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|  |  |  |  | **Cover Sheet** |
| 1 |  |  |  | Project Name and numberProject name and number appear on the right edge of the plan coversheet |
| 2 |  |  |  | Listing of STD Details used for project |
| 3 |  |  |  | Survey Datums Listed, NAD 1983 Horizontal and NAVD 1988 Vertical |
| 4 |  |  |  | Engineering firm name, address, phone, and engineer Seal with signature & date |
| 5 |  |  |  | Vicinity Map showing entire City of Tulsa with magnified view of work location |
| 6 |  |  |  | Sheet Index |
| 7 |  |  |  | Call OKIE and Utility Contact Table (Utility Name & Phone Number) |
| 8 |  |  |  | Legend |
| 9 |  |  |  | “Director, Water and Sewer Dept.” Signature Block with Advertisement Date |
|  |  |  |  | **Construction Notes/Schedule of Quantities/Drainage Basin Map** |
| 10 |  |  |  | All construction to be in strict accordance with current City of Tulsa Standards and Specifications |
| 11 |  |  |  | Contractor will be required to vacuum test all manholes according to City of Tulsa and Development Department Standards and Specifications.  |
| 12 |  |  |  |  Standard note for traffic control & street closures |
| 13 |  |  |  | Schedule of Quantities with pay notes separate from construction notes |
| 14 |  |  |  | Contractor shall submit signed and sealed professional engineered trench excavation plan for all excavations in excess of 20 feet |
| 15 |  |  |  | Reference City of Tulsa blasting ordinance if rock excavation is expected and include a pay note stating that blasting is included as unclassified excavation. |
| 16 |  |  |  | Pay Items Match and Reference the Proper Specifications |
| 17 |  |  |  | Contractor shall repair any irrigation systems damaged during construction. Payment shall be included in Right-of-Way Clearing and Restoring. No additional payment shall be made. |
| 18 |  |  |  | Consider the impact of multiple phases of construction, over an extended time period, terminating at a single location. Modify the alignments as needed to minimize the disruption to the residential or commercial area. |
| 19 |  |  |  | Consider requirements for future access and maintenance when construction is in remote/undeveloped areas. (i.e., low water crossings, gates, access roads etc.) |
| 20 |  |  |  | General note requiring that all signal and electrical work be done by a licensed electrical contractor. |
| 21 |  |  |  | Verify that all special specifications and special provisions have been included. |
| 22 |  |  |  | New service connections to private plumbing must be constructed by a licensed plumber; reconnection of existing services or extension of service tees and risers (for future service) may be constructed by utility contractor.If any active existing service lines are cut off by removal of sanitary sewer line and manhole, contractor must reconnect service to the main. |
| 23 |  |  |  | Unsewered Areas: Include limited restoration: sod, salvage and replace fences, repair or replace irrigation systems, retaining walls and drainage structures. |
| 24 |  |  |  | Rehabilitation and other Pipeline projects: Full restoration, however, no trees replanted within easement |
| 25 |  |  |  | Contractor must ensure proper protocols in place for 24-hour monitor bypass pumping and that the contractor must complete a SOM bypass pumping form before completing any bypass pumping. |
| 26 |  |  |  | Owner’s allowance provided with reference to special provision for administration. |
| 27 |  |  |  | Concrete encasement (SPEC 319) and water table cradle (SPEC 331) only allowed with prior approval by City. |
| 28 |  |  |  | All new installed MH’s regardless of diameter will have 30” lid and cover. |
|  |  |  |  | **Drainage Basin Map** |
