width.

\[
V = \frac{0.995}{n} b^{0.67} S^{0.50}
\]

Where:

\[ V = \text{velocity, in ft/s} \]
\[ b = \text{bottom width, ft} \]
\[ n = \text{Manning's "n" for channel flow} \]
\[ S = \text{slope, ft/ft} \]

- **Intensity Determination:** The rainfall intensity shall be determined from Tables 2.2 and 2.3.

**B. Napa Charts**

The 2006 City of Napa Storm Drainage Master Plan developed charts of discharge versus drainage area for the City of Napa watersheds, Figure 2.1. Charts to be used in residential, commercial (+20%) were developed as well. Included in these drainage standards are the most commonly used curves for 10-year and 100-year peak flows for residential, commercial and between 10 and 80 acres. For 25-year discharges multiply 10-year discharges by 1.20. Included in the charts is design flow versus drainage area curves for MAPs ranging from 22 to 36 inches per year. For development exceeding 80 acres in size, the appropriate curve in the City of Napa Storm Drain Master Plan shall be used.

**C. HEC Hydrology Modeling**

U.S. Army Corps of Engineer’s software HEC-HMS (Hydraulic Engineering Center Hydrologic Modeling System) should be used in watersheds over 80 acres and may be used in smaller watersheds if the design engineer desires. Modeling is also necessary when runoff peaks are to be combined, when runoff hydrographs are designed and when detention and/or water quality BMPs volume-based storage is to be used.
To establish some consistency when modeling in Napa runoff, it is recommended that unit hydrographs be derived based on one of two methods; Clark coefficients or TR-20. Both methods are available in HEC-HMS. TR-20 is also available as stand-alone software or as a module in hydrology software programs.

**Clark Coefficient Method:**

The Corps of Engineers developed values for the Clark time of concentration \( T_c \) and the Clark storage coefficient \( R \) as part of their local watershed studies in Napa.

The Corps data is the basis for the construction of Figure 2.8 showing Clark coefficients \( T_c + R \) plotted to drainage area. A best fit resulted in the adoption of the relationship \( R / (T_c + R) = 0.25 \). Entering Figure 2.8 with a drainage area and using the \( T_c + R \) from the curve, the Clark coefficients may be derived and used in the HEC-RAS or HEC-HMS model. In summary, the recommended criteria and methods to estimate discharge are presented in Table 2.1. For sizing detention basins in watersheds less than 250 acres, other methods (not including Clark limit hydrograph method) within HEC-RAS or HEC-HMS should be used to adequately represent how the runoff will be routed through the detention basin.

**TR-20 Method:**

There are five basic data required to determine runoff using TR-20 – drainage area, runoff curve number, time of concentration, rainfall distribution and 24-hour rainfall depth.

Runoff Curve Number is an index used to rate the runoff potential of a watershed. It is based on the type of soil (hydrologic soil group) and land use/treatment class (surface condition of the watershed).

The National Resources Conservation Service (NRCS) created four synthetic rainfall distributions to represent the various rainfall intensities and geographical regions of the United States. The City of Napa falls under the Type 1A distribution, which corresponds to wet winters and dry summers. The 24-hour rainfall depth is the amount of total rainfall an area will receive in 24-hours during a rain event. This data may be obtained from the publication by the National Oceanic and Atmospheric Association (NOAA) Atlas 2, Volume XI (Northern California).

For a brief study of the TR-20 method and its processes, refer to the NRCS’s publication TR-55 – Urban Hydrology for Small Watershed, which is the non-automated version of the TR-20.

### 2.03.03 HYDROLOGY / HYDRAULICS
(StUDY REPORT / PLAN SUBMITTAL REQUIREMENTS)

A narrative report shall be provided discussing the hydrologic and hydraulic characteristics of the project and all applicable information specified in Section 2.03.02 of these standards. The report shall state the goals, assumptions, and design concepts underlying the drainage system and include, at minimum, the items listed below:

- A discussion of pre-development and post-development site conditions. This
analysis should include the proposed hydrologic and hydraulic modifications and a summary of the reported results.

- A drainage basin map showing the limits of all drainage areas and their size in acres or square feet. Drainage basins may not necessarily be limited to project limits and should include the maximum extent of any area that contributes to total runoff. The drainage basin map should show at minimum the following drainage characteristics: Boundaries of all drainage basins, pervious and impervious surfaces, flowlines, and all drainage structures with associated flow elevations.

- Calculations for all hydrologic properties specified in section 2.03.02 including but not limited to: time of concentration, weighted runoff coefficients, rainfall intensity, and total runoff predicted using the appropriate method specified in Table 2.1. Calculations should be provided for both pre-development and post-development conditions.

- Hydraulic calculations that show flow capacities for all drainage structures including but not limited to: pipes, swales, gutters, inlets, and outfalls.

- All charts, tables, and supporting documents used within the report.

Additional information may be required as appropriate depending upon the size and complexity of the project. Incomplete submittals will require subsequent submittals with additional information. Any special issues should be discussed with City staff in advance of the submittal.

2.04 DRAINAGE STRUCTURES

- Manholes and Junction Boxes shall conform to City of Napa Standard Plans. They shall be located at changes in grade or conduit size, at junction points, on curved pipe at the beginning and ending of the curve. Maximum spacing between manholes and/or accessible structures (catch basins) shall be 400 feet.

- Catch basins shall conform to the City of Napa Standard Plans. Catch basins shall be designed and spaced such that they intercept and fully contain the design storm required for the project. Under no circumstance shall the spacing of catch basins result in water flowing in gutters over 500 feet.

- Box culverts shall be required when specified by the Public Works Director or their designee and shall be designed on an individual basis per Caltrans Design Standards and Standard Plans.

- Headwalls, wingwalls, endwalls, etc. shall be considered on an individual basis, and in general, designed in accordance with Section 51 of the Caltrans Standard Specifications.

- Drainage Pump Stations are not permitted unless approved by the Public Works Director or their designee.

- Temporary inlets and outlets shall conform to good engineering practice and shall be specifically designed and detailed on the plans.

- Gutters – Stormwater runoff in gutters shall be conveyed in underground structures when any one of the following criteria is met:
  1. Gutter runoff exceeds 3.0 cfs.
2. Length of gutter flow exceeds 500 feet.
3. Water spread exceeds requirement of Design Criteria, Section 2.02.
4. The minimum longitudinal slope of gutters shall be 0.5 percent. Gutters can slope a minimum of 0.33 percent with a 2-foot wide gutter pan with the approval of the Public Works Director or their designee.

2.05 OPEN CHANNEL DESIGN

For the purposes of these drainage provisions, a ditch with a capacity of over 2.5 cfs shall be classified as an open channel. Drainage may not be conveyed through a development in open channels without written approval of the Public Works Director or their designee. Requirements for open channels are as follows:

- **Channel construction may require permits and design reviews from environmental regulators outside the City of Napa.**

- **Construction:** Channels shall be constructed to a typical cross section. Fully lined channels shall be designed with maximum side slopes of 2:1; channels with unlined sides shall be designed with maximum side slopes of 3:1. Lined channels shall have a minimum bottom width of at least twice the channel depth and shall have adequate access ramps for maintenance equipment. The lining shall be finished concrete, riprap rock, or other lining approved by the Public Works Director or their designee. The minimum weight of sacked concrete shall be determined from Figure 2.9, (replacing sack concrete for rock) and in no case shall an individual sack of concrete weigh less than 60 pounds. For use in this figure, impinging velocities shall be 1.4x the mean velocity and the tangential velocity shall be 0.75x the mean velocity.

- **Design:** Channels shall be designed to convey the 100-year design flow with a minimum velocity of two (2) fps. The maximum velocities shall be as follows:
  1. Earth channels, six (6) fps.
  2. Fully lined channels, ten (10) fps.

  The hydraulic grade line shall be calculated and plotted on all channel profiles. All computations including a narrative of the design shall be submitted to the Public Works Director or their designee for approval.

  A minimum of 3-feet or 1-foot of freeboard in channels with or without levees respectively shall be provided. The latest FEMA Regulations shall also apply.

- **Curve Radius:** The centerline curve radius of an open channel shall be equal to or greater than twice the bottom width (35-foot minimum).

2.06 BENCH DRAINS AND DIVERSION DITCHES

A ditch shall be considered a bench drain or diversion ditch as long as its design capacity is does not exceed 2.5 cfs. Any ditch, which has a capacity greater than 2.5 cfs, shall be considered an open channel and designed as such.

Bench drains and diversion ditches shall be concrete lined and designed with a velocity range of
between 3 and 20 feet per second. At changes in alignment and at inlets, adequate measures such as banking, circular curves or energy dissipaters shall be used to confine water to the channel. At locations where, in the opinion of the Public Works Director or their designee, the overflow of a bench drain or diversion ditch could cause flooding, erosion or other damage, the channel section shall be designed to carry the 100-year runoff.

2.07 LEVEES

Where new levees are constructed, the landside levee slope shall be 2:1. The waterside slope of the new levee embankment shall be constructed at 3:1. The top width of the levee berm will be 15 feet and shall also function as a patrol road. The limits of the right-of-way shall extend 10 feet beyond the toe of the landside slope of the new levee embankment to provide access for levee maintenance.

Levees may require permits and design reviews from environmental regulators outside the City of Napa.

2.08 SLOPE PROTECTION

Where channel slope protection is required, stone riprap protection shall be designed in accordance with USACE Standard EM 1110-02-1601, “Hydraulic Design of Flood Control Channels”.

Slope protection installation may require permits and design reviews from environmental regulators outside the City of Napa.

2.09 STRUCTURE OPERATION CRITERIA

All structures such as ponds, control gates, weirs, flap gates, temporary facilities, etc., shall be shown in detail on design and construction drawings. Their purpose, functional operation parameters and settings shall be described on the drawings. Pond ownership and maintenance responsibilities shall also be included.

2.10 DETENTION

2.10.01 PURPOSE

The City of Napa’s stormwater systems as well as the Napa River Flood Protection Project do not provide protection for additional flow caused by increases in peak runoff generated by new development. Much of the City’s storm drain does not have existing capacity to carry 10-year storm flow. Specific areas of the City also have unique drainage situations including the Big Ranch Specific Plan Area which requires “all projects of more than four units draining directly or indirectly to the Salvador Channel or Bel-Aire/Gasser Tributary to provide enough stormwater detention capacity to maintain post-project 100-year peak flows at pre-project levels.” Because of Salvador Creek flooding concerns the above standard is applied to all projects in the Salvador Creek watershed. Please see Figure 2.10 for a drainage basin map showing the limits of the Salvador Creek watershed. Other requirements also exist.
which affect the need for detention. Those concerning Water Quality are covered in the BASMAA Post-Construction Manual adopted by the City of Napa.

**Detention Requirements:**

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Size</th>
<th>10-year</th>
<th>25-year</th>
<th>100-year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>&lt; 1 acre modified and &lt; 0.5 acres of new impervious surfaces</td>
<td>Not required</td>
<td>Not required</td>
<td>Not required</td>
</tr>
<tr>
<td>Residential</td>
<td>≥ 1 acre modified or ≥ 0.5 acres of new impervious surfaces</td>
<td>✓</td>
<td>Not required</td>
<td>Overland release</td>
</tr>
<tr>
<td>Commercial</td>
<td>&lt; 25 acres</td>
<td>✓</td>
<td>✓</td>
<td>Overland release</td>
</tr>
<tr>
<td>Commercial</td>
<td>≥ 25 acres</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Salvador Basin*</td>
<td>Residential</td>
<td>&gt; 4 units</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Salvador Basin*</td>
<td>Commercial</td>
<td>All projects</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

* Projects of 4 units or less are required to meet all other detention requirements listed in the above table.

**Table Notes:**

a. Existing storm drains may be required to be upsized or replaced if there is inadequate capacity for downstream conveyance.

b. See Figure 2.10 for location and limits of the Salvador Basin.

c. A residential unit is defined as any dwelling or place designed for human occupancy which contains a kitchen.

### 2.10.02 INTRODUCTION

This section is concerned with the planning and design of facilities and features for providing storage in drainage systems. An emphasis is placed in use of storage for flood control.

Storage can also be an effective tool for the management of stormwater runoff. Storage lends itself to multiple land uses and is often the least costly alternative for achieving a particular flood control objective. Temporarily detaining a few acre-feet of runoff can significantly reduce downstream flows and pipe and channel sizes, especially when the flood hydrograph has a rapid rise and fall. Storage can also remove sediment and debris that reduces sediment and pollutant loading on receiving waters.

However, the use of storage to reduce flood peaks is also potentially detrimental to flooding conditions. Storage facilities must be adequately maintained in order to function properly. Further, storage may potentially worsen downstream conditions for events larger or smaller than a single design event, and storage provided at some locations in a basin can actually increase total watershed peak flows by causing runoff peaks to coincide with peaks from other parts of the basin.

Detention facilities shall be designed to capture, temporarily hold and gradually release a volume of stormwater runoff to attenuate and delay stormwater runoff peaks. Outlet
structures shall be sized to limit the maximum flow rates. Detention facilities shall drain completely after storm events, within a minimum of 72 hours.

Calculations for detention requirements shall be as outlined for storm drainage design.

Projects shall provide on-site detention of stormwater such that the peak flows from a storm with a two inches per hour intensity, 10-year storm, 25-year storm and 100-year storm does not exceed predevelopment runoff. The Applicant shall provide storm drain inlets with enough capacity to ensure 100-year stormwater enters the detention system. Detention facilities shall not be located within public street rights-of-way. Side slopes should not exceed 3:1 and shall include a 100-year overland escape.

Underground stormwater detention facilities shall be constructed within a Private Drainage Easement at the sole cost of the subdivider, developer and/or contractor. Detention facilities shall not be located within public street rights-of-way.

Maintenance responsibility for stormwater detention facilities shall be the responsibility of an appropriately established Homeowners Association (HOA), or other responsible entity, such as a private maintenance agreement, as approved by the Public Works Director or their designee and the City Attorney. A long-term operations and maintenance plan shall be submitted to and approved by the Public Works Department. The plan shall include a viable method of long term financing for such maintenance, inspection verification reporting and a third party beneficiary agreement. If the Homeowners Association, or other responsible entity, fails to maintain the detention facilities, then the City shall enforce the maintenance through this agreement.

The third party agreement shall allow, but not limit, the City of Napa to force the HOA, or other entity, to do the work, the right to enter onto the property to do the work, the right to charge for the work completed by the City of Napa, or its contractor, and the right to establish a lien to recoup the cost of the work.

2.10.03 CONCEPTS AND DEFINITIONS

A. Detention and Retention

Detention storage temporarily delays a portion of the inflow so that the maximum outflow is less than the maximum inflow. The storage of runoff is temporary, i.e. water stored is released soon after the maximum inflow has occurred.

Retention storage functions similarly to detention storage except that water is stored for a significantly longer period. Water may be released from retention storage after a storm has ended or it may be retained for a much longer period for other uses such as recreation, surface water supply, or ground water recharge.

B. On-site Storage

The storage of water close to the points of rainfall occurrence is considered on-site storage. On-site storage is typically small scale and includes ponding in parking lots, property line swales, small ponds in green areas, underground tanks and infiltration trenches.

- Parking lot detention for industrial/business development shall provide pedestrian access through the ponded areas. Depths of ponding shall not exceed four (4") inches.
• Conduit storage can be utilized by over sizing the underground drainage facilities. Care should be taken to prevent siltation problems.

Channel storage can be utilized by over sizing the open channel facilities. Care again should be taken to prevent siltation problems, and allowances must be made for a minimum capacity at a maximum silt buildup.
2.10.04 PRINCIPLES AND POLICIES

A. Avoiding Detrimental Effects

A storage facility shall not worsen conditions downstream. Any storage facility, especially a detention basin, has a potential for creating worse conditions downstream by altering the timing of peak flows in the stream and its tributaries. In order to avoid detrimental effects, the following criteria are required to be met:

- A hydrologic study of the watershed in which the basin would be sited is to be conducted. The downstream limit of the study would be the point beyond which changes in peak flows would not be measurable such as tidally influenced water bodies. Where they exist, the HEC watershed models supported by the City should be used.
- Storage basins must limit outflows to pre-development levels for the 10, 25 and 100-year event peak flow rates with the basin initially empty.
- The spillway must carry the 100-year storm hydrograph with the basin initially full and provide one foot of freeboard above 100-year event spillway design water surface.
- Best management practices such as low impact development shall be used to minimize hydromodification to the maximum extent practicable.

B. On-site Storage

On-site storage mitigation of increased runoff shall be used to provide storage where appropriate. Project features, which can be used for incidental storage, include parking lots, parks, and other common areas along with underground storage facilities. On-site storage may create incidental storage, which is effective in reducing peak flows downstream. The ponding function of on-site storage should be considered with the planning and design of the project and coordinated with the master drainage plan.

2.10.05 HYDROLOGIC EVALUATION

The evaluation of the effects of storage on flows is the same, regardless of the scale of the storage facility. The objectives of the hydrologic evaluation are to determine the required storage capacity and to verify the effectiveness of the outlet design in achieving objective flows.

The required capacity of a storage basin is a function of the objective outflows, design inflows, and required freeboard. Carryover and multi-purpose storage are also factors when retention is involved. A routing of the design storm inflows is required to determine the capacity for storage basins. The outflows used in the detailed routing shall be based upon hydraulic rating curves for the outlet works proposed for the basin.

Note that if the actual storage capacity is limited by topography or costs of land acquisition and constructions, it may be necessary to reformulate the objective outflows.
A. **Objective Outflows**

When storage is to be used to mitigate downstream impacts due to increased flows generated by development of a site, the objective outflow shall be taken as the estimated pre-development peak flow rate.

B. **Outflow Control**

It is desirable to design the storage to operate under hydraulic control: i.e. the hydraulics of the outlet controls the outflow rates. In no case shall the spillway be manually operated.

C. **Duration**

The duration of flood routings shall be sufficiently long for stream flows and storage levels to return to initial conditions. Runoff from storms of increasing durations shall be routed through the storage basin to determine the maximum volume required considering carryover from one period of high runoff to the next. Detention facilities shall be designed to drain completely within 72 hours of the end of the design storm.

2.10.06 **DETECTION TANKS AND VAULTS**

Tanks and vaults provide underground storage of stormwater as part of the runoff quantity control system. As with any underground structure, they must be designed not only for their function as runoff quantity control facilities, but also to withstand an environment of periodic inundation, potentially corrosive chemical or electrochemical soil conditions and heavy ground surface loadings. They must also be accessible for maintenance.

Tanks and vaults typically do not have a built-in design feature for containing sediment, as do multi-cell ponds. Therefore, when tanks or vaults are used for detention storage either a surface sediment containment pond or other sediment control BMP shall be placed upstream of the tank or vault.

Tanks and vaults can be used in conjunction with other detention storage facilities, such as ponds or parking lot ponds, to provide initial or supplemental storage.

A. **Design Requirements**

The following criteria shall apply to detention tank and vault design:

- All areas of a tank or vault shall be within 200 feet of a minimum 24-inch diameter access entry cover. All access openings shall have round solid locking lids.

- Privately owned detention tanks and vaults are not permitted within the public right-of-way. If developments are served with publicly operated and maintained tanks and vaults that are not located within the right-of-way, the tanks/vaults shall be located in separate open space tracts with private drainage easements. All privately owned and maintained facilities shall be located to allow easy maintenance and access.

- All tanks and vaults shall be designed as flow-through systems, unless separate sediment containment is provided.
If the collection system piping is designed also to provide storage, the resulting maximum water surface elevation shall maintain a minimum 0.5-foot of freeboard in any catch basin below the catch basin grate. Pipe capacity shall be verified utilizing backwater analysis, using an accepted methodology approved by the City. The minimum internal height of a vault or tank shall be 3 feet and the minimum width shall be 3 feet. The maximum depth of the vault/tank invert shall be 20 feet.

All tank and vault shop drawings shall be included with improvement plans for the project.

B. Materials and Structural Stability

Pipe materials and joints shall conform to the City of Napa standards. For pipes outside of City right-of-way, pipe material used may be SDR-35 or PVC Schedule 40 plastic.

All tanks and vaults shall meet structural requirements for overburden support and traffic loadings, if appropriate. H-20 live loads shall be accommodated for tanks and vaults under roadways and parking areas. End plans and caps shall be designed for structural stability at maximum hydrostatic loading conditions.

Detention vaults shall be constructed of structural reinforced concrete (3000 psi, ASTM 405). All construction joints shall be provided with water stops.

In soils where groundwater may induce flotation and buoyancy, measures shall be taken to counteract these forces. Ballasting with concrete or earth backfill, providing concrete anchors or other counteractive measures shall be required. Calculations shall be required to demonstrate stability.

Tanks and vaults shall be placed on stable, consolidated native soil with suitable bedding. Tanks and vaults shall not be allowed in fill slopes, unless a geotechnical analysis is performed for stability and construction practices.

2.10.07 CONTROL STRUCTURES

Detention control structures shall be either weir structures or orifice structures. Weir structures may be enclosed in a catch basin, manhole, or vault or may be installed in the open provided they are accessible for maintenance and are not exposed to damage. Riser type restrictor devices also provide some incidental oil/water separation and spill control. Weir structures provide some oil/water separation when fitted with a baffle plate located upstream of the weir.

The following criteria shall apply to control structure design:

- Flow control manholes shall have solid locking covers. Open grates shall not be permitted in control manholes.
- Multiple orifices are usually necessary to meet the design storm performance requirements for a detention system.
2.12 DRAINAGE EASEMENTS

Drainage easements shall be established when drainage facilities exist, or are designed to be constructed, on private property. Clear access must be provided and maintained to all public structures on the drainage system.

Publicly maintained drainage conduits and channels will not be allowed on private property unless they lie within dedicated public drainage easements. When minor improvement of a drainage channel falls on adjacent property (such as day lighting a ditch profile) written permission from the adjacent property owner(s) for such construction shall be required. A copy of the document which grants said approval shall be submitted to the Public Works Director or their designee prior to the approval of the improvement plans.

Easements for closed conduits shall have a minimum width of either 15 feet or a width in feet equal to the required trench width according to the standard detail for trench backfill plus 2 additional feet of width for every foot of depth of the pipe as measured from the bottom of the pipe to finished grade, whichever is wider. For pipes outside the City right-of-way and less than 10” in diameter, a 10’ wide minimum easement shall be provided. All conduits shall be centered at the quarter point within their easements. Drainage easements for open channels with flows of over 3 cubic feet per second shall have sufficient width to contain the open channel and two 17-foot wide service roads. The toe of a bank shall not be within 17 feet of an easement boundary. Easement boundary lines shall, at changes of alignment, have a 50-foot radius sufficient to provide turning room for vehicles operating on the service road.

Easements shall be categorized as follows:

- **Public drainage easements** cover fully improved drainage and detention facilities that provide for the drainage of publicly owned and maintained areas, such as streets and parks. Public drainage easements shall be dedicated to the City and will be accepted by the City. The City will be responsible for the maintenance of drainage facilities within these easements.

- **Private drainage easements** cover improved or unimproved drainage and detention facilities that are constructed on private property for the purpose of draining adjacent privately owned lots. In a subdivision, these private drainage easements are typically a result of the overall drainage design of the subdivision and may serve many lots. Private easements are generally not dedicated to nor accepted by the City. The private property owner is responsible for the maintenance of all drainage facilities contained within private drainage easement and may be liable for any damage to adjacent properties resulting from a failure to do so. In a subdivision, the CC&R’s or Maintenance Agreement between property owners shall indicate that the maintenance of these private drainage easements is the responsibility of the respective property owner.

There may be situations where, at the City’s election, an irrevocable offer to dedicate a private drainage easement may be required. Normally this would only be necessary to provide overall drainage to an area upstream of a development for future extension of a drainage system that may be a public system in the future.

Physical improvements, beyond landscaping such as grass and low-lying vegetation, are prohibited (including fill) in a public drainage easement. Any obstructions placed in this public drainage easement are subject to removal by the City of Napa with the expense billed to the property owner.
All drainage easements that result from a subdivision development shall be shown on the Final Map, including descriptions for type of easements shown.

The following definitions are provided solely for historical knowledge and are no longer used to designate drainage easements by the City of Napa:

- **Type A** easements cover fully improved drainage facilities that provide for the drainage of publicly owned and maintained areas, such as streets and parks. The City will be responsible for the maintenance of drainage facilities within Type A easements.

- **Type B** easements cover unimproved drainage facilities that serve public as well as privately owned lands. The most common use of Type B easements are for unimproved natural water sources. These easements are dedicated to the City, but will not be accepted by the City and, therefore, will not be maintained by the City. The private property owner is responsible for the maintenance of all drainage facilities contained within Type B easements.

- **Type C** easements cover improved or unimproved drainage facilities that are constructed on private property for the purpose of draining adjacent privately-owned lots. In a subdivision, Type C easements are typically a result of the overall drainage design of the subdivision and may serve many lots. Type C easements are private storm drain easements and shall not be dedicated to nor accepted by the City.

### 2.13 SPECIAL PROVISIONS

All storm drainage pipes installed within public streets or easements shall be a minimum of 18 inches in diameter and shall be a minimum Class III reinforced concrete pipe with rubber gasketed joints, unless otherwise approved by the Public Works Director or their designee.

Whenever a storm drainage pipe is installed in paved public streets, the sides of the trench shall be cut to a neat line in a manner satisfactory to the Public Works Director or their designee. The trench shall be backfilled with ¾” Class II AB and a temporary patch of cold mix asphalt shall be placed on the trench at the end of the workday. Permanent pavement shall be placed on the trench within 48 hours after the storm drainage pipe has been installed unless otherwise approved by the Public Works Director or their designee. Attention is directed to City of Napa Standard Plan D-12, “Storm Drain Trench”.

