SECTION I

ENGINEERING DESIGN CRITERIA

AND

SECTIONS II thru VI

STANDARD SPECIFICATIONS FOR CONSTRUCTION

FOR

THE CITY OF GLENPOOL, OKLAHOMA

AND

GLENPOOL UTILITY SERVICES AUTHORITY

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INTRODUCTION:

This assembly of engineering Design Criteria and Standard Specifications for Public Infrastructure related construction has been prepared by the City of Glenpool and adopted by the City Council by Ordinance No. 663. These design standards and guidelines were developed and are provided by the City to assist any person, firm, corporation, or governmental entity to be in complying with said ordinance related to development and infrastructure improvements. It is the purpose of this design criteria to establish standard engineering policy for the design and construction of both private and publicly financed and owned infrastructure related improvements.

The review and approval of: site clearing and disposal, soil erosion control, water distribution mains, sanitary sewer collection systems, drainage and stormwater management facilities, and street and paving construction plans by the City Engineering Department is a sub-system of the overall City of Glenpool subdivision platting process. It is recommended that the Subdivider, Developer, or Private Consulting Engineer coordinate all proposed development type projects within the corporate limits of the City of Glenpool with the City Community Development Department Staff at the conceptual stage of such development in order that the City Engineering Staff become familiar with the project and therefore be in position to process necessary improvement construction plan submittals and associated design reviews in a more efficient and timely fashion.

The design criteria and specifications set forth herein shall be considered as *minimum design requirements* pertaining to the development and construction of privately or publically financed and owned infrastructure type improvements within the corporate limits of the City of Glenpool. However, promulgation hereof, and adherence hereto, shall not be considered as relieving persons or entities governed hereby from prudent, reasonable, and generally accepted engineering design and construction practices pertaining to development type infrastructure improvement installation.

The provisions hereof shall become effective on and after the 17th day of September, 2012. The engineering design of development or infrastructure type projects commencing on, or after, such date shall be governed by the Design Criteria and Construction Specifications contained herein.

1.0 GENERAL

Definitions: For the purpose of these regulations, the following terms, phrases, words, and their derivations have the meaning given herein. The word "shall" means mandatory; the word "may" means permissive:

"**City**" shall mean the City of Glenpool, Tulsa County, Oklahoma.

"**City Council**" shall mean the Council of the City of Glenpool, Oklahoma.

"**City Engineer**" shall mean the Registered Professional Engineer licensed to practice engineering in the State of Oklahoma, in good standing with the Oklahoma State Board of Engineers and Land Surveyors, and employed by the City of Glenpool to fulfill any of the normal duties of a City Engineer.

"**Consulting Engineer**" shall mean a Registered Professional Engineer licensed to provide engineering services in the State of Oklahoma and be in good standing with the Oklahoma State Board of Registration for Professional Engineers and Land Surveyors.

"**Contractor**" shall mean a person, firm, or corporation engaged in any aspect of the construction of any public or private development infrastructure improvements.

"**Cul-de-sac**" shall mean a short street having one end open to traffic and being terminated at the other end - typically by a circular open space or paving surface designed to facilitate vehicular turn around.

"**Developer**" shall mean the owner, or agent of the owner, of the land being subdivided or developed who has the right to subdivide the property and execute the construction of public and/or private infrastructure type improvements there-on.

"**GUSA**" shall mean the Glenpool Utility Services Authority.

"**Improvements**" shall mean clearing, grubbing, grading, debris disposal, soil erosion control, construction of street base and surfacing, the installation of curb and gutters, sidewalks, crosswalks, drainage culverts, bridges, water distribution lines, sanitary sewer collection lines, sanitary sewer force mains and lift stations, storm sewer conveyance systems and structures, stormwater management facilities, miscellaneous public or private utilities, and the construction of other related support facilities.

"**Lot**" shall mean a parcel or tract of land within a subdivision plat separated by other parcels depicted and delineated on the plat either described by dimensional information or by metes and bounds for the purpose of sale or lease to or for another separate entity.

"**Municipal Authority**" shall mean the Board of Trustees of the City of Glenpool Utility Service Authority.

"**ODEQ**" shall mean the Oklahoma State Department of Environmental Quality, or any State agency succeeding to the jurisdiction of ODEQ on matters pertaining herein.

"**Owner**" shall mean any individual, firm, or corporation having sufficient proprietary interest in the land sought to be subdivided to commence and maintain proceedings to subdivide and/or install improvements on the land so regulated under these provisions.

"**Plans**" shall mean the general construction or engineering design drawings and specifications detailing the installation of public and/or private improvements and illustrating the layout and principal design features necessary to serve a particular subdivision or project with infrastructure type improvements.

"**Record Drawings**" shall mean drawings (documents) illustrating the plan and profile view of subdivision development improvements (public and private) as they were actually constructed with field determined dimensions, grades, and elevations, and shall also be known as "As-Built" construction documents.

"**Specifications**" shall mean the detailed working drawings and written technical instructions and design requirements adopted by the City of Glenpool concerning the construction and installation of public and/or private development infrastructure improvements.

"**Streets and Alleys**" shall mean a roadway for vehicular traffic, regardless of how designated. Where curbs are required and constructed, the word "street" shall refer to that portion of the roadway between the curbs. Streets may be further designated as follows:

1. **Highways**: shall mean a fast paced or heavily travelled roadway having limited vehicular access and generally used as a traffic artery for travel between Glenpool neighboring cities and other areas. From an engineering design standpoint, frontage roads associated with limited access highways are to be considered as collector streets.

2. **Arterial Street**: shall mean a fast paced or heavily traveled roadway of considerable continuity and used generally as a traffic artery for travel among and between large areas within the City. Arterial Streets may be further designated as either primary or secondary arterial streets per the adopted Major Street and Highway Plan for the City of Glenpool.

3. **Collector Street**: shall mean a roadway which carries vehicular traffic between residential and commercial areas and from minor streets to arterial streets. Collector streets include principal entrance streets of residential or commercial developments, as well as streets utilized as major circulation paths within any such development or subdivision.

4. **Local or Residential Street**: shall mean a roadway used for traffic circulation within a development or subdivision that may also provide primarily or secondary access to properties or areas that abut a particular development.

5. **Alley**: shall mean a passageway affording a secondary means of vehicular access to abutting properties that is not intended for general traffic access and circulation.

6. **Surveyor:** shall mean a Registered Professional Land Surveyor licensed to practice land surveying in good standing with the Oklahoma State Board of Registration for Professional Engineers and Land Surveyors.

1.0 Procedural Outline

1.1 Private Development Projects with Public or Privately Owned Improvements

1. It is advised that the Developer of any proposed project should closely coordinate any such land development or project with the Community Development Department staff and with the City Engineer during the conceptual or preliminary phase of a project and prior to the start of detailed project improvement engineering design work.

2. Prior to any City approvals, the Developer is required to execute and deliver to the City Community Development Department an agreement guaranteeing installation of all required public infrastructure improvements required to support any proposed development project (see Appendix).

3. The private Consulting Engineer shall submit certificates of general liability insurance coverage to the City Engineer upon submittal of any privately funded public infrastructure improvement design documents for official City review. Publically funded infrastructure improvement projects shall also require certificates of insurance be submitted evidencing professional liability coverage in such amounts as the City Council or the Glenpool Utility Services Authority shall require. Generally, a minimum coverage amount of $1,000,000 shall be required for any publically funded infrastructure improvement project.

4. The private Consulting Engineer shall submit three (3) sets of proposed construction documents and a preliminary Engineers Estimate of Cost covering the construction of all proposed public improvements supporting a particular project to the office of the Community Development Department for review, comment, and/or approval by the City Engineer and any other City Staff that may be involved with such processing.

5. Submitted engineering design studies and related construction documents shall be reviewed and approved by the City Engineer. The City Engineer shall return one set of submitted construction documents and specifications, along with any review comments and requirements, to the private Consulting Engineer generally within ten (10) working days of submittal. The private Consulting Engineer shall also develop and submit to the City Engineer for review and approval any general utility easement and/or right-of-way dedication documents that may be required to support the installation of any public infrastructure improvements.

6. On all publically funded public improvement projects approved by the City Engineer, the selected contractor shall furnish applicable performance, payment, and maintenance bond(s) or equivalent irrevocable letter(s) of credit along with appropriate certificates of insurance prior to the issuance of a Notice-to-Proceed by the City Engineer. Upon submittal, such bonds and insurance certificates shall be presented to the City Attorney for final approval and shall be retained on file in the office of the City Engineer. On privately funded public infrastructure, a copy of the selected contractor's construction contract with the Developer and the final Certified Engineer's Estimate of Cost developed by the private Consulting Engineer, shall accompany the submittal of required bonds and/or irrevocable letters of credit.

Such documentation shall be used in determining the total amount of the bonds or other forms of security required. Any required public easement or right-of-way dedication document shall be executed by the appropriate property owner involved and be delivered to the City Engineer for processing, approval, and acceptance by the City Council prior to recordation and prior to the start of construction.

7. A pre-construction conference shall be conducted by the City Engineer to coordinate construction procedures, activities, scheduling, and required City inspections *prior* to commencing any public or private improvement construction. Such pre-construction conference shall be attended by the Developer/Owner, contractor, the private Consulting Engineer, and the City Engineering and Inspections Department Staff. The construction of public or private infrastructure improvements shall not be allowed to start until all improvement design and associated construction plans and related documents have been fully approved by the City Engineer.