| 29 |  |  |  | Drainage Basin Map shall clearly define all areas tributary to the subject property and/or proposed sewer main. Show calculation of ordinance flow. |
| 30 |  |  |  | Sewers shall be sized and located to accommodate future build out of drainage basin |
|  |  |  |  | **Survey Data Sheet** |
| 31 |  |  |  | Include overall plan view showing manhole numbers and control point locations |
| 32 |  |  |  | State Plane Coordinates on all proposed and existing manholes along with distance and bearing to next manhole. |
| 33 |  |  |  | USGS Elevations using NAVD 1988 datum and Horizontal control using NAD 1983 datum |
| 34 |  |  |  | Locate and identify property pins on the Survey Data Sheet. |
| 35 |  |  |  | Minimum of two land ties (property pin, permanent or temp monument) providing hor./vert. control at each end of project and two land ties (section corners) at each section crossing Survey Data Table (description, location, and coordinates); Table of manhole coordinates (MH #, X, Y, Z) |
| 36 |  |  |  | All Right of Way Maps and Survey Data Sheets shall be sealed by a Professional Land Surveyor Licensed to practice Surveying in the State of Oklahoma. |
|  |  |  |  | **Right-of-Way Sheet** |
| 37 |  |  |  | Show ROW and easements (include width and bearings if unplotted) with book and page or plat number |
| 38 |  |  |  | Show ownership name and legal description |
| 39 |  |  |  | Confirm dedicated ROW on unplotted properties |
| 40 |  |  |  | Verify width of ROW is sufficient for size of pipe and depth of excavation |
| 41 |  |  |  | Provide table of all required easements listing ownership and date signed or book and page number |
| 42 |  |  |  | All Right of Way Maps and Survey Data Sheets shall be sealed by a Professional Land Surveyor Licensed to practice Surveying in the State of Oklahoma. |
|  |  |  |  | **New Construction Plan and Profile Sheets** |
| 43 |  |  |  | Appropriate current City of Tulsa Title Block (Water and Sewer vs. Development Services) with advertisement date |
| 44 |  |  |  | Profile to dictate position of North Arrow (rising grade from left to right) |
| 45 |  |  |  | Atlas Page Number |
| 46 |  |  |  | Benchmarks on each sheet |
| 47 |  |  |  | Call OKIE on each sheet |
| 48 |  |  |  | Lettering height 0.10” minimum |
| 49 |  |  |  | New Construction shown in bold font |
| 50 |  |  |  | Streets, subdivisions, addresses shown on P&P sheets providing location of proposed work. |
| 51 |  |  |  | All pipelines stationed and manholes labeled; Use match lines where appropriate |
| 52 |  |  |  | For unimproved area, projects need to ensure year-round accessibility to manholes, and pipeline for maintenance purposes. This may include access road, low water crossings, establishment of drainage etc. as needed. |
| 53 |  |  |  | For channel or creek crossings:* Rip rap the channel over the cut.
* All creek crossings shall require encasement of the utility, steel conduit is acceptable per ODEQ.

 Use SDR 26, manhole to manhole  |
| 54 |  |  |  | Aerial Crossings are discouraged and require special approval by the Water and Sewer and SOM.  If an aerial crossing is unavoidable, the following is required:* Design calculations, both static and dynamic structural design, (including impact stability during flooding) prepared by a PE experienced in sewer/structural design.
* Utility be placed within a steel conduit.
* Restrained joint non-metallic sewer pipe (bell harness megalugs on SDR26 PVC or Fused DR17 HDPE)
* Geotech report showing the strata and depth the deep foundations are penetrating.
* Type of deep foundations in center and type of deep or shallow footing into banks (H piles, concrete piers, drilled shafts, spread footings, etc.)
* Maximum spacing of foundations
* Pile cap design showing strap and anchor bolt material and sizes.