#### 2.13.01 ASPHALT PLACEMENT

After backfilling and compacting trenches passing through pavements, three inches (3”) of asphalt cutback shall be placed to grade. Temporary asphalt cutback shall be maintained at Contractor’s expense until permanent paving is installed.

All trenches through asphalt concrete (AC) shall be permanently paved with a minimum of four inches (4”) of CC placed in two (2) lifts. All trenches shall be “T” cut prior to the placement of the permanent AC. The “T” cut shall be created after the trench is recompacted.

Existing AC or Portland Cement Concrete (PCC) shall be saw-cut or planed only. Jackhammered edges shall not be allowed. AC must be compacted to 95% minimum.
2.13.02 CRACK SEALING OF TRENCH PATCH

After all permanent ACC or PCC trench patches have been installed, the joint between the existing concrete and the newly placed patch shall be crack sealed. Crack sealing shall be per Section 37-5, “Crack Treatment”, of the Standard Plans. The cost of crack sealing shall be at no additional City expense.

The placement and compaction of backfill material shall conform to the provisions in Section 19-3 of the Caltrans Standard Specifications, the Trench Backfill Standard Plan, D-16, and as directed by the Public Works Director or their designee.

2.13.03 TRENCHING, BORING, BACKFILL AND COMPACTION

DESCRIPTION

A trench is defined as an excavation in which the depth is greater than the width. Excavation for appurtenant structures such as, but not limited to, manholes, transition structures, junction structures, catch basins/drain inlets, and bore pits shall be deemed to be on the category of trench excavations.

Excavation shall include the removal of all water and material of any nature which interfere with the construction work. Placement of spoil materials on the paved street area shall only be allowed under written approval from the Public Works Director.

Installation of conduits shall be by open trench unless otherwise specified or shown on the drawings. If a Contractor elects to tunnel or bore and jack any portion of the work, written approval shall be obtained from the Public Works Director. (See Section, “Tunneling, Boring, and Jacking”).

Open trenching shall be prohibited on all newly paved streets for a period of not less than three (3) years from the date of the latest overlay without written approval by the Public Works Director.

MAXIMUM LENGTH OF OPEN TRENCH

The maximum length of open trench, where prefabricated pipe or other structures are to be placed, shall be the distance necessary to accommodate that amount of pipe which can be installed and backfilled in a single day. The distance is the collective length at any location, including open excavation, pipe laying and appurtenant construction and backfill which have not been temporarily resurfaced. The use of steel plates as open trench or excavation cover shall be allowed only with prior approval of the Public Works Director. All trenches or excavations within a sidewalk area or driveway shall be covered with steel plates. The use of plywood for open trench or excavation cover shall not be allowed within or adjacent to the City right-of-way.

The maximum length of open trench allowed to be covered with steel plates shall be a total of fifty (50) lineal feet or as approved in writing by the Engineer.

TRENCH PLATES

Trench plates are steel plates used for temporary cover of trenches and other excavations. All trench plates used in the City right-of-way shall have a skid resistant surface treatment. When backfilling trenches and excavations within a paved street
section or within the concrete curb, gutter and sidewalk area, whether transverse or longitudinal, and the work cannot be properly completed within the same working day, trench plates with non-skid surface treatment will be required to maintain traffic flow. The following conditions shall apply:

- All steel trench plates shall extend beyond the edge of the trench wall a minimum of twelve (12”) inches.
- All steel trench plates shall be fully supported around the perimeter to prevent tipping.
- Trenches and excavations shall be adequately shored or braced to withstand highway traffic loads.
- All trench plates shall be tack welded together at the end of each day.
- All trench plates shall be pinned in each corner to prevent movement.
- All trench plates shall be shimmed to prevent movement.
- Temporary paving or cold-mix asphalt concrete (cutback) shall be placed around all edges of the trench plates.
- A maximum of fifty (50) lineal feet of trench plating shall be allowed unless otherwise approved in writing by the Engineer.

The following table shows minimum required thicknesses for trench plates:

<table>
<thead>
<tr>
<th>TRENCH WIDTH</th>
<th>MINIMUM PLATE THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3 m (1.0 feet)</td>
<td>13 mm (1/2 inch)</td>
</tr>
<tr>
<td>0.45 m (1.5 feet)</td>
<td>19 mm (3/4 inch)</td>
</tr>
<tr>
<td>0.6 m (2.0 feet)</td>
<td>22 mm (1 inch)</td>
</tr>
<tr>
<td>0.9 m (3.0 feet)</td>
<td>25 mm (1 inch)</td>
</tr>
<tr>
<td>1.2 m (4.0 feet)</td>
<td>32 mm (1 1/4 inch)</td>
</tr>
</tbody>
</table>

For trenches and excavations with spans greater than four feet (4’), a structural design shall be prepared by a registered civil engineer and approved by the City.

All trench plating shall be designed for HS20-44 Truck loading per the Caltrans Bridge Design Manual.

Trench plates shall maintain a skid resistant surface treatment having a minimum coefficient of friction equivalent to 0.35 per California Test Method 342. A Rough Road Sign (W33) shall be used in advance of all trench plates.

Steel trench plate deformation may occur during loading, but if a steel plate is deformed without loading to at least 1.2 cm (0.5 inch) per 2.4 meter length (8 feet) the plate shall be removed and replaced.

**TRENCHING**

The maximum clear width of the trench at the top of the pipe shall not be more than the outside diameter of the pipe at any point plus two (2’) feet. Greater width of the trench at the top of the pipe shall be permitted only on written approval by the Public Works Director or by plan design. In no case shall the free working space on each side of the pipe be less than six inches (6”) without Public Works Director’s approval.
If maximum trench width is exceeded, the Contractor shall provide additional bedding, another type of bedding, a higher strength of pipe, or any other additional work, as required or approved by the Public Works Director, to adequately install and protect the pipe equal to the original design, at no additional City cost.

**BRACING AND SHORING EXCAVATIONS**

The manner of bracing and shoring excavations shall be as set forth in the rules, orders and regulations of the State of California Construction Safety Orders, Division of Industrial Safety.

Contractors may be required at the discretion of the Public Works Director to provide drawings or calculations by a registered engineer five (5) working days prior to beginning construction for specially designed bracing and shoring of an excavation where standard pre-manufactured bracing or shoring cannot be used.

Contractors shall submit a copy of their current Annual Excavation Permit issued by the State of California Division of Industrial Safety (CAL-OSHA) along with the Contractor’s own Trench Safety Plan prior to the start of construction.

**TUNNELING, BORING, AND JACKING**

Any pipe or facility placed underground in any method other than open cut trenching shall be considered as tunneling or boring and jacking.

All tunneling or boring and jacking shall receive the Public Works Director’s approval prior to work start. All existing utilities shall be potholed for actual depth prior to tunneling or boring and jacking operations. A borepath sheet, showing all potholed utilities, shall be submitted for approval by the Engineer five (5) days prior to start of work. The City shall receive a copy of all permits and orders for the installation of any facilities that require boring and jacking or tunneling that will be within the City right-of-way or within any other agency’s jurisdiction. Including, but not limited to, Caltrans, railroads, and private property within City Limits.

All voids between the inside of the casing and the pipe shall be completely backfilled by blowing sand or pumping grout between the casing and the facilities within the casing as directed by the Public Works Director. Casing inside diameter shall be a minimum of twice the outside diameter of the facility to be placed within the casing. The wall thickness of the casing shall be 0.375 inches or as directed by the Public Works Director. All casings shall be fully welded at each joint. All casings shall have a sealed end cap sealing the end of the casing.

All pipes to be installed within the casing shall be installed on plastic skids or spacers with a maximum spacing of three feet (3’) between skids or spacers and banded to the pipe using stainless steel bands or as approved by the Engineer. All installations shall be per the boring and jacking detail.

**2.13.04 COVER REQUIREMENTS**

All stormwater conveyance structures shall be designed to allow a minimum of two feet of cover as measured from bottom of sub-grade to the top of pipe. If achieving this cover is not possible due to some sound engineering reason, the pipe shall be encased in concrete or provided with a one-foot concrete cover as approved by the Public Works Director or their designee.
2.13.05 REINFORCED CONCRETE PIPE (RCP)

All storm drainage pipes installed within public streets or easements shall be a minimum of 18 inches in diameter and shall be a minimum of Class III reinforced concrete pipe with rubber gasketed joints, unless otherwise approved by the Public Works Director or their designee.

Reinforced concrete pipe (RCP) shall conform to ASTM Designation C76-08a (or latest ASTM adopted standard). A Certificate of compliance with ASTM C76-08a shall be provided to the City inspector prior to the installation of RCP. Tests results per ASTM C497-17 (or latest ASTM adopted standard) including the following shall also be provided to the City inspector prior to installation of RCP:

- External load crush test
- Hydrostatic: 13 PSI for 20 minutes
- Absorption
- Permeability
- Cylinder strength
- Allowable leakage: none

The following chart lists the minimum allowable classes of reinforced concrete pipe and cover requirements for each class of pipe.

<table>
<thead>
<tr>
<th>Minimum Class, RCP</th>
<th>Cover (in feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CL V (3000D)</td>
<td>Less than 2.5</td>
</tr>
<tr>
<td>CL III (1500D)</td>
<td>2.5- 7.9</td>
</tr>
<tr>
<td>CL IV (2000D)</td>
<td>8.0-11.9</td>
</tr>
<tr>
<td>CL V (3000D)</td>
<td>12.0-17.0</td>
</tr>
</tbody>
</table>

No storm drainpipe, which lies totally or in part within the structural section of a street, shall be allowed unless approved by the Public Works Director or their designee.

2.13.06 CAST IN PLACE PIPE (CIPP)

Cast in place pipe (CIPP) is not accepted unless specifically approved by the Public Works Director or their designee. If the use of CIPP is approved the following standards shall apply:

A City approved independent inspector under the direct supervision of an independent Registered Civil Engineer experienced in the manufacture and placement of CIPP shall be required for continuous inspection of the construction process. The inspection shall be certified in writing and signed by the inspector and the Registered Civil Engineer. The certification to be done on a daily basis of operation shall include, as a minimum, the following:

- Review of trench form, soil conditions, and trench grade.
- Report on method of operation and compliance with these specifications.
- Report on concrete mix used, temperature, transit method, machinery condition.
- Report on visual appearance of the pipe as poured for smoothness, rock pockets if
any, alignment, grade, and compliance with these specifications.

- Report on deficiencies that require repair or replacement.
- Report on curing method.
- Report on backfill placement.
- Review of concrete test results and adequacy of the finished product.

The minimum allowable wall thicknesses for CIPP are as follows:

<table>
<thead>
<tr>
<th>INTERNAL DIAMETER</th>
<th>MINIMUM WALL THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>24&quot; to 30&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>3½&quot;</td>
</tr>
<tr>
<td>42&quot;</td>
<td>4&quot;</td>
</tr>
<tr>
<td>48&quot;</td>
<td>5&quot;</td>
</tr>
<tr>
<td>54&quot;</td>
<td>5½&quot;</td>
</tr>
<tr>
<td>60&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>66&quot;</td>
<td>6½</td>
</tr>
<tr>
<td>72&quot;</td>
<td>7&quot;</td>
</tr>
<tr>
<td>84&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>96&quot;</td>
<td>9&quot;</td>
</tr>
<tr>
<td>108&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>120&quot;</td>
<td>12&quot;</td>
</tr>
</tbody>
</table>

The Contractor shall provide adequate means of providing fresh air delivery to the inside of the pipe. This shall be for the use of workers during construction and for the use of the Engineer during inspection. The methods and quantities fresh air delivery shall be suitable for the purpose and shall conform to applicable requirements of local, state and federal rules, regulations, laws and ordinances.

2.13.07 VIDEO INSPECTION  
(Cleaning and Closed Circuit Television Inspection of Newly Constructed Storm Drain Pipelines)

OBJECTIVE

These specifications define the minimum requirements for the preparatory cleaning and closed-circuit television (CCTV) inspection of newly constructed storm drainage pipelines, and for required warranty CCTV inspections of pipelines. The purpose of this work will be to determine the condition of the pipeline, document the location of connections and other key features, identify any structural deficiencies, and to locate defects that may be allowing groundwater to infiltrate into the pipeline. All storm drains shall be CCTV inspected at the completion of construction and at the one-year warranty. A ¾" or 1" gauge shall be used for all CCTV inspections.
GENERAL

Experienced and pre-qualified personnel utilizing equipment and materials meeting the requirements of these specifications shall perform all work. Pre-qualification shall require that the contracting company and the job supervisor each have a minimum of three (3) years experience in the performance of the type of work specified and shall have specifically performed at least 100,000 feet of cleaning and television inspection within the past three years. A company with less than three (3) years experience may pre-qualify if they can demonstrate to the satisfaction of the City that they have the capabilities and overall experience, equipment and expertise to satisfactorily complete the project in accordance with these specifications.

All work shall be performed to the minimum standards of the industry. Where not conflicting with the requirements of these specifications, the most current available edition of the National Association of Sewer Service Companies (NASSCO) Specifications Guidelines and the NASSCO Inspector Handbook shall be used as a measure of the standard of practice for this work.

The Contractor shall use designated City and standard industry terminology in the performance and documentation of the CCTV inspection work. A pipeline joint, as used within these specifications, refers to the junction of two pipes. The term, “manhole section” as used in these specifications shall mean the length of pipe connecting two manholes or a manhole and a clean-out.

Before final acceptance of the work by the City, the Contractor shall review with the City the findings of the fieldwork to confirm that all necessary work has been performed as needed. This shall include a review of finished written records of defects found, the videotapes, and any sketches or diagrams prepared to illustrate defects found. Videotapes or other acceptable electronic files shall be submitted to the City and become the property of the City.

2.13.08 VERTICAL GRADE / STANDING WATER ALLOWANCE

Any new installed storm drain pipe up to 10 inches in diameter shall have no more than 1/2 inch of standing water in the flow line after construction is completed (3/4 inch for pipes larger than 10 inches). After one year, as part of the warranty inspection, the storm drain pipe shall not have more than 3/4 inch of standing water in the flow line (1 inch for pipes larger than 10 inches). Laterals shall have no standing water in the flow line after construction is completed and after one year of construction. This standing water measurement shall be taken during televised inspections of the storm drainage lines and laterals (see Section 18:  Cleaning and Closed- Circuit Television Inspection of Newly Constructed Sanitary Sewer and Storm Drain Pipelines), after water is introduced and allowed to leave for measurement indicator to function correctly.

2.13.09 CAPS/STOPPERS

Caps or stoppers shall be furnished with branch pipes that are to be left unconnected. Caps and stoppers shall be prefabricated and water tight fitting the bell of the branch pipe and installed according to the manufacturer’s recommendations.
2.14 STORMWATER QUALITY

In order to achieve compliance with the State Water Resources Control Board’s National Pollutant Discharge Elimination System (NPDES) General Permit for Small Municipal Separate Storm Sewer Systems (2013-0001-DWQ) development activity shall implement stormwater quality control measures and best management practices and shall also comply with Chapter 8.36, “Stormwater Runoff Pollution Control”, of the City of Napa Municipal Code (NMC).

Any construction activity that results in the disturbance of one (1) acre or greater total land area, or is part of a larger common plan of development that disturbs one (1) acre or greater total land area, the developer shall file a Notice of Intent with the California State Water Resources Control Board (“SWRCB”) and obtain a Waste Discharger Identification (WDID) number prior to any grading or ground disturbing activities. Construction activity resulting in less than (1) acre of land disturbance must follow an approved Erosion and Sediment Control Plan (ESCP).

Industrial/commercial facilities shall file a Notice of Intent with the State Water Board in accordance with the Industrial General Permit prior to establishment of the use.

Development projects shall incorporate Low-Impact Development (LID) standards designed to reduce runoff, treat storm water, and provide baseline hydromodification management.

Development projects over an acre in the City of Napa are required to limit the post-development peak stormwater runoff discharge rate leaving certain projects to the estimated pre-development discharge rate.

2.14.01 POST CONSTRUCTION SITE DESIGN MEASURES

All projects creating and or replacing between 2,500 square feet and 5,000 square feet of impervious surface and are not part of a larger development shall incorporate site design measures to treat and infiltrate stormwater runoff.

Projects that create and or replace more than 5,000 square feet of impervious surface are required to treat stormwater runoff by incorporating site design measures using LID standards.

Regulated projects shall incorporate source control measures for all pollutant generating activities where applicable.

Low Impact Development Standards shall be met by all regulated projects.

Projects that create and or replace more than one acre of impervious surface shall incorporate hydromodification management into the project to match pre-project flow rates. Post project runoff shall not exceed the estimated pre-project flow rate for both the 2-year, 24-hour storm and the 10-year, 24-hour storms events.

The responsible entity shall enter into a long-term maintenance agreement for the maintenance of post construction stormwater quality treatment facilities with the City of Napa. A long-term operations and maintenance plan shall be incorporated as part of the agreement and shall include a viable method of long term financing for such maintenance, inspection verification reporting and a third party beneficiary agreement. If the Homeowners Association, or other responsible entity, fails to maintain the post construction treatment facilities, then the City shall enforce the maintenance through this agreement.
The third party agreement shall allow, but not limit, the City of Napa to force the HOA, or other entity, to do the work, the right to enter onto the property to do the work, the right to charge for the work completed by the City of Napa, or its contractor, and the right to establish a lien to recoup the cost of the work.

Complete post construction design details can be found by referring to the City adopted BASMAA Post Construction Manual.

2.15 MISCELLANEOUS ITEMS

2.15.01 CREEK SETBACKS

The Napa Municipal Code Chapter 17.52.110 regulates the requirements for stream bank safety and protection and enhancement of riparian habitat corridors.

2.15.02 FENCING

Fencing - All open channels shall be enclosed by a 6’ high chain link fence per Caltrans Standard Plan A85, or other type as approved by Public Works Director or designee.

The fence shall be located 6 inches inside the required easement lines. Gates must be provided for access through any fence crossing a public storm drain easement. Where vehicular access is required for maintenance, minimum 14’ wide gates must be provided with sliding gates preferred. Where vehicular access is not required 4’ wide gates for pedestrian access must be provided.

2.15.03 SERVICE ROADS

Two service roads shall be provided within the boundary of all open channels. They shall be a minimum of 17 feet wide, each graded for vehicular traffic and clear of trees, shrubbery and other obstructions for its full width. Fourteen feet of the road’s width shall be paved or graveled all-weather (surface type to be determined by the Public Works Director or their designee for each case) with a minimum unpaved shoulder width of 1-foot on each side of the roadway. Service roads are required on both sides of the channel.

2.15.04 FLOOD CONTROL

Flood Plain regulations apply to all new and redevelopment, which would be inundated by the 100-year flood (Floodway and Hazard Area) and are contained in NMC Chapter 17.38. There are several basic requirements which must be met including but not limited to the following:

- All applications for a floodplain permit shall include plans drawn to scale showing at a minimum the nature, location, dimension, and elevation of the area in question; existing or proposed structures, fill, storage of materials or equipment, and drainage facilities.
- All new residential construction and substantial improvements to residential units must have the lowest floor, including basement, elevated to one foot or more above the base flood elevation.

- All new non-residential construction and substantial improvements to non-residential structures must have the lowest floor, including basement, elevated to one foot or more above the base flood elevation or be flood proofed to one foot or more above the base flood elevation.

- All attendant utilities and sanitary facilities must be constructed to resist flood damage.

- Upon completion of the building the elevation of the lowest floor including basement shall be certified by a professional engineer or surveyor, and verified by the Building Inspector.

- Flood evacuation plans required by NMC Chapter 17.38.070, Additional Regulations for Certain Residential Development in Portions of the Floodplain (Flood Evacuation Area) shall be completed and approved by the City prior to occupancy of residential structures in the floodplain evacuation area.
2.16 CHARTS, FIGURES, AND TABLES

2.16.01 CHARTS

Chart 2.1 Flow in Triangular Gutter Sections
Chart 2.2 Isohyetal Map of Napa City
NOTES

1. FOR V-SHAPE, USE THE NOMOGRAPh WITH $S_x = \frac{S_x^t S_x^s}{S_x^t + S_x^s}$

2. TO DETERMINE DISCHARGE IN GUTTER WITH COMPOSITE CROSS SLOPES, FIND $Q_s$ USING $T_s$ AND $S_x$; THEN, USE CHART A TO FIND $E_o$. THE TOTAL DISCHARGE IS $Q = Q_s/(1-E_o)$ AND $Q_w = Q-Q_s$.

$Q = \frac{2gh^2}{3t^2} \cdot 1 - \frac{1}{2} \cdot \frac{t^2}{h^2}$

$Q =$ FLOW RATE, CFS

$T =$ WIDTH OF FLOW (SPREAD), FT

$S_x =$ CROSS SLOPE, FT/FT

$Q_s =$ CROSS SLOPE OF GUTTER, FT/FT (MEASURED FROM CROSS SLOPE OF PAVEMENT)

$S =$ LONGITUDINAL SLOPE, FT/FT

$N =$ MANNING'S COEFFICIENT
2.16.02 FIGURES

Figure 2.1 City of Napa Discharge vs. Drainage Area
Figure 2.2 Residential Area 10-Year Peak Flow - 0 to 80 Acres
Figure 2.3 Commercial Area 10-Year Peak Flow - 0 to 80 Acres
Figure 2.4 Rural Area 10-Year Peak Flow - 0 to 80 Acres
Figure 2.5 Residential Area 100-Year Peak Flow - 0 to 80 Acres
Figure 2.6 Commercial Area 100-Year Peak Flow - 0 to 80 Acres
Figure 2.7 Rural Area 100-Year Peak Flow - 0 to 80 Acres
Figure 2.8 Tc+R and Area Relationship for Napa
Figure 2.9 Bank and Shore Protection
Figure 2.10 Salvador Drainage Basin
Salvador Basin

CITY OF NAPA

PUBLIC WORKS DEPARTMENT

SALVADOR WATERSHED

DRAWN BY: NGB
DATE: 02/2018
SCALE: NONE

CHECKED BY: TCW
APPROVED BY: JRL
DRAWING NO. FIGURE 2.10

FIELD NOTES:
2.16.03 TABLES

Table 2.1 Criteria & Methods to Estimate Discharge
Table 2.2 Rainfall Depth - Duration
Table 2.3 Rainfall Intensity - Duration
Table 2.4 Runoff Coefficient for Rational Method
<table>
<thead>
<tr>
<th>FACILITY</th>
<th>DESIGN CRITERIA</th>
<th>METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. STORM DRAINS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. RESIDENTIAL, UNDER 40 ACRES</td>
<td>10-YEAR WITH 100-YEAR OVERLAND RELEASE ANALYSIS</td>
<td>RATIONAL METHOD OR NAPA CHARTS</td>
</tr>
<tr>
<td>B. RESIDENTIAL, OVER 40 ACRES</td>
<td>25-YEAR WITH 100-YEAR OVERLAND RELEASE ANALYSIS</td>
<td>RATIONAL METHOD OR NAPA CHARTS</td>
</tr>
<tr>
<td>C. COMMERCIAL AND HIGH VALUE DISTRICTS</td>
<td>25-YEAR WITH 100 YEAR OVERLAND RELEASE ANALYSIS</td>
<td>RATIONAL METHOD OR NAPA CHARTS</td>
</tr>
<tr>
<td>D. FLOOD CONTROL</td>
<td>100-YEAR</td>
<td>NAP CHARTS OR HEC-1* UNLESS OTHERWISE PROVIDED BY THE PW DIRECTOR</td>
</tr>
<tr>
<td>E. ALL BRIDGES AND ROADS WITH TRAFFIC INDEX OF 6 OR GREATER</td>
<td>100-YEAR</td>
<td>NAP CHARTS OR HEC-1* UNLESS OTHERWISE PROVIDED BY THE PW DIRECTOR</td>
</tr>
<tr>
<td>2. OPEN CHANNELS</td>
<td>10 AND 100-YEAR</td>
<td>NAP CHARTS OR HEC-1* UNLESS OTHERWISE PROVIDED BY THE PW DIRECTOR</td>
</tr>
<tr>
<td>3. WATERSHEDS WITH ADDITIONAL ANALYSIS REQUIREMENT (a)</td>
<td>10 AND/OR 100-YEAR</td>
<td>HEC-1* UNLESS OTHERWISE APPROVED BY THE PW DIRECTOR</td>
</tr>
<tr>
<td>4. DEVELOPING AREAS UPSTREAM OF EXISTING FACILITIES</td>
<td>VARIOUS, BASED ON DOWNSTREAM CAPACITY</td>
<td>VARIIES</td>
</tr>
<tr>
<td>5. WATERWAYS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. MAJOR WATERWAYS - DRAINAGE AREA OF 4 SQUARE MILES OR MORE</td>
<td>100-YEAR</td>
<td>NAP CHARTS OR HEC-1* UNLESS OTHERWISE PROVIDED BY THE PW DIRECTOR</td>
</tr>
<tr>
<td>B. SECONDARY WATERWAYS - HAVING A DRAINAGE AREA OF BETWEEN 1 AND 4 SQUARE MILES</td>
<td>50-YEAR</td>
<td>NAP CHARTS OR HEC-1* UNLESS OTHERWISE PROVIDED BY THE PW DIRECTOR</td>
</tr>
<tr>
<td>C. MINOR WATERWAYS - DRAINAGE AREA FROM 40 ACRES TO 1 SQUARE MILE</td>
<td>25-YEAR</td>
<td>NAP CHARTS OR HEC-1* UNLESS OTHERWISE PROVIDED BY THE PW DIRECTOR</td>
</tr>
<tr>
<td>D. TRIBUTARIES - HAVING A DRAINAGE AREA OF 40 ACRES OR LESS</td>
<td>10-YEAR</td>
<td>NAP CHARTS OR HEC-1* UNLESS OTHERWISE PROVIDED BY THE PW DIRECTOR</td>
</tr>
<tr>
<td>6. BRIDGES</td>
<td>100-YEAR</td>
<td>NAP CHARTS OR HEC-1* UNLESS OTHERWISE PROVIDED BY THE PW DIRECTOR</td>
</tr>
</tbody>
</table>