8. If it is determined that change orders are necessary during the construction of either private or public development improvements, the private Consulting Engineer shall submit three (3) sets of the dated change order plan documents to the City Engineer's office for approval and field inspection purposes – *prior to the incorporation and installation of said modifications.*

9. Upon completion of the development improvement construction (public or private), the private Consulting Engineer shall furnish the City Engineer's office a completed set of Mylar type reproducible record drawings which shall include any approved modifications or additions made during the construction process. An electronic copy of the record drawings in PDF format shall also be submitted to the City upon final acceptance of the record drawings by the City Engineer.

10. Upon approval of the record drawings, the City Engineer shall make recommendations regarding the acceptability of the public improvements to the City Council or to GUSA at the next regularly scheduled public meeting. At that time, the City Council or GUSA will decide on whether or not to accept ownership and the associated future maintenance responsibility of the public improvements as constructed - subject to the required bonding period. The date on which the City Council or GUSA formally accepts the improvements for ownership and maintenance shall be the effective date of the contractor's maintenance period and associated surety.

1.2 Improvement Design Standards, Construction Requirements, and Material Specifications

1. All development infrastructure improvement construction documents shall be reviewed in regard to how they will affect other existing public or private facilities, any projected future site development improvements (phases), and how the proposed improvements may affect or impact other public infrastructure - either existing currently or contemplated in the future.

2. Where, on a particular tract, the standards and specifications set forth herein are not necessary or applicable by reason of topography, soils, drainage, floodplains, or other conditions peculiar to such project site, other more applicable engineering design standards and specifications may be considered with the prior approval of the City Engineer.

3. For any item of required work or improvement construction not covered by the adopted criteria herein or the related standard specifications and construction drawings of the City, the consulting engineer shall include two copies of the proposed engineering design, specifications, all necessary computations, and/or any special provisions with the first submittal of such non-standard construction documents for review and approval by the City Engineer.

4. The approval of proposed or required infrastructure improvement design and construction documents by the City Engineer does not release the private Consulting Engineer from his, or her, responsibility to insure full compliance with those final planning, engineering design, and construction documents and specifications by the contractor through the completion of the installation of such improvements.

5. The cover sheet and each following sheet of all infrastructure construction plan documents; the cover sheet of any associated separate written construction specifications; and any required research or calculation report shall be signed, sealed, and dated by a licensed professional engineer, registered in the State of Oklahoma. The submittal of any proposed modifications to the approved final plans or supporting documents to the City Engineer's office for consideration regarding any modifications that may be necessary during the construction phase of the project shall be evidenced by revision and approval dates.

6. On all Publically Funded Public Improvements (PFPI), pay items and the associated engineer's estimated cost for each item of work covered by the construction documents and standard specifications, and/or any special provisions, shall be itemized and rounded to the nearest unit and be listed clearly indicating the basis for payment. Privately Funded Public or Private Improvements shall be exempt from this requirement.

1.3 Drafting Standards for Private or Public Improvement Construction Documents

1. All public or private infrastructure type construction plan documents shall be reproduced and submitted for City review on standard plot or reproduction paper suitable for photographic reproduction or as may be required due to unusual circumstances.

2. All development infrastructure type construction document plan sheets (public or private improvements) shall be reproduced and submitted to the City as twenty four (24) inch high and thirty six (36) inch wide documents having a margin of one and one-half (1/2) inches along the left border and one-half (1/2) inch along the top, bottom and right border. All final infrastructure construction documents covering privately or publically funded public improvements - as fully approved by the City Engineer, shall be submitted to the City Engineer's office in electronic PDF format prior to start of construction.

3. The private Consulting Engineer responsible for the project design shall provide to the City Engineer electronic drawing files in PDF format all record 'As-Built' construction documents. All such document files shall be recorded on compact disks compatible with the City's computer and electronic operating systems. All such 'As-Built' plans shall accurately reflect horizontal and vertical locations of all public and private infrastructure improvements (publically or privately funded) constructed to support any particular development project.

4. All construction documents developed for proposed public or private infrastructure improvements shall be submitted to the City for review as individual plan sets that address the construction of each separate type of improvement referencing, but independent from, other proposed development improvements, ie., Site Grading (rough and finished) Water Distribution, Sanitary Sewer Collection, Storm Sewer, Stormwater Management facilities, and Paving. All such construction document plan sets shall be generally structured as illustrated in the appendix attached herewith.

5. North shall be oriented to the top or to the left side of all cover or plan sheets within the construction document plan sets.

6. A standard City of Glenpool title block shall be located in the lower right hand corner of each cover, plan, profile, or detail sheet. Each such title block shall include the project title, the Owner/Developer and private Consulting Engineer's name, related contact information, drawing description and title, page number, original production date, and the date of all subsequent revisions and related approvals by the City Engineer. See appendix attached herewith.

7. Generally, the drawing scale for plan sheets shall not be greater than one inch equals fifty (50) feet horizontally and one inch equals five (5) feet vertically on all plan and/or profile sheets. The minimum drawing scale shall be one (1) inch equals one hundred (100) feet on all plan or cover sheets. Larger scales may be required where conditions warrant or where, due to the size of the project area, sufficient detail may not be feasible or practical on a small-scale plan or profile sheet.

8. All construction document drawing line work shall be of sufficient width and density to be clearly reproducible by photographic reproduction processes. Any drawing line work which does not reproduce satisfactorily may be cause for rejection of the plans by the City Engineer.

9. All construction document plan base maps shall be referenced to existing land lines (section or legal division corners, etc.), property lines, rights-of-way, or appropriate easements created by subdivision plat or by separate instrument. Any easements created by separate instrument for the installation of public infrastructure improvements are required to be submitted for review and acceptance by the City Engineer and the City Attorney prior to subsequent approval and acceptance by the City Council. All City reviews and approvals are required prior to the recordation of any such document and prior to the actual start of the construction of the related public infrastructure improvements.

10. All existing and proposed utility or infrastructure structures (manholes, junction boxes, inlets, headwalls, fire hydrants, etc.) shall be numbered or lettered and be labeled as such both in plan and in profile and shall be fully detailed on associated detail sheets included in the construction document plan sets. Standard City of Glenpool Construction Details shall be incorporated wherever possible. The use of special construction or structure details must be approved by the City Engineer prior to incorporation into any public infrastructure improvement construction documents.

12. Water distribution lines, sanitary sewer collection lines, and storm sewer lines shall be identified on both plan and profile sheets by letter, ie, Line "A", Line "B", Line A-1, etc. All structures and appurtenances shall be labeled as letters, ie, "A", "B", "C", "A-1", or by number – "1", "2", "3", "3-1" etc. in both plan and in profile. See appendix attached herewith.

13. Construction document cover sheets, plan sheets, and plan and profile sheets shall show all known obstructions - existing and proposed, above and below grade. All such known obstructions shall be located both vertically and horizontally by line stationing and/or dimensions from existing or proposed structures. The private Consulting Engineer shall be responsible for contacting all public or private utility and/or pipeline companies to obtain accurate locations of any existing facilities or pipelines associated with, or impacted by, the installation of proposed improvements.

14. All public or private infrastructure construction document drawings shall accurately illustrate existing and proposed elevations, grades, tract or parcel boundaries, and any associated easements related to proposed improvements to be constructed in support of a particular development project.

15. The construction documents, developed by the private Consulting Engineer, pertaining to the installation of public infrastructure improvements (publicly or privately funded) shall incorporate an accurate listing of pay items and the corresponding estimate of quantities of materials to be supplied, constructed, and installed during the course of the work.

16. The construction contractor shall be responsible for coordinating all utility crossings on public streets with the City Engineer, City Construction Inspector, private utility suppliers, and all applicable emergency services providers (police, fire, ambulance, etc.) regarding accessibility and vehicular traffic issues to be anticipated during the installation of any proposed public or private infrastructure improvements.

17. The private Consulting Engineer shall submit preliminary prints of all record 'As-Built' drawings and supporting documents covering the installation of public infrastructure improvements for review and approval by the City Engineer. Upon such approval, the Consulting Engineer shall submit reproducible and electronic record drawings in PDF format as outlined herein to support the submittal of such record drawings to the City Council for approval and acceptance.

1.4 Project Benchmark Requirements

1. All elevations shown on the construction plans shall be based on the most current and accepted USGS or USC&GS elevation datum and shall clearly state the source of the referenced datum.

2. A minimum of one temporary on-site reference benchmark (TBM) used for the vertical control of the proposed project improvements shall be accurately located and described including the source of such temporary benchmark with the corresponding elevation datum listed, on the cover or plan sheets of all public or private improvement design or construction plans.

3. Any additional temporary project benchmarks (TBM) used for on or off site vertical control during the installation of the project improvements shall also be clearly illustrated and labeled on the cover or plan sheets of each type of improvement and shall be referenced to the permanent on-site project benchmark (BM) as required herein.

4. A permanent project benchmark (BM) shall be established on the project site - based on and set from an officially recognized reference benchmark. The permanent bench mark shall be a brass cap, pin, or other normally accepted monument set in concrete in a location approved by the City Engineer. Any such set brass cap shall read "City of Glenpool Benchmark" together with a letter and/or numerical designation assigned to it by the City Engineer's office. The location, physical description, and elevation of the permanent bench mark (BM) established for the project shall be shown on the cover or plan sheet of the record or 'As-Built' plans submitted for the project and shall be subject to the approval of the City Engineer.

