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**SECTION 0110**

**GENERAL**

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**0111 PURPOSE**

- A. The purpose of these Engineering Design Criteria is to establish standard guidelines to aid in the design of water system, sanitary sewer system, streets, and stormwater system infrastructure within the City of Owasso. The design engineer shall be responsible for producing engineering design reports, construction plans, and specifications meeting these Engineering Design Criteria. The Public Works Director may make changes to criteria in keeping with improved technology or that which improves the quality or function of city infrastructure.
- B. It is anticipated that changes and updates will be made to criteria and standards on a periodic basis throughout the life of this document. Such changes shall be made per the following prescribed procedures:
1. The Public Works Department Standardization Committee, chaired by the Public Works Director, will evaluate proposed changes and distribute recommendations to City Staff.
  2. City Staff will evaluate each proposed change for further consideration.
  3. Public notice will be made of pending changes and comments solicited for those changes warranting Staff recommendation for approval.
  4. City Staff will present recommended changes to the City Council for final approval.
  5. No approved changes to criteria and standards will be applied to projects for which initial construction plans have been submitted.

**0112 ABBREVIATIONS**

Whenever the following abbreviations are used in these specifications or on the plans, they are to be construed the same as the respective expressions represented:

AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway Traffic Officials
AIA	American Institute of Architects
ASA	American Standards Association
ASCE	American Society of Civil Engineers
ASTM	American Society of Testing & Materials
AWWA	American Water Works Association
CADD	Computer Aided Design Drawings

FEMA	Federal Emergency Management Agency
NPDES	National Pollution Discharge Elimination System.
ODEQ	Oklahoma Department of Environmental Quality
ODOT	Oklahoma Department of Transportation

### 0113 DEFINITIONS

Whenever in these design criteria, or in any documents or instruments pertaining to construction where these design criteria govern, the following terms, abbreviations, or pronouns in place of them are used, the intent and meaning shall be interpreted as follows below. In order to avoid cumbersome and confusing repetition of expressions in these design criteria, it is provided that whenever anything is, is to be, done, if, as, or, when, or where "contemplated, required, determined, directed, specified, authorized, ordered, given, designated, indicated, considered necessary, deemed necessary, permitted, reserved, suspended, established, approval, approved, disapproved, acceptable, unacceptable, suitable, accepted, satisfactory, unsatisfactory, sufficient, insufficient rejected, or condemned," it shall be understood as if the expression were followed by the words "by the Engineer" or "to the Engineer." Unless otherwise defined by the terms of this section, the definitions of words used in this document, shall be interpreted to give them the meaning they have in common usage and to give this article its most reasonable application.

BASE COURSE: The layer or layers of specified or selected materials of design thickness placed on a sub-base or a sub-grade to support a surface course.

BRIDGE: - A structure, including supports, erected over a depression or obstruction such as water, highway, or railway, and having a track or passageway for carrying traffic, and having an opening measured along the center of the roadway of more than 20 feet between abutments or springline of arches or extreme ends of openings for multiple boxes.

CALENDAR DAY: Every day shown on the calendar.

CHANNEL: A natural or artificial water course.

CITY: The City of Owasso, Oklahoma, a municipal corporation, acting through its duly authorized officers or agents.

CONTRACT DEFECT (MAINTENANCE) BOND: The security furnished by the Contractor and his/her surety to guarantee that all defects relating to materials and/or workmanship that occur during the stated bond period are corrected by the Contractor or an agent designated by the surety. **The bond shall be written for 100% of the construction cost and wherein the City is the grantee (the City of Owasso, the Owasso Public Works Authority or the Owasso Public Golf Authority.**

CONTRACTOR: The individual, company, partnership or corporation contracting with the City of Owasso for performance of prescribed work.

CONSTRUCTION: Any act of placing, configuring or installing materials or the demolition of existing structures or features for the purpose of creating new structures, features, utilities or other infrastructure.

**CONTROL OF ACCESS:** The condition where the right of owners or occupants of abutting land or other persons to access, light, air or view in connection with a roadway is fully or partially controlled by public authority.

**CULVERT:** Any structure not classified as a bridge which provides an opening under the roadway.

**DEPARTMENT:** The Public Works Department of the City of Owasso.

**DEVELOPER (SUBDIVIDER):** An individual, corporation or group having legal ownership of a property for the purpose and intent to construct improvements on said property for residential, commercial or other uses.

**DRAINAGE DITCH:** A constructed open excavation or ditch constructed for the purpose of carrying off surface water.

**EASEMENT:** A grant of a right of use of the property of an owner for a certain purpose at the will of the grantee.

**ENGINEER:** The Director of Public Works or his/her duly authorized representative. For the purpose of this contract, this refers to the Owner's representative.

**EQUIPMENT:** All machinery and equipment, together with the necessary supplies for upkeep and maintenance, and also tools and apparatus necessary for the proper construction and acceptable completion of the work.

**INSPECTOR OR TECHNICIAN:** The Engineer's authorized representative assigned to make detailed inspections of contract performance.

**LABORATORY:** The official testing laboratory of the City or any other testing laboratory which may be designated by the Engineer.

**MATERIALS:** Any substances specified for use in the construction of the project and its appurtenances.

**MAYOR:** The mayor of the City of Owasso as constituted by charter to administer the affairs of the City of Owasso.

**OWNER:** City of Owasso, Owasso Public Works Authority, Owasso Public Golf Authority, or other entity of the City.

**PARKING:** That portion of the right-of-way on City streets or urban projects not designated as a traffic way or sidewalk.

**PAVEMENT STRUCTURE:** The combined subbase, base and surface courses placed on the subgrade to support the traffic load and distribute it to the roadbed.

**PLANS:** The approved plans, profiles, typical cross sections, working drawings and supplemental drawings, or exact reproductions thereof, which show the location, character, dimensions, and details of the work to be done.

**PROJECT:** The specific section of construction to be performed thereon under the contract.

**SHOULDER:** The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.

**SPECIAL PROVISIONS:** Additions and revisions to the standard and supplemental specifications covering conditions peculiar to an individual project.

**SPECIFICATIONS:** A general term applied to all directions, provisions and requirements pertaining to performance of the work.

**SUBBASE:** The layer or layers of specified or selected material of designed thickness placed on a subgrade to support a base course.

**SUBCONTRACTOR:** An individual, company, partnership or corporation to whom the Contractor contracts part of the contract.

**SUBGRADE:** The top surface of a roadbed upon which the pavement structure and shoulders are constructed.

**SUBSTRUCTURE:** All of that part of the structure below the bearings of simple and continuous spans, skewbacks or arches and tops of footings of rigid frames, together with the backwalls, wingwalls and wing protection railings.

**SUPERINTENDENT:** The designated representative of the Contractor present on the work at all times during progress, authorized to receive and execute instructions from the Engineer and capable of superintending the work effectively.

