

**CITY OF IRVING  
CONSTRUCTION PLAN REVIEW**

*This list will need to be submitted by the engineer/developer with  
generated construction plans.*

*For a pre-development meeting:*

**CONTACT: Building Inspections 972-721-2371**

LEGAL DESCR: \_\_\_\_\_ PROJECT: \_\_\_\_\_  
 ENGINEER: \_\_\_\_\_ CONTACT: \_\_\_\_\_  
 PHONE: \_\_\_\_\_ FAX: \_\_\_\_\_  
 OWNER: \_\_\_\_\_ CONTACT: \_\_\_\_\_  
 PHONE: \_\_\_\_\_ FAX: \_\_\_\_\_

DATE PLANS SUBMITTED TO CITY FOR REVIEW: \_\_\_\_\_

<b>A. GENERAL</b>			
<u>ENGR</u>	<u>CITY</u>		
		1.	Plans submitted on 22" x 34" sheets.
		2.	Submittals from Consulting Engineers: Four (4) sets of plans and a PDF copy for each review; One (1) extra set required if flood plain issues exist. Five (5) sets of plans after final approval if Public Contracts are required. Submittals from City of Irving In-House Design Team: Ten (10) sets of plans for each internal review session.
		3.	Title block shown on each sheet (excluding cover) with plat & project name.
		4.	Include plat in plan sets.
		5.	Texas Board of Professional Engineer's Firm Number Required.
		6.	Professional seal, signature, and date on each sheet after all City comments have been addressed and plans are approved.
		7.	Submittals for Consulting Engineers only: The second sheet in the plan set (immediately after cover sheet) shall be a copy of latest Preliminary/Final Plat, either filed with the County or submitted for approval.
		8.	Easements shown correspond with locations of proposed public utility lines. If utilities will not be within easements, then additional easements, either by separate instruments or by amended plat, will be required prior to construction. (Abandonments are always by separate instrument.)
		9.	Provide easements by separate instrument as required for off-site utilities.
		10.	North arrow and scale shown on each sheet. Minimum horizontal scale for 22" x 34" plan sheets shall be 1"=20'. Use Bar Scales on plans.
		11.	Coordinate and right-of-way sheet(s) with Benchmarks, coordinate control, and found right-of-way monumentation tied to the City GPS NAD 83 Texas North Central State Plane coordinate system. Northing and Easting coordinates shall have precision to two decimal places. Vertical datum shall have precision to two decimal places.
		12.	Minimum size for all lettering is 0.1" for proposed features and 0.08" for existing features on 22" x 34" sheets. Suggest Simplex font for readability when plans reduced to 1/2 size sheets.
		13.	Lot Grading Plan shall be included in plans as applicable.

		14.	Written permission or easement from adjacent owner required if grading/earthwork encroaches adjacent property.
		15.	General Notes include that a Traffic Control Plan in accordance with the latest Texas Manual on Uniform Traffic Control Devices must be submitted by the Contractor & approved by the Traffic & Transportation Department prior to starting construction.
		16.	A "Recommended Erosion Control Plan" shall be included in the plans. Show erosion control measures (i.e. BMP's) to limit sediment discharge from the site.
		17.	Provide SWPPP in a bound notebook with the final set for disturbed areas greater than 1 acre. Include a NOI for disturbed areas greater than 5 acres.
		18.	Show proposed street light locations shown on a separate plan. A contract between ONCOR and the Developer/Owner for installation of street lights shall be signed prior to final acceptance of the project.
		19.	General Notes for private development projects shall include the following: "The Contractor shall be responsible for providing Performance, Payment & Maintenance Bonds for 100% of the value of the proposed public work (i.e. for all water, wastewater, storm drainage, pavement, sidewalks, etc.). Maintenance Bonds shall be for two (2) years from the date of acceptance by the City."
		20.	General Notes shall include the following: "The City of Irving's Inspector overtime policy allows the Contractor to work from 7 a.m. to 6 p.m., Monday through Saturday. No work is allowed on Sundays. Overtime charges (per hour) shall be paid by the Contractor to the City for work outside the normal work day & week (i.e. 8 a.m. to 5 p.m., Monday thru Friday). Saturday work requires a four (4) hour minimum O.T. charge. The Contractor must notify the Inspector by noon Thursday if the Contractor wants to work on the following Saturday."
		21.	Are TxDOT, DCURD, USACOE, TCEQ, DART, TRE, etc. permits required? Yes _____ No _____ If yes, provide a list of necessary permits.
		22.	List City standard detail sheets. Do not create new details without prior coordination.
		23.	All material call-outs on the plans shall meet the latest City of Irving Approved Products List and Specifications unless approved otherwise by the City Engineer.
		24.	Proposed grading shall produce a "top of ground" slope no steeper than 4 to 1 (horizontal to vertical.)
		25.	Show existing contour lines with dashes and proposed contour lines with solid lines. Same for other existing & proposed features & improvements.
		26.	Show names and phone numbers of utility company contacts that have utilities in the area on each plan sheet.
		27.	No structures, including signs and walls with foundations shall be allowed in utility easements.
		28.	Show location of existing and proposed water lines on each plan sheet.