5. Field determined level notes recorded during the establishment of the permanent project benchmark (BM) shall be provided to the City Engineer' office for approval and for permanent City records. All levels notes shall be of a closed loop survey performed in the field. (Ord. 370 § 1 (part), 1996)

2.0 MINIMUM DESIGN CRITERIA for PUBLIC or PRIVATE WATER DISTRIBUTION MAINS

2.1 General Requirements

The minimum design criteria for all public or private potable water distribution facilities constructed within the City of Glenpool shall be in full compliance with the latest edition of the Oklahoma State Department of Environmental Quality (ODEQ) engineering guidelines and requirements as outlined in Bulletin No. 0589 - Standards for Public Water Supply Facilities. These referenced design and construction standards are amended and supplemented as provided for and described herein:

1. All proposed construction documents pertaining to the distribution and/or treatment of public drinking water must be fully approved and permitted by ODEQ **prior to starting construction.**

2. The Developer or his private Engineering Consultant shall submit two sets of the final construction documents, as were approved by the City Engineer, a completed standard ODEQ Engineers Report, and a fully completed ODEQ application for a Permit-to-Construct to the City Engineer for review, approval, and forwarding to ODEQ for their review and issuance of the required Permit-to-Construct. The Developer or his private Consulting Engineer shall be responsible for all ODEQ application and plan review fees.

3. The design and installation of any proposed waterline shall maintain a minimum separation of two (2) feet vertically and ten (10) feet horizontally from any existing or proposed sanitary sewer collection line or force main and shall be in full compliance with all applicable Oklahoma State Department of Health requirements and regulations.

4. Any proposed water distribution line shall be located and constructed on the south or east side of public or private street rights-of-way and be positioned eight (8) feet inside said street right-of-way unless otherwise approved by the City Engineer. All proposed public waterlines, not located in public street right-of-way, shall be centered in a Restricted Waterline Easement, a minimum of fifteen (15) feet in width as approved by the City Engineer and accepted by the City Council. Any such Waterline Easement shall be dedicated to the public by separate instrument and filed in the public records of Tulsa County prior to final acceptance of the completed public waterline improvements by the City Council.

5. The minimum size of water distribution lines constructed along all section lines and/or arterial streets as designated on the City Major Street and Highway Plan shall be in compliance with the Master Water Distribution Plan adopted by the City and be a minimum of twelve (12) inches in diameter. Proposed water distribution lines to be constructed along half section lines or collector type streets shall be a minimum of eight (8) inches in diameter. The minimum size of all other public water distribution lines shall be six (6) inches in diameter, except on dead-end or cul-de-sac streets less than five hundred (500) feet in length, in which case a four (4) inch diameter line may be allowed as approved by the City Engineer. All newly proposed developments or subdivisions located along, or adjacent to, a section line or arterial street shall be required to construct a minimum twelve (12) inch diameter water line parallel to said section line or arterial street in standard location within the street right-of-way the entire length of said development's boundary with or frontage on the section line or arterial street – regardless whether or not said waterline is to serve that particular development. Any such initially unused waterlines shall be appropriately plugged for future use and extension necessary to serve other development areas.

6. The maximum permissible depth of cover over installed waterlines shall be eight (8) feet. The minimum depth of cover shall be three (3) feet. Where air relief valve vaults and standard bury depth fire hydrants are proposed, a minimum depth of cover of four and one half (4.5) feet shall be designed and provided at those locations.

7. All waterline construction document plan and profile sheets shall illustrate and include existing and proposed finished grade along the centerline of the pipe, the lowest adjacent curb line grade, and the adjacent centerline of street grade where applicable and shall depict both the proposed top and bottom of pipe grade.

8. All proposed fire hydrants to be located in public or private street rights-of-way shall be placed one and one half (1.5) feet inside any such public or private street right-of-way line and shall be placed opposite a particular lot corner within the subdivision. The proposed finished grade elevation at each fire hydrant location shall be shown and shall be, generally, no more than six (6) inches above or below the adjacent top of street curb. All proposed fire hydrants shall have a specified bury depth of four and one half (4.5) feet. Fire hydrant bury depth may be modified by the use of standard hydrant extensions or shallow hydrant fittings due to unusual field situations as may be approved by the City Engineer. All proposed fire hydrants shall indicate a specific finished base elevation on the applicable pipe plan and profile sheet.

9. Proposed fire hydrants shall be located such that all proposed or existing building sites are within a three hundred (300) feet hose length from the nearest hydrant.

10. Fire hydrants, associated isolation valve assemblies, and connections to the source waterline shall be in accordance to City standard construction details. Any proposed deviation from the standard details must be approved by the City Engineer. Fire hydrants shall not be installed on lines under six (6) inches in diameter.

11. All public or private water distribution system piping shall conform to the current American Water Works Association (AWWA) specifications for ductile iron pipe, steel pipe, reinforced concrete pipe, or polyvinyl chloride (PVC) C-900 pipe.

12. If PVC or reinforced concrete pipe is proposed for new waterline installation, detectable Mylar type marking tape, No. 6 solid copper locator wire, and proper sand bedding and pipe cover shall be installed along the length of the proposed waterline per standard City construction details associated with such installation.

13. The minimum cover over proposed waterlines at all creek or drainage way crossings shall be four (4) feet. All such waterline creek crossings shall, at a minimum, incorporate restrained mechanical joints within an area fifty (50) feet either side of the high bank of said creek.

14. In residential subdivision projects, adequately sized dry pipe conduits shall be required to be installed under any proposed street paving appropriately sized to accommodate future long service lines to lots on the opposite side of the street from the main water source line. Said pipe conduits shall be terminated at lot corners to accommodate domestic water service to two separate lots with future meters set on either side of the common lot corner. Any such service line conduit shall be installed with a minimum cover of thirty six (36) inches from finished paving grade. All such proposed service line conduits shall be accurately illustrated and dimensioned on the plan sheets for the proposed distribution waterline extensions and shall be field located and accurately dimensioned on the Record Drawings submitted to the City upon completion of the public or private waterline improvements.

15. To assist in the proper selection of adequate pipe materials, diameters, and pressure rating class for any proposed waterline, the City will furnish to the private consulting engineer normal working waterline pressures and field determined fire flow rates to be anticipated in the area of the proposed waterline improvements.

16. The design of all proposed water system extensions or improvements shall minimize or eliminate dead end lines by providing loop type connections to existing multi-source waterlines. The design of water distribution systems shall provide internal looping within the system being proposed where possible.

17. Regarding the construction of public waterline extensions, the developer or contractor shall provide a maintenance bond or an irrevocable letter of credit satisfactory to the City Engineer and/or the City Attorney in an amount equal to one hundred (100) percent of the final Engineer's Certified Statement of Cost specifying the actual installation costs incurred. Said security shall be used to cover the cost of any required maintenance for a one year period, commencing with the final acceptance of the waterline improvements and "As-Built" or "Record" construction documents by the City Engineer and City Council per these requirements and in compliance with the City's adopted Subdivision Regulations.

18. All fill areas along the length of proposed water lines to be located within the street rights-of-way or restricted waterline easements shall be cross-hatched on the pipe profile with notation made on the plans that all such fill shall be placed to the finished grade shown and compacted to a minimum of ninety five (95) percent of standard proctor density **prior** to any excavation or trenching for the placement of waterlines or associated appurtenances. No general 'area' type fill shall be allowed to be placed after waterlines have been installed in those locations.

19. All fire hydrants shall have a six (6) inch isolation valve installed between the hydrant and the main waterline. Valve placement on main distribution waterlines shall be such that no more than two (2) fire hydrants can be isolated along any particular section of said main waterline.

20. All valve boxes shall be adjusted to final finished grade and shall have a concrete protective collar, twenty four (24) inches in diameter, placed around the top of all such boxes located in graded, sod, or paved areas (Ord. 370 § 1 (part), 1996)

3.0 DESIGN CRITERIA FOR PUBLIC OR PRIVATE SANITARY SEWER COLLECTION SYSTEMS

3.1 General Requirements

The minimum design criteria for all sanitary sewer collection, pumping, and treatment facilities shall be in full compliance with the latest edition of the Oklahoma State Department of Environmental Quality (ODEQ) Engineering Bulletin No. 0587 ttled Standards for Water Pollution Control Facilities:

1. All construction documents pertaining to the installation of public or private sanitary sewer collection, pumping, or treatment systems must be fully approved and permitted by ODEQ **prior** to starting construction of any such facilities.

2. The developer, or his private engineering consultant, shall submit two sets of the final construction documents, as were approved by the City Engineer, as well as a standard ODEQ Engineers Report to ODEQ for review, approval, and the issuance of a Permit to Construct. The developer or his private consulting engineer shall be responsible for all ODEQ application, plan review, and permit fees.

3. In situations where a proposed sanitary sewer line is to be placed within two (2) feet vertically *under* an existing waterline, the proposed sanitary sewer line shall be ductile iron pipe (C-151) a minimum distance of ten (10) feet either side of the waterline crossing. If the proposed sanitary sewer line is to be installed *over* an existing waterline, the sewer line shall be concrete encased ductile iron pipe (C-151) placed a minimum of ten (10) feet either side of the waterline crossing - *regardless of the vertical separation between the water and sewer lines.* Proposed sanitary sewer lines shall not be designed to parallel existing or proposed water lines with less than ten (10) feet of horizontal separation.

4. Where possible, proposed sanitary sewer lines shall be located in their standard location within dedicated general utility easements per Exhibit "D" herein

5. No public or private gravity flow main line sanitary sewer collection line shall be less than eight (8) inches in diameter, except that the use of a six (6) inch diameter sanitary sewer line may be permitted where it cannot, or will not be permitted to be extended in the future. In such case, the six (6) inch line shall not exceed one hundred (100) feet in total length and be terminated with a standard four (4) foot diameter manhole. The use of standard terminal lampholes shall be allowed in these situations.