(a) DIVERSION OR DETENTION
<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>5 M</th>
<th>15 M</th>
<th>1 HR</th>
<th>2 HR</th>
<th>3 HR</th>
<th>6 HR</th>
<th>12 HR</th>
<th>24 HR</th>
<th>2 D</th>
<th>4 D</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-YR</td>
<td>0.15</td>
<td>0.27</td>
<td>0.57</td>
<td>0.82</td>
<td>1.02</td>
<td>1.50</td>
<td>1.98</td>
<td>2.45</td>
<td>3.12</td>
<td>4.03</td>
</tr>
<tr>
<td>5-YR</td>
<td>0.20</td>
<td>0.38</td>
<td>0.80</td>
<td>1.16</td>
<td>1.42</td>
<td>2.12</td>
<td>2.79</td>
<td>3.44</td>
<td>4.51</td>
<td>5.77</td>
</tr>
<tr>
<td>10-YR</td>
<td>0.25</td>
<td>0.46</td>
<td>0.97</td>
<td>1.39</td>
<td>1.70</td>
<td>2.53</td>
<td>3.33</td>
<td>4.12</td>
<td>5.42</td>
<td>6.94</td>
</tr>
<tr>
<td>25-YR</td>
<td>0.30</td>
<td>0.56</td>
<td>1.16</td>
<td>1.66</td>
<td>2.04</td>
<td>3.03</td>
<td>4.00</td>
<td>4.95</td>
<td>6.63</td>
<td>8.38</td>
</tr>
<tr>
<td>50-YR</td>
<td>0.32</td>
<td>0.62</td>
<td>1.30</td>
<td>1.87</td>
<td>2.29</td>
<td>3.40</td>
<td>4.48</td>
<td>5.56</td>
<td>7.49</td>
<td>9.44</td>
</tr>
<tr>
<td>100-YR</td>
<td>0.36</td>
<td>0.69</td>
<td>1.44</td>
<td>2.07</td>
<td>2.54</td>
<td>3.76</td>
<td>4.96</td>
<td>6.14</td>
<td>8.33</td>
<td>10.45</td>
</tr>
<tr>
<td>500-YR</td>
<td>0.45</td>
<td>0.85</td>
<td>1.78</td>
<td>2.55</td>
<td>3.14</td>
<td>4.67</td>
<td>6.15</td>
<td>7.60</td>
<td>10.50</td>
<td>13.01</td>
</tr>
</tbody>
</table>

Chart is from City of Napa 2006 Storm Drainage Master Plan Table 3-2
<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>5 M</th>
<th>15 M</th>
<th>1 HR</th>
<th>2 HR</th>
<th>3 HR</th>
<th>6 HR</th>
<th>12 HR</th>
<th>24 HR</th>
<th>2 D</th>
<th>4 D</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-YR</td>
<td>1.80</td>
<td>1.08</td>
<td>0.80</td>
<td>0.41</td>
<td>0.34</td>
<td>0.25</td>
<td>0.16</td>
<td>0.10</td>
<td>0.06</td>
<td>0.04</td>
</tr>
<tr>
<td>5-YR</td>
<td>2.40</td>
<td>1.52</td>
<td>0.88</td>
<td>0.58</td>
<td>0.47</td>
<td>0.35</td>
<td>0.23</td>
<td>0.14</td>
<td>0.09</td>
<td>0.06</td>
</tr>
<tr>
<td>10-YR</td>
<td>3.00</td>
<td>1.84</td>
<td>0.97</td>
<td>0.70</td>
<td>0.57</td>
<td>0.42</td>
<td>0.28</td>
<td>0.17</td>
<td>0.11</td>
<td>0.07</td>
</tr>
<tr>
<td>25-YR</td>
<td>3.60</td>
<td>2.24</td>
<td>1.16</td>
<td>0.83</td>
<td>0.68</td>
<td>0.50</td>
<td>0.33</td>
<td>0.20</td>
<td>0.14</td>
<td>0.08</td>
</tr>
<tr>
<td>50-YR</td>
<td>3.84</td>
<td>2.48</td>
<td>1.30</td>
<td>0.94</td>
<td>0.76</td>
<td>0.57</td>
<td>0.37</td>
<td>0.23</td>
<td>0.16</td>
<td>0.10</td>
</tr>
<tr>
<td>100-YR</td>
<td>4.32</td>
<td>2.76</td>
<td>1.44</td>
<td>1.04</td>
<td>0.84</td>
<td>0.63</td>
<td>0.41</td>
<td>0.26</td>
<td>0.17</td>
<td>0.11</td>
</tr>
<tr>
<td>500-YR</td>
<td>5.40</td>
<td>3.40</td>
<td>1.78</td>
<td>1.28</td>
<td>1.04</td>
<td>0.78</td>
<td>0.51</td>
<td>0.32</td>
<td>0.22</td>
<td>0.14</td>
</tr>
</tbody>
</table>

Chart is from City of Napa 2006 Storm Drainage Master Plan Table 3-2
<table>
<thead>
<tr>
<th>ZONING OR SURFACE LAYER</th>
<th>RUNOFF COEFFICIENT, C</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAVED AREAS (ASPHALT OR CONCRETE)</td>
<td>0.95</td>
</tr>
<tr>
<td>INDUSTRIAL AREAS</td>
<td>0.85</td>
</tr>
<tr>
<td>COMMERCIAL AREAS</td>
<td>0.85</td>
</tr>
<tr>
<td>RESIDENTIAL AREAS</td>
<td></td>
</tr>
<tr>
<td>SINGLE FAMILY, AVE. SLOPE LESS THAN 2%</td>
<td>0.50</td>
</tr>
<tr>
<td>SINGLE FAMILY, AVE. SLOPE BETWEEN 2% AND 7%</td>
<td>0.55</td>
</tr>
<tr>
<td>SINGLE FAMILY, AVE. SLOPE GREATER THAN 7%</td>
<td>0.65</td>
</tr>
<tr>
<td>MULTI-FAMILY, DETACHED</td>
<td>0.65</td>
</tr>
<tr>
<td>MULTI-FAMILY, ATTACHED</td>
<td>0.70</td>
</tr>
<tr>
<td>SCHOOLS</td>
<td>0.45</td>
</tr>
<tr>
<td>AGRICULTURAL LAND</td>
<td>0.45</td>
</tr>
<tr>
<td>UNDEVELOPED OPEN SPACES, INCLUDING PASTURE</td>
<td></td>
</tr>
<tr>
<td>AVERAGE SLOPE LESS THAN 2%</td>
<td>0.40</td>
</tr>
<tr>
<td>AVERAGE SLOPE BETWEEN 2% AND 7%</td>
<td>0.47</td>
</tr>
<tr>
<td>AVERAGE SLOPE GREATER THAN 7%</td>
<td>0.55</td>
</tr>
<tr>
<td>OAK TIMBER AND HEAVY BRUSH</td>
<td></td>
</tr>
<tr>
<td>AVERAGE SLOPE LESS THAN 2%</td>
<td>0.35</td>
</tr>
<tr>
<td>AVERAGE SLOPE BETWEEN 2% AND 7%</td>
<td>0.42</td>
</tr>
<tr>
<td>AVERAGE SLOPE GREATER THEN 7%</td>
<td>0.50</td>
</tr>
</tbody>
</table>

These coefficients are to be used for a return period of 10 years. For return periods of 25 and 100 years, modify the table values as follows:

- 25-Year Return: \( C = \text{table value} \times 1.07 \)
- 100-Year Return: \( C = \text{table value} \times 1.25 \)

Note: No value of \( C \) shall be modified beyond 1.0
3 - STREET STANDARDS

3.01 STREET DESIGN CRITERIA

3.01.01 DEFINITIONS

A. Arterial

Arterial streets primary purpose is to carry higher volumes of through traffic between major residential and/or commercial areas and channel and distribute traffic from freeways to collector streets and vice versa. The optimum minimum distance between major intersections is approximately ½ mile. Driveways to major traffic generators may be located within the ½ mile spacing. New arterials will be constructed within 74 to 136 foot rights of way. Major arterials consist of four to six lanes and provide for a striped left turn lane or curbed median. Arterials carry up to 40,000 vehicle trips per day. Residential development along arterials generally requires larger than average setbacks and landscape buffers.

B. Collector

Collector streets have the primary purpose of serving as connectors between local and arterial streets. Collector streets provide direct access to parcels. At major intersections, driveways on collector streets should be no closer than 50 feet to the intersection. Collectors carry two lanes of traffic, usually do not have left turn medians, may have continuous left turn lanes, and are generally constructed within rights of way that are up to 84 feet in width. Collector streets carry up to 12,000 vehicle trips per day. Collector street typical intersection spacing is ¼ mile. The collector street standards are used for the industrial and office park street systems.

C. Local Streets

Local streets provide low volume access from abutting parcels to collector and arterial streets. Local streets generally consist of two travel lanes and rights of way widths up to 56 feet.

3.01.02 GENERAL

Design of City facilities shall conform to the provisions of these standard specifications, supplemented by these publications

- Caltrans Highway Design Manual, latest edition
- Manual of Uniform Traffic Control Devices as amended by the California Supplement, latest edition
- A Policy on Geometric Design of Highways and Streets (AASHTO), latest edition
- Caltrans Standard Plans
- County Engineers Association & Caltrans & League of California Cities Flexible Pavement – Structural Section Design Guide for Cities and Counties (1979)
• AASHTO, Guide for Design of Pavement Structures (1993)
• Asphalt Institute MS-1, Thickness Design – Asphalt Pavements for Highways & Streets

Modifications to these design standards may be considered on a case-by-case basis as appropriate to accommodate and provide for storm water quality measures (Best Management Practices for storm water pollution prevention) as reviewed and approved by the City Engineer.

3.01.03 STREET DESIGN CRITERIA TABLE

The *Street Design Criteria Table* (Table 3.1) provides the minimum right of way widths, centerline radii, design speeds, structural sections, maximum longitudinal grades and the traffic indexes that correspond to the various City street classifications shown on Standard Details S-6(a-f).
### TABLE 3.1 – STREET DESIGN CRITERIA

<table>
<thead>
<tr>
<th>Street Classification</th>
<th>Avg. Daily Traffic (ADT)</th>
<th>R/W Width</th>
<th>Pavement Width (FC To FC)</th>
<th>Min. C.L. Radius</th>
<th>Design Speed (mph)</th>
<th>Traffic Index</th>
<th>Minimum Structural Section</th>
<th>Max. Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTERIALS</td>
<td>Up to 40,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AC AB</td>
</tr>
<tr>
<td>Major</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Lane (Type A) (Divided w/ Pkg)</td>
<td>126’ to 136’</td>
<td>106’ to 116’</td>
<td>1000’</td>
<td>50</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Lane (Type B) (Divided w/ Pkg)</td>
<td>102’ to 112’</td>
<td>82’ to 92’</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Lane (Type C) (2-Way LTL w/o Pkg)</td>
<td>84’ to 94’</td>
<td>64’ to 74’</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Lane (Type D) (Undivided w/ Pkg)</td>
<td>84’ to 94’</td>
<td>64’ to 74’</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MINOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Lane (2-Way LTL w/ Pkg)</td>
<td>74’ to 84’</td>
<td>54’ to 64’</td>
<td>600’</td>
<td>40</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COLLECTORS</td>
<td>Up to 12,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3” 15” 10%</td>
</tr>
<tr>
<td>Type A</td>
<td>60’ to 84’</td>
<td>40’ to 64’</td>
<td>450’</td>
<td>35</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type B</td>
<td>68’ to 82’</td>
<td>48’ to 62’</td>
<td>300’</td>
<td>30</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCAL STREETS</td>
<td>Up to 5,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.5 3” 10%</td>
</tr>
<tr>
<td>Standard</td>
<td>56’</td>
<td>36’</td>
<td>200’</td>
<td>25</td>
<td>5.5</td>
<td>15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parking One Side</td>
<td>48’</td>
<td>28’</td>
<td>200’</td>
<td>25</td>
<td>4.5</td>
<td>15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Parking</td>
<td>40’</td>
<td>20’</td>
<td>200’</td>
<td>25</td>
<td>4.5</td>
<td>15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hillside Street</td>
<td>Varies</td>
<td>20’ No Pkg</td>
<td>28’ Pkg one side</td>
<td>200’</td>
<td>25</td>
<td>4.5</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Rural Street</td>
<td>29’</td>
<td>28’</td>
<td>200’</td>
<td>25</td>
<td>4.5</td>
<td>15%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Requires specific approval by the City Engineer.

Notes:
1. Type A collectors serve residential, mixed use and commercial projects. Type B collectors serve corporate park and industrial projects.
2. See Standard Detail S-4 for Sidewalk and Landscape area standards.
3. 4 foot sidewalks separated from the street by a 6 foot planter are required on both sides of all street sections except:
   a) Hillside and rural local streets as indicated on Standard Details S-6e and S-6f.
   b) Private streets that will ultimately serve 4 or fewer units or as provided by Municipal Code Section 17.52.360 Pedestrian Friendly Streets Standards.
4. See Future Bikeway Map (Figure 3-5) in the General Plan for bike lane locations.
5. LTL = Left Turn Lane
6. Street cross sections may be wider than indicated in Table 3.1 as necessary to conform to the sight distance and visibility standards, parking requirements, vehicle backup turnaround movements and Fire Department turning movements. Compliance with access requirements is to be demonstrated by plotting the parking space locations and the appropriate AASHTO vehicle turning templates on the improvement plan.
7. Street pavement structural sections are to be designed in accordance with Section 3.01.06 of these specifications. If the calculated street structural section per Section 3.01.06 is less than that shown in Table 3.1, then the values shown in Table 3.1 are required.
3.01.04 VERTICAL ALIGNMENT

The vertical alignment of streets shall meet the following minimum criteria:

- The minimum longitudinal grade on all streets shall be 0.5%.
- The minimum grade around curb returns at intersections shall be 0.7%.
- The minimum grade across valley gutters and around cul-de-sacs and Knuckles shall be 0.5%.
- Cross-slopes for all streets shall be 2%. In special cases approved by the City Engineer cross-slopes up to 5% may be considered. A minimum cross slope of 1% may be approved in special cases as determined in accordance with a design exception approved by the City Engineer.
- The gradient of each street entering an intersection shall not be more than 7% within a distance of 25 feet from the near curb line of the crossing street, except as approved by the City Engineer.
- All street elevations and grades shown on the improvement plans shall be established in accordance with City of Napa benchmarks. The benchmark shall be identified on the plans.
- Vertical parabolic curves shall be used to connect grade profiles where the algebraic difference in grade rates exceeds 1% (does not apply at intersecting streets).
- Vertical curves shall be designed in accordance with Caltrans’ Highway Design Manual. If the calculated vertical curve is less than 100 feet, a minimum 100-foot vertical curve shall be used.

3.01.05 HORIZONTAL ALIGNMENT

The horizontal alignment of streets shall meet the following minimum criteria:

- Streets which are designed with reverse curves shall have a minimum tangent length between the curves equal to 50 feet for local streets and 100 feet for all other streets unless otherwise approved by the City Engineer.
- All streets shall be designed for two-way traffic (minimum 20 feet wide, no parking on either side) unless specific approval is obtained from the City Engineer to allow one-way traffic (minimum 14 feet wide, no parking on either side).
- All street centerlines shall intersect one another as near to a 90-degree angle as practical. Driveways shall intersect streets as near to a 90-degree angle as practical. Angles may not deviate from the perpendicular more than 10-degrees.
- At intersections, the centerlines of cross streets (including full access driveways to commercial developments, industrial developments, or five (5) or more residential units) shall be collinear, or shall have a minimum centerline separation as indicated in the Table 3.2 and Figure 3.1 scenarios.
TABLE 3.2

<table>
<thead>
<tr>
<th>Street Classification (1)</th>
<th>Scenario A Distance in feet (min.) (2)</th>
<th>Scenario B Distance in feet (min.) (2)</th>
<th>Scenario C Distance in feet (min.) (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Street</td>
<td>125</td>
<td>150</td>
<td>125</td>
</tr>
<tr>
<td>Collector</td>
<td>175</td>
<td>185</td>
<td>125</td>
</tr>
<tr>
<td>Minor Arterial</td>
<td>225</td>
<td>230</td>
<td>125</td>
</tr>
<tr>
<td>Major Arterial</td>
<td>300</td>
<td>275</td>
<td>125</td>
</tr>
</tbody>
</table>

Reference: Access Management Handbook, Center for Research and Education, Iowa State University

Notes:

(1) Street classification refers to the classification of the main roadway (not the cross streets).

(2) Designs not meeting the above requirements are subject to design exception approval by the City Engineer and additional safety enhancements may be required.

(3) The distances listed in Table 3.2 are minimums. The actual distance may be longer based on a traffic operations analysis and the resulting intersection configuration design parameters.

FIGURE 3.1
• At street intersections, the curb return ramps shall be designed in accordance with Standard Details S-8 & S-9 and applicable Americans with Disabilities Act (ADA) standards.

• Through access or turnarounds shall be provided in accordance with Section 3.04 – “Fire Department Access” of these “Design Specifications”.

3.01.06 PAVEMENT STRUCTURAL SECTION (STREETS)

Improvement plans shall include the design “R” Values, Expansion Indexes, and Traffic Indexes in the typical sections or in a note or table on the same sheet as the typical sections. In addition, the following design requirements must be met:

A. Pavement Structural Section Design

• The street pavement structural section shall be determined by a Registered Civil or Registered Geotechnical Engineer from “R” values obtained from native material gathered from the level of the proposed subgrade using the design methods in Chapter 600 of the State of California, Department of Transportation Highway Design Manual. If this calculated street pavement structural section is greater than the minimum pavement structural section listed in Table 1, then the calculated section shall be used. If this calculated street pavement structural section is less than that shown in Table 1, then the Table 1 values are required.

• Streets designated as truck routes shall be designed to meet the minimum pavement structural section identified for arterials (see TRUCK ROUTE MAP – FIGURE 3.2).

B. Geotechnical Report (Pavement Structural Section Data)

(1) Resistance “R” Values

• The subgrade soil shall be tested in accordance with California Test 301 “Method of Determination of the Resistance “R” Value of Treated and Untreated Bases, Sub-bases and Basement Soils by the Stabilometer” in use by the California Department of Transportation, Transportation Laboratory.

• In general, design of the structural section for a particular street shall be based on the lowest “R” Value material encountered. If the design is based on something other than the lowest “R” Value material encountered then the geotechnical report is to include data and an explanation that specifies and supports this alternative. If an “R” Value of 5 is utilized then “R” Value tests will not be required.

(2) Active Soils

• An Expansion Index Test shall be provided regardless of the “R” Value used.

• A soil will be classified as active if the Expansion Index is 50 or greater as measured by the Uniform Building Code Standard 29-2, “Expansion Index Test”.

• The design of all streets constructed on active soils must include measures to prevent pavement structure damage resulting from shrink-swell movement of
these soils. These measures may include lime treatment of subgrade materials, over-excavation and placement of additional aggregate base rock and stabilization fabric, cut-off walls or other methods presented by the developer’s Geotechnical Engineer and deemed appropriate by the City Engineer. The structural section required in some cases may be governed by the expansion-shrinkage properties of the soils rather than the traffic and soils bearing criteria.

- The proposed measures identified in the soils report to deal with active soils shall be submitted for review and approval by the City Engineer. A peer review of the proposed measures may be required.

(3) The geotechnical report shall include the location and elevation of sampling points, “R” Values, and Expansion Index Tests data. The developer’s geotechnical engineer may be required to make a field survey of soils conditions when rough subgrade has been cut to verify data presented in the Soils Report. The costs of all sampling and testing shall be at the developer’s expense.

(4) All subgrade design selections shall be shown on the improvement plan set that is signed by the geotechnical engineer.
CITY OF NAPA
APPROVED TRUCK ROUTE MAP
FIGURE 3.2
3.02 DRIVEWAYS AND PARKING FACILITIES

3.02.01 DEFINITIONS AND REGULATIONS

Driveway Definition – Driveways are defined in Section 17.54.150 of the Napa Municipal Code (NMC).

Driveway Regulations – Driveways and parking facilities are regulated in accordance with Chapter 17.54 of the NMC and these standards.

3.02.02 TWO-WAY SERVICE

- All driveways (except residential driveways serving up to two single family dwelling units) shall be designed for two-way traffic (minimum 20 feet wide, no parking on either side) unless specific approval is obtained from the City Engineer to allow one-way traffic (minimum 14 feet wide, no parking on either side).
- One-way driveways will only be permitted when a two-way driveway is not feasible because of site physical limitations or to avoid operational impacts to the public street system.
- Where an entrance only driveway is allowed, on-site circulation shall provide for connection to a suitable exit drive.
- Backing out of driveways (except on local streets for single family residences, accessory second units or duplex residences where each is served by an individual driveway) onto a public street shall not be allowed. A suitable on-site turn around or circulation pattern shall be provided that will enable the driveways to provide forward entry to the public street.
- For a flag lot (that does not require Fire Department access) when through access is not available, a passenger vehicle (AASHTO P-Vehicle) turnaround is required to provide for forward entry and exit. When Fire Department access is required, turnarounds shall be provided per Section 3.04 – “Fire Department Access” of these Standard Specifications.
- When forward entry and exit is required a minimum 25 foot backup turn-around street or drive aisle width shall be provided behind all required parking spaces, including tandem spaces, except for parking spaces served off of a driveway that provides access to a flag lot, in which case the backup turnaround minimum access width behind parking spaces may be 20 feet.
- Dead-end parking lot drive aisles that are less than 30 feet wide shall extend a minimum 5 feet beyond the last parking space to provide for the required backup turnaround maneuver.
- To avoid congestion at the entrance from the street to parking lots, no on-site parking space shall be allowed within the initial 20-feet of the driveway, where it connects to the public street measured from the back of sidewalk of the fronting street or from the ultimate right of away line in areas without sidewalks.
3.02.03 DESIGN CRITERIA

- The design of all features relating to driveways and parking facilities shall conform to the requirements of these standards and Chapter 17.54 of the Napa Municipal Code and are subject to review and approval by the City Engineer.

- The construction plans shall include a fully dimensioned layout of the parking lot, driveways and related features on the site being developed. These features shall include emergency vehicle access routes (with the appropriate Fire Department vehicle AASHTO turning template plotted at curves), accessible routes of travel conforming to ADA Standards, utilities, curbs, gutters, sidewalks, drainage facilities, pavement structural section, traffic circulation signing and pavement striping and markings. The construction plans shall also include proposed finish grades and topographic mapping 100 feet beyond the boundaries of the site, or a sufficient distance to determine drainage patterns and related impacts to neighboring properties.

- Parking stalls shall be marked using 4 inch wide white paint stripes. All directional arrows and legends shall be white. Double lining of parking stalls may be used with specific approval of the City Engineer.

- Construction materials and placement procedures shall meet the City construction specifications and standards as contained herein.

- Portland Cement Concrete curbs and gutters are required around the perimeter of the parking facilities and driveways to control the surface drainage and contain the landscape planting areas. Concrete curbs shall be a minimum of 6 inches high above the paved areas. Asphalt berms may only be used with specific approval of the City Engineer. Railroad ties may be considered for specific applications if they will not be used to control drainage. Alternate curb designs may be considered on a case by case basis as required to accommodate and provide for water quality measures (Best Management Practices) as reviewed and approved by the City Engineer.

- **Pavement Structural Section (Driveways & Parking Facilities)**
  
a. The minimum pavement structural section for driveways that serve a maximum of two residential units and do not serve as Fire Department access routes shall be equivalent to 2 inches of asphalt concrete over 6 inches of Class 2 Aggregate Base material over 95% compacted subgrade.

b. The pavement structural section for (1) driveways serving as Fire Department access routes, and (2) parking areas and drive aisles shall be determined using the design methods described in Section 3.01.06 “Pavement Structural Section (Streets)” of these Standard Specifications. In no case shall the minimum section for these facilities be less than 3 inches of asphalt concrete over 10 inches of Class 2 Aggregate Base. If the calculated pavement structural section is greater than the minimum pavement structural section, then the calculated section shall be used.

c. Equivalent Portland Cement Concrete Pavement structural sections may be used for parking facilities and driveways if designed by a registered civil or geotechnical engineer and approved by the City Engineer.
- Project storm water runoff may not surface flow across any public sidewalk or driveway approach nor may it be directed onto adjacent properties without appropriate easements. Project drainage must be conveyed under the public sidewalk to the gutter (per Standard Detail D-5A and D-5B), or connected by pipe directly into either the public storm drain system or adjacent creek, if available.

- The minimum slope of asphalt concrete surfacing shall be 1% and the minimum slope of Portland Cement Concrete surfacing shall be 0.5%.

- The maximum cross slopes of parking space surfacing shall be 5%.

- Handicap parking areas shall be designed to satisfy the Americans with Disabilities Act requirements.

- Vertical parabolic curves shall be used to connect grade profiles where the algebraic difference in grade rates exceeds 1%.

- Portland Cement Concrete valley gutters when used in non-traffic lane areas shall be a minimum of 2 feet wide. Valley gutters when used in traffic lanes shall be a minimum of 3 feet wide when running parallel with the drive aisle and shall be a minimum of 4 feet wide where crossing the drive aisle. The minimum grade across valley gutters shall be 0.5%.

- City standard storm drain inlets (D-2 or other approved side opening inlet) shall be used where possible for curb inlets when pipe sizes are 10-inch diameter or larger.

- Parking facilities shall drain away from the paths of travel of the pedestrian. Valley gutters shall not be located at pedestrian crossings if reasonable drainage alternatives are available.

- Signs and/or red curb markings are required where necessary to prevent vehicles from parking in the driveway.

- For compact parking stalls “Compact Parking Only” shall be stenciled on the pavement at the entrance to each stall with 6” minimum height letters.