		29.	Show location of existing and proposed wastewater lines on each plan sheet.
		30.	Show location of existing and proposed storm drainage lines and inlets on each plan sheet.
		31.	Show location of existing and proposed pavement and R-O-W on each plan sheet.
		32.	Show all lot and block numbers, addresses and property owners.
		33.	Show location and clearance of all franchise utilities, especially gas/petroleum lines.
		34.	Show location, width, and type of easements.
		35.	Any panel of street pavement which is required to be open cut shall be fully removed and replaced. Or a trench cut pavement repair may be allowed with the installation of a full width asphalt overlay of the street from intersection to intersection.
<b>B. COVER SHEET</b>			
		1.	Show location map of project.
		2.	Show index to drawings.
		3.	Show name, address, and telephone number of the Developer/Owner.
		4.	Show name, address, and telephone number of the Engineer.
		5.	Show Engineering Firm's License number.
		6.	Show Project Name and Final Plat on cover sheet.
<b>C. WATER SYSTEM IMPROVEMENTS - PLAN VIEW</b>			
		1.	<b>Verify with City</b> that proposed water system meets the requirements of the Master Water Distribution System Plan.
		2.	Size, type, and pressure class of all proposed water mains identified.
		3.	Show General Notes for water system construction: No water jetting allowed.
		4.	Show location, size, material & date constructed of all existing on-site water mains.
		5.	Show location and size of all existing off-site water mains within 200' of property.
		6.	Include each standard construction detail of required water service line.
		7.	Water mains shall be stubbed out to undeveloped adjacent property according to the Master Water Distribution System Plan.
		8.	Dimension proposed water main from the back of curb to centerline of pipe. Stationing shall be shown as station/offset from centerline of R-O-W.
		9.	Proposed water mains shall be a minimum of eight inches (8") in diameter. Fire hydrant leads two hundred feet (200') or less may be six inches (6") in diameter.
		10.	Fire hydrant leads and lateral leads to a double detector check, shall not be tapped for domestic services except for irrigation.

		11.	Water mains shall not be concrete encased without written permission of the City Engineer.
		12.	Proposed water mains shall be located in such a manner and to minimize the replacement of pavement. Typically, new water mains shall be installed in the parkway, within a zone between two feet (2') from the back-of-curb and two feet (2') from the right-of-way line.
		13.	Proposed water mains crossing under Freeways, Principal Arterials, Major Arterials, and Minor Arterials as defined by the latest edition of the Master Thoroughfare Plan shall be steel encased. The encasement shall extend into the parkway two feet (2') from the back-of-curb. Split encasement shall not be allowed unless approved otherwise by the City Engineer.
		14.	Proposed water mains crossing under railroads/DART light rail shall be steel encased through the entire railroad right-of-way.
		15.	Proposed water mains crossing under creeks, ditches, or storm box culverts shall be steel encased.
		16.	Water mains shall have a minimum of 4 feet of cover.
		17.	Water mains shall have a minimum horizontal clearance of 4 feet and minimum vertical clearance of 2 feet from other utilities or structures unless approved otherwise by the City Engineer.
		18.	<b>Blow-Off Valves</b> – Blow-off valves shall be installed at low points along water transmission mains to drain the mains for 16-inch diameter and greater.
		19.	<b>Air And Vacuum Release Valves</b> – Air and vacuum release valves shall be installed at high points along water transmission mains to exhaust trapped air and relieve vacuums from the system for 16-inch diameter and greater.
		20.	Access points shall be installed a maximum of every 1,000 feet for water mains 16-inch diameter and greater.
		21.	Proposed water services to be centered on each lot. If standard location is not practical, proposed water services shall be dimensioned to lot corners.
		22.	Show legend identifying existing & proposed lines.
		23.	All proposed water system must be fed from at least (2) locations (i.e. looped), unless otherwise approved.
		24.	Water valves shall be placed along the main such that not more than one fire hydrant would be out of service if two consecutive main line valves were closed.
		25.	Main line valves shall not be spaced greater than 1,000 feet apart.
		26.	Show Fire Hydrants: Residential: 500' along the main. (250' maximum hose laying length); Non Residential: 300' along the main. (150' maximum hose laying length)
		27.	Proposed fire hydrants may be alternated from one side of the street to the other with approval from the City Fire Marshal.
		28.	Proposed fire hydrants shall be located a minimum of 35 feet from the beginning of a curb return of a cul-de-sac.