6. Proposed sanitary sewer extensions terminating in a manhole shall project a minimum of fifteen (15) feet into the last property to be served. Six (6) inch diameter sanitary sewer extensions terminating with a standard lamphole shall project into the last property served a minimum of ten (10) feet.

7. Generally, the horizontal alignment, pipe size, and gradient of any proposed public or private sanitary sewer line extension shall be subject to the approval of the City Engineer and shall in all cases comply with minimum ODEQ requirements.

8. Manhole spacing on any proposed public or private sanitary sewer main extension shall be a maximum of three hundred (300) feet. The use of lampholes shall be restricted to terminal structures on six (6) inch diameter dead-end line extensions not exceeding one hundred (100) feet from the last downstream manhole. Any such lamphole shall be installed with a twenty four (24) inch diameter concrete collar placed and adjusted to finished grade. Requested variances in maximum manhole or lamphole spacing requirements may be approved by the City Engineer, but in no case shall they exceed ODEQ design criteria.

9. The minimum manhole depth for any proposed public or private sanitary sewer extension shall be four (4) feet as measured from top of rim to invert flow line at the center of the structure. The proposed use of any special manhole structure, regardless of depth, shall require the approval of the City Engineer and shall be in compliance with ODEQ design requirements.

10. All proposed manhole or lamphole rim elevations shall be designed to be a minimum of one (1) foot above the one hundred (100) year frequency floodplain elevation in areas subject to periodic stormwater inundation. The use of mechanically sealed manhole rims and lids must be approved by the City Engineer and shall be in strict compliance with ODEQ regulations. All proposed manhole and lamphole invert and rim elevations shall be specified on the sanitary sewer pipe profiles and accurately staked in the field. All proposed manhole inverts shall be installed having a one tenth (0.10) foot drop measured from the inflow side to the discharge side of the structure. Any proposed drop manhole shall have the drop piping and associated fittings located outside of the structure and shall have a ***minimum*** drop of two (2) feet, measured from the inflow piping at the drop to the invert discharge side of the manhole.

11. Individual in-line sewer service tees shall: be accurately located and dimensioned on the construction document plan sheets; be stationed on the plan and profile sheets; and be installed during construction such as to provide convenient sewer service access for all platted lots being developed. The location, size, and configuration of proposed service line tees shall be measured or stationed from the closest downstream manhole and shall be clearly identified as such on the "As-Built" or record plan and profile sheets covering the mainline installation.

12. The maximum permissible depth for the placement of in-line sanitary sewer service tee connections is fifteen (15) feet from finished grade as measured at the centerline of the sanitary sewer mainline.

13. The minimum design depth of any such in-line service tee shall be based on a private four (4) inch diameter sanitary sewer service line being placed **under** the structural foundation (footing) of the building structure being served or a minimum of twenty four (24) inches below the proposed finished slab elevation. From that point at the structure's perimeter foundation line, the private service line shall be required to be placed at a minimum gradient of 2.08% (1/4" per foot) between the building and the sanitary sewer mainline and shall allow for an additional twelve (12) inches of fall into the sewer mainline at the service tee connection.

14. All public or private sanitary sewer mainline pipe shall be SDR-35 PVC or better and shall be in compliance with current ODEQ standard specifications. Any proposed sanitary sewer mainlines with depths in excess of fifteen (15) feet to finished grade shall require special approval by the City Engineer. Any approved areas of depths exceeding fifteen (15) feet shall utilize ductile iron pipe (C-151). Polyvinyl chloride pipe (SDR-35) shall be restricted from use under section line arterial streets regardless of depth. AWWA C-900 PVC Class 200 pipe shall be specified for use under all arterial streets, regardless of depth, and shall also be specified for use under collector and local streets where the design depth is less than six (6) feet below finished paving grade.

15. Concrete encasement for SDR-35 PVC piping shall be required where the design depth from the finished grade elevation to the top of pipe is four (4) feet or less in any location other than the requirements for street crossings described above.

16. Public or private sanitary sewer collection lines shall maintain a minimum of four (4) feet of cover at all drainage way and creek crossings. Concrete encased ductile iron pipe (C-151) shall be installed in these areas extending a minimum of twenty (20) feet beyond each bank.

17. The developer shall be required to post with the City a maintenance bond or irrevocable letter-of-credit regarding the construction and dedication of any public sanitary sewer improvements. Such bond or letter-of-credit shall be in the minimum amount equal to the Engineer's Certified Statement of Cost covering the actual installation cost of the improvements and shall be for a term of one year from the date the facilities are approved and the ownership dedication accepted by the City Council.

18. The design of any public sanitary sewer facilities shall be such that flow and handling capacity will be adequate to serve not only the subject development, but the acceptance and conveyance of sewerage discharged from all anticipated future development within the entire natural drainage area located upstream from the subject project. Such excess design flow and handling capacity shall pertain to all proposed sewer system collection lines, lift stations, and force mains necessary to accommodate said future flow volumes and rates. All such excess capacity design elements necessary in conjunction with providing sewer service to a particular development project shall be submitted to, and approved by, the City Engineer in the form of an Engineer's Report produced by the developer's private engineering design consultant.

19. Regarding any proposed public or private sanitary sewer construction plans, all areas of fill placement shall be cross hatched on the piping profiles with a notation made on the plan and profile sheets that the fill area so indicated shall be filled to the design finished grade and shall be compacted to a minimum of ninety-five (95) percent of standard proctor density prior to the excavation and placement of the proposed piping or structures. No 'area' type grading and filling shall be allowed after the sanitary sewer piping and associated structures have been installed.

20. A one (1) inch diameter potable water line shall be installed within proposed sanitary sewer lift station facility locations. A standard below-grade freeze-proof yard hydrant shall be installed at such lift station facilities to accommodate maintenance activities. (Ord. 370 § 1 (part), 1996)

4.0 DESIGN CRITERIA FOR PUBLIC OR PRIVATE STREETS

4.1 General Requirements

The term Street Construction shall include all clearing, debris disposal, rough grading and earthwork excavation, filling, finished grading, proper subgrade preparation, soils modification, subgrade density compaction, placement and compaction of paving base course(s), placement and compaction of wearing surface, placement of concrete curb and gutter, proper curb backfill placement and compaction, and the installation of proper drainage structures including; storm sewer piping, access structures, curb inlets, flumes, headwalls, and other related miscellaneous structures.

At the full completion of any such public Street Construction project and the approval of such by the City Engineer, a maintenance bond or irrevocable letter of credit shall be issued to the City Engineer in an amount equal to one hundred (100) percent of the Certified Engineers Statement of Cost covering the installation of such improvements. Such security shall obligate the contractor or the developer for a period of two years regarding maintenance issues, repairs, and all associated costs. The provisions in this section shall not necessarily apply to public street rehabilitation, overlay, or patching project design, repair, or replacement. All such repair or rehabilitation projects shall be treated on a project-specific basis regarding appropriate design, replacement procedures, repair material specifications, and any maintenance bonding that may be required.

4.2 Plan Sheets and Plan and Profile Sheets

1. All street intersections, cul-de-sacs, and other critical paving and drainage related locations shall be shown in individual large-scale plan sections, drawn and detailed at a minimum horizontal scale of one (1) inch equals twenty (20) feet. All such detailed plan sections shall include: direction of surface and gutter drainage: top of curb elevation at intersection, cul-de-sac, and eyebrow curb return PC's, PT's, PRC's. All high and low (sump) points shall be clearly illustrated, dimensioned, or stationed. All proposed horizontal and vertical curve information for centerline and curbing layout shall be given. The horizontal and vertical location of proposed drainage structures related to the street paving improvements, such as curb inlets and flumes, shall be illustrated in detail sufficient for accurate installation.

2. All stormwater drainage sub-basin areas shall be clearly delineated on a Master Drainage Divide Plan sheet indicating existing and proposed topography superimposed over the base map of the project. Such Master Drainage Divide Plan shall include drainage area sizes, storm water run-off calculations, and resulting post development run-off volumes and rates that support and form the basis of the Engineers' Project Drainage Report as required herein and used in piping system hydraulic design and analysis.

3. A master site plan illustrating proposed finished grade contouring and the locations and elevations of all public utility improvements proposed to provide services to the project area shall be incorporated into the proposed construction documents related to street and stormwater management improvements necessary to support the project.

4. Plan and profile sheets for the design of either public or private street construction may be composed of either three separate profiles or one single profile:

    a. Three Profile Method: When using three separate profiles, the top and bottom profile shall show existing property line grades and proposed top of curb for that side of the street. The middle profile shall show only existing center line profile. All three profiles shall show stationing based on the centerline of the proposed street.

c. Single Profile Method: When using one single profile for street design, grades along the left and right right-of-way lines shall be shown along with the proposed centerline of street profile. Profile stationing shall be along the center line of the proposed street.

5. All areas of fill within the street right-of-way shall be cross hatched on the profile. A notation shall be made that the fill area indicated shall be placed and compacted to a minimum of ninety-five (95) percent standard proctor density. When storm sewer piping or structures are located in fill areas, the fill shall be placed to the finished grade indicated and compacted to the required ninety five (95%) standard density prior to the installation of any such storm sewer piping or related structures.

6. Curb returns with centerline of street stationing and proposed top-of-curb elevations at street intersections shall be clearly shown and labeled on the centerline profile.