**SUPERSTRUCTURE:** The entire structure except the substructure.

## **0114 PRIVATELY FINANCED DEVELOPMENT**

### **0114.1 Introduction**

- A. General: All construction plans and engineering reports for City infrastructure, both publicly and privately financed, shall be reviewed to determine the effect on adjacent area development and to ensure the development infrastructure will have a reasonable lifespan. All procedures of the City of Owasso Subdivision Regulations, current version, shall be followed for privately financed improvements. A flowchart of these procedures is included as Appendix A to the Engineering Design Criteria. A flowchart of platting procedures is included as Appendix C. Where conflicts exist between the current version of the Subdivision Regulations and the Design Criteria, the following regulations and procedures of the currently adopted version of the Design Criteria shall take precedence over the Subdivision Regulations for any and all matters related to the Public Works Department. See Appendix D for the Public Works Department development process flowchart. The following paragraphs detail procedures of these Design Criteria which must be followed.
- B. Qualifications for Professional Services: All design engineers and/or land surveyors providing designs for infrastructure projects within the City of Owasso shall be licensed to practice by the Oklahoma State Board of Registration for Professional Engineers and

Land Surveyors. Designs/surveys for all proposed projects for new or rehabilitated infrastructure which are to be constructed either by the City, or which will become the City's responsibility for maintenance following construction, are subject to this requirement. In order to facilitate a clear understanding between the City and designer/surveyor, the parties shall execute a contract for engineering services. The contract format is included in these Engineering Design Criteria as Appendix B, Part II.

- C. Guarantee of Completion of Improvements: A formal agreement between the City and the Developer/Subdivider is required to insure that all improvements initiated by the Developer/Subdivider and his/her Contractor are completed and are completed in a timely manner. The agreement format is included as Appendix B, Part I, to the Engineering Design Criteria.

#### **0114.2 Public Works Department Procedures**

This Section is designed to provide the Developer/Subdivider and his/her Contractor with an overview of requirements for construction and inspection of subdivision utilities. Detailed information on utility design and construction is contained in the City's Design Criteria, Construction Standards, Standard Details, City Subdivision Regulations, and City Code. Together these documents provide a basic outline for the construction of utilities in subdivisions. Should there be a perceived conflict between this document and the aforementioned documents, the user is requested to bring this conflict to the attention of the Engineer. The Engineer will clarify these conflicts as quickly as possible. Any improvements to this section will be reviewed and considered by the Engineer.

#### **0114.3 Submittals and Inspections**

##### **A. Site Preparation**

1. Submittals/permits required prior to construction:
  - a. Approved preliminary plat
  - b. Approved grading plans
  - c. Earth Change Permit
  - d. Burning permit (if required)
  - e. Fill material (if required)
  - f. Notice of Intent filed with the ODEQ
  - g. U.S. Army Corps of Engineers 404 Permit (if required)
2. Submittals required during construction:
  - a. Documentation of proper disposal of any hazardous items removed from site.
  - b. Compaction tests on any fill areas under future roads.

3. Required inspections:
  - a. Pre-work inspection to locate potential future problems such as ponds, gullies to be filled in, drainage channels, and existing utilities.
  - b. Completion of site work.
4. Key items checked by inspectors:
  - a. Utilities flagged prior to starting excavation
  - b. Brush and refuse disposed of properly
  - c. Cut and fill work in compliance with the accepted plan
  - d. Proper fill and compaction procedures being used
  - e. Measures taken to prevent erosion
  - f. Excess fill disposed of properly

B. Streets

1. Submittals/permits required prior to construction:
  - a. Approved grading, streets and drainage plans including any required reports
  - b. Earth Change Permit
  - c. Concrete mix design (if used)
  - d. Asphalt mix design (if used)
  - e. Aggregate base sieve analysis (if used)
  - f. Approved testing laboratory
2. Submittals required during construction:
  - a. Stabilization reports on subgrade
  - b. Compaction reports on subgrade
  - c. Compaction reports on base
  - d. Documentation of concrete mix (if used)
  - e. Documentation of asphalt mix (if used)
  - f. Concrete test results (if used)
  - g. Asphalt test results (if used)

- h. Construction staking
  - i. Core tests (if required)
3. Required inspections:
- a. Subgrade prior to base work
  - b. Street base prior to paving
  - c. Form work for curb and gutters
  - d. At start of paving operations
  - e. Finished roadway surface
  - f. Final inspection
4. Key items checked by inspectors:
- a. All soil tests and compactions tests within prescribed limits
  - b. When proof rolled with a loaded scraper or dump truck, check for subgrade pumping
  - c. All unsuitable material removed from the subgrade
  - d. All vegetable matter removed from the subgrade
  - e. All utility line crossings properly compacted
  - f. All manholes, valves, and inlets at the proper elevation
  - g. All water valve boxes have a concrete pad (asphalt streets only)
  - h. Curbs are a minimum of 6" high and 6" wide
  - i. The street is in the location and at the grade shown on the plans. The backside of the curb is at least 12" deep
  - j. The gutter at least 18" wide and the required thickness
  - k. Required wheel chair ramp cuts formed into the curbs
  - l. Concrete or asphalt delivered to the site conforms to the accepted mix
  - m. The concrete is placed at the thickness required on the plans
  - n. The proper type of asphalt is placed at the thickness required on the plans
  - o. Expansion joints are placed at all intersections and radius points

- p. Dowel bars and reinforcement placed as required by the plans
- q. Ground and air temperature within the limits for paving
- r. The is asphalt above 225 degrees Fahrenheit and below 300 degrees Fahrenheit when placed
- s. Proper placement procedures are followed
- t. There are no areas on the finished street that do not properly drain
- u. Saw joints are placed at less than the maximum allowed for the paving thickness in the curb and gutter and the street
- v. All required cylinders pulled, checked by the accepted laboratory, and results of the tests given to the Engineer
- w. Required slump tests taken and results given to the inspector

C. Storm Sewer

- 1. Submittals/permits required prior to construction:
  - a. Approved grading, drainage and street plans and any required hydrologic/hydraulic reports
  - b. Earth Change Permit
  - c. Submittal for piping, manholes, manhole covers, curb inlets and grates.
  - d. Concrete mix design
  - e. Approved testing laboratory
  - f. Hydraulic calculations
- 2. Submittals required during construction:
  - a. Compaction reports on cuts in street
  - b. Documentation on materials used
  - c. Construction staking
- 3. Required inspections:
  - a. Materials prior to installation
  - b. Location and elevation
  - c. Backfilling procedures

- d. Manhole and inlet construction and connections
  - e. Forms and rebar prior to concrete placement
  - f. Final inspection
4. Key items checked by inspectors:
- a. Materials have no cracks or broken parts
  - b. Materials comply with submittals
  - c. Storm drains are located properly and on grade
  - d. Standard bedding material placed according to the Standard Detail STRM-01
  - e. Pipe backfilled with required material over top of pipe
  - f. Standard bedding material used in streets and compacted to 95% density
  - g. Manhole joints properly sealed
  - h. Pipe joints are properly sealed
  - i. Pipes are properly grouted at manholes and inlets
  - j. Lift pin holes are properly grouted
  - k. Manhole lid rings are properly grouted inside and out
  - l. Curb inlets are properly positioned and attached
  - m. Reinforcing steel properly sized and placed
  - n. All grates and manhole lids in place
  - o. All lines clean
  - p. All lines flow properly
  - q. There is no ponding in the lines