- The minimum vertical clearance shall be 13 feet 6 inches at all points across the required width of driveways.

- Vehicle path of travel pavement width changes shall occur only at intersections or at other logical locations as approved by the City Engineer.

- Porous and pervious pavement structural sections may be considered for private streets, parking areas and driveways on a case by case basis as appropriate to accommodate and provide for water quality measures (Best Management Practices for storm water pollution prevention) as reviewed and approved by the City Engineer.

- Modifications to these design standards may be considered on a case-by-case basis as appropriate to accommodate and provide for storm water quality measures (Best Management Practices for storm water pollution prevention) as reviewed and approved by the City Engineer.
3.03 DRIVEWAY & PRIVATE STREET CONNECTIONS TO PUBLIC STREETS

For projects with frontage on a designated collector or arterial street, the design and location of driveways and private street connections is critical to maintaining good traffic flow on the street. Driveways and private street connections for these projects may be subject to special traffic operation studies as determined by the City Engineer.

- The number of driveways and private street connections to public streets shall be kept to a minimum.
- Driveways and private street connections to public streets shall be located as far as possible from public street intersections and other full access driveways to commercial, industrial or residential developments.
- Residential driveways shall connect to the public street with Standard Detail S-5 concrete driveway approaches. Private streets and commercial driveways shall connect to the public street with Standard Detail S-5 concrete driveway approaches, or a street type opening with Standard Details S-8 & S-9 curb returns. When street type openings are used the limits of the private pavement areas shall be clearly distinguishable from the public street by installing a minimum 10 foot wide decorative concrete strip on the project parcel along the public street right of way line.
- Driveway approach aprons (excluding the flare) shall be the same width as the required width of the driveway.

3.04 FIRE DEPARTMENT ACCESS

3.04.01 GENERAL

- More than one fire apparatus access route shall be provided when it is determined by the Fire Chief that access by a single route might be impaired by vehicle congestion, condition of terrain, climatic conditions or other factors that could limit ingress or egress.
- Residential developments having more than 50 dwelling units shall be provided with at least two points for fire apparatus access.
- When two points of access are required, they shall be located a distance apart equal to not less than one half of the length of the maximum overall diagonal dimension of the property or area to be served, measured in a straight line between the two access points.
- Emergency vehicle only access routes are not permitted as a means to satisfy the second point of access requirement.
- Fire apparatus access routes shall be unobstructed as defined by the following criteria:
  1. Streets and commercial driveway minimum widths shall be as follows:
     (a) 14 feet for one-way traffic (no parking on either side).
     (b) 20 feet for two-way traffic (no parking on either side).
  2. Residential driveway minimum widths shall be 12 feet.
  3. A minimum unobstructed vertical clearance of 13 feet 6 inches shall be provided.
4. A maximum longitudinal grade of 15% shall be provided.

- Refer to the City of Napa “Citywide Guidelines for Traffic Calming and Neighborhood Traffic Management” for appropriate and acceptable traffic calming measures.
- All temporary and permanent Fire Department access routes surfacing structural sections shall be designed to support an H-20 loading, and in accordance with Section 3.01.06 – “Pavement Structural Section (Streets)” of these Standard Specifications.
- Permanent Fire Department access routes shall be surfaced with an asphalt concrete or Portland Cement Concrete structural section (or an alternate equivalent all-weather pavement structural section approved by the Fire Chief and City Engineer).
- The ladder truck shall be used as the design vehicle for fire access routes to buildings or facilities that 1) exceed 20 feet in height (as measured to at least one access point to the roof eave line), or 2) are classified as commercial as defined in the fire code.
- Fire Department access shall be provided so that a 150 foot length of hose can be extended from the parked fire vehicle to all points along the exterior perimeter of all structures along an approved route.
- **Public Street Turnaround** – Fire Department access for all public streets shall be along a through route or (when through access is not available) shall end in a standard cul-de-sac bulb designed and installed in accordance with Standard Details S-7A & S-7B.
- All streets (and driveways exceeding 150 feet in length) shall be along a through route or shall end with an approved turnaround area (to provide for forward entry and exit). Private street access will be reviewed and approved by the Fire Chief and City Engineer based on site constraints in accordance with the following hierarchy:
  1. Through access shall be provided.
  2. **Standard Turnaround** – When through access is not available, a cul-de-sac bulb shall be installed at the end of the street as follows:
     (a) **Residential Developments**
      (1) **Standard Bulb** – A standard cul-de-sac bulb designed in accordance with Standard Detail S-7A shall be installed at the end of the street.
      (2) **Reduced Bulb** – Generally, the cul-de-sac bulb face of curb radius shall be 40 feet to provide for on-street parking. However, on private streets the bulb face of curb radius may be reduced to 35 feet when at least one 8 foot wide parallel parking bay is provided, outside of the 35 foot radius area, along the frontage of each lot. No parking is allowed along the reduced portion of the bulb, and appurtenant bulb return frontages. These no-parking frontages require red curbing and/or “No-Parking” signs (Standard Details FP-2A & FP-2B) as determined by the Fire Chief.
     (b) **Commercial/Industrial Developments**
      (1) A standard cul-de-sac bulb designed in accordance with Standard Detail S-7B shall be installed.
      (2) The cul-de-sac bulb face of curb radius shall be 55 feet to provide for on-street parking.
  3. **Alternate Turnaround** – For residential development private streets, when through access is not available, and a standard turnaround is not feasible,
alternate turnarounds will be allowed (in accordance with Standard Details S-29A & S-29B) as follows:

(a) Based on evidence supplied by the developer (in the form of a design exception that is approved by the Fire Chief and City Engineer) when:

(1) The standard cul-de-sac bulb will cause significant environmental impacts such as excessive hillside grading, rock outcroppings, and/or removal of significant trees.

(2) The standard cul-de-sac bulb will prevent site layouts that achieve minimum development densities.

(b) For a driveway serving a flag lot.

(c) For a street that abuts 4 or less lots.

(d) The layout of the hammerhead turnaround and surrounding lots and connecting driveways shall be “self policing”, (i.e., in addition to signage and painted curbing the layout configuration shall include design elements that discourage the parking of vehicles or placement of obstructions within the fire lane turnaround area), as reviewed and approved by the Fire Chief and City Engineer.

- **Residential Partial Cul-de-Sac (Standard Details S-7C & S-7D)** – When a standard turnaround is required for residential developments (and that turnaround will serve future development across the street on an abutting parcel) a partial cul-de-sac designed in accordance with either Standard Detail S-7C (Fire Engine) or Standard Detail S-7D (Fire Ladder Truck) will be allowed as an interim solution when approved by the Fire Department. All public street partial cul-de-sacs shall be designed with parking, i.e., a minimum 40 foot face of curb radius partial bulb and a minimum 28 foot pavement width partial street cross section are required.

- The cross slope of a turnaround area shall not exceed 5%.

- When required by the Fire Chief, Fire Department apparatus access routes shall be designated as “Fire Lanes” and appropriate signs and/or markings shall be installed in accordance with Standard Details FP-2A & FP-2B and the California Vehicle Code.

- To allow for Fire Department apparatus access, 1) parking shall be prohibited on streets with pavement widths that are less than 28 feet, 2) parking on one side of a street is permitted on streets with pavement widths that are 28 feet or greater, and 3) parking on both sides of the street is permitted on streets with pavement widths that are 36 feet or greater.

- Fire Department access routes that exceed 500 feet in length require additional intermittent turnaround areas. The maximum spacing between turnaround areas shall be 500 feet. Hammerhead turnarounds may be used to satisfy the intermittent turnaround requirement.

3.04.02 FIRE ACCESS REQUIREMENTS (FOR BUILDING CONSTRUCTION)

- If the streets or access roads in a development are not paved from October 15th through April 15th, the City requires that a temporary all weather access road be provided.
The City of Napa Fire Department requires that a fire hydrant be in service within 250 feet of the furthest point of construction prior to the stockpiling of combustible materials or the beginning of combustible construction.

Temporary all weather construction phase Fire Department access route structural sections shall consist of a minimum of 12 inches of base rock material over either: (1) a lime treated subgrade, or (2) a subgrade covered with fabric in accordance with the following design criteria:

1. Subgrade is defined as the native soil at the bottom of the access route structural section, excavated to the lines and grades shown on the project grading plan, and provided with a discharge for the collected storm water runoff, as approved by the City Engineer.
2. Base rock shall be Class II aggregate base compacted to at least 95% relative compaction.
3. Base rock shall be placed only on a firm and unyielding (compacted to at least 95% relative compaction) excavated and drained subgrade.
4. Lime treated subgrades shall be designed in accordance with the recommendations of a geotechnical engineer and compacted to at least 95% relative compaction.
5. Fabric shall be a ground stabilization fabric such as Mirafi 600X or equivalent.
6. Fire Department access shall be a minimum 20 feet in width and provided so that a 150 foot length of hose can be extended from the parked fire vehicle to all points along the exterior perimeter of all structures.
7. Alternate all weather access road sections may be proposed by a geotechnical engineer and submitted to the Public Works Director for approval. Approval of the Public Works Director and Fire Marshal is required for alternate all weather access roads.

3.05 STREET SPECIAL PROVISIONS

Whenever a pipe is installed in paved public streets, the sides of the trench shall be cut to a neat line in a manner satisfactory to the Public Works Director or their designee. The trench shall be backfilled with ¾” Class II AB and a temporary patch of cold mix asphalt shall be placed on the trench at the end of the workday. Permanent pavement shall be placed on the trench within 48 hours after the storm drainage pipe has been installed unless otherwise approved by the Public Works Director or their designee. Refer to City of Napa Standard Plan D-12, “Storm Drain Trench” for drainage related facilities, City of Napa Standard Plan W-16, “Water Trench Detail” for water related facilities, and City of Napa Standard Plan S-12, “Standard Backfill Detail”, for all other facilities.

3.05.01 EXISTING FACILITIES

The work performed in connection with various existing highway facilities shall conform to the provisions in Section 15, "Existing Facilities," of the Standard Specifications and these City Standard Specifications.
The Contractor shall remove and relocate/reset traffic signs and poles and other facilities which are in the construction area.

3.05.02 AGGREGATE BASE

Aggregate base shall be Class 2, three quarter inch (¾”) maximum grading, and shall conform to the provisions in Section 26, "Aggregate Bases," of the Standard Specifications and these City Standard Specifications.

Aggregate for Class 2 aggregate base placed in street sections shall not include material processed from portland cement concrete, lean concrete base, cement treated base or a combination of any of these materials.

Amend Section 26-1.03E “Compacting” by adding the following:

In addition, contractor shall obtain complete stabilization of aggregate base material with no rolling or deflection of the finish aggregate base grade. This proof-rolling is determined by passing a loaded 3 axle water truck, cement truck or similar vehicle over the completed subgrade without the material rolling, deflecting more than ¼” or cracking perpendicular to the path of travel.

If accepted aggregate base becomes saturated and/or disturbed or more than five working days pass between acceptance of the material and placement of the upper layer, the aggregate base must again be proof-rolled and retesting will be required. The cost of the retesting shall be borne by the Contractor.

3.05.03 ASPHALT CONCRETE

General


Description

- This work shall consist of furnishing and mixing aggregate and asphalt binder at a central mixing plant, spreading and compacting the mixture and furnishing, all as specified in these specifications and the special provisions.
- Asphalt concrete shall be Type A (Modified).
- Asphalt concrete shall be produced in a batch mixing plant, a continuous pugmill mixing plant or a drier-drum mixing.
- Proportioning shall be either by hot-feed control or cold-feed control.

Materials

ASPHALTS

- Asphalt binder to be mixed with aggregate shall be a steam-refined asphalt in conformance with the provisions in Section 92, "Asphalt Binders," and shall be of the grade designated in the special provisions or as determined by the Engineer.
The amount of asphalt binder to be mixed with the aggregate for concrete will be determined by the Engineer in conformance with the requirements in Test 367 using the samples of aggregates furnished by the Contractor conformance with the provisions in Subsection of 10-2.11B, "Proportioning."

Liquid asphalt for prime coat shall conform to the provisions in Section "Prime Coat and Paint Binder (Tack Coat)," and shall be of the grade designated by the contract specified in the special provisions.

Asphaltic emulsion for paint binder (tack coat) shall conform to the provisions in Section 94, "Asphaltic Emulsions," for the rapid-setting or slow-setting type and grade selected by the Engineer.

AGGREGATE

The aggregate grading shall be ½-inch maximum, medium with a minimum 85% machine aggregate with a minimum of two fractured faces.

The grade of asphalt binder to be mixed with aggregate for Type A asphalt concrete shall be PG 64-16 and shall conform to the provisions in "Asphalts" of these special provisions. Aggregates shall be clean and free from decomposed materials, material and other deleterious substances. Coarse aggregate is material retained on the No. 4 sieve; fine aggregate is material passing the No. 4 sieve; supplemental fine aggregate is added fine material passing the No. 30 including, but not limited to, cement and stored fines from dust collectors.

Unless otherwise specified in the special provisions, the aggregate grading of the various types of asphalt concrete shall conform to the following:

<table>
<thead>
<tr>
<th>Type</th>
<th>Grading</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>½-inch maximum, medium</td>
</tr>
</tbody>
</table>

The combined aggregate, prior to the addition of asphalt binder, shall conform to the requirements of this section. Conformance with the grading requirements will be determined by California Test 202, modified by California Test 105 when there is a difference in specific gravity of 0.2 or more between the coarse and fine portions of the aggregate or between blends of different aggregates.

In the tables below, the symbol "X" is the gradation which the Contractor proposes to furnish for the specific sieve.

The proposed gradation shall meet the gradation shown in the table under "Limits of Proposed Gradation." Changes from one mix design to another shall not be made during the progress of the work unless permitted by the Engineer. However, changes in proportions to conform to the approved mix design shall not be considered changes in mix design.

AGGREGATE GRADING REQUIREMENTS

Types A Asphalt Concrete Percentage Passing
### 1/2 inch Maximum, Medium

<table>
<thead>
<tr>
<th>Sieve Sizes</th>
<th>Limits of Proposed Gradation</th>
<th>Operating Range</th>
<th>Contract Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;</td>
<td>—</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>—</td>
<td>95-100</td>
<td>89-100</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>—</td>
<td>80-95</td>
<td>75-100</td>
</tr>
<tr>
<td>No. 4</td>
<td>59-66</td>
<td>X±5</td>
<td>X±8</td>
</tr>
<tr>
<td>No. 8</td>
<td>43-49</td>
<td>X±5</td>
<td>X±8</td>
</tr>
<tr>
<td>No. 30</td>
<td>22-27</td>
<td>X±5</td>
<td>X±8</td>
</tr>
<tr>
<td>No. 200</td>
<td>—</td>
<td>3-8</td>
<td>0-11</td>
</tr>
</tbody>
</table>

- The combined aggregate shall conform to the following quality requirements prior to the addition of the asphalt:

<table>
<thead>
<tr>
<th>Tests</th>
<th>California Test</th>
<th>Asphalt Concrete Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of Crushed Particles:</td>
<td>205</td>
<td>A</td>
</tr>
<tr>
<td>Coarse Aggregate (Min.)</td>
<td></td>
<td>90%</td>
</tr>
<tr>
<td>Fine Aggregate Passing</td>
<td></td>
<td>70%</td>
</tr>
<tr>
<td>No. 4, Retained on No. 8 (Min.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Los Angeles Rattler:</td>
<td>211</td>
<td></td>
</tr>
<tr>
<td>Loss at 100 Rev. (Max.)</td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>Loss at 500 Rev. (Max.)</td>
<td></td>
<td>45%</td>
</tr>
<tr>
<td>Sand Equivalent:</td>
<td>217</td>
<td></td>
</tr>
<tr>
<td>Contract Compliance (Min.)</td>
<td></td>
<td>47</td>
</tr>
<tr>
<td>Operating Range (Min.)</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Film Stripping (Max.)</td>
<td>302</td>
<td>—</td>
</tr>
<tr>
<td>$k_c$ Factor (Max.)</td>
<td>303</td>
<td>1.7</td>
</tr>
<tr>
<td>$k_f$ Factor (Max.)</td>
<td>303</td>
<td>1.7</td>
</tr>
</tbody>
</table>

- After mixing with asphalt binder

- If the results of either or both the aggregate grading and Sand Equivalent tests do not meet the requirements specified for "Operating Range" but meet the "Contract Compliance" requirements, placement of the asphalt concrete may be continued for the remainder of that day. However, another day's work may not be started until tests, or other information, indicate to the satisfaction of the Engineer that the next material to be used in the work will comply with the requirements specified for "Operating Range."

- If the results of either or both the aggregate grading and Sand Equivalent tests do not meet the requirements specified for "Contract Compliance," the asphalt concrete which is represented by these tests shall be removed. However, if requested by the Contractor and approved by the Engineer, the asphalt concrete may remain in place and the Contractor shall pay to the State $1.75 per ton for the asphalt concrete represented by these tests and left in place. The Department may deduct this amount from any monies due, or that may become due, the
Contractor under the contract. If both the aggregate grading and Sand Equivalent do not conform to the "Contract Compliance" requirements, only one adjustment shall apply.

- No single aggregate grading or Sand Equivalent test shall represent more than 500 tons or one day's production, whichever is smaller.

- The asphalt concrete mixture, composed of the aggregate proposed for use and the optimum amount of asphalt as determined by California Test 367, shall conform to the following quality requirements:

<table>
<thead>
<tr>
<th>Tests</th>
<th>California Test</th>
<th>Asphalt Concrete Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swell (Max.) (inch)</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>Moisture Vapor Susceptibility</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Stadiometer Value (Min.):</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>(3/8” &amp; No. 4 Max. AC)</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>All Others</td>
<td>37</td>
<td></td>
</tr>
</tbody>
</table>

**Storing, Proportioning and Mixing Materials**

**STORAGE**

- Aggregate shall be stored so that separately sized aggregates will not intermingled, and asphalt binder shall be stored so that different be grades of asphalt will not be intermingled. Any aggregate which has been intermingled with another size of aggregate shall be removed and replaced with aggregate of specified grading. As used in this specification, "cold storage" is the storing of aggregates prior to there having been processed in a drier, and "hot storage" is the storing of aggregates after there having been processed in a drier. "Hot-feed control" and "cold-feed control" indicate the location of measuring devices or controls.

- When the Contractor adds supplemental fine aggregate, each supplemental fine aggregate used shall be stored separately and kept thoroughly dry.

- The measurement and storage requirements of this Section 10-2.11B, shall not apply to the dust collected in skimmers and expansion chambers (knock-out boxes) or to the dust collected in centrifugal (cyclone) collectors. Dust from these collectors may be returned to the aggregate without being measured or stored separately, provided the dust is returned uniformly at a point in advance of the sampling device in batch-mixing plants or is returned at or before mixing in continuous mixing plants. Aggregate and asphalt binder shall also be stored in conformance with the following:

**Cold Storage**

- When aggregate contains material of which at least 20 percent will pass the No. 8 sieve, the material shall be fed from storage by means of a mechanical feeder. Before being fed to the drier, aggregate shall be separated into sizes and stored as follows:
Cold Storage for Plants Utilizing Hot-Feed Control

- Aggregate for Type A asphalt concrete of the 1/2-inch maximum sizes shall be separated into 3 or more sizes and stored separately.

Cold Storage for Plants Utilizing Cold-Feed Control

- When the Contractor elects to use a plant equipped with cold-feed control, aggregate for asphalt concrete of the 1/2-inch maximum sizes shall be separated into 3 or more sizes.
- After the aggregate is separated, each size shall be stored separately.

Hot Storage

Aggregate for asphalt concrete to be mixed in batch mixing plants, after being dried, shall be stored in accordance with the following:

- Aggregates for asphalt concrete of 1/2-inch maximum sizes shall be separated into 3 or more sizes
- After the aggregate is separated, each size shall be stored in a separate bin and shall be recombined in conformance with the provisions in Subsection of 10-2.11B, "Proportioning," to conform to the gradings specified in Section 10-2.11A, "Materials." Storage bins shall be provided with chutes to prevent overflow into adjacent bins.

Asphalt Binder Storage

- Asphalt to be used as a binder for asphalt concrete shall be stored in tanks accurately calibrated in uniform intervals of 100 gallon intervals and maintained to this accuracy. The storage tanks shall be accessible for measuring the volume of asphalt at any time.
- The Contractor shall provide a suitable sampling device in asphalt feed lines connecting plant storage tanks to the asphalt weighing system or spray bar. The sampling device shall consist of a valve with a nominal diameter between 1/2 inch or 3/4-inch valve constructed in a manner that a one-quart sample may be withdrawn slowly at any time during plant operations. The valve shall be maintained in good condition, and if the valve fails to function properly, the valve shall be replaced. The sampling device shall be readily accessible and in an area free of dangerous obstructions and shall be between 24 inches and 30 inches above the platform. A drainage receptacle shall be provided for flushing the device prior to sampling.
- The discharge end of the asphalt binder circulating pipe shall be maintained below the surface of the asphalt binder in the storage tank to prevent discharging hot asphalt binder into open air.
- A temperature-sensing device shall be installed in the asphalt feed line. The device shall measure the temperature of the asphalt and shall be accurate to 10° F. The indicator shall be located and maintained at the point where the
proportioning operations are controlled. When a recording type indicator is used, the recording type indicator shall be maintained in working condition and shall be serviced as required.

DRYING

- Aggregate shall be fed directly to a drier-drum mixer or to a drier at a uniform rate.
- Drying shall continue for a sufficient time and at a sufficiently high temperature that, at the time of spreading, the moisture content of the completed mixture shall not exceed one percent. Moisture content will be determined by California Test 310 or 370.
- The drier or drier-drum mixer shall be provided with a device which senses the temperature of the material leaving the drier or the drier-drum mixer. The temperature-sensing device shall be accurate to the nearest 10° F, and shall be installed in such a manner that changes of 10° F in temperature of the material will be shown within one minute. The indicator shall be located and maintained at the point where the proportioning operations are controlled. When a recording type indicator is used, the recording type indicator shall be maintained in working condition and shall be serviced as required.
- The burner used for heating the aggregate shall achieve complete combustion of the fuel.

PROPORTIONING

- Before producing asphalt concrete, the Contractor shall submit in writing to the Engineer the gradation of the aggregate for each mix which he proposes to furnish. If the aggregate is separated into 2 or more sizes, the proposed gradation shall consist of gradations for individual sizes, and the proposed proportions of individual sizes, combined mathematically to indicate one proposed gradation. The gradation shall meet the applicable grading requirements shown in Subsection of 10-2.11A, "Aggregate," and shall show the percentage passing each of the specified sieve sizes.
- Should the Contractor change the source of supply, the Contractor shall furnish new samples and proposed proportions, as determined by the Engineer to be necessary, at least 2 weeks before their intended use. A change which affects any portion of the total aggregate in the mix will be considered a change in source and will require a new mix design. Up to 3 mix designs will be performed by the State at State expense when the mix design is utilized for one or more working days. The Contractor shall bear all costs involved in developing any mix design not utilized for one or more days and for all mix designs developed after the first 3 that have been so utilized. The Engineer will determine the cost to the State for the mix designs, and the Department may deduct this amount from any moneys due, or that may become due the Contractor under the contract.
- Where asphalt concrete is to be produced from established sources and if acceptable to the Engineer, the Contractor may advise the Engineer in writing that the source, gradings and proportions of those aggregates proposed to be furnished are the same as those approved for, and used on, another prior or
The project shall be identified by contract number. The Engineer will determine if an existing mix design is acceptable for the current project.

Proportioning for Batch Mixing

- When the Contractor elects to use batch mixing equipment, each aggregate storage bin shall be equipped with a suitable, safe sampling device which will provide a sample, representative of actual production, of the aggregate discharged into the weigh hopper or volumetric proportioning bin. When the samples are taken from a location above ground level, a means shall be provided for lowering the aggregate samples to the ground.
- The fine material collected in dust control systems, other than centrifugal collectors or knock-out boxes, shall be proportioned as provided for supplemental fine aggregate in this Section 10-2.11B.
- When supplemental fine aggregate is used, it shall be proportioned by weight as provided in "Weight Proportioning" of Section 10-2.11B, "Storing, Proportioning and Mixing Materials". A suitable, safe sampling device shall be installed in each feed line or surge tank preceding the weigh hopper. The delivery point of samples shall be safe and convenient. Aggregate and asphalt shall be proportioned by weight or by volume as follows:

Manual Proportioning

- An automatic plant shall not be operated manually unless the automatic circuitry is disconnected to the extent that the automatic circuitry cannot be activated by the mere operation of a switch, circuit breaker or some other similar routine procedure.
- When manual proportioning is used in the production of asphalt concrete, proportioning shall conform to the following:

Weight Proportioning

- The zero tolerance for aggregate scales shall be 0.5-percent of the total batch weight of the aggregate. The zero tolerance for separate scales for weighing supplemental fine aggregate or asphalt binder shall be 0.05-percent of the total batch weight of the aggregate.
- The indicated weight of material drawn from storage for any draft of material shall not vary from the preselected scale setting by more than the following percentages of the total batch weight of the aggregate:

1. Aggregate shall be within one percent, except that when supplemental fine aggregate is used and is weighed cumulatively with the aggregate, the draft of aggregate drawn immediately before the supplemental fine aggregate shall be within 0.5-percent.
2. Supplemental fine aggregate shall be within 0.5-percent.
3. Asphalt binder shall be within 0.1-percent.
- The asphalt binder shall be measured by a tank scale.
Volumetric Proportioning

- Each size of aggregate, except supplemental fine aggregate, shall be proportioned in a separate bin that is adjustable in size. Each bin shall have a gate or other device so designed that the bin shall be filled and struck off in measuring the volume of aggregate to be used in the mix. Means shall be provided for calibrating the weight of material in each measuring bin at any time. The plant shall be operated in such a manner that the material in each aggregate bin is within 2 percent of the weight preselected for the type of mixture being produced.