7. Vertical curves along the centerline of street profiles shall indicate the top of curb elevation at the PC, PT, high or low point, and at a maximum of fifty (50) foot intervals. Vertical curve lengths shall not be less than fifty (50) feet.

8. Storm sewer lines shall only be designed to be installed under streets when crossing streets or for the purpose of connecting curb inlets located on opposite sides of the street.

4.3 Streets Design Standards

1. Minimum Street Widths: The width of streets shall be according to the classifications provided for in the City of Glenpool Major Street and Highway Plan. Street width shall be measured from back of curb to back of curb as follows:

Residential (local)	27 feet
Residential Collector	36 feet
Commercial and Industrial (local)	32 feet
Commercial and Industrial Collector	40 feet

All streets shall be constructed with concrete curbs except as provided for in these design criteria. The center line of paving shall be the centerline of the right-of-way where dedication has been made according to the major street and highway plan. All other cases shall be determined by the city. The minimum grade set along the curb shall be one-half percent. The maximum grade for nonarterial streets shall be limited to eight percent. For situations where the topography is unusually hilly, grade may be permitted up to a maximum of twelve (12) percent, providing they do not exceed five hundred (500) feet in length for the PT to PC. The grade of the curb returns will continue for the full arc on all intersections where midway opposing break is not provided. Sag vertical curves shall be designed according to the current AASHTO specifications using the criteria of headlights sight distance and drainage control. Crest vertical curves shall be designed according to the current AASHTO specifications using the criteria of safe stopping sight distances.

2. Vertical curves shall be the minimum length available for the two grades entering into any sump area as defined by the AASHTO publication titles, "A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS - 1984

3. Design speed shall be twenty-five (25) miles per hour on all residential streets and thirty (30) miles per hour on all collector streets.

4. The minimum centerline curve radius on horizontal street alignments shall be one hundred twenty-five (125) feet.

5. The minimum back of curb curve radius on curb returns at residential intersections shall be twenty-five (25) feet. At intersections of a residential and arterial street, the minimum back of curb curve radius on returns shall be thirty (30) feet. At intersections of arterial streets, the minimum back of curb curve radius on returns shall be forty (40) feet. The minimum back of curb curve radius on the returns for streets within industrial districts and subdivisions shall be forty (40) feet.

6. The maximum centerline of street grade on residential streets when intersecting an arterial street shall be two percent for a minimum distance of one hundred (100) feet from the curb line of the arterial. No vertical curve shall begin or end any closer than fifty (50) feet from the curb line of the arterial street. The maximum centerline of street grade at residential street intersections shall be four (4) percent.

7. The centerline of street profile of a proposed street shall be extended beyond the end of all dead end streets a minimum distance of two hundred (200) feet in order to determine a satisfactory design grade for any future development of adjacent property.

8. Street paving cross slope may be either one-quarter inch per foot (2%) or three-eighth inch per foot (3%) from the centerline of the street to the corresponding toe of curb. However, the crown formed at the centerline shall be required to be flattened and rounded so that the resulting crown elevation does not exceed the curb height opposite any particular point along the centerline of the street.

9. All proposed streets shall intersect as close to right angles as topography and other limiting design factors permit. In no case shall streets intersect at angles less than seventy (70) degrees.

4.4 Typical Paving Design Sections.

1. Typical paving sections shall be included in the construction documents and shall be drawn to a scale adequate to clearly provide dimensioning and other annotations. Any such typical section shall extend from right-of-way line to the opposite right-of-way line illustrating sidewalk locations and finished grade relationships to the proposed paving at any particular point along the street.

2. Typical paving sections shall show physical dimensions, type of materials proposed, layering details and thicknesses, compaction and density requirements, proposed subgrade soil modification, and curb and guttering details, specifications, and other requirements as necessary.

3. Typical paving sections shall also include any notes that are necessary to clearly reflect the design and materials being specified as may be specific to the project.

3. The developer shall provide soil testing and an investigative analysis (Soils and Paving Recommendation Report) developed specifically for all areas to be paved. Such soil testing and related report shall be submitted to the City Engineer for review and approval. If soil testing preformed at the site indicates a plasticity index (PI) of ten (10) or greater, a minimum thickness of six inches of existing subgrade shall be modified with hydrated lime applied at a minimum rate of five percent (5%) by weight or an equivalent amount of Class III fly ash as may be specified in the project Soils Report. If the onsite soil testing indicates the existing subgrade soil is excessively granular in nature such that unstable compaction will be likely, a method of stabilization shall be addressed in the project Soils Report and be submitted to and approved by the City Engineer. If desired, the required compacted subgrade may be constructed from borrow material that exhibits the required design parameters recommended in the project Soils Report - as verified by similar soils testing submitted to and approved by the City Engineer.

4. All public industrial and commercial street pavement sections shall be designed specifying a minimum thickness of ten (10) inches of asphaltic concrete or eight (8) inches of Portland cement concrete. Residential pavement sections shall be designed specifying a minimum thickness of six and one-half (6.5) inches of asphaltic concrete or six (6) inches of Portland cement concrete.

5. Public streets utilizing Portland cement concrete surfacing shall have an integrally placed curb of the same mix design as the paving surface. The street curbing on such concrete street paving shall be formed monolithic with the street surfacing. No dowelled-on curbing shall be allowed. The curbing shall be a minimum of six inches wide at the top and shall provide a one (1) inch taper from the top of curb to the gutter line. The curbing shall be a minimum of six inches in height measured from the gutter line.

6. Construction, control, and expansion joints in Portland cement concrete paving surfacing and associated curbing shall be placed in accordance with, and as specified, in the Soils and Paving Recommendation Report specific to the project.

7. Public streets specifying asphaltic concrete surfacing shall include a standard Portland cement concrete curb and gutter on either side of the street. Such curb shall; not be less than six (6) inches wide at the top; be a minimum of six (6) inches in height; provide a one (1) inch taper from the top of curb to the gutter line; and be a minimum of twenty four (24) inches in width - measured from the back of curb to the outside face of the gutter at the line of asphalt surfacing.

8. All curbing on public streets shall be barrier type in curb profile. No ‘mountable’ type curb profiles shall be allowed.

9. At a minimum, asphaltic concrete used for public streets shall be Types “A”, “B”, and “C” as specified in the current Oklahoma Department of Transportation (ODOT) Standard Specifications for Highway Construction.

10. At a minimum, all Portland cement concrete surfacing and associated curbing shall; be Class "A"; have five to seven percent (5-7%) entrained air; and a cement content and ratio determined by AASHTO T121 standards sufficient to produce a minimum twenty eight (28) day compressive strength of 3,500 psi.

4.5 Paving and Right-of-Way Cross Sections

1. Project specific paving and right-of-way cross sections may be required by the City Engineer as a part of the paving construction documents when necessary to reflect more clearly the intent of the design of proposed grading, street paving, or drainage improvements.

2. In commercial, industrial, and residential, subdivisions any required cross sections for street paving and right-of-way grading shall be drawn to a scale adequate to clearly illustrate existing and proposed finished grades from the building line on one side of the street to that on the other side.

3. Generally, paving and right-of-way cross sections shall be required and shown for each street if the proposed slope from the back of curb at the street to the right-of-way line exceeds one-quarter (1/4) inch per foot up or down from the proposed curb line.

4. When required, cross sections shall be stationed along the centerline of the street involved corresponding to the stationing for that street as established on the applicable plan and profile sheet.

5. The beginning and ending points of the proposed street shall be stationed per the centerline stationing. If cross sections are required for the project, cross sections for the beginning and end stations of each street shall be included.

6. When required, the maximum distance between cross sections shall be one hundred (100) feet.

7. Sufficient and accurate finished grade information shall be illustrated on the paving plan and profile and cross section sheet (if required) to demonstrate whether storm water surface flow patterns and courses are such that no ponding will occur between the adjacent building line and the back of street curbing.

8. The drawing scale for any required street paving or improved drainage channel cross sections shall not be less than:

Channels:	1" = 5’ horizontal	1" = 5’ vertical,
Streets:	1" = 5’ horizontal	1" = 1’ vertical.

4.6 Structure Design and Detail Requirements

1. All special or non-standard structures shall be fully detailed with accurate dimensional information and material specifications.

2. Any special structure detail plan shall be drawn to a scale adequate to clearly depict the required dimensional and structural information.

3. Construction details, dimensions, and related notes shall be provided on any structure plan such that the proposed structure can be constructed with ease and accuracy.

4. All bridge or drainage related structures subject to vehicular traffic shall be designed for H-20E loading per the requirements and specifications listed in the latest edition of Standard Specifications for Highway Bridges published by AASHTO.

4.7 Public or Private Public Sidewalk Requirements

1. All public sidewalk layout and construction design details for development or building projects located within the central business district or in other commercial and industrial areas shall be furnished to the City Engineer for review and approval.

2. Public sidewalks shall be required on both sides of local and collector streets serving a single family or multifamily residential subdivision, except on projects where Residential Estate (RE) zoning has been granted. Individual homebuilders shall be required to construct sidewalks as part of any residential building project fronting onto a public street.

3. All public sidewalks shall be constructed of non-reinforced Class "A" Portland cement concrete having five to seven percent (5-7%) entrained air yielding a minimum twenty eight (28) day compressive strength of 3,000 psi. Sidewalks shall include pedestrian bridges across creeks and streams where applicable. Any such bridge will be of a specific design adequate for the particular situation as approved by the City Engineer.

4. The finished thickness of public Portland cement concrete sidewalks shall not be less than four (4) inches and shall not be less than four (4) feet in width.