D. Improved Drainage Channels

- 1. Submittals/permits required prior to construction:
  - a. Accepted plans for grading, streets, drainage, water and sewer.
  - b. Earth Change Permit
  - c. Concrete mix (if required)

- d. Vegetative cover
  - e. Erosion Control Plan
  - f. U. S. Army Corp of Engineers Section 404 Permit (if required)
2. Submittals required during construction:
- a. Concrete mix used
  - b. Construction staking
3. Required inspections:
- a. Form work prior to concrete placement
  - b. Final inspection
4. Key items checked by inspectors:
- a. Work complies with approved plans
  - b. Ditch conforms to planned slope
  - c. Side slopes are 3 to 1 or flatter
  - d. Reinforcement is placed as called for in the plans
  - e. Side channels properly tied into the ditch
  - f. Was riprap (with fabric or bedding) placed at structure aprons (if required)
  - g. Work area (unpaved) properly seeded
  - h. Erosion control placed and maintained as required
  - i. Ditch drains properly
  - j. There are no areas where water ponds
  - k. Fill areas are properly compacted
- E. Storm Retention/Detention Facilities
1. Submittals/permits required prior to construction:
- a. Approved hydrologic reports and grading and drainage plans
  - b. Environmental impact statement (if required)
  - c. U.S. Army Corps of Engineers Section 404 Permit (if required)

- d. Concrete mix (if used)
  - e. Materials used in structure
  - f. Vegetative control
  - g. Erosion control
  - h. Earth Change Permit
2. Submittals required during construction:
- a. Compaction reports
  - b. Documentation on materials used
  - c. Construction staking
  - d. Final survey of stormwater detention facility(s)
3. Required inspections:
- a. Alignment and elevation of facility
  - b. Materials prior to installation
  - c. Backfilling procedures
  - d. Forms and reinforcement prior to concrete placement
  - e. Final inspection
4. Key items checked by inspectors:
- a. Materials have no cracks or broken parts
  - b. Materials comply with submittals
  - c. Drainage structure located properly and on grade
  - d. Proper backfilling and compaction procedures used around the drainage structure
  - e. Pipe joints properly sealed
  - f. Reinforcing steel properly sized and placed
  - g. Drainage structure flow properly
  - h. Drainage structure clean, and there is no ponding inside the drainage structure
  - i. Trickle channels flow properly

- j. Trickle channels properly located, and on the proper slope
- k. Work complies with approved plans
- l. Work area (unpaved) properly seeded
- m. Erosion control placed as required
- n. Fill areas properly compacted

F. Water Lines

- 1. Submittals/permits required prior to construction:
  - a. Approved water plans and water Engineering Report
  - b. Construction permit from the State of Oklahoma Department of Environmental Quality
  - c. Submittals for pipe, valves, fire hydrants, valve boxes and fittings
  - d. Concrete mix design for thrust blocks (if allowed)
  - e. Approved testing laboratory
- 2. Submittals required during Construction:
  - a. Documentation on materials used
  - b. Compaction reports on cuts in the streets
  - c. Construction staking
- 3. Required inspections:
  - a. Materials prior to installation
  - b. Location and elevation
  - c. Backfilling procedures
  - d. Visual inspection of all valves, fire hydrants, taps and bends prior to backfilling
  - e. Pressure testing and sampling of the completed line
- 4. Key items check by inspectors:
  - a. Pipe used in the project matches the size and class in the submittals
  - b. Fittings and fire hydrants match the materials approved in the submittals

- c. Water lines are laid in the easement and at the required elevations
- d. Standard bedding material placed according to Standard Detail WAT-01
- e. A #12 copper wire is placed on the top of the PVC water pipe and connected to fire hydrants
- f. Ductile iron pipe, valves, and fittings are polywrapped properly
- g. Backfill in streets areas is properly compacted and tested
- h. All street crossover trenches filled with ODOT Type A aggregate from the top of the bedding material to the base of the road
- i. Assure that water lines under all streets are sleeved
- j. Fire hydrants are oil-filled as required by City standards
- k. Fire hydrants are placed at a height of 18" minimum from ground level to the 4.5" pumper cap
- l. Meter wrench can be placed on the valve, and is the valve box properly positioned
- m. All valves are open
- n. A concrete pad is placed around all valve boxes (asphalt paving)
- o. The water line meets the pressure test requirements
- p. All sample points removed and backfilled
- q. Backfill of the water line encased areas completed properly

G. Sanitary Sewers

- 1. Submittals/permits required prior to construction:
  - a. Approved sanitary sewer plans and sanitary sewer Engineering Report
  - b. Construction permit from the State of Oklahoma Department of Environmental Quality.
  - c. Submittals for pipe, manholes, manhole rings and lids.
  - d. Concrete mix
  
- 2. Submittals required during construction:
  - a. Documentation on materials used

- b. Compaction reports
  - c. Construction staking
3. Required inspections:
- a. Material prior to installation
  - b. Alignment and elevation
  - c. Backfilling procedures
  - d. Mandrel test
  - e. Manhole grouting before backfilling
  - f. Taps before backfilling (if required)
  - g. Grouting of manhole inverts
  - h. Line pressure and manhole vacuum tests
  - i. Final inspection
4. Key items checked by inspectors:
- a. Pipe sizes and class match the submittals
  - b. No broken or cracked pipes
  - c. Lines are laid at the proper elevation, grade and in the easement
  - d. Pipe bedding and backfill per SAN-01
  - e. Line is at least 3' below ground level
  - f. Backfill in street cuts is properly compacted and tested
  - g. Assure all sanitary sewer pipe is sleeved under commercial/industrial collector streets
  - h. Service taps (if used) are stubbed to the surface and located accurately on as-builts
  - i. Steel plate placed on the stub out per SAN-10 and fence or pipe post marker in place
  - j. Manholes, rings, and lids are as specified in submittals
  - k. Manhole joints are properly sealed
  - l. Lift pinholes are properly grouted

- m. Manhole lid rings are properly grouted inside and out
- n. Pipes are properly grouted at flowline inside manholes
- o. Manhole inverts provide for free flow
- p. All lines and manholes are clean
- q. All lines flow properly without ponding

#### H. Lift Stations

1. Submittals/permits required prior to construction:
  - a. Approved lift station and sanitary sewer plans and any required engineering report.
  - b. Construction permit from the State of Oklahoma Department of Environmental Quality.
  - c. Submittals for pipe, valves and fittings
  - d. Submittals for electrical gear and pumps
  - e. Concrete mix
  - f. Submittals for structural materials
  - g. Submittals for force main pipe
2. Submittals required during construction:
  - a. Documentation on materials used
  - b. Compaction report on cuts in streets
  - c. Request for telephone line
  - d. Request to turn on power to station
  - e. Request for gas line (if required)
  - f. Construction staking
3. Required inspections:
  - a. Materials prior to installation
  - b. Location and elevation of station and force main
  - c. Grouting of all station penetrations before backfilling