Must conform to ODEQ regulation 252:656-5-4 (d) |
| 55 |  |  |  | * Show FEMA A-Zone and Regulatory Floodplain
 |
| 56 |  |  |  | Water and sanitary sewer separation (outside to outside of pipes) to be minimum two (2) feet vertical and ten (10) feet horizontal per ODEQ regulations. When it is impossible to obtain above clearances, the sanitary sewer shall be designed and constructed equal to water pipe. Include plan note: “Sanitary sewer shall be pressure tested to ensure water tightness of joints adjacent to the water line after backfilling.” |
| 57 |  |  |  | Pothole high-pressure gas pipelines at all crossings |
| 58 |  |  |  | List contact name, phone number, and necessary advance notification time for all impacted utilities and agencies |
| 59 |  |  |  | Show service tees in profile with station, size and direction |
| 60 |  |  |  | Service line 8” or larger must connect to manhole crown to crown either through direct entrance or through a drop. Flow calculation to justify size must be provided. |
| 61 |  |  |  | Maximum depth for service connections to a property is 16 feet |
| 62 |  |  |  | Direction arrows on sewer line |
| 63 |  |  |  | Limits of pavement removal and replacement shown on plan view |
| 64 |  |  |  | Street features and special backfill requirements shown in profile |
| 65 |  |  |  | Sufficient survey data to reconstruct curbs and streets |
| 66 |  |  |  | PVC, SDR 26 or other approved pipe material required in fill areas and within street ROW. Backfill/fill compacted to 95% Standard Proctor Density |
| 67 |  |  |  | Type “A” aggregate backfill entire trench under all paved driving surfaces |
| 68 |  |  |  | Sufficient depth of main to serve all intended properties (check cleanout elevations) |
| 69 |  |  |  | Service tee depth sufficient for service line to clear utilities and maintain cover at ditches  |
| 70 |  |  |  | Sufficient capacity to serve the entire upstream drainage basin (based on revised ordinance flow equation) |
| 71 |  |  |  | Capacity to serve other basins if described in the Comprehensive Plan |
| 72 |  |  |  | Provide stub-outs for future extensions per Comprehensive Plan |
| 73 |  |  |  | Note locations where property owner is required to install backflow preventer (if building site is below the upstream/downstream manhole rim). |
| 74 |  |  |  | Two-foot contour lines shown on plan view (existing [dashed] and proposed [solid]) |
| 75 |  |  |  | Manhole spacing to be no greater than 500 feet. Longer spacing may be allowed on sewers 12” I.D. and greater per ODEQ specifications. |
| 76 |  |  |  | All New Manholes shall have 30” Lids and Covers and No Steps |
| 77 |  |  |  | Sufficient pipeline slope considering minimum velocity of 2.0 FPS for 12” and smaller lines, 3.5 FPS for 15” and larger lines. (Max. slope 8%) \*See attached table for Slope Calculations  |
| 78 |  |  |  | Existing utilities and features in plan view, include stationing of features in profile view |
| 79 |  |  |  | Conduit extended from ROW to ROW under all arterial streets |
| 80 |  |  |  | All conduits shall be steel with 3/8” wall thickness \*\*See attached table for Conduit Sizing  |
| 81 |  |  |  | Pipe length, I.D. and slope identified |
| 82 |  |  |  | QA/QC for Schedule of Quantities; Match with items listed in proposal |
| 83 |  |  |  | Detail existing manhole connection  |
| 84 |  |  |  | For manholes located in FEMA and/or City of Tulsa regulatory100-year floodplain, provide standard 5’ diameter manhole elevated 1’ foot above grade and add note: The manhole lid should be 3200 Series Composite Utility Access Cover with Quarter Turn Paddle locks manufactured by EAST JORDAN per City standards for manholes in floodplain. |
| 85 |  |  |  | Provide offset dimensions of sewer line from properly line |
| 86 |  |  |  | Allow for alternate pipe materials except where restricted |
| 87 |  |  |  | Consider and account for safety at schools, playgrounds, etc. |
| 88 |  |  |  | Service connections can only be provided on mains 12" ID and smaller (>12" ID with SOM approval) |