5. In general, public sidewalks in residential subdivisions shall be constructed within the dedicated street right-of-way, parallel to, and not less than one (1) foot from the outside right-of-way line, or no less than three (3) feet from the back of curb line on the adjacent street.

6. All such public sidewalks must provide reasonable access for safe and convenient foot traffic movement along the length of any proposed sidewalk as well as safe crossings at sidewalk/curb intersections configured to accommodate physically handicapped persons - including those persons in wheelchairs or similar vehicles. All public sidewalk construction and configuration shall conform to the most current Americans with Disability Act (ADA) standards and requirements.

4.8 Easements and Rights-Of-Way.

1. All proposed and existing easements and/or rights-of-way shall be clearly identified and dimensioned on any construction documents developed for the installation of infrastructure improvements necessary to support public or private development or building projects.

2. All proposed or existing restricted overland drainage easements shall be accurately illustrated and detailed on the construction documents developed for the installation of infrastructure improvements supporting a particular development or building project. All such easements shall be illustrated and accurately dimensioned on any final subdivision final plat associated with the project. The creation of and restricted uses specified for any such easement or right-of-way shall be clearly described and defined in the Covenants, Conditions, and Restrictions (CC&R.'s) created for and made a part of the final subdivision plat for the project.

3. Any drainage ways proposed to be left in a natural state shall be approved by the City Engineer and/or the City Floodplain Administrator. Any such approved natural drainage way shall be located within a drainage reserve area or within a restricted drainage easement, properly delineated, and dedicated to the public on the final subdivision plat or so dedicated by a separate instrument approved by the City Engineer and City Council. The minimum width of any such drainage reserve or easement shall be equal to the floodplain width required to pass the regulatory one hundred (100) year frequency flood event. Any such dedicated drainage reserve or easement shall be designed and configured such that means for adequate vehicular ingress and egress to and within the reserve or easement area is provided for to accommodate maintenance activities. If the one hundred (100) year event floodplain width is less than one hundred fifty (150) feet, the minimum width required for the corresponding drainage reserve or easement shall be the actual floodplain width plus an additional width of ten (10) feet on each side of the floodplain for access purposes.

4. The minimum width for any easement or reserve area created for the purpose of storm sewer installation shall be the outside diameter of the pipe plus ten (10) feet. Such storm sewer pipe installation shall be such that the pipe alignment is centered in the easement or reserve.

4.9 Street Lighting Requirements

1. The City Engineer shall designate the location of street lights along all proposed public streets in any new subdivision project upon receiving an application for Preliminary Subdivision Plat approval by the City Planning Department Staff and the City Planning Commission. (Ord. 370 § 1 (part), 1996)

2. The installation of street lights along any proposed public street shall be the responsibility of the developer and be completed prior to the issuance of building permits within a particular subdivision. The proposed location and spacing for street lighting shall be as required for traffic safety purposes only. The design and location of all proposed street lighting shall be submitted to, and approved by, the City Engineer and the electric utility supplier prior to installation.

3. The City shall not accept maintenance responsibility or the cost of operation regarding street lights installed along private streets or those intended solely for security purposes on either public or private streets.

5.0 STORMWATER MANAGEMENT AND DRAINAGE IMPROVEMENT DESIGN CRITERIA

5.1 Stormwater Management Runoff Computation Requirements

1. All proposed stormwater management facilities shall be subject to review and approval by the City Engineer with regard to analysis, design, and construction of public or private drainage related facilities.
   The City of Glenpool shall have the right to maintain, or to cause to be maintained, any public or private drainage way system or related improvements to insure the continued adequacy of its intended purpose. If a stormwater master drainage plan has been previously adopted by the City for the area under consideration, then the provisions of the adopted master drainage plan shall be adhered to for all subsequent upstream and/or downstream improvements. The proposed drainage system, both public and private, may consist of storm sewer piping; improved open channels constructed in conformity with adopted City standards; unimproved drainage ways left in their natural condition; areas covered by restricted drainage easements or reserve areas created for the purpose of providing overland drainage flow; and all appurtenances to the above including inlets, manholes, junction boxes, headwalls, dissipaters, culverts, bridge structures, etc. Upon acceptable completion, all portions of a drainage system supporting any particular development project that have been constructed within dedicated public right-of-way or restricted drainage easements shall be owned and maintained by the City, unless provided otherwise by special agreement. Any stormwater management improvements constructed to serve privately held developments shall be constructed within private easements or reserve areas. The maintenance of any such privately held drainage improvements shall be the responsibility of a common property owner's association legally created for such purposes along with the creation and adoption of restrictive covenants providing for maintenance activities as required. In the interest of public health and safety, the City shall retain the express right to access, maintain, or repair any such drainage improvements should the associated property owner's association fail to provide adequate maintenance or repairs. The cost of any such maintenance or repairs performed by the City shall be assessed to, and paid by, the property owner's association.

3. The overall stormwater management system for a particular development project shall be designed to accept, transport, and discharge the calculated runoff volume generated by a one hundred (100) year frequency (1% per year) storm event under fully urbanized conditions within the associated watershed. Full urbanization is defined as the total anticipated ultimate development within the watershed. The entire fully urbanized stormwater runoff flow volume shall be totally confined within a stormwater management system consisting of overland drainage swales, streets, storm sewer piping, improved or natural channels or a combination thereof as required under the stormwater management policies and improvement standards defined herein.

4. Generally, any proposed stormwater collection system shall be designed either to:

    a. Intercept and convey, at a minimum, the runoff volume from a five (5) year frequency rain event via a storm sewer piping network combined with various methods of overland flow facilities such that the combination of conveyance methods will convey the runoff volume generated by a one hundred (100) year frequency (1% per year) rain event under fully urbanized conditions;

    b. Or, to intercept and convey the runoff volume generated by a one hundred (100) year frequency rain event entirely within a storm sewer piping network. Should the entire runoff volume from a one hundred (100) year frequency rainstorm be conveyed within a pipe network, a method of overland flow shall be designed and provided to carry the flow volume from a five (5) year frequency rain event as an emergency conveyance measure in the event of inlet blockage and/or excessive inlet bypass caused by some form of unique circumstance. The overland flow portion of the collection system shall be totally confined to to the limits of dedicated public or private rights-of-way, or restricted drainage easements to assure that the calculated stormwater volumes generated from the one hundred (100) year frequency storm will pass through the development without inundating the lowest level of any proposed building, dwelling, or similar structure. Any such restricted public or private drainage easement or right-of-way shall be illustrated and fully dimensioned on the final subdivision plat or be created by separate easement documents approved by the City Engineer.

5. The rational method of runoff analysis may be used for the design of closed pipe networks for the storm sewer systems having upstream drainage areas of one hundred (100) acres or less. For drainage areas over one hundred (100) acres, a unit hydrograph or similar method shall be used as approved by the City Engineer.

6. The rainfall intensity curves prepared for and contained in the Federal TP-40 and the National Weather Service HYDRO-36 (June 1977 or latest edition) shall be used for design in determining appropriate rainfall intensities.

7. The Oklahoma Department of Transportation Technical Manual (latest edition) shall be used for determining the basic stormwater runoff coefficient "C" values. A weighted "C" value shall be determined with minimum values of 0.45 for residential developments or projects (RS and RD zoning districts), 0.65 for multifamily developments or projects (RM zoning districts), and 0.90 for industrial and commercial developments and/or projects (C or I zoning districts). Unplatted areas within three hundred (300) feet either side of an arterial shall be either considered commercial or shall be in accordance with the adopted Comprehensive Master Plan in estimating runoff coefficients. The weighted "C" value shall be increased by twenty-five (25) percent for the one hundred (100) year (1% per year) frequency rainstorm.

8. The distance between inlets, as well as the distance to the first inlet, shall be determined by the following, whichever is less:

    a. For the five-year frequency rainstorm, two driving lanes must remain open for streets on grade;

b. For the one hundred (100) year frequency rainstorm, one driving lane must remain open for streets on grade. Further, the depth of flow shall not exceed curb height;

c. A maximum time of concentration of ten (10) minutes to the first inlet in a pipe collection and conveyance system shall be used for single or multifamily residential areas;

d. A maximum time of concentration of five minutes to the first inlet in a pipe collection and conveyance system shall be used for commercial and industrial areas;

e. Six hundred (600) feet shall be the maximum distance allowed for surface flow before reaching the first inlet in a pipe collection and conveyance system unless approved by the City Engineer.

9. At sump locations, the maximum water depth shall not exceed twelve (12) inches above the top of the curb, or eighteen (18) inches above the top of the inlet grate, whichever is less, when considering the one hundred (100) year frequency rain event.

10. Where sump inlet and piping collection and conveyance systems are used, provisions for an emergency overland overflow shall be provided sized adequate to convey the total flow from a one hundred (100) year rain event assuming a complete blockage of the sump inlet structure.

11. Runoff volumes generated from areas greater than one acre located outside the roadway right-of-way or easement shall be intercepted by a conveyance system before it discharges onto the roadway surfacing. Parking lots shall incorporate internal drainage systems so as to reduce concentrated surface flow into streets. This requirement does not apply to single-family residential lots.

12. Curb or surface type inlets shall be located at intersections in such a manner so as to intercept curb or overland drainage flows prior to crossing the intersection. Curb inlets placed at intersections shall be located such that they do not encroach upon any area within a curb return. No drainage structure shall be permitted at an A.D.A. accessible ramp location.