- d. Force main pressure test
  - e. Tie into gravity sewer before backfilling
  - f. Final inspection
4. Key items checked by inspectors:
- a. Pipe size and class match the submittals
  - b. Materials are in good condition and free of defects
  - c. Force main is at the proper elevation and location
  - d. Proper backfill and compaction procedures are used
  - e. Force main is clean and free of obstructions
  - f. Force main is sleeved under all streets
  - g. Lift station is at the proper location and elevation
  - h. Wet well is properly sealed to prevent inflow and infiltration
  - i. Electrical controls positioned for easy access
  - j. All safety guards in place
  - k. Fittings and valves properly restrained
  - l. Float switches operate properly
  - m. Station operates properly
  - n. Force main flows freely
  - o. A #12 copper wire is taped to the top of the force main and connected to the manhole ring
  - p. Generator shutoff valve is operational

I. Sidewalks

- 1. Submittals/permits required prior to construction:
  - a. Approved grading and street plans
  - b. Concrete mix design
  - c. Approved testing laboratory
  - d. Earth Change Permit

2. Submittals required during construction:
  - a. Documentation of concrete mix
  - b. Concrete test results
  - c. Construction staking
  - d. Erosion control
3. Required inspections:
  - a. Forms and reinforcement prior to placing concrete
  - b. Erosion control during project
  - c. Construction staking
  - d. Erosion control
4. Key items checked by inspectors:
  - a. Unsuitable material removed from sidewalk subgrade
  - b. Sidewalk is at least 4" thick and 4' wide with 3" of sand bedding
  - c. Reinforcement placed as called for in the plans
  - d. Concrete conforms to the submittal
  - e. Wheel chair ramps are placed as required
  - f. Expansion joints spaced a maximum of 20'
  - g. Sawed joints are spaced a maximum of 5' or less
  - h. Proper finish placed on the sidewalk and surface is cured per requirements
  - i. Sidewalk is in the proper location
  - j. Erosion control is used properly
  - k. Site is clean and trash free
  - l. All brush piles removed and disposed of properly
  - m. Site entrance has the required structure

#### **0114.4 Administration of Design and Construction**

- A. Pre-Development Conference:

1. Required participation: All agencies anticipated to be involved with the design and approval of infrastructure designs shall be represented.
2. Introduction and designation of responsible parties:
  - a. Engineer provides name/contact information for plan reviewer and inspector.
  - b. Developer shall provide name and contact information for the following, if known: Developer contact person, design engineer, architect, Contractor, and contractor superintendent. If any of these persons is unknown, they shall be identified as soon as they are known.
3. Developer or his designated representative shall present basic concept of development:
  - a. Location and size
  - b. Type of development
  - c. Infrastructure layout
  - d. Geotechnical report
4. Developer shall present desired schedule:
  - a. Anticipated design completion date
  - b. Anticipated start of earth change
  - c. Anticipated start of infrastructure placement
  - d. Anticipated finish of construction
5. Engineer shall provide feedback:
  - a. Any limits to concept
  - b. Any limits to schedule
6. Engineer notifies Developer of requirements:
  - a. Design criteria requirements including any reports to accompany submittals.
  - b. Earth change requirements
  - c. Other governmental requirements

**B. Stormwater Pollution Prevention Plan (SP3)**

1. The SP3 shall be submitted at the Pre-Development Conference and shall conform to the requirements in Section 0600, Stormwater Pollution Prevention. The plan

shall include a copy of Notice of Intent to ODEQ, the erosion and sediment control plan and the site grading plan.

2. Review and approval of the SP3 is a prerequisite to issuance of the Earth Change Permit.

C. Earth Change Permit

1. Required to be issued to the Developer prior to commencement of any earth change activities. See Appendix F of the Engineering Design Criteria for permit format.
2. Developer may submit multiple phases for Earth Change Permits if staged construction planned. In this case, care shall be taken to do no actual site grading further than proposed in the last approved City Earth Change Permit.
  - a. Three (3) copies of plans for each phase shall be submitted in accordance with the Engineering Design Criteria, Subsection 0604:
    - (1) City Earth Change Permit form
    - (2) The previously approved SP3
  - b. The SP3 shall be included in the plans for all construction phases covered by an Earth Change Permit.
3. Engineer review of City Earth Change Permit application:
  - a. Engineer shall review City earth change permit request and attachments.
  - b. Earth Change Permit will be approved or disapproved within 10 working days of receipt. Should plan submittals be on a piecemeal basis, the 10-day limit shall apply from the time that a total submittal is received (including any engineering reports that support the proposed designs).
  - c. Engineer will return approved or disapproved City Earth Change Permit to the Developer.
  - d. A disapproved permit must have all corrections made to submittals and be resubmitted.
  - e. After City Earth Change Permit approval, Developer may:
    - (1) Submit construction plans for infrastructure including required reports.
    - (2) Construct all earth changes shown in the Storm Water Pollution Prevention Plan.
4. Construction of earth change:
  - a. Engineer shall inspect site for compliance.

- b. Contractor superintendent shall notify Engineer 48 hours prior to work start.
  - c. Contractor superintendent shall have City earth change permit and all attachments available at the site during work.
- D. Submission of water and sewer construction plans:
- 1. Developer shall submit four (4) copies for the initial review including necessary reports to support the proposed designs.
  - 2. A design submittal checklist is included as Appendix E to the Engineering Design Criteria. This checklist shall be attached to all construction plans and engineering reports submitted to the City of Owasso Public Works Department.
  - 3. Water and sewer construction plans shall show locations of other utilities indicating proper clearances. All design calculations shall be shown in an engineering report or on the construction plans.
- E. Engineer review of water and sewer construction plans:
- 1. Engineer shall review and approve all water and sewer construction plans prior to construction.
  - 2. The Fire Marshal shall review water plans for fire protection. His review shall include both City of Owasso systems and rural water district systems within the City first-response area.
  - 3. Water and sewer construction plans will be approved or disapproved within 10 working days of receipt. Should plan submittals be on a piecemeal basis, the 10-day limit shall apply from the time that a total submittal is received (including any engineering reports that support the proposed designs).
  - 4. Engineer will return approved or disapproved water and sewer construction plans to Developer or his design engineer.
  - 5. Disapproved water and sewer construction plans must have all corrections made and be resubmitted.
  - 6. Following incorporation of all City comments, the design engineer shall submit six copies of the plans (sealed by the design engineer), the engineer's report and an original Permit to Construct application form. The Public Works Director will sign the permit form and return the permit form, a copy of the approved engineer's report and four plan sets to the Developer.
- F. Developer submits water and sewer construction plans to ODEQ:
- 1. Three signed and approved construction plans.
  - 2. Approved engineer's report.
  - 3. Signed Permit to Construct application form.