		29.	Proposed fire hydrants shall be located a minimum of 35 feet from the mid-point of the curb return of an intersection.
		30.	All fire hydrants have a clear 36" operating radius for the top nut.
		31.	Fire hydrants located 2'-6" to 8'-6" behind the pavement edge or back of curb and shall <b>NOT</b> be located in the sidewalk.
		32.	Water lines to be steel encased when located between two residential lots.
		33.	Meters can only be ¾", 1", 1-1/2", 2", 4", 6" and 8 inches in size. Meters greater than 8" will require special approval. Vaults are required for meters 4-inch and larger. Meters less than or equal to 2-inch must be purchased from the City.
		34.	Combination fire and domestic water meters shall be a minimum of 6-inch diameter in a vault located within a utility easement next to the ROW.
		35.	Fire lines that are separate from the domestic service and are for sprinklers and hydrants shall be connected at the City main with a minimum 4-inch double check detector assembly (DCDA) in a vault next to the ROW. Show a City-installed ¾" detector meter next to the DCDA vault.
		36.	Fire lines on Private Property will require a Private Fire Line Service Agreement with City and provide an easement around the DCDA.
		37.	Three valves required at all street intersection Tees. Offset tees shall be used in lieu of crosses.
		38.	Show valve at end of lines for future development. Also, extend line one (1) pipe length beyond valve and plug end.
		39.	Grout or remove all existing water mains to be abandoned.
		40.	All buildings that will require temporary water for chillers or fire watch for water shut offs have been identified on the plans.

**D. WATER SYSTEM IMPROVEMENTS – PROFILES**

		1.	Profile proposed water lines crossing channel/ditch sections.
		2.	Profile shall be provided for water mains 12" or greater. For clarity, smaller diameter mains may also be required to be profiled if so directed by the City Engineer.
		3.	Show crossings of existing and proposed utilities.
		4.	Street crossings and existing driveway crossings are preferred by bore, not open cut

**E. WATER SYSTEM IMPROVEMENTS – DETAILS**

		1.	Water system construction details meet all City detail requirements.
		2.	Show standard trench backfill details and state compaction requirements.

**F. WASTEWATERWASTEWATER SYSTEM IMPROVEMENTS - GENERAL**

			<b>Verify with City</b> that the proposed wastewater system improvements meet the requirements of the Wastewater Collection System Master Plan
		1.	General notes for wastewater system construction: No water jetting allowed.

<b>G. WASTEWATER SYSTEM IMPROVEMENTS - PLAN VIEW</b>			
		1.	Show location, size, material, and date constructed of all existing on-site wastewater mains.
		2.	Show location and size of all existing off-site wastewater lines within 200' of property shown.
		3.	Show dimensions from lot lines to service lines if service line is not in standard location (10' downstream of centerline of lot).
		4.	Show locations of existing and proposed water mains (Dimensioned from back of curb and Centerline of ROW).
		5.	Show locations of existing and proposed storm drainage lines and inlets.
		6.	Wastewater mains shall have a minimum horizontal clearance of 4 feet and minimum vertical clearance of 2 feet from other utilities or structures unless approved otherwise by the City Engineer.
		7.	Location, width, and type of easements.
		8.	Wastewater lines stubbed out with a manhole to undeveloped adjacent property.
		9.	Proposed wastewater line dimensioned to centerline of street.
		10.	Utility plan and profile stationing shall be shown as station/offset from street or R-O-W centerline stationing.
		11.	Proposed wastewater lines shall be a minimum of eight inches (8") in diameter unless approved otherwise by City Engineer.
		12.	Manholes identified by baseline station and northing and easting coordinates.
		13.	Legend identifying existing and proposed features.
		14.	Manholes located at 500' maximum spacing and at all wastewater line intersections, grade changes, alignment changes and at the end of stubs greater than 250'.
		15.	Wastewater systems shall comply the latest requirements of the Texas Commission on Environmental Quality (TCEQ), as defined in the Texas Administrative Code, Title 30: Environmental Quality, Part 1: Texas Commission on Environmental Quality, Chapter 217: Design Criteria For Domestic Wastewater Systems, Subchapter C: Conventional Collection Systems.
		16.	Label drop connections and/or watertight manhole covers.
		17.	Show benchmarks (tied to the City datum) on all sheets.
		18.	Six inch service with a manhole required for all Commercial connections.
		19.	Provide Wastewater service area map (i.e. drainage area map) and flow calculations for development greater than 2 acres and/or where wastewater extension is proposed.
		20.	Trenchless installation methods for pipe replacement/rehabilitation (pipe bursting, cured-in-place pipe, etc.) shall be utilized only with pre-CTTV report and written approval of the City's Engineer.