- Asphalt binder shall be proportioned by a meter or an adjustable calibrated tank. When meters are used, the asphalt lines leading to asphalt meters shall be full-circulating or shall be regulated so that, during plant stoppages, the temperature of the asphalt does not change more than 15° F from the temperature maintained while the plant is in full operation. Asphalt binder shall be proportioned to within 2 percent of the weight preselected for the mixture being produced.

Automatic Proportioning

- When automatic batch mixing is required by the special provisions or when the Contractor elects to use an automatic batching system, the proportioning devices shall be automatic to the extent that the only manual operation required for proportioning all materials for one batch shall be a single operation of a switch or starter.

Weight Proportioning

- Automatic proportioning devices shall be of a type in which materials discharged from the several bins are controlled by gates or by mechanical conveyors. The batching devices shall be so interlocked that no new batch may be started until all weigh hoppers are empty, the scales are at zero, and the discharge gates are closed. The means of withdrawal from the bins and of discharge from the weigh box shall be interlocked so that not more than one bin can discharge onto any given scale at one time, and that the weigh box cannot be tripped until the required quantity from each of the bins has been deposited therein. In addition, automatic proportioning devices shall be interlocked so that the weighing cycle will be interrupted whenever the amount of material drawn from any storage varies from the preselected amount by more than the tolerances specified in Subsection of 10-2.11B, "Manual Proportioning." Whenever the weighing cycle is interrupted, that specific batch shall not be used in the work unless it can be manually adjusted to meet the specified tolerances based on the total weight of the batch. When partial batches are batched automatically, the interlock tolerances, except the zero tolerance, shall apply to the total weight of the aggregate in the partial batch.

- Automatic proportioning devices shall be operated so that all weight increments required for a batch are preset on the controls at the same time. Controls shall be designed so that these settings may be changed without delay, and the order of discharge from the several bins can be changed as directed by the Engineer.
Automatic proportioning controls shall be equipped with means for inspection of the interlock tolerance settings, and instructions for doing so shall be immediately available at the point of operation.

To check the accuracy of proportioning during plant operation, the Contractor shall provide means to check the weight of various proportioned amounts on a separate scale located at the plant.

**Volumetric Proportioning**

- Asphalt binder shall be proportioned by an adjustable calibrated tank.
- Automatic volumetric proportioning devices shall be of a type which will not allow the bins to discharge into the mixer unless the mixer is empty and the mixer discharge gate is closed and will not operate unless the aggregate bins and asphalt binder tank are full.
- The automatic proportioning device shall operate in such a manner that the material in each aggregate bin and the asphalt binder tank is within 2 percent of the preselected weight.
- To check the accuracy of proportioning during plant operation, the Contractor shall provide means to check the weight of various proportioned amounts on a separate scale located at the plant.

**Proportioning for Continuous Mixing**

- Asphalt binder shall be introduced into the mixer through a meter in conformance with the provisions in Section 9-1.02, "Measurement." The asphalt meter shall automatically compensate for changes in asphalt temperature, unless the meter is of the weight flow, Coriolis effect, type. The system shall allow the rate of delivery of binder proportionate with the delivery of aggregate. During any day's run, the temperature of asphalt binder shall not vary more than 50°F. The meter and lines shall be heated and insulated. The storage for binder shall be equipped with a device for automatic plant cut-off when the level of binder is lowered sufficiently to expose the pump suction line.
- When supplemental fine aggregate is used, it shall be proportioned by weight by a method that uniformly feeds the material within 2 percent of the required amount. Supplemental fine aggregate shall be discharged from the proportioning device directly into the mixer.
- The supplemental fine aggregate proportioning system shall function with such accuracy that, when operated at between 30 percent and 100 percent of maximum operating capacity, the average difference between the indicated weight of material delivered and the actual weight delivered will not exceed one percent of the actual weight for three 15-minute runs. For any of 3 individuals 15-minute runs, the indicated weight of material delivered shall not vary from the actual weight delivered by more than 2 percent of the actual weight.
- The fine material collected in all dust control systems may be returned to the aggregate production stream without proportioning if returned at a rate commensurate with overall plant production, and if returned at or before the mixer. Any return rate of less than 100 percent of the collection rate shall be metered as specified above for supplemental fine aggregate.
- The asphalt feeder, each of the aggregate feeders, the supplemental fine
aggregate feeder, if used, and the combined aggregate feeder, shall be equipped with devices by which the rate of feed can be determined while the plant is in full operation.

- The combined aggregate shall be weighed using a belt scale. The belt scale shall be of such accuracy that, when the plant is operating between 30 percent and 100 percent of belt capacity, the average difference between the indicated weight of material delivered and the actual weight delivered will not exceed one percent of the actual weight for three 3-minute runs. For any of the 3 individuals 3-minute runs, the indicated weight of material delivered shall not vary from the actual weight delivered by more than 2 percent of the actual weight.

- The actual weight of material delivered for proportioning device calibrations shall be determined by a vehicle scale in conformance with the provisions in Section 9-1.02, "Measurement." The vehicle scale shall be located at the plant and shall be sealed within 24 hours of checking the plant's proportioning devices. The plant shall be equipped so that this accuracy check can be made prior to the first operation for a project and at any other time as directed by the Engineer.

- The belt scale for the combined aggregate, the proportioning devices for supplemental fine aggregate, if used, and the asphalt proportioning meter shall be interlocked so that the rates of feed of the aggregates and asphalt will be adjusted automatically (at all production rates and production rate changes) to maintain the bitumen ratio (pounds of asphalt per 100 pounds of dry aggregate including supplemental fine aggregate, if used) designated by the Engineer. The plant shall not be operated unless this automatic system is operating and in good working condition.

- Asphalt meters and aggregate belt scales used for proportioning aggregates and asphalt shall be equipped with rate-of-flow indicators to show the rates of delivery of asphalt and aggregate, and resettable totalizers so that the total amounts of asphalt and aggregate introduced into the mixture can be determined. Rate-of-flow indicators and totalizers for like materials shall be accurate within one percent when compared directly. The asphalt cement totalizer shall not register when the asphalt metering system is not delivering material to the mixer.

- The bin or bins containing the fine aggregate and supplemental fine aggregate, if used, shall be equipped with vibrating units or other equipment which will prevent any hang-up of material while the plant is operating. Each belt feeder shall be equipped with a device to monitor the depth of aggregate between the toughing rollers. The device for monitoring depth of aggregate shall automatically shut down the plant whenever the depth of aggregate is less than 70 percent of the target depth. To avoid erroneous shutdown by normal fluctuation, a delay between sensing less than 70 percent flow and shutdown of the plant will be permitted, as determined by the Engineer, at the time of the initial California Test 109. A second device shall be located either in the stream of aggregate beyond the belt or where it will monitor movement of the belt by detecting revolutions of the tail pulley on the belt feeder. The device for monitoring no flow or belt movement shall stop the plant automatically and immediately when there is no flow. The plant shall not be operated unless both low-flow and no-flow devices are in good working condition and functioning.

- The Contractor shall determine the moisture content of the aggregate at least once during each 2 hours of production and shall adjust the moisture control equipment accordingly.
• For continuous pugmill mixing plants an aggregate sampling device which will provide a 60-pound to 80-pound sample of the combined aggregate while the plant is in full operation shall be provided in advance of the point where the aggregate enters the mixer.

• For drier-drum mixing plants an aggregate sampling device which will provide a 60-pound to 80-pound sample of the combined aggregate while the plant is in full operation shall be provided in advance of the point where the aggregate enters the drier-drum mixer. When the samples are taken from a location above ground level, a means shall be provided for lowering the aggregate samples to the ground. When supplemental fine aggregate is used, a suitable, safe sampling device shall be installed in each feed line or surge tank preceding the proportioning device for the supplemental fine aggregate.

MIXING

• Aggregate, supplemental fine aggregate and asphalt binder shall be mixed in a batch mixer, continuous mixing pugmill mixer or continuous mixing drier-drum mixer. The asphalt content of the asphalt mixture will be determined by extraction tests in conformance with the requirements in California Test 310 or 362 or will be determined in conformance with the requirements in California Test 379. The bitumen ratio (pounds of asphalt per 100 pounds of dry aggregate including supplemental fine aggregate if used) shall not vary by more than 0.5-pound of asphalt above or 0.5-pound of asphalt below the amount designated by the Engineer. Compliance with this requirement will be determined by testing samples taken from the mat behind the paver before initial or breakdown compaction of the mat.

• The charge in a batch mixer, or the rate of feed to a continuous mixer, shall not exceed that which will permit complete mixing of all the material. Dead areas in the mixer, in which the material does not move or is not sufficiently agitated, shall be corrected by a reduction in the volume of material or by other adjustments.

• Asphalt binder shall be at a temperature of not less than 250° F nor more than 375° F when added to the aggregate.

• The temperature of the aggregate before adding the binder shall be not more than 325° F.

Batch Mixing

• When asphalt concrete is produced by batch mixing, the mixer shall be equipped with a sufficient number of paddles of a type and arrangement to produce a properly mixed batch.

• The binder shall be introduced uniformly into the mixer along the center of the mixer parallel to the mixer shafts, or by pressure spraying. When a pan is used, the pan shall be equipped with movable vanes in order that the flow of binder may be directed across the width of the pan, as desired. The vanes shall be equipped with a means for quick adjustment, and a positive lock to prevent shifting.

• The mixer platform shall be of ample size to provide safe and convenient access to the mixer and other equipment. The mixer housing and weigh box housing shall be provided with gates of ample size to permit ready sampling of the
discharge of aggregate from each of the plant bins and from each feed line or surge tank of supplemental fine aggregate, if used. The Contractor shall provide a sampling device capable of delivering a representative sample of sufficient size to permit the required tests.

- The mixer shall be equipped with a timing device which will indicate by a definite audible or visual signal the expiration of the mixing period. The device shall measure the time of mixing within 2 seconds.
- The time of mixing a batch shall begin on the charging stroke of the weigh hopper dumping mechanism and shall end when discharge is started. Mixing shall continue until a homogeneous mixture of uniformly distributed and properly coated aggregates of unchanging appearance is produced. The time of mixing shall be not less than 30 seconds. When automatic proportioning or automatic batch mixing is required by the special provisions or when the Contractor elects to use an automatic batching system, an interval timer shall control the time of mixing. The interval timer shall be interlocked so that the mixer cannot be discharged until all the materials have been mixed for the full time specified.

Continuous Mixing

- Continuous mixing plants shall utilize pugmill or drier-drum mixers.
- When asphalt concrete is produced by pugmill mixing, the mixer shall be equipped with paddles of a type and arrangement to provide sufficient mixing action and movement to the mixture to produce properly mixed asphalt concrete. The combined aggregate shall be fed directly from the drier to the mixer at a uniform and controlled rate.
- Mixing shall continue until a homogeneous mixture of thoroughly and uniformly coated aggregates of unchanging appearance is produced at discharge from the mixer.
- Temperature of the completed mixture shall not exceed 325° F at discharge from the mixer.
- The mixer shall discharge into a storage silo with a capacity of not less than that specified in Subsection 10-2.11B, "Asphalt Concrete Storage." The Contractor shall provide a means of diverting the flow of asphalt concrete away from the silo to prevent incompletely mixed portions of the mixture from entering the silo.

ASPHALT CONCRETE STORAGE

When asphalt concrete is stored, the asphalt Concrete shall be stored only in silos. Asphalt concrete shall not be stockpiled. The minimum quantity of asphalt concrete in any one silo during mixing shall be 20 tons except for the period immediately following a shutdown of the plant of 2 hours or more. A means shall be provided to indicate that storage in each silo is being maintained as required.

Storage silos shall be equipped with a surge-batcher sized to hold a minimum of 2 tons of material. A surge-batcher consists of equipment placed at the top of the storage silo which catches the continuous delivery of the completed mix and changes it to individual batch delivery and prevents the segregation of product ingredients as the completed mix is placed into storage. The surge-batcher shall be center loading and shall be thermally insulated or heated or thermally insulated and heated to prevent material
buildup. Rotary chutes shall not be used as surge-batchers.

The surge-batcher shall be independent and distinct from conveyors or chutes used to collect or direct the completed mixture being discharged into storage silos and shall be the last device to handle the material before it enters the silo. Multiple storage silos shall be served by an individual surge-batcher for each silo. Material handling shall be free of oblique movement between the highest elevation (conveyor outfall) and subsequent placement in the silo. Discharge gates on surge-batchers shall be automatic in operation and shall discharge only after a minimum of 2 tons of material has been collected and shall close before the last collected material leaves the device. Discharge gate design shall prevent the deflection of material during the opening and closing operation.

Asphalt concrete with hardened lumps in the mixture shall not be used. Any storage facility which contained the material with the hardened lumps shall not be used for further storage until the cause of the lumps is corrected.

**ASPHALT CONCRETE PLANTS**

- Any plants, including commercial plants, that produce asphalt concrete that is subject to these specifications shall conform to the provisions in Section 14-9, "Air Quality," and shall be equipped with a wet-tube dust washer or equal and other devices which will reduce the dust emission to the degree that adjacent property is not damaged. The washer and other equipment shall function efficiently always when the plant is in operation. During production, petroleum products such as diesel fuel and kerosene shall not be used as a release agent on belts, conveyors, hoppers or hauling equipment.

- Plants shall be equipped with an inspection dock so constructed that an inspector standing on the dock can inspect the completed mix and take samples, as necessary, from the hauling vehicle before the vehicle leaves the plant site. This inspection dock shall allow the vehicle to pull alongside and shall meet all applicable safety requirements of the California Division of Occupational Safety and Health. Drivers shall be instructed to stop at the dock whenever an inspector is on the dock and to remain there until directed to leave by the inspector.

**Subgrade, Prime Coat, Paint Binder (Tack Coat)**

**SUBGRADE**

- Immediately prior to applying prime coat or paint binder (tack coat), or immediately prior to placing the asphalt concrete when a prime coat or paint binder (tack coat) is not required, the subgrade to receive asphalt concrete shall conform to the compaction requirement and elevation tolerances specified for the material involved and shall be free of loose or extraneous material. If the asphalt concrete is to be placed on an existing base or pavement which was not constructed as part of the contract, the Contractor shall clean the surface by sweeping, flushing or other means to remove all loose particles of paving, all dirt and all other extraneous material immediately before applying the prime coat or paint binder (tack coat).
PRIME COAT AND PAINT BINDER

- Paint binder (tack coat) shall be applied to existing surfaces to be surfaced and between layers of asphalt concrete, except when eliminated by the Engineer.
- A prime coat of liquid asphalt shall be applied to the areas to be surfaced when there is a contract item for the work or when the work is required by the special provisions. Prime coat shall be applied only to those areas designated by the Engineer.
- Prime coat shall be applied at the approximate total rate of 0.25-gallon per square yard of surface covered. The exact rate and number of applications will be determined by the Engineer.
- Prime coat shall be applied at a temperature conforming to the range of temperatures provided in Section 93-1.03, "Mixing and Applying," for distributor application of the grade of liquid asphalt being used.
- A paint binder (tack coat) of asphaltic emulsion shall be furnished and applied in conformance with the provisions in Section 94, "Asphaltic Emulsions," and shall be applied to all vertical surfaces of existing pavement, curbs, gutters and construction joints in the surfacing against which additional material is to be placed, to a pavement to be surfaced and to other surfaces designated in the special provisions.
- Paint binder (tack coat) shall be applied in one application at a rate of from 0.02-gallon to 0.10-gallon per square yard of surface covered. The exact rate of application will be determined by the Engineer.
- At the Contractor's option, paving asphalt may be used for paint binder (tack coat) instead of asphaltic emulsion. If paving asphalt is used, the grade to be used and the rate of application will be determined by the Engineer. The paving asphalt shall be applied at a temperature of not less than 285° F nor more than 350° F.
- Prime coat or paint binder (tack coat) shall be applied only so far in advance of placing the surfacing as may be permitted by the Engineer. When asphaltic emulsion is used as a paint binder (tack coat), asphalt concrete shall not be placed until the asphaltic emulsion has cured.
- Immediately in advance of placing asphalt concrete or asphalt concrete base, additional prime coat or paint binder (tack coat) shall be applied as directed by the Engineer to areas where the prime coat or paint binder (tack coat) has been damaged, and loose or extraneous material shall be removed, and no additional compensation will be allowed therefore.

Spreading and Compacting Equipment

SPREADING EQUIPMENT

- Asphalt pavers shall be self-propelled mechanical spreading and finishing equipment, provided with a screed or strike-off assembly capable of distributing the material to not less than the full width of a traffic lane. Screed action shall include any cutting, crowding or other practical action which is effective on the mixture without tearing, shoving or gouging, and which produces a surface texture of uniform appearance. The screed shall be adjustable to the required section and thickness. The paver shall be
provided with a suitable full width compacting device. Pavers that leave ridges, indentations or other marks in the surface shall not be used unless the ridges, indentations or other marks are eliminated by rolling or prevented by adjustment in operation.

- The asphalt paver shall operate independently of the vehicle being unloaded or shall can propel the vehicle being unloaded in a satisfactory manner. The load of the haul vehicle shall be limited to that which will ensure satisfactory spreading. While being unloaded the haul, vehicle shall be in contact with the machine always, and the brakes on the haul vehicle shall not be depended upon to maintain contact between the vehicle and the machine.

- No portion of the weight of hauling or loading equipment, other connection, shall be supported by the asphalt paver, and no vibrations motions of the loader, which could have a detrimental effect on the riding quality of the completed pavement, shall be transmitted to the paver.

- When asphalt concrete is placed directly upon asphalt treated permeable base, the asphalt concrete shall be placed with a paver equipped with tracks unless layer being placed is 0.15-foot or less in compacted thickness.

GENERAL REQUIREMENTS

- Placing material in a windrow, then picking it up and placing it in the asphalt paver with loading equipment, will be permitted provided:
  
  A. The asphalt paver is of such design that the material will fall into a hopper which has a movable bottom conveyor to feed the screed.
  
  B. The loader (pick-up machine) is constructed and operated substantially all the material deposited on the roadbed is picked up and deposited in the paving machine.
  
  C. The windrow is deposited only so far in advance of the paver to provide for continuous operation of the paver and not so far as to temperature of the asphalt concrete in the windrow to fall below 260° F.

- Type A asphalt concrete shall be placed only when atmospheric temperature is above 50° F.

- Asphalt concrete shall not be placed underlying layer or surface is frozen, or when, in the opinion of the weather conditions will prevent the proper handling, finishing or compaction of the mixtures.

- Asphalt concrete shall be spread and compacted in the number of layers of the thicknesses indicated in the following table:

<table>
<thead>
<tr>
<th>Total Thickness Shown on Plans</th>
<th>No. of Layers</th>
<th>Top Layer Thickness (foot)</th>
<th>Next Lower Layer Thickness (foot)</th>
<th>All Other Lower Layer Thickness (foot)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20-foot or less</td>
<td>1</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>0.25-foot</td>
<td>2</td>
<td>0.12</td>
<td>0.13</td>
<td>0.12</td>
</tr>
<tr>
<td>0.30- 0.40 foot</td>
<td>2</td>
<td>0.15</td>
<td>0.20</td>
<td>0.15</td>
</tr>
</tbody>
</table>
When pavement reinforcing fabric is shown to be placed between layers of asphalt concrete, the thickness of asphalt concrete above the pavement reinforcing fabric shall be the "Total Thickness Shown on Plans" for spreading and compacting the asphalt concrete above the pavement reinforcing fabric.

At the option of the Contractor, one layer 0.25-foot thick may be placed.

At least 2 layers shall be placed if total thickness is 0.45-foot. At least 3 layers shall be placed if total thickness is more than 0.45-foot and less than 0.90-foot. At least 4 layers shall be placed if total thickness is 0.90-foot or more.

A layer shall not be placed over a layer which exceeds 0.25-foot in compacted thickness until the temperature of the layer which exceeds 0.25-foot in compacted thickness is less than 160° F at mid depth.

Asphalt concrete to be placed on shoulders, and other areas off the traveled way having a width of 5 feet or more, shall be spread in the same manner as specified above. When the shoulders and other areas are less than 5 feet in width, the material may be deposited and spread in one or more layers by any mechanical means that will produce a uniform smoothness and texture. Unless otherwise shown on the plans, asphalt mixtures shall not be handled, spread or windrowed in a manner that will stain the finished surface of any pavement or other improvements.

The completed mixture shall be deposited on the roadbed at a uniform quantity per linear foot, as necessary to provide the required compacted thickness without resorting to spotting, picking-up or otherwise shifting the mixture.

Segregation shall be avoided, and the surfacing shall be free from pockets of coarse or fine material. Asphalt concrete containing hardened lumps shall not be used.

Longitudinal joints in the top layer shall correspond with the edges of proposed traffic lanes. Longitudinal joints in all other layers shall be offset not less than 0.5-foot alternately each side of the edges of traffic lanes. The Engineer may permit other patterns of placing longitudinal joints if the Engineer considers that those patterns will not adversely affect the quality of the finished product.

Unless otherwise provided herein or permitted by the Engineer, the top layer of asphalt concrete for shoulders, tapers, transitions, road connections, private drives, curve widenings, chain control lanes, turnouts, left turn pockets, and other such areas, shall not be spread before the top layer of asphalt concrete for the adjoining through lane has been spread and compacted. At locations where the lanes are changed, the top layer for the through lanes shall be paved first. Existing pavement is to be surfaced and the specified thickness of asphalt concrete to be spread and compacted on the existing pavement is 0.25-foot or less, shoulders or other adjoining areas may be spread simultaneously with the through provided the completed surfacing conforms to the requirements specifications. Tracks or wheels of spreading equipment shall not be operated on the top layer of asphalt concrete in any area until final compaction completed.

At locations shown on the plans, specified in the special provisions directed by the Engineer, the asphalt concrete shall be tapered or feathered conform to existing surfacing or to other highway and non-highway facilities.

At locations where the asphalt concrete is to be placed over areas inaccessible to spreading and rolling equipment, the asphalt concrete shall be spread by any means to obtain the specified results and shall be compacted thoroughly to the required lines, grades and cross sections by means of pneumatic tampers, or by...
other methods that will produce degree of compaction as pneumatic tampers.

SPREADING

- All layers, except as otherwise provided in Section 10-2.11E, “General Requirements,” and in this Section, shall be spread with an asphalt paver. Asphalt pavers shall be operated in such a manner as to ensure continuous uniform movement of the paver.

- In advance of spreading asphalt concrete over an existing base, surfacing bridge deck, if there is a contract item for asphalt concrete (leveling) or if ordered by the Engineer, asphalt concrete shall be spread by any mechanical means that will produce a uniform smoothness and texture. Asphalt concrete (leveling) include, but is not limited to, the filling and leveling of irregularities. Asphalt concrete used to change the cross slope or profile of an existing shall not be considered as asphalt concrete (leveling). When directed by the Engineer, paint binder (tack coat) shall be applied to any layer in advance of spreading the next layer.

- Before placing the top layer adjacent to cold transverse construction joints, the joints shall be trimmed to a vertical face and to a neat line. Transverse joints shall be tested with a 12-foot straightedge and shall be cut back as required to conform to the provisions in Section 10-2.11E, “Compacting,” for surface smoothness. Connections to existing surfacing shall be feathered to conform to the for smoothness. Longitudinal joints shall be trimmed to a vertical face neat line if the edges of the previously laid surfacing are, in the opinion Engineer, in such condition that the quality of the completed joint will be affected.

COMPACTING

- Compacting equipment shall conform to the provisions in Section "Compacting Equipment.

- The Contractor shall furnish a sufficient number of rollers to obtain the compaction specified in these special provisions and the surface finish required by the Standard Specifications and these special provisions.

- Rollers shall be equipped with pads and water systems that prevent sticking of asphalt mixtures to the pneumatic tired or steel tired wheels. A parting agent that will not damage the asphalt mixture may be used.

- A pass shall be one movement of a roller in either direction. A coverage shall be as many passes as are necessary to cover the entire width being paved. Overlap between passes during any coverage, made to ensure compaction without displacement of material in accordance with good rolling practice, shall be part of the coverage being made and not part of a subsequent coverage. Each coverage shall be completed before subsequent coverages are started.

- Rolling shall commence at the lower edge and shall progress toward the highest portion, except that when compacting layers which exceed 0.25-foot in compacted thickness, and if directed by the Engineer, rolling shall commence at the center and shall progress outwards.

- Asphalt concrete shall be compacted by any means to obtain the specified relative compaction before the temperature of the mixture drops below 65°C (150°F). Additional rolling to achieve the specified relative compaction will not be permitted after the temperature of the mixture drops below 65°C (150°F) or once the pavement is opened to public traffic. When vibratory rollers are used as finish rollers the vibratory unit shall be turned off.

- Asphalt concrete shall be compacted to a relative compaction of not less than 95.0 percent and shall be finished to the lines, grades, and cross section shown
on the plans. In-place density of asphalt concrete will be determined prior to opening the pavement to public traffic.