4. Application fee.
- G. "At-Risk" Construction: After the City of Owasso has approved all infrastructure design plans, a Developer may proceed with site grading and the construction of the storm drainage system while awaiting construction permits for sanitary sewer and the water system from ODEQ. **No construction of sanitary sewer or water system infrastructure shall be allowed prior to receipt of the ODEQ permit to construct.**
- H. Submission of streets and drainage construction plans:
  1. Developer shall submit three (3) copies for the initial review.
  2. A design submittal checklist is included as Appendix E. This checklist shall be attached to all construction plans and engineering reports submitted to the City of Owasso Public Works Department.
  3. Submission of streets and drainage construction plans shall be simultaneous with submission of water and sewer construction plans. Street profiles shall indicate all utility crossings.
  4. Developer shall also submit to the Engineer:
    - a. An engineering/geotechnical report for streets and drainage.
    - b. The erosion and sedimentation control plan shall be included in the construction plans.
- I. Engineer review of streets and drainage construction plans:
  1. Engineer shall review and approve all streets and drainage construction plans prior to construction.
  2. Streets and drainage construction plans will be approved or disapproved within 10 working days of receipt. Should plan submittals be on a piecemeal basis, the 10-day limit shall apply from the time that a total submittal is received (including any engineering reports that support the proposed designs).
  3. Engineer will return approved or disapproved streets and drainage construction plans to the design engineer.
  4. Disapproved streets and drainage construction plans must have all corrections made and be resubmitted.
  5. After streets and drainage construction plans are found to be acceptable, the design engineer shall submit four copies of the plans (sealed by the design engineer) for signature by the Public Works Director. Two sets of the signed plans will be returned to the design engineer.
- J. Pre-construction conference:

1. The Engineer will schedule a pre-construction conference with the Developer and his/her construction Contractor upon final review and acceptance of the design plans. Those in attendance shall include a City civil engineer, infrastructure inspector, design civil engineer, Developers, construction Contractor and any subcontractor or their legal representatives.
2. The Public Works Department will return approved plans to the Developer and Contractors at this meeting.
3. Developer shall submit revised construction schedule, if required.

**K. Construction:**

1. Engineer shall inspect all improvements and additions to City infrastructure.
2. Developer shall construct improvements in accordance with the approved construction plans. An approved original set of plans must be present at the job site at all times during construction.
3. The Engineer shall be notified in advance of any proposed field changes which result in deviations from the approved plans. Such changes must be submitted to the design engineer for recommendation and then submitted to the Engineer for further review. No changes may be made prior to a review and approval process. Minor shifts in structure location, minor elevation changes or deviations which do not alter the design intent may be made. However, such changes must be shown (marked) on the Contractor's set of construction plans as well as the City inspector's plans. Such changes must later be shown on the design engineer's as-built plans.

**L. Final inspection:**

1. Developer shall request a final inspection in writing when construction is complete.
2. Engineer shall perform final inspection within 5 working days of request and provide the Developer and the construction Contractor a punchlist of deficiencies within three (3) working days following the inspection.
3. Developer and/or their designated representative shall be present at inspection.

**M. Approval by Engineer:**

1. Developer shall assure his/her Contractor corrects all deficiencies listed on the punchlist before Engineer makes a recommendation for project acceptance.
2. A maintenance bond or letter of credit shall be submitted by the Developer's construction contractor to the Engineer for 100% of the cost of construction. The maintenance bond or letter of credit shall be in effect for two (2) years from the date of City Council acceptance for water, sanitary sewer, stormwater and street systems.
3. After a maintenance bond or letter of credit is received and after having passed inspection, Engineer will present the improvements to City Council for acceptance.

4. If there is an irresolvable construction issue between the Engineer and the Developer, the project may be presented to the City staff for consideration of the issue for resolution prior to presentation to the City Council.

N. Acceptance by City Council:

1. Ownership of the utilities is transferred to the City of Owasso by acceptance of the utilities by a majority vote of the Owasso City Council at a regularly scheduled public meeting. The Developer's construction contractor shall retain responsibility for maintenance of the utilities until expiration of the maintenance bonds.
2. If the City Council rejects acceptance of the utilities, the Developer must construct corrections to satisfy the Engineer and City Council. Failure to do so will preclude issuance of building permits.

O. Issuance of 10% of building permits:

1. The Engineer may recommend to the Community Development Department that building permits equal to 10% of the total lots within the development be issued pursuant to the following:
  - a. As-built drawings for water and sanitary sewer have been received and the City Council has accepted the water and sewer improvements and
  - b. The Developer has submitted a performance bond on uncompleted street and drainage infrastructure.
2. Home builders may be restricted from street right-of-ways during critical construction of streets.
3. Builders, Developers and all Contractors are restricted from allowing erosion from lots or otherwise tracking mud, dirt, or debris onto streets and shall immediately remove any mud, dirt, trash or debris in the streets in the area of construction. Failure to comply with this requirement shall result in the suspension of building permits.

P. Issuance of remaining building permits shall occur after the City Council accepts all improvements.

Q. Submission of as-built construction plans:

1. Shall be produced by the design engineer (representing the Developer) and submitted to the Engineer.
2. Shall be submitted prior to City Council acceptance of each of the following: water, sanitary sewer, streets and drainage improvements.
3. The as-builts shall show the following information:
  - a. Location and elevation of all manholes.

- b. Locations of all valves, water meters, fire hydrants and other appurtenances.
  - c. The elevation of all flow lines for the storm sewer or the sanitary sewer.
  - d. All field changes made during construction.
  - e. A final (as-built) topographical survey of stormwater detention facility(s) to assure the structure(s) provides the designed storage volume.
4. The following shall be submitted:
    - a. One mylar set sealed by the design engineer
    - b. Two bond (white paper) sets
    - c. One AutoCAD set on compact disk (compatible with current City version)
  5. Failure to submit as-built construction plans shall result in the Engineer recommending that no additional building permits be issued until the as-built construction plans are received.

R. Maintenance bond inspection:

1. At any time during the maintenance bond period, the Engineer shall have the right to require timely repair or reconstruction of any and all development infrastructure which the Engineer deems to constitute a safety or environmental risk.
2. Engineer shall perform last maintenance bond inspection approximately three (3) months before expiration of the maintenance bond.
3. Developer or his designated representative is required to participate in inspection.
4. Developer shall repair or replace all items on punchlist no later than one month prior to the scheduled City Council meeting immediately proceeding the bond expiration date. If little or no action is taken to complete the punch list, the Engineer shall initiate action to call the bond. The cost of any corrections not completed by the original Contractor or the bonding company will be accomplished by the City and billed to the original Contractor.

**0114.5 Changes in Minimum Criteria**

Whenever a design engineer wishes to deviate from the minimum criteria, the design engineer shall submit in writing the proposed changes and justification to the City of Owasso Public Works Department for review and approval. Submission must be complete and approved before work shall begin.

**0114.6 Specialized Design and Specifications**

Proposed work not covered by the adopted design criteria or standard specifications of the City of Owasso shall be reviewed and approved by the Engineer before the work shall begin. The design

engineer shall include four (4) copies of the water and sanitary sewer plans and three (3) copies of streets and stormwater plans, specifications and/or special provisions with his first submittal.