| 89 |  |  |  | All concrete manholes associated with mains 15” ID (5’ ID MH or Larger) and larger shall have interior epoxy coating |
| 90 |  |  |  | Match manhole diameter to appropriate pipe size (8” - 12” pipe: 4ft ID; 15” - 21” pipe: 5ft ID; 22” - 36” pipe: 6ft ID) |
| 91 |  |  |  | Manholes with less than 4.0’ depth from top of rim to top of pipe shall require a special structure (5’ I.D. Flat Top MH).  |
| 92 |  |  |  | For inside drops 2’ or less from invert hydraulic (beaver) slide to be called out on plan and detail provided. |
| 93 |  |  |  | Provide restoration details of retaining walls, improved channels, and other special structures |
| 94 |  |  |  | Sewers to project a minimum of 15.0 feet into the property to be served and must terminate in a manhole. Lamp-holes are not allowed unless approved by SOM. |
|  |  |  |  | **Rehabilitation Plan and Profile Sheets** |
| 95 |  |  |  | Proper reference to Rehabilitation Specifications |
| 96 |  |  |  | Plan and Profile shown for all open cut pipelines |
| 97 |  |  |  | All piping connections for HDPE shall be by fusion. Service reconnects shall use fusion saddles. |
| 98 |  |  |  | When a full line rehab is completed, drops shall also be replaced. Drop replacement shall be included as a separate pay item |
| 99 |  |  |  | When a Type F manhole rehab is completed, lid and cover shall be 30” and no steps shall be installed |
| 100 |  |  |  | When at all possible, Lamp holes should be replaced with manholes. If not possible, lamp holes should be replaced when full line rehabs are completed. |
| 101 |  |  |  | Confirm sufficient capacity exists for all rehabilitation methods that reduce cross sectional area |
| 102 |  |  |  | Cost efficiency of multiple point repairs versus pipe lining |
|  |  |  |  | **Invert Detail Sheet(s)** |
| 103 |  |  |  | Details of all manhole inverts |
| 104 |  |  |  | Show to scale, manhole diameter, pipe O.D., invert, minimum radius of invert (per Standard 366), and list deflection angles. |
| 105 |  |  |  | Allow 1.0-foot clear space between O.D.’s of adjacent pipe. |
| 106 |  |  |  | No manhole steps shall be installed unless directed by City. |
|  |  |  |  | **Reviews** |
| 107 |  |  |  | SOM |
| 108 |  |  |  | Field Engineering |
| 109 |  |  |  | Water Design |
| 110 |  |  |  | Storm Water Design |
| 111 |  |  |  | Transportation Design |
|  |  |  |  | ***Infrastructure Management*** |
| 112 |  |  |  | Park Department |
| 113 |  |  |  | Surface Drainage |
|  |  |  |  | ***River Parks Authority*** |
| 114 |  |  |  | Local County Agency |
| 115 |  |  |  | OWRB |
|  |  |  |  | ***Release Letters Required*** |
| 116 |  |  |  | Utility Coordination |
| 117 |  |  |  | Right of Way |
|  |  |  |  | ***Permits (as required)*** |
| 118 |  |  |  | Corps of Engineers |
| 119 |  |  |  | Levee Authority |
| 120 |  |  |  | Railroad Crossing |
| 121 |  |  |  | ODOT |
| 122 |  |  |  | Turnpike Authority |
| 123 |  |  |  | Engineering Report Form for ODEQ Permit for construction (New sewer or increased capacity only) |
| 124 |  |  |  | NPDES (SWP3 required for all projects disturbing one (1) acre or more; NOI and NOT form to be completed by contractor) |
| 125 |  |  |  | Watershed Development Permit if constructing within floodplain |
|  |  |  |  | ***Design Criteria*** |
| 126 |  |  |  | All City of Tulsa Design Criteria met |
| 127 |  |  |  | All ODEQ Design Criteria met |
| 128 |  |  |  | All ODOT Design Criteria met |
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| **Sanitary Sewer pipe size versus minimum slope requirements** |
| Pipe Size (inches) | 8 | 10 | 12 | 14 | 15 | 16 | 18 | 21 | 24 |
| Min. %Slope\* | 0.40 | 0.29 | 0.22 | 0.17 | .44  | .41 |  .35 | .28 | .235 |

\*8”-14” pipes are designed to velocity of 2 fps. 15” and up are designed to 3.5 fps

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| **Conduit Sizing (inches) Wall Thickness minimum 3/8”** |
| Carrier Pipe Size | 6 | 8 | 10 | 12 | 14 | 15 | 16 | 18 | 20 | 24 | 30 | 36 | 42 | 48 |
| Conduit Size | 20 | 20 | 24 | 24 | 30 | 30 | 30 | 36 | 36 | 42 | 48 | 54 | 62 | 68 |