- Relative compaction will be determined by California Test 375
- If the test results for a quantity of asphalt concrete indicate that the relative compaction is below 95.0 percent, the Contractor will be notified. Asphalt concrete spreading operations shall not continue until the Contractor has notified the Engineer of the adjustment that will be made to meet the specified relative compaction.
- If the test results for a quantity of asphalt concrete indicate that the relative compaction is less than 95.0 percent, the asphalt concrete represented by that quantity shall be removed, except as otherwise provided in these special provisions. If requested by the Contractor and approved by the Engineer, asphalt concrete with a relative compaction of 93.0 percent or greater may remain in place and the Contractor shall pay to the Engineer the amount of reduced compensation for the quantity with relative compaction less than 95.0 percent and greater than or equal to 93.0 percent. The Engineer will deduct the amount of reduced compensation from moneys due, or that may become due, the Contractor under the contract. The amount of reduced compensation the Contractor shall pay to the Engineer will be calculated using the total tones{tons} in the quantity with relative compaction less than 95.0 percent and greater than or equal to 93.0 percent multiplied by the contract price per ton{ton} for asphalt concrete or involved multiplied by the following compensation factors:

<table>
<thead>
<tr>
<th>Relative Compaction (Percent)</th>
<th>Reduced Compensation Factor</th>
<th>Relative Compaction (Percent)</th>
<th>Reduced Compensation Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>95.0</td>
<td>0.030</td>
<td>93.9</td>
<td>0.098</td>
</tr>
<tr>
<td>94.9</td>
<td>0.034</td>
<td>93.8</td>
<td>0.108</td>
</tr>
<tr>
<td>94.8</td>
<td>0.039</td>
<td>93.7</td>
<td>0.118</td>
</tr>
<tr>
<td>94.7</td>
<td>0.044</td>
<td>93.6</td>
<td>0.129</td>
</tr>
<tr>
<td>94.6</td>
<td>0.050</td>
<td>93.5</td>
<td>0.142</td>
</tr>
<tr>
<td>94.5</td>
<td>0.056</td>
<td>93.4</td>
<td>0.157</td>
</tr>
<tr>
<td>94.4</td>
<td>0.062</td>
<td>93.3</td>
<td>0.175</td>
</tr>
<tr>
<td>94.3</td>
<td>0.068</td>
<td>93.2</td>
<td>0.196</td>
</tr>
<tr>
<td>94.2</td>
<td>0.075</td>
<td>93.1</td>
<td>0.225</td>
</tr>
<tr>
<td>94.1</td>
<td>0.082</td>
<td>93.0</td>
<td>0.300</td>
</tr>
<tr>
<td>94.0</td>
<td>0.090</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Asphalt concrete with a relative compaction of less than 93.0 percent will be removed and replaced at the Contractor’s expense.
- Rolling shall be performed so that cracking, shoving or displacement will be avoided.
- Upon completion of rolling operations, if ordered by the Engineer, the asphalt concrete shall be cooled by applying water. Applying water shall conform to the provisions in Section 13, "Water Pollution Control.
- The completed surfacing shall be thoroughly compacted, smooth and free from ruts, humps, depressions or irregularities. Any ridges, indentations or other
objectionable marks left in the surface of the asphalt concrete by blading or other equipment shall be eliminated by rolling or other means. The use of any equipment that leaves ridges, indentations or other objectionable marks in the asphalt concrete shall be discontinued, and acceptable equipment shall be furnished by the Contractor.

- When 12 feet long is laid on the finished surface and parallel with the center line, the surface shall not vary more than 0.01-foot from the lower edge of the straightedge. The transverse slope of the finished surface shall be uniform to a degree such that no depressions greater than 0.02-foot are present when tested with 12 feet long laid in a direction transverse to the center line and extending from edge to edge of a 12-foot traffic lane.
- Pavement within 50 feet of a structure or approach slab shall conform to the smoothness tolerances specified in Section 51-1.03F(5)(b), "Bridge Deck Surface Texture."

**Miscellaneous**

**MISCELLANEOUS AREAS**

- Surfacing of miscellaneous areas, such as median areas (exclusive of inside shoulders), island areas, sidewalks, dikes, gutters, gutter flares, ditches, override drains, aprons at the ends of drainage structures and other areas outside the traveled way which are designated on the plans as miscellaneous areas to be paved with asphalt concrete, shall conform to these specifications.
- The combined aggregate grading for asphalt concrete placed on miscellaneous areas shall conform to that specified for the asphalt concrete placed on the traveled way, unless otherwise directed by the Engineer. The amount of asphalt binder used in the asphalt concrete placed in dikes, gutters, gutter flares, override drains and aprons at the ends of drainage structures, unless otherwise directed by the Engineer, shall be increased one percent by weight of the aggregate over the amount of asphalt binder used in the asphalt concrete placed on the traveled way.
- The asphalt concrete placed in miscellaneous areas may be spread in one layer. The material shall be compacted to the required lines, grades and cross section.
- Dikes shall be shaped and compacted with an extrusion machine or other equipment capable of shaping and compacting the material to the required cross section.

**SEAL COAT**

Where shown on the plans or provided in the special provisions, a fog seal coat shall be applied to the surface of Types A asphalt concrete in conformance with the provisions in Section 37, "Bituminous Seals."

**3.05.04 MISCELLANEOUS CONCRETE CONSTRUCTION**
Miscellaneous concrete shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," and Section 90, “Portland Cement Concrete”, of the Standard Specifications and these City Standard Specifications.

The second paragraph of Section 73-1.01 “Description” of the Standard Specifications is amended to read:

This work shall be constructed of minor concrete conforming to the provisions in Section 90 10, "Minor Concrete," except as follows:

4. Concrete aggregate shall be ¾” unless otherwise approved by the City Engineer.
5. All concrete shall be 6 sacks per cubic yard (4,000 psi).

Jet-black lampblack shall be added to the Portland Cement Concrete at the rate of one (1) pound lampblack per cubic yard of concrete (only within the Downtown Specific Area).

The Contractor, as he installs the P.C.C. sidewalk, shall be responsible for setting all of the utility boxes (except AT&T and PG&E) to the grade of the finished sidewalk and for cleaning and clearing concrete mortar from all utility boxes in the area so that they are fully accessible upon completion of the sidewalk installation. The Contractor shall be responsible for setting meter boxes to grade.

The Contractor shall be responsible for coordinating with AT&T and PG&E for the adjustment of AT&T and PG&E facilities prior to installing new curb, gutter, sidewalk, and driveway.

Contractor shall be responsible for guarding or otherwise protecting concrete work from vandalism or other damage. All such damage shall be repaired by the Contractor at the Contractor’s own expense.

The Contractor shall replace any asphalt paving that is removed as part of curb and gutter removal and as part of valley gutter removal; a 2’ AC plug is required. The extent of removal and replacement of asphalt concrete on either side of valley gutters shall be a minimum of two feet. Attention is directed to the section 3.05.03, “Asphalt Concrete” of these City Standard Specifications.

Constructing P.C.C. curb, gutter, sidewalk and driveways shall include any necessary excavation and backfill, furnishing and installing aggregate base, reinforcement, expansion joint filler, and all other required materials, including water.

If the Contractor elects to use the curing compound method for curing concrete, the curing compound shall be curing compound (6), non-pigmented, conforming to the provisions in Section 90-1.03B(3), "Curing Compound Method," of the Standard Specifications.

The curing compound shall be applied in a manner that will provide a complete coating of all exposed faces of the concrete surface.

The Downtown Napa Specific Plan states that all sidewalk within the “Parkway Plaza Redevelopment Area” shall include a 2 foot by 2 foot square scoring pattern.

3.05.05 SIGNS AND PAVEMENT MARKERS

A. Special Directional Signs

To the extent that the Napa Municipal Code authorizes directional signs to be installed, they shall be installed in accordance with the requirements of the Napa Municipal Code.
B. *Street Addresses on Curb Face*

The painting of house address numbers on the face of the curb is used to identify houses for emergency vehicles, delivery vehicles and other similar purposes, and shall conform to Standard Plan S-26.

C. *Street Name Signs*

These signs are used to identify intersecting public streets and shall conform to the following specifications:

- Metal name and block number plates are to be unpainted aluminum alloy 6061-T6, 0.63 inch thick, degreased to such extent that water will wet the surface uniformly, etched and free from all dents, and are to have a smooth and uniform flat surface. The metal plates are to be cut to size and shape, and shall be smooth and free from defects, prior to application of the reflective sheeting.
- Each individual sign face shall have 3/4-inch radius corners and 3/16-inch holes pierced as shown on Standard Plan S-19, entitled "Standard Street Name Sign".
- Name and block number plate background to be 3M2270 "Scotchlite" or approved equal. After the sign blank surface has been processed as specified, a reflective sheet shall be applied to the full face of the sign, unless otherwise noted.
- Street name and number plate height total shall be 9 inches; width shall be a minimum of 24 inches. Sign letters shall be 4 inches high California Department of Transportation Series C; block numbers and arrows shall be 2 inches high and shall be 605 Black Scotch-Cal, direct screened with 705 Black, or approved equal.
- Sign shall have a 1/4-inch wide black border, inset 1/8 inch from edge of sign.
- The spacing of letters shall be in accordance with the alphabetical spacing as per standard practice.
- The street name plates shall be assembled back to back with number 8-32 Phillips head aluminum bolts and number 8-32 aluminum nuts.
- Shall conform or be approved equal as shown on the street name sign Standard Plan S-19.
- Street name signs for private streets intersecting public or other private streets shall meet the above specifications except for color. These street name signs are to be privately owned and maintained and shall be located outside of the public street right-of-way. See Standard Plans S-18B and S-19 for color and other details.
4 - LANDSCAPING STANDARDS

4.01 PUBLIC RIGHT-OF-WAY STREET TREE PLANTING

Trees shall be planted from a minimum 15 gallon container and be of a size not less than 5 feet in height nor less than 3/4 inch in diameter. Trees shall have a healthy root system that is established in its container. The roots shall not be circled in the container. Trees shall have a single trunk with vertical leader branches that have not been “topped”. Tree shall be free from pests, dead and damaged branches or trunks. When 24-inch box container size trees are required, trees shall be a minimum of 8 feet tall and have a minimum trunk diameter of 1 ¾ inches.

The 15-gallon tree shall be planted in a hole that is a minimum of 24 inches square by 24 inches deep. In severely compacted or layered soil it will be necessary to break the continuity of the hardpan, clay pan or compacted layer by digging deep enough to penetrate below the pan or compacted layer. The excavation material in most cases can be returned to the hole. For 24-inch box container size trees the planting hole shall be a minimum of 36 inches square and at a minimum depth of 24 inches or deeper in order to accommodate the root ball.

Root barriers shall be installed whenever adjacent sidewalk and or curb are replaced. Root barrier shall be placed in the trench created alongside the new, or existing sidewalk and curb. The barrier shall be a continuous length and shall extend from ½” above finished soil grade downwards to a minimum depth of 12” adjacent to the sidewalk and 18” adjacent to the curb. Root Barriers shall be the Deep Root Barrier panel LB12-2 and UB18-2, or acceptable equivalent. Refer to Manufacturer’s Specifications for all other applicable requirements.

Trees shall be planted in original soil material unless otherwise required by the Engineer. Trees shall be set 2 inches higher than grown at the nursery.

Install two deep watering perforated plastic pipes as shown on Standard Plan T-1. Fill pipes with 3/4-inch clean drain rock.

Trees shall be staked as indicated below:

- **Double stake support system** - Two 2-inch diameter by 8 foot minimum lodge pole pine stakes or approved equal and spaced with a Mission Manufacturing tree stake stabilizer or approved equal. Stakes shall be pressure treated with a wood preservative material. Trees shall be tied with a 24-inch minimum GroStrait tree ties or approved equal.

Exact location of trees shall be determined by the Parks and Recreation Services Department. Tree spacing varies depending on type. Trees shall be located a minimum 20 feet from curb returns, 15 feet from street lights, 6 feet from driveways, and 10 feet from sewer laterals and water facilities.

When the area between the curb and the sidewalk contains a concrete or similar hard surface, a minimum 40 inches square opening around the tree shall be maintained.

Tree species designated for each street are on file at the Parks and Recreation Services Department Office. Large tree types shall not be planted when overhead utilities are present or when it is determined by the City that inadequate planting space is available.

Newly planted trees shall be watered deeply during the dry season or twice a week by the property owner or occupant. Water for approximately ten minutes with a hose adjusted to very
low pressure (approximated 10 gallons). The root ball of the tree shall be thoroughly soaked. The two deep watering perforated pipes that have been installed shall be used to get water down to the root ball. Deep watering will encourage the roots to go deep into the soil away from paved surfaces.

4.02 PUBLIC RIGHT-OF-WAY LANDSCAPE SPECIFICATIONS

4.02.01 GENERAL REQUIREMENTS

All landscape construction plans shall have been approved by the City of Napa Parks and Recreation Services Department. A pre-construction conference must be scheduled with the Parks and Recreation Services Department prior to the start of the landscape installation.

4.02.02 REQUIRED INSPECTION POINTS

During the course of construction, approval of Engineer shall be required as follows:

<table>
<thead>
<tr>
<th>Approval Required On</th>
<th>Prior To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Installations</td>
<td>Covering Trenches and Connection</td>
</tr>
<tr>
<td>Irrigation Mains and Laterals</td>
<td>Covering Joints</td>
</tr>
<tr>
<td>Fine Grading</td>
<td>Planting</td>
</tr>
<tr>
<td>Plant Materials</td>
<td>Installation</td>
</tr>
</tbody>
</table>

4.02.03 SITE PREPARATION AND GRADING

Clearing and grubbing shall include the removal of the vegetation, asphalt, concrete and other debris from the site. Tree stumps, roots and other unsuitable material shall be removed to a depth of 12 inches below the finished grade.

Curb, gutter and sidewalk which is required to be removed shall be cut to minimum depth of 1½ inches with an abrasive type saw, on a score line, and the entire section shall be removed.

Removing concrete shall conform to the provisions in Section 15-1.03B of the State of California Standard Specifications.

The Contractor shall roto-till or otherwise cultivate soil to remove the existing vegetation from the site.

All utility and valve boxes shall be adjusted to meet the finished grade of the site. All finished soil grades shall be one inch below sidewalk or curb level and shall not create run-off into adjacent properties.
4.02.04 IRRIGATION PIPING AND ELECTRICAL SYSTEMS

A. Materials

Sprinklers: Rainbird 1800 series or approved equal.

Gear Drive rotors: Hunter I-40, I-20

Bubblers: Rain Bird 1400 series or approved equal.

Subsurface Dripline: Rain Bird XFS Subsurface Dripline

Automatic Remote Control Valve: Hunter ICV Series valve or approved equal centered in approved valve boxes. Each valve shall have a polyurethane tag with station identification number. Tag shall be Christy’s ID-STD-Y1, or approved equal.

Remote Control Valve Boxes: Carson Industries Model 1419-12 with 1419-4B (bolt down) lid marked “Irrigation”. Color shall be green for potable water and purple for reclaimed water applications.

Gate Valve: Three inches and smaller shall be Nibco T-113 or approved equal. Four inches and larger shall be Nibco F-619 –RW series as specified.


Backflow Preventer: To be approved by the Parks and Recreation Services Department’s Cross Connection Specialist. Wilkins 975 XL reduced pressure / 950 XL double check or equal approved by California Department of Health. Installed with Wilkins Model No. 600 Pressure Reducer Valve on services of 80 PSI or greater. Polar Parka backflow insulation is required.

Backflow Preventer Enclosure Strong Box: Model BC-CR.

Pressure Regulator: Wilkins Model No. 600 regulator to be used whenever the system pressure exceeds manufacturer specifications for sprinkler performance.

Quick Coupler Valves: Model 44 Rainbird or equal installed in Carson 910-12B box with bolt down lid. Coupling valve must be capable of receiving RB44K keys.

Irrigation Piping: Schedule 40 PVC

Electrical Conduit: Gray schedule 40 PVC.


B. Installation

The Contractor shall install the irrigation and electrical systems in accordance with the approved plans, each controller cabinet shall contain a GFI electrical receptacle. All
work and installations shall be in accordance with the California Plumbing Code, the National Electric Code and the local regulations.

Irrigation systems shall be installed to provide full coverage of all landscaped areas. If areas are receiving insufficient coverage, the contractor shall adjust and/or reinstall the system to provide proper coverage.

Trenches shall be straight with bottoms of uniform slopes. The bottom of the trench shall be undisturbed native material or imported material compacted. Main lines shall be installed with a minimum cover of 18 inches. A minimum of 1-inch vertical clearance shall be maintained between lines which cross. No line shall be installed parallel to and directly over another line. All lines, when passing under areas that are to be paved, shall be placed in a P.V.C. conduit sleeve.

All main lines shall be placed on sand bedding, a minimum of 2 inches thick.

Irrigation control wires shall be installed in the same trench as irrigation pipe, maintaining a 2-inch clearance at pipe joints. Control wires are to be on the same level as (not on top of) irrigation pipe. Irrigation control wire shall be bundled and taped at 6-foot intervals. There shall be a minimum of 36 inches for each wire coiled inside each valve box. Irrigation pipe is to be installed with identifying marks visible for inspection.

A minimum of 5 inches of sand shall be placed over the lines. Native material may be used for remainder of the backfill.

The entire irrigation system shall be thoroughly flushed with water to remove dirt scale and foreign material of any nature prior to the pressure test.

Prior to backfilling, the main lines shall be filled with water. The irrigation system shall not leak and a pressure test of 125 psi for a period of 2 hours, shall be maintained on the entire system.

Control and common ground wire shall be type UF600V with a minimum 1/16-inch insulation or of a type approved by the governing electrical code for underground direct burial for Class 2 wiring for 24 volt, 60 cycle A.C. Direct lines shall be No. 14-1 AWG-UF, black. Common lines shall be No. 14-1 AWG-UF, white. All control and common ground wires shall be placed in minimum 1½-inch PVC conduit when passing under areas that are to be paved. All 24-volt splices shall be made using 3M Company No. DBR/Y-6 Splice Kit, or approved equal. Install spare control wires of a different color along entire main line. Loop 36-inch excess wire into each single valve box. Minimum of two spare wires per controller.

Galvanized pipe or fittings will not be permitted in the system.

The control and quick coupler valves shall be installed as shown on the approved plans. The valve boxes shall extend from the finished grade to the bottom of the valve.

The electrical system shall be installed to properly operate the irrigation system.

The Contractor shall furnish and install all required materials and equipment to connect the system to electrical service point and water meters.

The Contractors shall furnish and install all required materials and equipment to install the controller in the cabinet.

Wiring for the remote control valves shall be in accordance with the manufacturer recommendations. Each master valve shall have a dedicated control wire and dedicated common wire.
The Contractor shall furnish a reproducible “as built” plan of the irrigation and electrical system.

The Contractor shall furnish applicable operating manuals, warranty cards for controllers, valves, backflow preventer and pressure regulators.

4.02.05 CENTRAL CONTROL SYSTEM SPECIFICATIONS

A. General

All materials furnished and installed shall be new and shall conform to the City of Napa Standard Specifications and Standard Plans, current addition, as adopted by the City.

All materials except interconnect conductors shall have a five-year limited warranty. The contractor shall submit proof of warranty to the City inspector prior to the start of the maintenance period. It shall be the contractor’s responsibility to obtain the necessary warranty inspections from the equipment supplier. No installation will be accepted without proof of warranty.

All existing and new computerized irrigation control system components shown on the plans shall be fully operational at final acceptance.

All incidental parts which are not shown on the plans or specified herein and are necessary to complete or modify the existing system shall be furnished and installed as though such parts were shown on plans or specifications. All systems shall be in satisfactory operation at the time of completion.

Existing interconnect systems shall be maintained in effective operation by the contractor for the duration of the work. The contractor shall notify the City inspector 48 hours prior to performing any work on an existing system.

The contractor shall coordinate with the local telephone company for connections to the service and/or installation of conduits, telephone conductors, jacks and modems at the locations shown on the drawings. Minor changes caused by actual site conditions shall be made at no cost to the City. All changes to plans shall be approved by the City Engineer.

B. Products

Conduit

All central control system interconnect conduit and fittings shall be PVC schedule 40, 1-inch in size, unless otherwise noted.

All telephone service interconnect conduit and fittings shall be as approved by the local telephone company.

Conductor

The communication cable as required from the sub master satellite assembly to the other satellite assemblies on line shall be a 4 conductor shielded cable (Part No. EV-CAB-COM). Communication cable may be used to link satellites up to 5,000 feet from each other. Cable shall be installed in a gray 1-inch schedule 40 PVC.

The flow sensor wire as required from the flow sensor into the satellite assembly enclosure shall be a 2 conductor shielded cable (Part No. EV-CAB-SEN). The sensor
cable may be used to connect the flow sensor to a satellite up to 2,000 feet from each other. **Cable shall be installed in a gray 1-inch schedule 40 PVC. Each flow sensor cable shall be a continuous run.**

All conductors shall be the same type and size shown on the drawings as required for proper operation of the system.

**Wire Splices**

Conductors shall be installed with **NO UNDERGROUND** splices unless absolutely necessary and unavoidable. Any and all underground splices that are required to be made must be approved by the City Inspector and shall be placed in a suitable type, 14 inch by 19 inch valve box for easy access.

Wire splices on the communication or sensor cable shall be made with a splice kit (3M Company Part No. 72-N1).

**Pull Boxes**

Pull boxes shall be fabricated from a durable plastic material resistant to weather, sunlight and chemical action of soil. Pull boxes shall be a minimum size of 20 inches in length, 15.25 inches in width and 12 inches in height. In paved areas, the pull box shall be a concrete type with a cast iron lid.

**Ground Rod**

A 5/8-inch by 8 foot ground rod, clamp and No. 6 wire shall be provided at every satellite location. It shall be installed between 8’ – 12’ from enclosure, installed in a 10” round valve box.

All central control system equipment shall be grounded to conform to requirements of the National Electric Code; current edition as adopted by the City, and the manufacturer’s specifications. No solder connection will be allowed. Resistance to ground shall be no more than 25 ohms.

**Satellite Assembly**

The number and location of the satellites shall be as shown on the drawings and shall be as manufactured by Rain Master.

All satellites shall be pre-assembled, hereafter referred to as Satellite Assembly, by Site One Green Tech in a top entry (SA6 series) or metered (SA5 series) “Strongbox” stainless steel weatherproof, vandal resistant, lockable enclosure manufactured by V.I.T. Products.

The satellite assembly shall consist of a stainless steel enclosure, stainless steel removable backboard, interconnect terminal strips, primary power voltage surge protection, on/off switch, a ground fault interrupt circuit, ground rod, wire and clamp.

The satellite assembly (Part No. SA6-RM4-XX/PHB or SA5-RM4-XX/PHB series) shall include a phone communication circuit board for communicating with the central computer by means of the telephone system.

The satellite assembly (Part No SA6-RM4-XX/RHG or RFL or SA5-RM4-XX/RHG or RFL series) shall include a radio communication circuit board for communicating with the central computer by means of a data radio. For proper antenna selection, contact Site One Green Tech at (888) 438-7435.
The satellite assembly (Part No. SA6-RM6 or SA5 series) shall include a hard wire communication circuit board for communicating with a submaster satellite assembly (Part Nos. SA6-RM4-XX/HWB, SA5-RM4-XX/HWB) when interconnected by means of hard wire (Part No. EV-CAB-COM).

The satellite assembly (where applicable) shall include a flow sensing assembly with a normally open master valve assembly option (Part No. FSAV series) for each point of connection (maximum of two per satellite/group) or a dual flow sensing assembly with master valves option (Part No. DFSAV series) for a single point of connection with a bypass to monitor very low and high flows.

The satellite assembly (where applicable) shall include a Rain Master PRO-MAX transmitter and built-in remote receiver with a controller access code (Part No. PMR) or PRO-MAX built-in receiver only with controller access code (Part No. PMR-CAC) whichever is applicable.

The satellite shall be covered by a five-year limited warranty.

C. Execution of Work

Interconnect Conduit

The interconnect conduit shall be located within the public right-of-way whenever possible. If the conduit is installed outside of the public right-a-way, an easement shall be provided to the City prior to installation.

Conduit runs shall be installed as shown in the approved plans. Any changes shall be approved by the City Engineer prior to installation.

The ends of the conduits, whether shop or field cut, shall be reamed to remove burrs and rough edges. Cuts shall be made square and true.

The ends of the conduit shall be capped until the pulling of wiring is started.

Conduit bends, except factory bends, shall have a radii of not less than six times the inside diameter of the conduit.

Conduit shall be installed at a depth of not less than 18 inches below finished grade.

Conduit shall be free of soil and debris.

A nylon or polypropylene pull rope with a minimum tensile strength of 500 pounds shall be installed in all conduits which are to receive future interconnect cable. At least 2 feet of pull rope shall be extended beyond each end of the conduit run and secured.

Interconnect Conductors

All interconnect conductors shall be pulled by hand.

A total of 3 feet of cable shall be left at each satellite assembly and pull box. Sufficient slack shall be left to allow the wire to extend 18 inches above the top of the pull box grade.

The interconnect wire shall be continuous from satellite to satellite. All splices shall occur within the satellite enclosure unless specifically authorized by the City Engineer. Splices shall be capable of satisfactory operation under continuous submersion in water.

Pull Boxes
Pull boxes shall be installed with a 36-inch loop inside the box, at intervals not to exceed 200 feet, at all changes in direction, and where the conduit crosses a roadway, bridge or railroad track.

Pull boxes shall be installed in area to be landscaped whenever possible.

The bottom of the pull box shall be bedded in crushed rock six inches deep prior to installation of the interconnect cable.

D. Equipment Supplier Support

- Review system and plans.
- Conduct one pre-construction meeting on site, for the contractor and owners' representative.
- Hook-up communication and flow sensor cable inside the assembly.
- Test to verify proper grounding.
- Field test for proper operation of the assembly components.
- Communication cable continuity and resistance test.
- Calibration of assembly flow sensing components (if applicable).
- Verify equipment conforms to and is installed in accordance with Site One Green Tech and Manufacturers specifications and recommendations.
- Perform functional test of system from a computer.
- Provide written certification letter.

4.02.06 LANDSCAPING MATERIALS

All trees/shrubs (all plant material) shall possess a County of Napa Agricultural Commission inspection stamp.

Soil Mix: Import soil mix shall consist of 50 percent loam and 50 percent nitrogen fortified redwood sawdust or approved equal.