#### **0114.7 Design Responsibility**

Prior to submitting plans to the Public Works Department for review, the construction plans, contract specifications cover sheet, and all engineering report cover sheets shall be signed, sealed and dated by the design engineer, who shall be a professional engineer, registered in the State of Oklahoma. The design engineer sealing the documents shall be directly responsible for his/her work. Approval by the City of Owasso does not release the design engineer from liability or professional responsibility to meet the planning and design objectives of the project as required by good engineering practice and the City of Owasso.

### **0115 ENGINEERING REPORTS**

Engineering reports shall be submitted by the design engineer for all significant improvements showing step-by-step calculations and/or easily readable computer generated tables and graphs verifying adequate design.

#### **0115.1 Geotechnical Report**

Together with the initial submittal of construction plans, the Developer will provide a geotechnical report indicating existing conditions at the proposed development site. This comprehensive report shall address soil types, existing groundwater conditions and any other condition which could affect the construction and later maintenance of all infrastructure. The location, number and depth of test holes and/or core holes will be at the discretion of the geotechnical engineer and shall be representative of the total development area.

#### **0115.2 Water Improvements**

Engineering reports shall contain the minimum information requested in the standard ODEQ engineering report form and the minimum information required in Subsection 0202 of these design criteria. Pressure information can be obtained from the Engineer, if current pressures are available.

#### **0115.3 Sanitary Sewer Improvements**

Engineering reports shall contain the minimum information requested in the standard ODEQ engineering report Form and the minimum information required in Subsection 0302 of these design criteria.

#### **0115.4 Street Improvements**

Engineering reports shall contain the following minimum information and any other pertinent information required in Subsections 0402 and 0403 of these design criteria:

- A. Current and projected traffic counts
- B. Design of pavement thickness (unless minimum thickness is used) including surface courses, base courses and subgrade treatments.

### **0115.5 Stormwater Improvements**

Engineering reports shall contain the following minimum information and any other pertinent information required in Section 0500 of these Design Criteria:

- A. Flood prevention measures:
  - 1. Hydrology
  - 2. Hydraulics of all proposed temporary and permanent structures
  - 3. Graphs of existing versus developed flows
- B. Stormwater quality measures:
  - 1. Site grading plan
  - 2. Erosion and sedimentation control plan report
  - 3. Submittal data for Earth Change Permit

### **0115.6 Additional Information**

Additional information to address special project needs for any infrastructure may be required. This information will be determined at the Pre-Development Conference.

## **0116 SURVEYING**

### **0116.1 Licensed Surveyors**

All surveys for design and construction shall be performed by a surveying company and/or individual licensed to practice by the Oklahoma State Board of Registration for Professional Engineers and Land Surveyors.

### **0116.2 Benchmarks**

- A. All elevations shown on the plans shall be based on USC&GS level datum (NGVD88).
- B. Horizontal coordinates shall be on the basis of the NGS Oklahoma State Plane Coordinate System, NAD 83, and latest revision. Northings and Eastings shall be shown for all structures.
- C. The permanent bench mark location and description used to extend level datum to the projects shall be noted on the plans.
- D. All temporary bench marks used for control of the project shall be designated on the plans stating elevation, location and description. The nearest such bench mark shall be shown on each sheet.
- E. A permanent bench mark shall be established in all quarter sections. If a permanent benchmark does not exist within a quarter mile of the project, the surveyor shall provide

one. This permanent bench mark will be a brass cap set in concrete in locations accepted by the Engineer. The cap shall read "City of Owasso Bench Mark" together with a letter and/or numerical designation assigned it by the Engineer's office from the master file of bench marks maintained by the Engineer. The location, description and elevation of the permanent bench mark shall be shown on the front sheet of the plans. Benchmarks shall be referenced with at least three land ties for future location.

- F. All property boundary surveys shall close to a point of beginning and shall be certified as such by the surveyor on the title sheet of the construction plans using a statement similar to the following:
  - 1. "I hereby certify that I am familiar with the adopted ordinances and regulations of the City of Owasso governing surveying and that the following plans contain boundary surveys which close to the point of beginning and comply with relevant surveying standards of the City of Owasso to the best of my knowledge, information, and belief."
- G. Benchmarks or temporary benchmarks shall be set a minimum of every 1000 feet of sanitary sewer line or storm water sewer length.

### **0116.3 Alignment Surveys**

- A. Alignment surveys for water, sewer, storm drainage, and roadway designs shall begin at a station designated to the nearest hundred feet. Station 0+00 shall be the beginning station for all alignment surveys, unless back stationing will be needed. Station 0+00 shall be referenced as the following:
  - 1. Existing downstream manhole where new sewer line begins.
  - 2. Downstream drainage structure where the new storm drainage begins.
  - 3. Existing water main where the new water line begins.
  - 4. Intersection of the center lines of both the proposed new roadway and the existing connecting roadway.
- B. Station 10+00 shall be the beginning station for alignment surveys where back stationing is needed. Examples where back stationing might be needed are:
  - 1. Where a branch sewer line extends from the new collector line, or a collector line branches from a new outfall line.
  - 2. Where two new water lines tie together and extend into two separate areas.
  - 3. Where a new collector street starts from a new arterial street.
- C. Alignment surveys for sanitary sewer and storm drainage projects shall begin at the downstream terminus and proceed upstream, unless these projects are concurrent with a roadway or water line project, in which case the stationing shall be the same as the roadway or water line project.

- D. Alignment surveys for roadway and water line projects shall proceed from west to east or from south to north.

## 0117 DRAFTING

### 0117.1 General

A. Media materials:

1. Construction plans shall be prepared using computer aided design. For publicly funded projects, originals provided to the City of Owasso shall be on mylar sheets that are plotter printed. For privately financed projects, copies of construction plans provided shall be printed or copied on white paper; blueline copies may be allowed if easily readable.
2. Black ink shall be used on all drawings.

B. Media size:

1. Full size sheets: Standard sheets shall be 22" x 34" having a margin of 1.5" along the left border and 0.5" along the top, bottom and right borders. Full size sheets shall be used for submitting plans to the City for review and for bidding.
2. Half size sheets: 11" x 17" sheets may be submitted to the City of Owasso, only after prior approval from the reviewing Engineer. Half size sheets may also be used at the request of the Contractor. The design engineer shall correct the scale on the half size sheets so the user does not have to convert scales from the full size drawings.

C. Lettering, line weights and symbols:

1. All line work shall be of sufficient density to be reproducible by current reproduction processes. Any line work which does not reproduce satisfactorily may be cause for rejection of the plans by the City.
2. All lettering shall be at least 0.10 inch tall for full size sheets. All lettering must be legible at half size if half size sheets are to be used.
3. Scale bars are required on all pages.