13. Inlet or overland drainage areas, runoff volumes generated by a five (5) year and one hundred (100) year frequency rain event, time of concentration, bypass volumes, and selected inlet design for each structure shall be summarized and tabulated on the construction plans developed for the project. This summary table shall also be a part of the drainage calculations found in the supporting Master Drainage Report developed and submitted to the City for review and approval covering the overall project. The flow volumes and velocities for each section of piping and those related to any natural or improved channel shall be summarized and tabulated in a similar format and made a part of the Master Drainage Report. If a proposed development contains or is impacted by a regulatory floodplain area within or immediately adjacent to its boundary, then a hydrologic and hydraulic analysis of the existing and proposed stormwater management system shall be performed and provided to the City Engineer as part of the overall Master Drainage Report developed for the project. The purpose of such hydrologic and hydraulic analysis is to demonstrate that

the development of the project site will result in no net negative impact on surrounding or downstream properties related to stormwater run-off volumes, velocities, and upstream or downstream water surface elevations associated with a one hundred (100) year storm event.

14. All proposed improved open flow trapezoidal channels shall be designed incorporating a concrete lined low-flow trickle channel. Low-flow trickle channels shall be designed and located to intercept the flows from any storm sewer piping discharging into the improved channel. The minimum depth of the low flow channel shall be a minimum of six inches lower than the adjacent main channel bottom elevation. The minimum cross slope on the bottom of the trapezoidal channel shall be two percent (2%).
    All improved open channels shall be contained within a public or private drainage easement of sufficient width to allow access to both sides of the channel in order to accommodate periodic maintenance activities.

15. Roughness coefficients incorporated in the design of drainage structure, piping, and natural or improved channels shall be as listed in Tables 5-5 and 5-6, and figure 5-5, pages 109 through 123, of "Open Channel Hydraulics" by Ven Te Chow (published by McGraw-Hill Book Company, 1959, or latest edition).

16. The minimum flow velocity in any element of a proposed drainage system shall be 2.0 feet per second for the conveyance of stormwater run-off volumes generated by storm events of five-year frequency and greater. The maximum design flow velocity within a piping conveyance system shall be limited to thirty (30) feet per second. The maximum design flow velocity in an unlined improved open channel shall be limited to six (6) feet per second or the erodible limits of the natural soils type existing at the location. The maximum design flow velocity within a fully lined improved open channel shall be limited to twenty (20) feet per second.

17. Culvert piping shall be sized using either Kutters or Mannings hydraulic charts or nomographs and the Oklahoma Department of Transportation inlet control charts, based on the required design flow. The slope used for culvert design sizing shall be the proposed gradient of the invert of the piping.

18. No stormwater conveyance piping or improved channel shall be designed to accept discharge volumes from upstream structures that have a diameter or effective end area greater than the pipe or channel receiving the discharge volume.

19. Reinforced concrete pipe used in stormwater conveyance systems shall not be less than C-76 Class III. Corrugated metal piping used in stormwater conveyance systems shall meet Oklahoma Department of Transportation wall thickness gauge and corrugation dimensional requirements based on anticipated fill heights, and shall be bituminous coated and fully lined.

20. At junction structure or manhole locations having different upstream and downstream pipe diameters, the top inside elevation of the downstream accepting pipe shall equal the top inside elevation of the upstream discharge pipe.

21. An accessible manhole or junction structure shall be required at all changes of pipe flowline grade, changes in horizontal piping alignment, and at junctions between two or more different piping diameters.

22. The minimum horizontal distance between stormwater piping being placed in a common trench shall be a minimum of two (2) feet or one half of the diameter of the larger pipe, whichever is greater. This minimum spacing requirement shall also apply to multiple pipe culvert applications.

23. The minimum inside pipe diamenter used for any stormwater conveyance piping system shall be fifteen (15) inches. Any proposed use of piping having an inside diameter less than fifteen (15) inches shall require approval by the City Engineer.

24. Radius type piping shall not be allowed for stormwater conveyance systems having an inside diameter of thirty six (36) inches or less. Radius type piping shall be allowed on stormwater piping conveyance systems having an inside diameter of forty two (42) inches or larger. The minimum radius of the horizontal piping alignment curvature shall not be less than five (5) times the diameter of the pipe. The maximum pipe alignment deflection shall not be greater than seven and one-half (7.5) degrees per pipe joint or shall be in accordance with the pipe manufacturer's recommendation, which ever is less.

25. In all paved areas, stormwater piping systems shall be designed such that a minimum of (six) inches or cover shall be provided and maintained between the outside top of pipe and the paving subgrade elevation at any point along the length of pipe including culvert piping applications.

26. All proposed stormwater piping systems shall be shown in profile at a drawing scale adequate to clearly illustrate, top of pipe and flow line gradient, pipe diameter, and type of pipe being utuilized. Piping profiles shall illustrate the existing and finished grade along the centerline alignment of the piping. Piping profiles shall also clearly illustrate the calculated energy and water surface gradient as determined for the stormwater volume generated by the applicable design frequency storm. Pipe profile stationing shall be continuous from the bottom of the piping system continuous through manhole or junction structures and continuing along the main branch line to the top of the system. Branch piping to the main line shall be stationed starting with 0+00 at its connection with the main line then proceeding upstream to the top of the branch. Stationing for all piping profiles shall commence with the downstream structure placed on the left side of the drawing sheet proceeding upstream to the right side of the sheet.

27. The minimum inside radius allowed for the placement of a curved reinforced concrete box conveyance structure (RCB) shall be three (3) times the total outside width of the box structure or fifty (50) feet whichever is greater.

28. Any proposed reinforced concrete box culvert (RCB) structures and free span bridges shall have adequate hydraulic capacity sufficient to pass stormwater flow volumes equal to, or greater than, the one hundred (100) year fully urbanized storm event within the total upstream watershed. The design of any free span bridge shall also incorporate and provide a minimum of one (1) foot of free board between the Q100 water surface and the low cord of the bridge structure. A detailed backwater

hydraulic analysis shall be provided to demonstrate compliance with this requirement.

29. All drainage system piping discharge outlets shall be provided with standard headwall type structures of a design appropriate for the application. Outlet piping with discharge flow rates exceeding six (6) feet per second or with velocities exceeding the erodible limits of the existing soil type shall be provided with a standard energy dissipating structure or a non-standard of a design approved by the City Engineer.

30. The centerline radius of a curve in the horizontal alignment of an improved open channel shall be a minimum of three times the top width of the channel or one hundred (100) feet, whichever is greater.
    The City Engineer may grant an exception to the minimum radius of an improved open channel upon the submittal of a detailed hydrologic and hydraulic analysis that demonstrates an adequate safety factor.

31. All improved open channels shall be designed to provide a minimum of one (1) foot of freeboard above the water surface generated by the run-off from a one hundred (100) year frequency rainstorm. At all bends in the horizontal alignment of improved open channels, the amount of freeboard shall be increased by the following equation:

$$H = \frac{V^2 * b}{64.4 * r}$$

Where:
H = height of freeboard in feet
V = average velocity in feet per second
b = width of channel at water surface in feet
r = radius of curvature of channel centerline in feet.

32. Storm sewer piping constructed in or across areas of compacted fill shall only be installed after the fill material has been placed to proposed finished grade and has been fully compacted to ninety five (95) percent of standard density.

33. The maximum spacing between storm sewer manholes or junction boxes shall not exceed three hundred (300) feet for piping diameters up to and including twenty one (21) inches and four hundred (400) feet for pipe diameters greater than twenty one (21) inches.

34. All junction boxes and manholes shall be of standard design and constructed incorporating a standard manhole ring and cover installed at the design finished grade for that location as indicated on the applicable piping profile. Proposed non-standard manholes or junction boxes may be approved by the City Engineer upon submittal of satisfactory documentation as to the need and applicability of any such special design.

35. A standard manhole or junction box shall be designed and installed at the Point of Curvature (PC) and the Point of Tangency (PT) of all proposed horizontal curves in a storm sewer piping system.

36. Borrow ditches and swales located adjacent to and designed to convey surface storm drainage from public streets in lieu of the use of an underground piping system shall not be allowed.

5.2 Storm Water Detention Storage Requirements

1. Generally, the City of Glenpool maintains a policy of "No Adverse Impact" related to stormwater management involving the development and improvement of properties within the corporate limits of the City.

2. The detention and controlled release of stormwater run-off rates and volumes generated, conveyed, and discharged by any proposed development and its associated improvements shall be of a design that clearly demonstrates no resulting upstream or downstream adverse impact. From an engineering design standpoint, the required stormwater management system as a whole shall be such that the post development release rate shall be equal to or less than pre-development conditions during a five (5), ten (10), and one hundred (100) year frequency rain event. The storage volumes required during each rain event analyzed shall be equal to the calculated stormwater run-off volume increase resulting from the full urbanization of all areas within the development. The downstream discharge release rates shall be equal to, or less than, pre-development conditions during each of the required design storms.

3. The following methods are approved for use in the design of stormwater storage and management facilities:

Method	**Drainage Area**
HEC-1 Snyder' s Method	Greater than 100 acres
HEC-1 SCS Method	2 to 2000 acres
Modified Rational Approach with volume factors*	Less than 100 acres
Graphical method*	Less than 2 acres

Other similar design methods and approaches may be approved by the City Engineer.

3. US Weather Bureau Technical Paper No. 40 and National Weather Service HYDRO-35 (June, 1977) shall be used for rainfall intensities, durations, and return frequencies.

4. The watershed rainfall pattern shall be in accordance with the modeling technique selected.

5. For Snyder's synthetic unit hydrograph method, the loss rates used in the determination and development of the runoff/hydrograph shall incorporate an initial loss of 0.5 inches and a uniform loss of 0.08 inches per hour for the subsequent storm duration after the initial losses are accounted for and satisfied.