Fertilizers and Soil Conditioners:

- Controlled release fertilizer for groundcover: 20-6-8 (N-P-K) or approved equal with a minimum of one percent iron.
- Soil Amendment: Redwood sawdust – nitrogen stabilized or approved equal.
- Controlled release fertilizer for trees and shrubs: 20-10-10 (N-P-K) or approved equal with calcium, sulfur and iron.
- All fertilizers and soil conditioners shall be first quality, standard brand, and agricultural products.

Pre-emergent Herbicides: All herbicides must be approved by the Parks and Recreation Services Department and be registered for plant materials used. Applications must be performed in accordance with CDPR standards.

Compost: Available from Napa Garbage Company
All plant material shall be approved prior to installation by the Parks and Recreation Services Department, must be well suited to Napa’s climate and require minimal water once live.

**Trees:** Fifteen gallon trees with a root system established in its container a minimum of 6 months. Trees shall be not less than 5 feet in height, nor less than 3/4-inch caliper and shall not have evidence of stem damage, disease, fungus, root restriction or deformity. Additionally, no co-dominant stem growth shall be present; that is the tree shall possess one dominant stem with an internal branch structure.

**Shrubs:** Shrubs with a root system established in its container shall not have evidence of root restriction or deformity.

**Ground Cover Plants:** Ground cover plants shall be rooted plants grown in flats, unless otherwise approved in advance by the Parks and Recreation Services Department. Plants shall be full and compact.

### 4.02.07 SOIL PREPARATION

**Weed and Debris Removal:** All ground areas to be planted shall be cleaned of all weeds and debris prior to any soil preparation or grading work. Noxious weeds and grasses shall be removed by the roots wherever they are found at any stage of the work. Weeds and debris shall be disposed of off-site.

**Moisture Content:** Soil shall not be worked when moisture content is so great that excessive compaction will occur, nor when it is so dry that dust will form in the air or that clods will not break readily. Water shall be applied, if necessary.

**Soil Loosening:** Soil in all planting areas shall be cultivated to a depth of 8 inches below finish grade. Water shall be added and cultivating shall be continued until the entire 8-inch depth is loose and friable. All debris, concrete and rocks shall be removed to the 8-inch depth and shall be disposed off-site. No rocks or debris over 2 inches will be allowed to remain.

### 4.02.08 SOIL CONDITIONING

**General:** After soil preparation has been completed and the soil and water settled, high and low spots re-graded and the rough grade established, add soil amendments as indicated below and rototill, making repeated passes with the cultivator to the depth specified until the amendments have been thoroughly mixed.

**Ground Cover Areas:** Rototill 6 cubic yards nitrogen stabilized Redwood Sawdust or approved equal into the top 6 inches of soil at the specified rates per 1,000 square feet area.

**Shrub Areas:** Broadcast 3 cubic yards nitrogen stabilized Redwood Sawdust or approved equal and rototill into the top 3 inches at the manufacturer specified rates per 1,000 square feet of area.

Backfill all tree and shrub holes with soil from excavated hole.

**Tree and Shrub Holes:**

- Locate tree and shrub per the planting plan bringing any conflict with underground utility lines to attention of the Engineer.
- Holes shall be excavated to depth of the root ball and to a width twice the diameter of the root ball. In compacted soils, planting holes shall be excavated to a minimum depth of 1½ times the depth of the root ball. The sides and bottom of the hole shall be scarified before planting.

- The Contractor shall place mulch to a depth of 4 inches on all shrub areas. The mulch shall cover all soil areas with the exception of the circular well formed around each plants drip line.

**Finish Grading:**

- When weeding, rough grading, and soil conditioning have been completed and soil has been thoroughly water settled, all planting areas shall be smooth graded, and ready for placement of plant materials.

- Grading shall be done when soil is at optimum moisture content for working.

- Grades not otherwise indicated shall be uniform slopes between points where elevations are given, or between points established by curbs. Finished grades shall be smooth, even and on a uniform plane with no abrupt change of surface. Minor adjustments shall be made if required. Finished grade shall be one inch below curb and sidewalk.

- All grades shall provide for natural runoff of water without low spots or pockets. Flow line grades shall be accurately set and shall be not less than 2 percent gradient wherever possible.

**4.02.09 TREE STAKING (OTHER THAN STREET TREES)**

Trees shall be supported by double stakes as detailed on the standard plans. All stakes shall be at right angles to prevailing wind.

Wooden tree stakes shall be 8-foot minimum by 2-inch diameter round, pressure treated.

Stakes shall be set plumb. Tree ties shall be 24-inch minimum tire strap, “Gro Strait” or approved equal. Staking apparatus to be removed once the tree root system is well established. Follow the staking guidelines set forth in the latest edition ANSI A300 Standards – Part 6, Planting and Transplanting.

**4.02.10 PLANTING**

Plant materials shall not be installed until all construction work has been completed and sprinkler systems have been installed and tested. Planting areas shall have been graded and prepared as herein specified.

No planting shall be done during unfavorable weather.

All trees or shrubs shall be set so that, when settled, the natural grade at the top of container is at finished grade of the adjacent soil. No soil in muddy condition shall be used for backfilling. No filling will be allowed around trunks. The tree root flare shall be exposed at finished grade level.

All trees shall be staked per City Standard Plans T-1, T-2.

Trees planted in curb strips or near sidewalks shall be planted per City Standard Plans T-1, T-2.
Plants shall be irrigated to a depth of at least 18 inches.

Watering Basins: Form circular earth basin centered on the stem of each tree or shrub. The rim of basin shall be 4 inches above the grade at the trunk.

All plants shall be planted immediately after removal from the containers and containers shall be removed from the site so as to not present a hazard to persons using the area.

Upon completion of all planting operations, and again just prior to final inspection, all soil shall be lightly cultivated and neatly raked. Basins shall be left around trees and shrubs unless otherwise specified or directed.

All landscape areas must be treated with pre-emergent herbicides approved by the Parks and Recreation Services Department and registered for the plant materials that are planted in accordance with CDPR regulations.

4.02.11 ESTABLISHING MAINTENANCE PERIOD

As soon as all planting is completed, a planting review and preliminary inspection to determine the condition of the plantings will be held by the Engineer upon request by the Contractor.

Upon approval of the work by the Engineer and Parks, Trees & Facilities Manager, the 60-day maintenance period shall begin.

4.02.12 MAINTENANCE

Continuously maintain all plantings in area, from the beginning of work, during the progress of work, for a minimum of 60 days after completion of all planting, and until final acceptance of all work.

Maintenance shall include continuous operations of watering, weeding, cultivating, edging, trimming, and fertilizing. Treatment of insect, disease, rodent, and any other pest control operations shall utilize Integrated Pest Management practices to assure good, normal growth.

Weed Control: All planting areas are to be treated for pre-emergent weed control with material approved by the Parks, Trees & Facilities Manager and at recommended label rates, uniformly distributed in accordance with CDPR regulations.

Planting areas shall be kept neat and free from debris at all times and shall be cultivated and weeded at not more than 10-day intervals. Planting areas shall be weed free at the end of the maintenance period.

Replacements: Immediately replace any plant materials that die or are damaged. Replacements shall be made to the same specifications as required for original plantings.

Records of regular maintenance activities and dates must be provided to the City Parks and Recreation Department every 2 weeks. The Maintenance Period may be doubled if it is determined that the above maintenance standards have not been met.

At the termination of the Maintenance Period, all plant materials shall be live, healthy, undamaged and free from infestations. Plantings that do not conform to specifications shall be replaced and brought to a satisfactory condition before final acceptance of the work can be made. Based on City review, maintenance period may be doubled until all plant materials are sufficiently established.
4.03 TREE PRESERVATION STANDARDS

4.03.01 PURPOSE

Tree Preservation Standards shall be utilized for the protection of trees located on public property including street right of ways, public easements; or on private property where trees have been designated City of Napa Significant Trees or Protected Native Trees; as required by the City of Napa Parks and Recreation Services Department where said trees may be subjected to construction impacts or activity on either public or private land. Construction activity shall include but is not limited to: grading, trenching, excavating, and operation of construction equipment or vehicles in the vicinity of the public or Significant Tree which has the potential to harm or affect the health or vigor of the tree.

4.03.02 CONSTRUCTION INSPECTION AND SUPERVISION

All arboricultural and related soil work shall be performed under the supervision of International Society of Arboriculture (ISA) Certified Arborist (Project Arborist) or the City Engineer or designated representative.

All specified arboricultural work shall be completed prior to site grading (hand trenching, pruning, fencing, etc.)

4.03.03 PROTECTION WITHIN DRIP LINE OF INDIVIDUAL TREES

Prior to initiating any construction activity in the area, including demolition or grading, temporary protective fencing shall be installed at each site tree in the immediate vicinity of construction.

Fencing is to be located a minimum of one foot beyond the canopy drip line. If available space and logistics follow, fence shall be placed at a greater distance or up to twice the diameter of the drip line.

Fencing shall be a minimum of 5 feet in height at all locations, and shall form a continuous barrier without entry points around all individual trees, or groups of trees. Barrier type fencing such as chain link, but any fencing system which adequately prevents the entry of equipment and activity will be acceptable. The use of simple post and cable fencing is not permitted as this provides minimal protection and is easily removed or moved by construction personnel. Fencing shall be installed in a professional manner with adequate uprights and appropriate attachments. Concrete footings are not required due to the temporary nature of the fencing. Any encroachment into the drip line for fencing or construction purposes requires the permission of the City Inspector.

This fencing shall serve as a barrier to prevent drip line encroachment of any type by construction activities, equipment, materials storage, and personnel.

Contractors and subcontractors shall direct all equipment and personnel to remain outside the fenced area at all times until project is complete, and shall instruct personnel and subcontractors as to the purpose and importance of fencing and preservation.

Fencing shall remain in place and not be removed until all construction activities are completed. This shall include grading and compaction activities, installation of underground construction activities, and any other construction or activity, which may be scheduled prior...
to landscapes installation. There may be occasion when access is required, and fencing may temporarily be moved to facilitate the work.

Roots of single standing trees often extend two to three times the distance of the actual drip line and function primarily in the uptake of nutrients and water. The drip line is arbitrarily established as the minimum root area generally required to preserve tree health. As much area around the circumference of tree beyond the drip line should have minimum intrusion to further ensure tree survival and health.

4.03.04 GRADE CHANGES

Grade changes within a tree drip line are to be minimized wherever possible. Grade should not change from that which existed prior to grading activities without approval from the project arborist.

Maximum cut or fill within actual or estimated drip lines shall not exceed 6 inches. All cut activities should be done in conjunction with the project arborist, even those under 6 inches, to minimize root damage.

Estimated drip line is defined as the widest distance from main trunk to furthest branch tip applied around the entire circumference of each individual tree. This definition specifically applies to all trees where a one-sided or unbalanced structure exists and the actual drip line is not truly representative of the area of the root zone requiring protection. Cut and fill activities apply to this definition.

No more than 6 feet of fill soil shall occur without specifically developed mitigation measures. Removal of soil within tree drip line is also limited to 6 inches, or a lesser amount, which can be removed without contacting major roots. Detailed mitigation is required to remove a greater amount.

The amount of cut and fill is to be determined by actual tree species, rooting characteristics, soil conditions, and purpose of grade change.

All cut and fill activities within tree drip line increases percentage of short and long-term tree decline and loss, and approval of these activities, or compromise in this area, shall be done with full knowledge of the negative potential that is incurred.

Original grade shall be maintained in immediate area of the root crown, where the soil contacts tree bole, at all times. No increase in grade shall be allowed under any circumstances in this area.

Physical retaining structures are required where any fill operation is approved and exceeds 6 inches above original grade. Retaining structures function to prevent soil grade from being raised in the root crown area.

Physical retaining structures shall be permanent in nature and may be constructed from any material that is appropriate in function to hold raised grade away from root crown flare on a long-term basis. Engineering may be required in some instances.

Tree retaining structures shall be installed a minimum distance of 4 feet from any tree trunk and may completely or partially surround the tree depending on the location of grade change. If grade is raised on 50 percent of the drip line, then retaining structures must be installed to prevent that soil from moving to the immediate root crown flare in that area. If 100 percent of the grade is raised, structure must surround the tree entirely. It is the responsibility of the project designer to develop an appropriate structure for this purpose with the approval of the project arborist.
If site conditions exist which necessitate installation of retaining structures closer than 4 feet to tree trunk, the project arborist shall be consulted for details of this installation.

No part of the dry well structure shall be placed below original grade to minimize impact on root system. If necessary, structural posts may be installed to hold walls in place, providing that care is taken during the installation to minimize damage to the root system, and that posthole size is minimized. The excavation and pouring of footings and other structural support is not compatible with tree preservation.

Grade changes outside the retaining structures shall be such that drainage water of any type or source is not diverted toward or around the root crown in any manner. Grade shall drain away from root crown at a minimum of 2 percent.

If grading toward root crown is required, appropriate surface and/or subsurface drain facilities shall be installed so that water is effectively diverted away from root crown area. The project arborist shall be consulted for details and approval of installation.

Where fill is approved and/or where paving of any type is planned within the drip line, aeration tubes shall be installed from the dry well or retaining structure to the limit of the drip line and placed at a depth corresponding to slightly below original grade. A description of aeration tube use and construction follows:

- In all areas where paving, impermeable or semi-permeable surfaces, or fill over 6 inches is to be installed within any tree drip line, aeration tubes shall be required to the limit of the drip line or beyond where possible. Tubes shall radiate horizontally from each dry well to the root crown area to the limit of the drip line, and shall be located on 4-foot centers. Ends of tubes shall be connected to one another. A proportional number of tubes shall be installed when partial paving or filling within drip line is required.

- Aeration tubes shall consist of rigid and perforated PVC pipe, minimum class 200, styrene plastic, or molded ABS, minimum 3-inch diameter, 10 perforations per foot. Pipe shall be placed slightly below original grade. Each tube shall be wrapped in suitable filter fabric securely fastened with waterproof tape. Aeration tubes shall daylight within the retaining structure around tree trunk, and a grate shall be attached, but not glued, to the end of each daylighted tube to prevent the entry of debris. Aeration tubes shall also daylight near the outer perimeter of the drip line with a fitted metal grate properly installed such that water of any type or source back drains into dry well.

The installation of aeration tubes is meant to facilitate the normal exchange of atmospheric gasses with the soil and root system. When impermeable or semi-permeable paving is installed, or when soil grade is raised, this normal exchange is limited and commonly becomes a source of root damage and potential disease.

Tree roots will be expected to grow into areas of soil fill, and quality of imported soil should be considered. Ideally, fill soil should be site soil that closely matches that present within tree drip line. If import soil is utilized, it should be the same or slightly coarser texture than existing site soil, should have a pH range comparable to site soils, and generally should have acceptable chemical properties for appropriate plant growth. A soil analysis is required prior to importation to evaluate import soil for these criteria.

All approved soil cuts should be made outside the immediate drip line for minimal negative impact on trees. If approved within drip line, crown foliage shall be reduced accordingly to balance the estimated root loss. Any construction activity, which necessitates soil
excavation in the vicinity of preserved trees, should be avoided where possible, or mitigated under the guidance of the project arborist. Roots are to be clearly hand cut and sealed wherever possible when major structural roots are encountered over one inch in diameter. The tearing of roots by equipment of any type within the drip line shall not be allowed.

4.03.05 UNDERGROUND CONSTRUCTION

All underground work within tree drip lines shall be avoided wherever possible to reduce negative impact on trees. The location of underground utilities well outside drip line is recommended as part of tree preservation.

Weakened anchorage, root system integrity, and the ability to acquire moisture from the root soil areas are the most critical issues when considering any type of root impact or removal.

Underground work in the area of site trees has a potentially serious impact on tree health and tree stability. Underground trenching for a variety of utilities will sever large structural roots reducing nutrient and water uptake and more seriously affecting the ability of each tree to remain appropriately anchored.

The existing root system within the drip line should not be severed by construction activities of any type. If undergrounding within the drip line is required for unavoidable logistical reasons, the project arborist shall be consulted to determine the impact on tree health.

All underground work required within the drip line of the trees and below original grade shall be previewed by the project arborist to determine potential impact on trees and to prepare mitigation measures. The project arborist shall be present during the actual underground work.

4.03.06 PRUNING REQUIREMENTS

The removal of dead wood, damaged branches, and structurally unsound wood including bark, narrow crotches, and crossing branches shall be the priority for any pruning work. Co-dominant leaders or lateral branches shall be removed and pruned to retard growth if possible.

Pruning shall be as minimal as possible, removing dead or damaged branches, crossing or rubbing branches, or correcting other structural deficiencies that may be present. Removal of lower branches may be required to allow for access and clearance following construction. Minimal pruning is the desired approach to all trees. Follow the pruning guidelines set forth in the latest edition ANSI A300 Standards – Part 1, Tree Pruning.

The following general guidelines shall be used during all pruning procedures:

**Lateral Branch Removal**

- All laterals shall be removed immediately beyond the branch bark ridge, always preserving the branch collar.
- No stub cuts should be made which leave an inch or more beyond the branch collar.
- No flush cuts through the branch collar shall occur.

**Triple Cuts**
• All branches too large to be hand held shall be removed by means of the triple cut; undercutting branch 4 to 8 inches beyond base, removing branch beyond undercut, and removing remaining stub utilizing a shoulder cut.

Terminal Pruning

• Thinning: Cut back terminal portions of branches by cutting back to laterals with a basal diameter 1/3 the size of the terminal being removed. Removal of many smaller terminals is preferred over removal of a few large ones.

• Size reduction: Remove portions of the crown for reducing height by removing terminals back to laterals. Each lateral remaining should be located to serve as a new terminal. This will establish the crown at a lower level. The diameter at the base of a remaining lateral should be 1/3 the diameter of the terminal being removed.

Pruning may also be required to create appropriate access for construction equipment where low limb presence may obstruct access. This pruning is to be done by a qualified arborist, and shall by no means be done by construction personnel under any circumstances.

Pruning shall occur prior to initiation of all approved underground trenching. No ground shall be broken within the drip line of street trees without having pruning completed.

Project arborist shall be consulted prior to initiation of any pruning procedures to coordinate activities with the working arborist.

4.03.07 ADDITIONAL RECOMMENDED PROCEDURES

Continued discussion and coordination between project arborist, owners, contractors, and City engineer shall occur to further discuss and define these guidelines based on the actual work planned in the vicinity of these trees.

4.03.08 FERTILIZATION

Following completion of construction, all native trees shall be fertilized with a complete fertilizer which shall supply a minimum of 1 ½ pounds of actual nitrogen per 1000 square feet of drip line area, per year. A thorough irrigation shall immediately follow. This application shall be completed twice during the growing season following completion of construction. Ideally, application shall be by high-pressure soil injection or drenching.

Following completion of construction activities a determination of tree health should be conducted to visually evaluate tree performance and to recommend additional mitigation if it should be required. Owners additionally should monitor visible tree appearance and contact the project arborist should the tree exhibit unusual growth or characteristics.

4.03.09 MULCHING

Following completion of construction, 2 to 3 inches of wood chip mulch is recommended for placement under the drip line of the tree. Mulch shall remain a minimum of 2” from the trunk of the tree.
4.03.10 PEST CONTROL

A close visual examination for tree pests shall be conducted by the project arborist and/or the tree worker as he completes pruning procedures. If a serious infestation is present which was not apparent from ground observation then pesticide application should be considered at that time. However, the simple presence of tree pests does not warrant the use of chemical pesticides, and it should be clear that a serious infestation capable of causing tree decline must be present to warrant their use. The use of organic sprays or pesticidal soaps is the preferred method for treating any serious pest infestation. If infestations should occur, discussion with the project arborist is recommended. Treatment should only be performed by a licensed pest control operator/applicator under the direction of a use recommendation or prescribed treatment in accordance with labeling and in accordance with applicable California State laws and regulations. Administered by the California Department of Pesticide Regulation and regulated by the Napa County Agricultural Commissioner’s office.

4.03.11 DISEASE CONTROL

No specific measures are recommended for disease control unless otherwise noted in the Individual Tree Evaluations. The tree-pruning specialist should note any serious problem during climbing procedures if they become evident.

4.03.12 REFERENCE

The use of asphalt or concrete as a primary paving surface within the canopy drip line is prohibited. Utilization of a permeable substance which does not impede the natural percolation of water or limit the nature of gaseous exchange is recommended. Materials such as decomposed gravel or cobble are ideal for this purpose, however; generally do not function satisfactorily as a parking or driving surface.

Interlocking pavers come in a variety of shapes, colors and sizes and provide a suitable surface for driving, parking and walking. At the same time they will allow some infiltration of water and air to the original soil level. Functionally and aesthetically they are appropriate for consideration at many projects. Utilization of an installation method which excludes fine sand joints must be used, however, to maintain infiltration. A course sand leveling bed and course sand joints are recommended to increase water infiltration and aeration.

4.03.13 PLANTING UNDER EXISTING TREES

The installation of lawn beneath established native trees is prohibited. The ideal treatment under native trees is the use of organic or inert mulch. Redwood chips, gravel, or stone cobble are all excellent materials. If planting is required for aesthetic or functional purposes, the use of drought tolerant, woody species is most appropriate. Species should be selected for their ability to survive with minimal or no water through the summer months after initial establishment period. Only drip irrigation should be utilized within the canopy drip line to minimize summer water in the root zone.
5 - WATER DISTRIBUTION SYSTEM STANDARDS

SEE WATER STANDARDS ON CITY OF NAPA WATER DIVISION WEBPAGE
If standards or other government regulations (including but not limited to minimum separation requirements) are in conflict, the stricter requirement shall prevail.

5.01.03 DUCTILE IRON PIPE AND FITTINGS

Distribution pipelines shall be ductile iron pipe only. Pressure class 350 pipes shall be used as a minimum. Higher-class pipe will be required for mains with working pressures in excess of 150 psi or where unusual loading conditions exist.

Pipelines shall be a minimum of 6 inches in diameter with larger mains required to adequately serve the development. Standard main sizes shall be 6, 8, and 12 inches. All other pipeline sizes shall be approved by the Water Division.

Thrust blocks, per Standard Plan W-14A, shall be installed as required. Restrained joints shall be used as indicated in the Standard Plans. Pipelines 12 inches and larger shall be installed with mechanically restrained joints without the need for thrust blocks.

5.01.04 VALVES

Valves, per Standard Plan W-9, shall be installed on the distribution system at all intersections of two pipelines and within straight runs so that no more than 700 feet of water main would be out of service in the event that a section of main had to be isolated. Resilient seated gate valves shall be used for pipe sizes smaller than 12 inches. Butterfly valves shall be used for pipe sizes 12 inches and larger.

Valves installed within a street intersection shall be placed at the projection of the face of curb.

5.01.05 FIRE HYDRANTS

Refer to Standard Plan W-8 for installation requirements for Fire Hydrants. Final approval of fire hydrant locations shall be given by the City of Napa Fire Department, with the exception of fire hydrants used at the end of water mains as blow-offs. The guidelines specified in this section are general recommendations only. A minimum of one fire hydrant shall be located at each intersection. Hydrants will be required on opposite sides of the streets where raised medians trip are present, where heavy traffic loads are common, and where the street consists of more than 80 feet of dedicated width.

Whenever possible, fire hydrants shall be located at intersections and shall be installed within 5 feet of the curb return. When located in the middle of the block, fire hydrants shall be located at property lines whenever possible.

Fire hydrants servicing cul-de-sac streets shall be located as closely as possible to the intersection end of the street without exceeding other spacing limitations described herein. Contact the City of Napa Fire Prevention Division for additional information.

5.01.06 WATER SERVICE LATERALS

SEE WATER STANDARDS ON CITY OF NAPA WATER DIVISION WEBPAGE
Refer to Standard Plans W-1, W-2, W-3 (A, B, & C), and W-4 for installation requirements associated with water service laterals.

Service laterals shall be installed from the main line to the property designated for service. Separate service laterals shall be installed for domestic, fire, and irrigation services. Manifolding of service laterals shall not be allowed.

Separate irrigation meters shall be installed for all projects with a landscaped area greater than 5,000 square feet (per City of Napa Water Efficient Landscape Guides and Landscaping Standards, dated December 1992).

Standard service lateral sizes are 1, 2, 4, 6, 8, and 12 inches. No other sizes shall be installed.

Type “K” copper pipe shall be used for 1 inch and 2 inches service laterals for services with ¾, 1, 1½, and 2 inch meters.

Class 350 ductile iron pipe shall be used for 4 inches and larger service laterals. Water services with 3 and 4 inch meters shall be installed with 4 inch class 350 ductile iron pipe service laterals.

Service laterals being connected to an existing City water main require a hot-tap by City forces. The developer shall be responsible for paying all applicable fees.

Service laterals shall not be installed within a driveways or driveway approaches.

5.01.07 WATER METERS

Refer to Standard Plans W-1, W-2, and W-3 (A, B, & C) for installation requirements associated with water meters.

Meters shall be located within the public right-of-way or within a dedicated water line easement. Easements shall extend a minimum of 2 feet beyond the meter box.

Meters shall be installed within the frontage of the property being served.

Meters shall not be installed within a driveways or driveway approaches. Installation of driveways that conflict with the existing location of a water meter will require relocation of the meter per City standards. If a relocation is 5-feet or less, offset of the water lateral only shall be permitted. If a relocation exceeds 5-feet, the water lateral shall be abandoned at the main and a new water lateral installed per City standards.

Meters shall be installed at the back of curb regardless of location of sidewalk.

Meters shall be located a minimum of 3 feet from any obstruction (sign post, mail box, wall, fence, etc.) and a minimum of 10 feet from trees. See Standard Plan W-18 for additional requirements.

5.01.08 BACKFLOW PREVENTION DEVICES

Refer to Standard Plans W-5 (A, B, C, & D), W-6 (A, B, C, & D), and W-7 (A, B, C, & D) for installation requirements associated with backflow prevention devices.

Backflow prevention devices shall be installed on all new services and any existing service where the existing use of the service is being changed in any way.
Backflow prevention devices shall be approved by the California Department of Health Services. A list of approved devices is available at the Water Division office.