D. Title sheet requirements: A title sheet shall be included on all plans. The following information shall be included:

1. Project title
2. Project location map (1 inch = 2000 feet minimum) referencing plan sheet layout. Adjacent landowners or subdivision names shall be identified.
3. Project owner's name, address, telephone number
4. Funding source (if applicable)

5. City councilors / Public Works Authority trustees (City of Owasso projects only)
6. Contact person (other than the Owner)
7. Engineer's name, address, and telephone number
8. Drawing index
9. Legend
10. Seal of the professional engineer responsible for the project (Oklahoma registration only)
11. Signature area for the Public Works Director to approve drawings (City of Owasso projects only)
12. OKIE One Call logo
13. The following statement shall be placed under the design engineer's Seal:

*“I hereby certify that I am familiar with the adopted ordinances and regulations of the City of Owasso governing water facilities, sewer facilities, streets, and drainage facilities; that these plans have been prepared under my direct supervision; the above and the foregoing plans comply with all governing ordinances and the adopted standards of the City of Owasso to the best of my knowledge, information, and belief.”*

E. Plan and detail sheets requirements:

1. The title sheet shall not be used for a plan sheet.
2. North shall be oriented to the top or left hand side of all water line and street projects.
3. North shall be oriented as needed on all gravity line projects as long as the downstream end of the line is on the left hand side of the sheet.
4. A title block shall be located on each sheet and shall include the following:
  - a. Project title
  - b. Owner's name
  - c. Engineer's name
  - d. Drawing description
  - e. Scale
  - f. Page number

- g. Date the last revisions were made.
  - h. Initials of the design engineer, quality control engineer, and draftsman/technician responsible for the drawing.
  - i. Owner's approval space, size shall be as shown on the standard detail sheet.
  - j. File name, shown on edge of paper.
5. Minimum scale: The following minimum scales for full size sheets shall be used except for street construction plans.
- a. Plan and profile sheets
    - (1) Congested areas: 1 inch = 20 feet horizontal and 1 inch = 5 feet vertical (existing developed areas).
    - (2) Uncongested areas: 1 inch = 100 feet horizontal and 1 inch = 5 feet vertical in lower congested areas (new subdivisions).
  - b. Detail sheets: 3/16 inch = 1 foot
  - c. Cross section sheets: 1 inch = 10 feet horizontal and 1 inch = 5 feet vertical.
6. References
- a. All base and plan maps shall reference existing and proposed land lines.
  - b. At least one benchmark (BM) or temporary bench mark (TBM) with known elevation to the hundredth shall be on a single site plan sheet. On multiple site projects, (such as water, sewer, roadway, and storm drainage projects), the nearest two benchmarks shall be referenced on each plan and profile sheet.
  - c. All benchmarks or beginning construction stations shall be referenced with at least three land ties for future location.
7. Existing improvements: Each plan sheet shall show the existing and proposed improvements located above and below ground, horizontally and vertically. These should be items that could be affected by construction or a part of the construction. Grayscale (approximately 65% screening) lines shall be used to represent these items.
- a. Structures
  - b. Utilities
  - c. Roadways
  - d. Drainage improvements

8. No public improvements shall be installed without dedication of right-of-way or appropriate easements. These easements shall be submitted for review and acceptance prior to filing.
9. All structures (i.e. manholes, junction boxes, inlets, headwalls) shall be numbered and labeled both in plan and in profile and detailed on plans. All major structure locations shall be identified with Northings and Eastings.
10. Waterlines, sanitary sewer, and storm sewer lines shall be identified on both plan and profile sheets.
11. Drawings shall show all obstructions existing and proposed, above and below ground. These shall be located vertically and horizontally. The design engineer shall be responsible for contacting all utilities to obtain locations of their facilities.
12. Drawings shall show existing and proposed elevations.
13. For capital improvement projects, a list of construction pay items and estimate of quantities shall be shown on the plans.
14. Upon completion of construction, the design engineer will furnish the Engineer's office "record" (as-built) drawings incorporating those changes made during the construction process. This submittal shall include one set of full size plans on mylar, two sets of full size plans on bond paper, and CADD drawings on CD-ROM. CADD drawings shall be in an AutoCad format, current version used by the City of Owasso. These plans must be submitted prior to City Council acceptance.
15. All development plans must be tied to at least two section corners.

#### **0117.2 Specific Requirements for Construction Plans**

##### **A. Water system information requirements**

1. Water lines:
  - a. Each new water line shall be referenced by number or letter designation.
  - b. The diameter and material type shall be referenced on each section of new water line.
  - c. Service Connections: New service connections shall be referenced by station along the water line and for branch connections which go under the street.
  - d. A "V" is to be sawed in the curb at each water valve and a "W" at each service crossing.
2. Valves, fire hydrants and connections: All new valves, fire hydrants and connections shall be referenced by size and station number.

B. Sanitary sewer information requirements

1. Sewer lines:

- a. Each new sewer line shall be referenced by number or letter designation.
- b. The diameter and material type shall be referenced on each section of new sewer line.
- c. Bearings of each new sewer line section shall be shown on the plans adjacent to the sewer line in the plan view.

2. Manholes:

- a. Each new manhole shall be referenced by station and manhole number.
- b. Each existing manhole shall be referenced by station and letter.
- c. For rural and undeveloped areas, manholes shall be physically referenced every 1500 feet with land ties for future location.
- d. New standard manholes, drop manholes, and shallow manholes shall be distinguished on the plans.
- e. Influent and effluent invert elevations of each manhole shall be referenced.
- f. Top of manhole rim elevations shall be referenced.
- g. The deflections of each line entering and exiting the manhole shall be referenced to each other.

3. Lift stations:

- a. New lift stations shall be referenced by names assigned by the City of Owasso.
- b. Elevations shall be referenced for the following:
  - (1) top of lids for both the wet well and valve vault
  - (2) influent line invert
  - (3) dry well valve piping invert elevation(s), if applicable
  - (4) level control elevations
  - (5) floor elevation(s)

C. Street information requirements

1. Typical sections:

- a. Typical sections shall be drawn at the same horizontal and vertical scale. (3/8 = 1 foot minimum)
  - b. Typical sections shall show the following:
    - (1) Dimensions
      - a) Fill Slope
      - b) Original ground
      - c) Selected material or prepared roadbed
      - d) Shoulder surfacing
      - e) Subbase
      - f) Base course
      - g) Surface course
      - h) Back slope
      - i) Fore slope
      - j) Shoulder slope
      - k) Crown slope
      - l) Right-of-way width
      - m) Lane width
      - n) Shoulder width
      - o) Roadway width
      - p) Roadbed width
    - (2) Type and thicknesses of materials including:
      - a) Concrete pavement
      - b) Asphaltic concrete pavement
      - c) Tack and prime coats
      - d) Concrete curb and gutter
      - e) Subgrade treatment
      - f) Aggregate base
      - g) Dowels
      - h) Reserve topsoil
      - i) Temporary and permanent erosion control
  - c. All typical sections or notes that are necessary to clearly reflect the design shall be included.
  - d. Cross slope may be 2% or 3% (1/4" or 3/8" per foot).
2. For new streets, the plan and profile views shall be on the same sheet.
  3. Scales: Streets shall be shown in plan detail at the following scales:
    - a. Arterial streets: Minimum scale: 1 inch = 20 feet
    - b. Collector streets: Minimum scale: 1 inch = 50 feet
    - c. Residential streets: Minimum scale: 1 inch = 100 feet