6. All assumptions and resulting engineering design calculations for proposed detention facilities and associated stormwater management improvements shall be included in a written Project Drainage Report generated for the development of any particular project and shall be submitted for review by the City Engineer. The submittal shall include unit hydrographs or other approved forms of analysis for both pre and post-

development conditions, detention facility flood stage elevations, surface area and volume relationships, outlet structure details, and flood stage elevation versus time analysis though the facility and downstream discharge velocity and erosion control considerations.

7. The intent and extent of the storm water detention and stormwater management requirements and associated improvements shall be identified at the preliminary subdivision plat stage of the project. The limits of all regulated and unregulated one hundred (100) year frequency rain event floodplain areas shall be accurately determined and illustrated on any such preliminary subdivision plat.
   All proposed storm water detention facility locations shall be fully illustrated and accurately dimensioned on the preliminary subdivision plat to demonstrate that adequate drainage reserve or easement areas are being provided for in order to accommodate appropriately designed facilities.

8. Generally, stormwater management and detention facilities shall be located in areas within or immediately adjacent to the portion of the watershed being improved in such a manner so as to minimize required periodic maintenance.

9. Stormwater detention facilities may not be located within the limits of a FEMA regulated one hundred (100) year event floodplain or any related and delineated special flood hazard area. Detention facilities may be located within flood plain areas not currently regulated by FEMA - providing the one hundred year rain event floodplain area and the associated flood hazard area are determined and delineated with the facility in place and it can be demonstrated that no rise in upstream or downstream water surface elevations offsite of the development results from the installation of the facility. Any such detention facility located within a non-regulated floodplain or special flood hazard area must be designed such that the required detention volume is stored and accommodated within the facility totally above the one hundred (100) year frequency rain event flood elevation adjacent to the facility.

10. Additional stormwater detention storage volume in excess of the required storage for a particular drainage area can be provided within a facility to satisfy the detention requirements for a tract of land in the watershed located downstream of the detention facility providing the facility is constructed prior to the development of the downstream tract.

11. All public or private stormwater detention facilities shall be designed, constructed, and maintained as a "dry" facility unless some type of special maintenance agreement, has been created, submitted to, and officially approved by the City Engineer and City Council.

12. Developers are encouraged to limit the number of stormwater detention facilities required to serve any particular project.

13. If the natural and/or post development pattern of stormwater runoff flows in several different directions through the project site, the developer is encouraged to provide the required detention storage for the overall project within the largest on-site drainage area. Additional stormwater detention storage volume necessary to satisfy the detention requirements for separate drainage areas within the same overall development tract shall be allowed within one such facility provided that:

a. The overall development is located within the same watershed;

b. The smaller sub-drainage area(s) that have required stormwater detention volumes compensated for outside of the particular sub-drainage shed, do not exceed five (5) acres in size, and do not, either singly or in combination, adversely impact the health, welfare, and safety of the downstream general public.

14. If a tract of land being developed is located in more than one drainage area, any proposed re-grading or re-contouring of the tract that diverts surface or piping system flows from one drainage area to another shall not be permitted. Compensatory stormwater storage volumes shall not be permitted in one drainage area for that required in another.

15. Stormwater detention facilities used for compensatory storage may encroach into a non-regulated floodplain or special flood hazard area provided that the overall drainage system improvements:

    a. Do not cause a rise in the water surface elevation upstream or downstream of the facility;

    b. Do not adversely impact adjacent properties due to an increase in discharge and overland conveyance velocities.

    c. Provide all required stormwater volume storage above the base flood elevation adjacent to the facility

16. Stormwater detention facilities designed having levies, dikes, and spillways shall have typical cross sections drawn to scale and fully detailed on the associated construction documents.

17. Side slopes on detention facilities shall generally not be steeper than 4:l (horizontal:vertical). Steeper side slopes may be considered by the City Engineer should the site conditions necessitate. However, methods for proper temporary and permanent soil erosion control must be specified and clearly illustrated on the supporting construction documents.

18. All proposed stormwater detention facilities shall be provided with a low flow trickle channels from all inlet headwalls connecting with the outlet structure to transmit low flows and minimize soil erosion. All low-flow trickle channels shall be: concrete lined; of sufficient width and geometry to allow for proper maintenance; and approved by the City Engineer.

19. All proposed stormwater detention facilities shall be fully contained within standard drainage easements dedicated to the public or to the City of Glenpool by the applicable subdivision plat or by separate instrument as approved by the City Engineer.

20. A public access easement a minimum width of twenty (20) feet shall be dedicated to the public or the City of Glenpool by subdivision plat or by separate instrument

created and configured to provide access to any detention area for maintenance purposes as may be approved by the City Engineer. The associated roadway providing access to the stormwater detention facility shall have a maximum grade of ten (10) percent. The access road shall be paved a minimum of twelve (12) feet in width and shall extend from an adjacent street or roadway to the top of the bank or levy of the detention facility.

The improved roadway shall also extend into the detention facility in such a manner as to provide access to locations requiring high levels of maintenance.

21. If the detention facility is designed to serve additional areas outside the subdivision in which it is located, such additional areas shall be specifically identified in the Project Drainage Report submitted to and approved by the City Engineer.

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22. Outlet structures and/or spillways on stormwater detention facilities shall be designed and constructed to pass the runoff volume generated by a five hundred (500) year storm event and shall incorporate a minimum of one (1) foot of freeboard within the facility to prevent over-topping in uncontrolled areas. All detention facilities shall meet the Oklahoma Water Resources Board's requirements for the design of small dams.

23. All earthen slopes and areas subject to soil erosion related to a stormwater detention facility shall be solid sodded with Bermuda sod or protected with other erosion control measures as may be approved by the City Engineer. All such exposed earth surfaces protected by the installation of solid sod shall have an established growth of Bermuda grass or other approved species and shall be in an established growing condition prior to the approval the facility.

24. All proposed stormwater detention facilities shall be environmentally sound and be designed such as to be compatible with the area (neighborhood). Where feasible, such facilities shall be designed and configured to promote open space and/or recreational uses for the facility.

25. The maintenance responsibility for all on-site detention facilities shall belong to the private sector. Should a developer or other private entity wish to dedicate a particulat stormwater detention facility to the public or the City of Glenpool, a written request shall be submitted to the City Engineer. Any such request shall be considered by the City Engineer with resulting recommendations sent to the City Council for final approval and acceptance.

26. All stormwater detention facilities approved by the City Council for public ownership and maintenance responsibilities shall be included in a maintenance bond or irrevocable letter of credit. Any such surety shall be in accordance with standard City policy related to public drainage and stormwater management facilities and shall be in an amount equal to one hundred (100) percent of the determined amount of construction costs for a two-year period from acceptance of the facility by the City.

5.3 Stormwater Management Detention Facility Requirements

1. Definitions:

   a. A "Regional Detention Facility" is defined as a stormwater detention facility and its related collection and conveyance system that provides compensatory storm water detention storage volume in capacities sufficient to mitigate post development stormwater runoff from all new land development within a defined drainage area.

   b. An "On-site Detention Facility" is defined as a stormwater detention facility designed and constructed on the site of a development that provides the required detention storage volume necessary to mitigate the additional stormwater runoff volume generated from that particular development.

   d. A "Major Development" is defined as any development which is designed, configured, and constructed having greater than one-half acre of impervious surfaced area.

   c. A "Minor Development" is a development which is a small commercial, office, multi-family or single family residential development having less than one half (1/2) acre of impervious surfaced area. For a single-family residential development, the future impervious surface area per lot is assumed to include a minimum area of two thousand seven hundred (2,700) square feet per building lot after the construction of a residence and supporting improvements have been completed. Impervious surfaces shall include, but not limited to, sidewalks, driveways, porches, patios, and roof tops.

2. Existing Regional Detention Facility: In drainage sheds where a regional detention facility has been previously constructed to provide compensatory stormwater detention storage volumes adequate to serve the full urbanization of the upstream areas within that watershed, then all new upsteam development shall be allowed to incorporate the regional detention facility into the design of the drainage system for that particular development.

3. Watersheds with no Regional Detention Facility: In watersheds where no regional detention facilities have been constructed, the following shall apply to new developments within that watershed:

   a. On-site detention facilities shall be required and designed such that post development stormwater runoff rates are equal to or less than pre-development conditions in all rain event return frequencies, and it can be demonstrated by engineering analysis satisfactory to the City Engineer that post development runoff rates and discharge velocities will have no adverse impact on downstream areas.

4. Maintenance Responsibility.

   a. The original developer or a legally created property owners association shall own title to and be responsible for all necessary maintenance procedures and costs related to any stormwater detention facility constructed to serve that particular development.

   b. The ownership and maintenance requirements for any such facility shall be set forth in the form of a general warranty deed along with private deed restrictions

and/or Covenants, Conditions, and Restrictions (CC&R's) created that apply to all properties within that particular development.

c. The City of Glenpool shall be a listed as a beneficiary to all such private deed restrictions insuring the City's right to perform or enforce any and all necessary maintenance activities associated with stormwater detention facilities constructed within that particular development.

6.0 SOIL EROSION AND SEDIMENT CONTROL

6.1 General

The installation of all proposed improvements associated with, and necessary to support any particular development, shall be required to be in full compliance with all elements of the City of Glenpool Erosion Control Ordinance as attached herewith both during and after completion of the construction of such site improvements.

APPENDIX