Backflow prevention devices shall be located as close to the back of the meter as possible (not to exceed 20-feet from the public right-of-way). No connections shall be made between the meter and backflow device.

Double check valve devices shall be installed on residential and dedicated fire services. These devices may be installed above ground, below grade in a concrete box or vault, or within a utility closet, as permitted per W-5 (A, B, & D) and W-7 (A, B, & D).

Reduced pressure devices shall be installed on all commercial services and irrigation services to properties using alternate water sources (including wells, reclaimed water, ponds, etc). Above ground installation is mandatory.

Backflow devices shall be tested by an approved backflow tester prior to water service being initiated. A list of approved testers is available at the Water Division office.

The visual impact of backflow devices should be considered if not placed within boxes, vaults, or utility closets. Screening of devices can include various landscaping options (as approved by the Community Development Department) such as shrubs, wood trellises, and garden walls. Any screening used shall meet minimum separation requirements per W-5C, W-6A, W-6C, W-7C, and W-18.

Any existing well must be properly protected from potential contamination. If an existing well is to be destroyed, a well-destruction permit must be obtained from the Napa County Department of Environmental Management by a licensed well driller. If an existing well is not destroyed, it must be properly protected and an approved backflow prevention device installed according to the Water Division specifications.

5.01.09 SPECIAL STUDY AREAS

If any lot(s) proposed for development is located above elevation 300 feet, or above 150 feet in Zone 3, (see Figure 5.1, Upper Zone Water Map) a specialized water study will be required. This study shall verify adequate flow, pressure, fire flow availability and redundancy of the existing (and proposed) water system to the property to the satisfaction of the Water Division and the Fire Prevention Division.

5.02 WATER SPECIAL PROVISIONS

5.02.01 GENERAL

All water distribution facilities installed within the public right-of-way or dedicated easements shall be constructed in accordance with these City Standard Specifications and the City Standard Plans. Plans and specifications shall be submitted to the Water Division prior to any work taking place.

All facilities installed within the public right-of-way or dedicated easements shall be inspected by the Utility Department/Public Works Department inspector. The Contractor shall be responsible for scheduling inspection prior to starting work. The Contractor shall immediately correct any deficiencies identified by the inspector.
The Water Division will complete certain installations (hot-taps, service laterals, meters, etc.) at the Contractor's request or at the discretion of the Water Division. In these cases, the Contractor shall be responsible for paying all fees associated with the work.

The Contractor shall be responsible for furnishing all labor, tools, equipment, material and incidentals, and for doing all work involved in conforming to these specifications. In addition, prior to grading or trenching, the Contractor shall be responsible for calling Underground Services Alert (U.S.A.) at 811 or (800) 227-2600 a minimum of 48 hours prior to digging.

5.02.02 DISTRIBUTION MAINS

A. Description
Distribution mains shall refer to the main pipeline within a public right-of-way or easement, which supplies water to one or more service connections. Installation shall include the main pipeline and associated fittings, valves, air-vacs, blow-offs, and other materials necessary to provide a complete and functional product.

B. Operation of Existing Valves
City personnel shall operate existing valves on the water system at all times. Contractor is responsible for notifying the Water Division of a scheduled shut-down a minimum of 48-hours (2 working days) in advance.

C. Main Extensions
Extension of the City water main from the end of an existing main shall be completed by the Contractor. The Contractor is responsible for notifying water customers affected by water shut-off a minimum of 48 hours prior to the work by the use of door hangars.

D. Main Extensions at Dead Ends
City water mains that are extended from an existing main and that will end at a dead-end with the feasibility of being extended further in the future shall end with a tee that connects to a fire hydrant (per City Standard W-8) and a mechanical joint cap at the end. The extended main shall be installed with restrained joints per City standards. If the length of the new main is less than the required restrained length, the new main shall be installed with restrained joints to the point of the existing main and a wingwall (per City Standard W-14) shall be installed on the old section of the main. A concrete thrust block shall not be installed at the end of the main unless otherwise permitted by the City of Napa Water Division.

E. Hot-Taps for Perpendicular Extensions
Hot-taps, completed by the City, are required for all perpendicular tie-ins to existing City water mains. Contractor shall be responsible for scheduling the hot-tap and paying all fees associated with the work. Refer to Standard Plan W-16 for Contractor's responsibility associated with hot-taps.

F. Final Tie-Ins
Connection to existing City water mains shall be made by the Contractor only after passing the pressure test, chlorinating, flushing, and passing bacteriological testing.

G. Blow-offs
Installation of blow-offs on City water mains shall be limited to water mains that are less than 6" in diameter. All City water mains 6" in diameter and larger shall have fire

SEE WATER STANDARDS ON CITY OF NAPA WATER DIVISION WEBPAGE
5.02.03 WATER SERVICES
A. Description
Water services refer to the dedicated line extending off the distribution main to serve a domestic, commercial, irrigation, fire, or other water service customer. Water services include all items necessary to provide a complete and functional product from the distribution main to the point of connection by the customer. Refer to Standard Plans W-1, W-2, W-3 (A, B, & C), and W-4 for installation requirements.

B. Hot-Taps
Hot-taps, completed by the City at the Contractor’s expense, are required whenever the water service is connected to an existing City water main. Refer to Standard Plan W-16 for requirements.

C. Service Installation
Water services can be installed by the City for the applicable fees shown in the City’s Policy Resolution No. 16. Service installations by the City do not include casings (if required). Installation by the Contractor requires inspection by the City.

D. Backflow Prevention Devices
Backflow prevention devices shall be installed on all new water services and any existing service where the existing use of the service is being changed in any way. Refer to Standard Plans W-5 (A, B, C, & D), W-6 (A, B, C, & D), and W-7 (A, B, C, & D) for requirements associated with backflow devices.

E. Installation within State Right-of-Way (Caltrans)
The Contractor shall be responsible for obtaining all permits necessary for the service installation. The City will provide the hot-tap and installation of the water service (less excavation) for the applicable fees. Contractor is responsible for traffic control, excavation, shoring, backfill, compaction, and final paving.

F. Installation within Railroad Right-of-Way
Contractor shall be responsible for all work except hot-tap.

5.02.04 MATERIALS
The Contractor shall furnish all material required to complete the work. Specific manufacturers and part numbers are indicated within these City Standard Specifications and the City Standard Plans. These references indicate a standard item that is preferred by the Water Division to assure a quality product, match replacement products in inventory, and allow crews to be familiar with repair and replacement requirements. Substitutions and “or equal” items must be submitted by the Contractor and approved by the Water Division prior to use.

The Contractor shall furnish the Water Division a list of material sources with type, manufacturer, and model number of materials. The list shall be furnished in sufficient time to permit proper inspection and testing of materials to be furnished from such listed sources.
The Contractor shall furnish, without charge, such samples as may be required. Inspection and tests, if deemed necessary, will be made by the Water Division or designated representative, but it shall be understood that such inspections and tests, if made at any point other than the point of incorporation in the work, in no way shall be considered as a guarantee of acceptance of such material, nor of continued acceptance of material presumed to be similar to that upon which inspections and tests have been made. Manufacturer's warranties, guarantees, instruction sheets and parts lists which are furnished with certain articles or material incorporated in the work, shall be delivered to the Water Division before final acceptance.

Specific requirements for water facilities are described as follows:

**Ductile Iron Pipe:**
- Ductile Iron Pipe shall be manufactured in accordance with AWWA C151. Cement mortar lining shall be required in accordance with AWWA C104. Asphaltic outside coating and inside lining shall be in accordance with AWWA C151. The weight class, nominal thickness, manufacturer's mark and year shall be stamped on each piece of pipe.
- Ductile iron pipe shall be pressure class 350. Joint type shall be "push-on joint" standard with the manufacturer, except where shown otherwise on plans. Ductile Iron Pipe shall be TYTON JOINT pipe by U.S. Pipe, or equal.

**Polyethylene Encasement:**
- All ductile iron pipe and associated fittings shall be encased with 8 mils thick polyethylene tube. Encasement shall be secured with 2" wide polyvinyl pipe wrap tape.

**Fittings:**
- Ductile Iron fittings shall conform to AWWA C110 or AWWA C153 and shall have the same cement mortar lining specified for ductile iron pipe.

**Restrained Joints:**
- Where specified on the Project Plans, restrained joints shall be as follows:
  - **Pipe Joints (bell and spigot):** Restraint shall be achieved by use of gaskets with stainless steel locking segments vulcanized into the rubber gasket. U.S. Pipe TYTON JOINT Pipe with FIELD LOK Gaskets, or equal, shall be used.
  - **Fittings:** Ductile iron mechanical joint fittings with restrained locking glands shall be used. Joint restraint shall be EBBA Iron MEGALUG, or equal.

**Flanged Joints:**
- Joints shall be set plumb and void of stresses due to pipe or joint deflection. FLANGETYTE gaskets by U.S. Pipe, or equal, shall be used.

**Gate Valves:**
- Gate valves, resilient-seated type, shall have "O" ring steam seal, and meet or exceed AWWA C509-80 standards.

**Butterfly Valves:**
- Butterfly valves shall be in accordance with AWWA C504. Valves shall be short body, class 150, with direct bury type operators and shall be manufactured by Mueller Company, Kennedy Valve Manufacturing Company, Henry Pratt Company, or equal. The operators shall conform to AWWA C504, Section 11, Manual Operators, and shall be designed to hold the valves in an intermediate position between fully open and fully closed without fluttering or creeping. Manual valve operators shall be of the worm gear or traveling nut type and fully enclosed. Adjustable stops shall be provided to stop valves in the fully opened and fully closed positions. Valves shall open with a counter-clockwise rotation of the operating nut. Operator components see water standards on City of Napa Water Division webpage.
shall, at the extreme operator position, withstand without damage an input torque of 300 ft-lbs.

Combination Air and Vacuum Valves:
Valves shall be designed for 150 psi working pressure. Combination valves shall consist of an air and vacuum valve with an air release valve connected to its chamber, and a drainage valve at the base (for testing and maintenance purposes). The valve shall be capable of (1) venting large quantities of air when not under water pressure, (2) permitting the entry of air to prevent a vacuum, and (3) positive action in releasing air entrained in water under pressure. The valve body and cover shall be cast iron, trim shall be bronze and float shall be stainless steel. Cast iron parts shall be coated to retard corrosion.

Combination air and vacuum valves shall be VAL-MATIC Model 202C, or equal.

Fire Hydrants:
Fire hydrants shall be “Dry Barrel” in accordance with AWWA C502, and shall be Mueller “Super Centurion,” American Darling “B-62-B” or Kennedy “Guardian.” No substitutes shall be accepted. All hydrants shall have a 5¼” main valve, two (2) 2½” and one (1) 4½” outlets, with standard pentagon operating nut, opening left (counter-clockwise), with a maximum 60 foot pound operating torque at the operating nut, and with all drain outlets plugged. All hydrants shall be six-inch (6”) mechanical joint inlets. The upper portion of each hydrant shall be painted aluminum color before project is completed. Pavement markers shall be installed on streets (public and private) per Standard Specification W-21.

Coating Exposed Surfaces:
All buried fittings, fire hydrants and nuts and bolts shall receive two (2) coats of Bitumastic 50, following manufacturer’s recommendation on preparation of surface and application, or equal approved by the Engineer.

Flanged Adapters:
Flanged adapters shall be Rockwell International, Baker Series, or Columbus Standards, Inc., Ductile Iron, with high strength, low alloy steel nuts and bolts, flanged coupling adapters with low alloy steel anchor studs, or equal approved by the Engineer.

Transition and Flexible Couplings:
Transition and flexible couplings shall have cast iron or steel sleeves the same as pipe type furnished; ductile iron flanges, stainless steel or bronze bolts and nuts, and wedge-type rubber gaskets. The coupling shall be designed for 150 p.s.i. working pressure, except as noted, and each shall be sized to properly fit the ends of the two pieces of pipe being joined. The couplings shall be Rockwell International Type 441, or equal approved by the Engineer.

Copper Tubing:
Copper service tubing shall conform to ASTM Specifications B88-47, Type K. The tubing shall be installed without splicing in lengths up to 50 feet where possible.

Miscellaneous Appurtenances:
Miscellaneous appurtenances, including check valves, service materials, saddles, regulator valves, insulators, pumps, pressure tanks, valve boxes, and miscellaneous hardware shall be of the type shown on the plans and of a quality acceptable to the Engineer. Upon request of the Engineer, the Contractor shall deliver samples of any such miscellaneous appurtenances to the Engineer for examination and testing and, if rejected by the Engineer, all similar appurtenances shall be removed from the job site and not again utilized in the work.
Miscellaneous Iron and Steel shall conform to the provisions in Section 55, State Specifications.

Reinforcement shall conform to the provisions in Section 52, State Specifications.

Concrete shall conform to the provisions in Sections 51 and 90, State Specifications.

Thrust blocks shall be constructed of Class C concrete as a minimum.

5.02.05 EXCAVATION AND BACKFILL

Excavation and backfill shall be per Standard Plan W-13. Excavation shall conform to Section 19, "Earthwork," of the State of California Department of Transportation "Standard Specifications".

Excavations shall comply with all requirements of Cal-OSHA in regards to shoring, access, and worker safety. Trenches and other excavations that appear unsafe to the Utility Department/Public Works Department inspector or other City representative will be immediately corrected by the Contractor. Failure to take corrective action may result in termination of the work or reporting to the local OSHA inspector.

5.02.06 WATER LINE INSTALLATION

Each section of ductile iron pipe shall be carefully inspected for damage that may have occurred in transit. Any damaged or rejected pipe shall be marked appropriately and removed from project area.

If pipe is to be stored for future use, proper storage procedures as recommended by the manufacturer shall be followed, and shall include all pipe lubricant, gaskets and appurtenances.

Each section of pipe and each fitting shall be thoroughly cleaned before it is lowered into the trench. Cleaning of each pipe or fitting shall be accomplished by swabbing out, brushing out, blowing out with compressed air, washing out with water, or any combination of these methods necessary to remove all foreign matter.

If clean pipe sections and fittings cannot be placed in the trench without getting dirt into the open ends, the Engineer may require that a piece of tightly woven canvas be tied over the ends of the pipe or fitting until it has been lowered into position in the trench. After the pipe or fitting has been lowered into the trench, all foreign matter shall be completely brushed from the bell and spigot ends before assembly.

No pipe or fitting shall be lowered into a trench containing water. The trench bottom shall be free from pieces of rock or other material that would tend to damage the pipe. Water shall be pumped from wet trenches, and the trenches shall be kept dry until the joints have been completed, and the open ends of the main have been closed with water-tight plugs or bulkheads. Whenever pipe laying is discontinued on any job for short periods, or whenever work is stopped at the end of the day, the open ends of the main shall be closed with approved water-tight plugs or bulkheads. The plug or bulkhead shall not be removed unless the trench is dry. Every effort shall be made to keep the trench dry at all times.

Each section of ductile iron pipe shall be lowered into the trench by means of slings of a type approved by the Engineer, and the pipe main assembled piece by piece. Bells usually face the direction in which the work is progressing. Care shall be taken to provide for uniform support of the pipe in the bottom of the trench. Care should be exercised to avoid foreign material entering the pipe.
injury to the coating or lining. If damage occurs, repairs must be made before the damaged pipe will be acceptable. Where necessary to properly locate valves and fittings, the pipe shall be neatly and squarely cut to length by approved methods. Fittings shall be set in place to accurate line and grade, and centered. Thrust blocks or restrained joints shall be installed as required.

Mechanical or push-on joint fittings can be used with mechanical or push-on joint pipe. The plain end of the pipe usually is provided with one or two painted gauge lines that show whether it has been properly positioned in the bell socket after assembly. The pipe manufacturer's instructions as to the location of these lines should be followed.

When installing mechanical joint pipe, the assembly of the joint requires use of a torque wrench for the proper amount of pressure.

### Suggested Torque

<table>
<thead>
<tr>
<th>Bolt Size</th>
<th>Foot Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8 inch</td>
<td>45-60</td>
</tr>
<tr>
<td>¾ inch</td>
<td>75-90</td>
</tr>
<tr>
<td>1 inch</td>
<td>85-100</td>
</tr>
<tr>
<td>1¼ inch</td>
<td>105-120</td>
</tr>
</tbody>
</table>

From time to time, pit cast pipe will be found in the existing water system. Pit cast pipe was manufactured in four classifications, each having a different outside diameter than modern ductile or cast iron pipe. Before making extensions, existing pipe shall be measured to determine if special transition fittings are required.

Flanged joints at fittings or valves, where required by the Engineer, shall be neatly fitted, made with approved gaskets, and shall be water-tight. All bolts, nuts, and gaskets shall be sized to conform to size of flange and pressure class required.

### 5.02.07 PRESSURE TESTING

New water mains shall be subjected to a hydrostatic pressure/leakage test for a period of 4 hours at 150 pounds per square inch. Pressure testing shall be performed after all compaction of trench backfill has been completed and/or subgrade on new streets is fully compacted and ready for paving. Pipelines shall be pressure tested prior to connection to the existing water system. The water mains shall be tested as a complete system including all fire hydrants. Testing of multiple portions of a continuous run of water main shall not be accepted.

The measured pressure shall not change by ±2 psi during the test. The pressure/leakage test shall not be made until at least thirty-six (36) hours after the last concrete thrust block has been poured when Type III cement is used, or at least seven (7) days after the last thrust block has been poured when Type II cement is used.

Prior to starting the test, the pipeline shall be filled with water for twenty-four (24) hours. During the filling of the line, and before applying the specified test pressure, all air shall be expelled from the pipe. If necessary, taps shall be made as directed at the points of highest elevation and plugged upon completion of the test. The pipeline shall be slowly filled with water, and the specified test pressure applied at the point of lowest elevation by means of a pump connected to the pipe by a corporation cock. During the test, all exposed pipe, the measured pressure shall not change by ±2 psi during the test. The pressure/leakage test shall not be made until at least thirty-six (36) hours after the last concrete thrust block has been poured when Type III cement is used, or at least seven (7) days after the last thrust block has been poured when Type II cement is used.
fittings, valves, hydrants, and joints will be carefully examined. The water lost due to leakage shall be none. Any cracked or defective material shall be removed and replaced by the Contractor to the satisfaction of the Engineer, and no additional payment will be made therefor. The test shall be repeated until no defects remain. If water leakage occurs in the pipeline being tested, the Contractor shall locate and repair the defective joints or fittings, and no additional payment will be made therefor. The Contractor shall retest the pipeline until leakage has been eliminated.

Contractor is required to conduct pressure/leakage testing on the isolated system, i.e., Contractor is not allowed to connect into the City's system until the tests are passed. This will usually require that plugs and thrust blocks be used, which may not appear on the plans. Closing pieces will be laid after testing is complete. No testing against closed valves is allowed.

5.02.08 BACTERIOLOGICAL TESTS

After pressure testing, chlorinating, and flushing are complete, the Contractor shall schedule bacteriological testing with the City of Napa Water Division Construction Inspector two (2) working days prior to sampling. The Contractor is responsible for providing sampling points within the newly installed section of water main. Samples are typically taken at temporary blow-off locations. The Contractor is responsible for filling out and completing the Contractor portion of the City's "Checklist for Water Main Disinfection and Sampling" form (per ANSI/AWWA C651-05, see Figure 5.2) prior to City inspector's testing of new water mains.

The City will collect water samples on Monday, Tuesday, and Wednesday only. Bacteriological testing will be conducted by the City of Napa in its own laboratory, as specified in "Standard Methods for the examination of Water and Waste Water". Two sets of bacteria tests will be taken. One set twenty-four (24) hours after flushing has been completed and one set forty-eight (48) hours after flushing has been completed. Both sets must pass the bacteriological testing in order to be complete. Failure of either test will require flushing, re-chlorination if necessary, and two additional tests. The Contractor shall be fully responsible for all items necessary to assure passing bacteriological tests.

After all testing is complete, and upon approval of the Inspector, the Contractor can connect the facilities to the City's mains.

5.02.09 CHLORINATING AND FLUSHING

The Contractor shall disinfect the newly installed pipeline by use of HTH tablets (or other method as approved by the City of Napa Water Division). Tablets shall be attached to the crown of the pipe at each joint with Permatex Type B per AWWA specifications, as follows:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th># of Tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>1</td>
</tr>
<tr>
<td>6&quot;</td>
<td>1</td>
</tr>
<tr>
<td>8&quot;</td>
<td>2</td>
</tr>
<tr>
<td>12&quot;</td>
<td>4</td>
</tr>
<tr>
<td>16&quot;</td>
<td>2</td>
</tr>
<tr>
<td>20&quot;</td>
<td>2</td>
</tr>
<tr>
<td>24&quot;</td>
<td>2</td>
</tr>
<tr>
<td>30&quot;</td>
<td>2</td>
</tr>
<tr>
<td>36&quot;</td>
<td>2</td>
</tr>
<tr>
<td>48&quot;</td>
<td>2</td>
</tr>
<tr>
<td>+ As Approved</td>
<td></td>
</tr>
</tbody>
</table>

SEE WATER STANDARDS ON CITY OF NAPA WATER DIVISION WEBPAGE
The pipeline shall be slowly filled to allow proper circulation of the HTH and the solution shall be allowed to stand for a minimum of twenty-four (24) hours. Following chlorination, all superchlorinated water shall be thoroughly flushed from the mains until the replacement water is, upon both chemical and bacteriological tests, proved equal to the water quality at the point of supply. Disposal of chlorinated water shall be to the sanitary sewer system only. The Contractor shall notify the City of Napa Water Division Construction Inspector at (707) 257-9521 and the inspector for the Napa Sanitation District at (707) 258-6000 three (3) working days prior to disposal of chlorinated water into the sanitary sewer system. The Contractor is responsible for requesting the location of the proposed flushing from the Napa Sanitation District. The Napa Sanitation District will review the location, and if the location is approved, the Napa Sanitation District will provide an allowable gallon per minute flushing rate (if required). The Contractor shall be fully responsible for providing all necessary equipment and supplies required for the disposal of all flushed water into the sanitary system, including but not limited to a device that can control the flushing rate and also record the total gallons flushed, if required by the Napa Sanitation District. The quantity of total gallons flushed shall be provided to the Napa Sanitation District inspector and the City of Napa Water Division inspector immediately after flushing is completed for that business day. If the sanitary sewer system cannot be used for the disposal of chlorinated water, the Contractor shall be completely responsible for de-chlorinating all flushed water and for providing the necessary equipment and supplies for de-chlorination prior to disposal to the City's storm drain system. The Contractor shall provide in writing, to the City of Napa Water Division inspector, the method of dechlorination three (3) working days prior to proposed flushing date. The method of dechlorination shall be approved by the City of Napa prior to flushing any water into the storm drain system. 5.02.10 CITY-OWNED FACILITIES All existing water system materials are the property of the City of Napa. Any City-owned materials removed shall be delivered to the City Corporation Yard, 770 Jackson Street, as directed by the Engineer. 5.02.11 CONSTRUCTION WATER Water required for construction from the City of Napa water system shall be taken from a metered service or through a hydrant meter only. Any City water service used for construction water (including hydrant meters) shall be equipped with a backflow device immediately after the water meter. Backflow devices for hydrant meters will be provided by the City with the hydrant meter. The backflow device shall be fully supported from underneath so that the hydrant (if applicable) does not support the weight of the device. The water meter and backflow device shall be protected from damage during construction. If the backflow device is damaged at any time, the Contractor is responsible for fixing or replacing the backflow device within two (2) working days of the time of damage. If the backflow device is found to be damaged and not fixed for more than two (2) working days, the City of Napa Water Division will shut-off the construction water service until the backflow device is fixed (or replaced) and placed back into service. The backflow devices for hydrant meters shall be returned to the City with the hydrant meter.
5.02.12 WATER CONSERVATION

All projects shall meet water demand mitigation requirements as specified by the Water Division. Current requirements involve completion of toilet/urinal retrofits per Napa Municipal Code Chapter 13.09. Upon release of the building permit, specific toilet/urinal retrofit requirements for a project are determined and developers are notified by Water Conservation staff. In advance of building permit release, preliminary retrofit requirement estimates are available upon request. Final requirements, in the form of retrofit certificates or an in-lieu fee payment, must be met prior to release of the final sign-off for a project.

5.02.13 FIGURES

Figure 5.1 Upper Zone Water Map
Figure 5.2 Checklist for Water Main Disinfection and Sampling

SEE WATER STANDARDS ON CITY OF NAPA WATER DIVISION WEBPAGE
SEE WATER STANDARDS ON CITY OF NAPA WATER DIVISION WEBPAGE
City of Napa

Checklist for Water Main Disinfection and Sampling
(ANSI/AWWA C651-05)

Project Name:  PW Inspector:

Contractor for Disinfection:  Contractor Phone #:

Contractor Billing Address:

Linear Amount of Pipe for Disinfection (FT):  Number of Branches:

Number of Sample Taps {minimum of one every 1200 ft., one at each branch, one at end of line}:

Total Volume of Water in Pipe (gallons):  Total# of Flushes:

Total Volume of Water Discharged:

Discharged to:  Sanitary Sewer  Storm Drain

Method of Disinfection:  Tablet  Continuous Feed

Other

Liquid Chlorine  Sodium Hypochlorite  (low i l i d)

Calcium Hypochlorite  (granular form)

Calcium Hypochlorite  (tablets)

Date of Disinfection:  Initial Chlorine Dose:

Contact Time in Hours:

Chlorine Residual After Contact Time:

Approved Sampling Taps in Place at Each Site:

Chlorine Residuals Within Acceptable Ranges at Each Site (before sampler on site):

Signature of Contractor:

Sampler:  Date:

Contractor's Representative at Time of Sample Collection:

Inspector Present at Time of Sample Collection:

Chlorine Residual of Source Water:

Additional Comments:

SEE WATER STANDARDS ON CITY OF NAPA WATER DIVISION WEBPAGE