4. Topography (USC&GS datum: NGVD88): Topography to be shown on the plans shall include, but are not limited to the following:
  - a. New streets:
    - (1) New lot and block layouts
    - (2) Proposed streets
    - (3) Proposed drainage
    - (4) Proposed utilities
    - (5) Proposed sidewalks and handicap ramps
  - b. Street reconstruction:
    - (1) Existing and proposed streets
    - (2) Existing and relocated utilities
    - (3) Existing and proposed storm drainage
    - (4) Existing section, property, lot and block lines
    - (5) Existing surface and underground structures, including buildings, residences, etc.
    - (6) Existing sidewalks
    - (7) Existing side streets and driveways
5. Horizontal curve data: Data for each new or reconstructed horizontal curve shall be shown on each sheet. The minimum information required in the table is the following:
  - a. Delta ( $\Delta$ )
  - b. Radius (R)
  - c. Length of curve (L)
  - d. Point of curvature (PC) station
  - e. Point of indices (PI) station
  - f. Point of tangent (PT) station
  - g. Point of common curve (PCC) station

6. Vertical curve data: Data for each new or reconstructed vertical curve shall be shown on the profile of each sheet. The minimum information required in the table is the following:
  - a. Vertical point of curvature (VPC) station and elevation
  - b. Vertical point of indices (VPI) station and elevation
  - c. Vertical point of tangent (VPT) station and elevation
  - d. Length of vertical curve
  - e. Grades of vertical curves
  - f. Engineer must show 'k' value on street profile
  
7. Profiles:
  - a. Centerline: Centerline profile elevations and stations shall be shown at a minimum of 50-foot intervals.
  - b. Ground Profiles:
    - (1) New subdivisions: Existing ground profiles shall be shown at centerline and at property lines as dashed or faded lines and labeled as PL RT, PL LT, and CL for right, left, and center profiles, respectively.
    - (2) Plans for existing streets and new arterial streets: Existing ground profile shall be shown at centerline only.
  - c. Top of curb profiles: Top of curb profiles lines may be shown if they can be distinguished from centerline profile line.
  - d. Extent of profile: Proposed and existing profiles shall be shown beyond the end of all dead end streets for a minimum of 200 feet to determine the satisfactory grade for future development.
  - e. Curb returns: Curb returns with elevations shall be clearly labeled on profile.
  - f. Utilities: All proposed and existing drainage structures, water lines and sewer lines, either crossing the roadway or running parallel within the construction boundary, shall be shown in the roadway profile.
  - g. Fill areas: All fill areas within the street right-of-way shall be cross hatched on the profile and notation shall be made that the fill area shall be compacted to a minimum of 95 percent standard proctor density. When storm sewer pipes are located in fill area, the fill shall be made and compacted to finish grade, then trenched for storm drain excavation.

8. Plan view:
  - a. Stationing and Street names: Stationing and street names shall be shown on each street.
  - b. Utilities: The existing and proposed utilities and storm drainage shall be shown in the plan.
  - c. Drainage:
    - (1) All drainage areas shall be clearly marked on the drainage area plan sheet, showing acreage, runoff, and off site pickup points.
    - (2) At all street intersections (at PCs and PTs of curbs): Show top of curb elevations, valley gutter elevations, and drainage arrows.
  - d. Property lines: All property lines shall be shown, dimensioned and locations referenced. Included are right of way lines, easements, building lines and alleys.

9. Cross sections
  - a. Justification: Cross sections shall be required by the Engineer as a part of new collector and arterial street construction plans. Cross sections shall also be required for all street reconstruction. Cross sections for residential streets shall be shown if the slope to the property line exceeds 2%.
  - b. Extents: All cross sections within street rights of way shall be drawn to scale showing existing ground and proposed construction from building line to building line.
  - c. Stationing: Each section shall be stationed clearly and correspond to the plan and profile sheets.
  - d. Project beginning and ending: The beginning and ending points of a project shall be stationed and cross sections for both the stations shall be drawn.
  - e. Intervals: Cross-sections shall be shown for all changes in pavement or lane width and all changes in pavement or base thicknesses. For residential streets where no changes occur, a typical section will suffice.
  - f. Ponding: Sufficient roadside information shall be furnished to show that water will not pond behind curbs or in ditches.
  - g. Scale: Scale for cross sections shall not be less than 1 inch = 50 feet horizontal and 1 inch = 5 feet vertical.

D. Stormwater information requirements

1. Drainage plan sheet
  - a. Acreage of each subbasin

- b. Runoff of each subbasin
  - c. Off-site contributions
  - d. Predevelopment flow rate, drainage direction, and volume
  - e. Post-development flow rate, drainage direction, and volume
2. Storm sewer lines:
- a. Each new pipeline shall be referenced by number or letter designation.
  - b. The diameter, the calculated 100-year flow ( $Q_{100}$ ), and the material type shall be referenced on each section of new flowline.
  - c. Bearings of each new pipeline section shall be shown on the plans adjacent to the line in the plan view.
3. Channels:
- a. Each new channel shall be referenced by number or letter.
  - b. The slope shall be referenced on each section of new channel.
  - c. Bearings and stationing for each new channel section shall be shown on the plans adjacent to the line in the plan view.
4. Junction box and grated inlet boxes:
- a. Each new box shall be referenced by station and number.
  - b. Each existing box shall be referenced by station and letter.
  - c. Boxes shall be physically referenced every 1,500 feet with land ties for future location.
  - d. Differing boxes shall be distinguished on the plans.
  - e. Influent and effluent elevations of each box shall be referenced.
  - f. Top of box rim elevations shall be referenced.
  - g. Deflections of each section of storm sewer line shall be referenced at each box.
5. Site grading plan:
- a. Existing site conditions: The following existing site features extending a minimum of 100 feet past property limits shall be shown:
    - (1) Contour lines at 2 feet maximum interval
    - (2) Easements and rights-of-way

- (3) All utilities
  - (4) Drainageways with 100-year floodplain and floodway limits
  - (5) Buildings, fences, retaining walls, and other physical features
- b. Proposed site conditions:
- (1) Proposed contours shall match to existing contours of adjacent property
  - (2) Drainage flow arrows
  - (3) Grade breaks and slopes 3:1 or greater
  - (4) Top of curb elevation at each property line extension
  - (5) Proposed improvements:
    - (a) Sidewalks, bike paths, and other public improvements
    - (b) Storm drainage structures
    - (c) Fences, retaining walls, and other physical site improvements (cross sections may be necessary to detail these features)
    - (d) Minimum finished floor elevations for buildings
    - (e) Driveway culverts (if applicable)
- c. Deviations from the accepted site grading plan must be reviewed and accepted by the Engineer to:
- (1) Change drainage flow direction
  - (2) Revise other significant proposed features
- d. Erosion control: An Erosion and Sedimentation Control Plan report shall be prepared and submitted in accordance with Section 0600 for review by the Engineer.

## 0118 SPECIFICATIONS

Appropriate portions of the City of Owasso Construction Standards and Standard Details, latest edition, shall be used as part of the project specifications. Any required supplemental specifications shall be prepared in a similar outline format as the City of Owasso Construction Standards.

END OF SECTION