		21.	Proposed wastewater lines six-inches (6") in diameter or greater crossing under Freeways, Principal Arterials, Major Arterials, and Minor Arterials as defined by the "Master Thoroughfare Plan" shall be steel encased. The steel encasement shall extend into the parkway two feet (2') from behind the back-of-curb. Split encasement shall not be allowed unless approved otherwise by the City Engineer.
		22.	Proposed wastewater lines crossing under railroads/DART light rail shall be steel encased through the entire railroad right-of-way. Split encasement shall not be allowed unless approved otherwise by the City Engineer.
		23.	Proposed wastewater lines crossing under creeks, ditches, or storm box culverts shall be steel encased. Split encasement shall not be allowed unless approved otherwise by the City Engineer.
		24.	Concrete encasement is not allowable unless specific written exception is granted by the City's Engineer.

#### H. WASTEWATER SYSTEM IMPROVEMENTS - PROFILE VIEW

		1.	Proposed grades are equal to or greater than TCEQ minimum established grades and velocity in line does not exceed 10 fps.
		2.	Show elevation of existing and proposed ground at centerline pipe.
		3.	Show rim and flow line elevations at each manhole. Give flow lines for all pipes.
		4.	Show flow line elevations at 50-foot intervals (Max).
		5.	Show length, type, and size of pipe between manholes.
		6.	Show location and elevation of water mains crossed by wastewater line.
		7.	Show location and elevation of storm drainage lines crossed by wastewater line.
		8.	If approved, show locations of concrete encasement and/or concrete caps.
		9.	Show location and elevation of existing and/or proposed pavement sections crossed.
		10.	Indicate vertical scale of drawing.
		11.	Vertical and horizontal clearance between utilities meets current TCEQ requirements.
		12.	Show 100-year water surface elevation for ultimate conditions located in flood prone areas.
		13.	Street crossings are preferred by bore, not open cut. If open cutting a concrete street, pavement shall be removed & replaced to the closest adjacent saw joint or expansion joint.
		14.	Drop connections to manholes shall be exterior.
		15.	Show crossings of existing and proposed utilities.
		16.	Grout or remove all existing wastewater mains to be abandoned.
		17.	If the Wastewater system is within the 100 year flood plain, bolted water tight lids are required.
		18.	Vents are required every 1500 feet of continuous water tight manhole lids.

		19.	Call out vertical feet of extra depth for manholes deeper than 8'.
		20.	For mains deeper than 15 feet, SDR-26 is required.
<b>I. WASTEWATER SYSTEM IMPROVEMENTS – DETAILS</b>			
		1.	Standard Construction Detail of service line.
		2.	Wastewater system standard construction details meet all City requirements.
		3.	Manholes do not require steps.
		4.	Show standard trench backfill details and specify compaction requirements.
		5.	Drop manholes; show drop outside of manhole.
		6.	Show diameter of proposed manholes(4-foot minimum). Manhole covers shall have a 30" minimum diameter.
<b>J. STORM DRAINAGE IMPROVEMENTS - DRAINAGE AREA MAP</b>			
		1.	Proposed drainage improvements are in accordance with any existing City Drainage Plan/Study for the drainage area.
		2.	Show existing and proposed storm drainage lines and inlets.
		3.	Indicate sub areas for each inlet or set of inlets and off-site areas draining into the site.
		4.	Indicate land use zoning for all drainage areas.
		5.	Show time of concentration for each drainage sub area.
		6.	Indicate design runoff, "Q", at all inlets, dead-end streets, and alleys or to adjacent subdivisions or undeveloped tracts.
		7.	Provide for the appropriate Design Storm Frequency (DSF): 1) Storm Sewers for Residential, Commercial and Manufacturing areas – DSF is 25 years & maximum time of concentration of 30 minutes; 2) Culverts, Bridges, Channels & Creeks for any type of area less than 100 acres – DSF is 25 years & maximum time of concentration of 30 minutes; 3) Culverts, Bridges, Channels & Creeks for any type of area more than 100 acres and less than 640 acres – DSF is 50 years & maximum time of concentration of 45 minutes; 4) Culverts, Bridges, Channels & Creeks for any type of area more than 640 acres – DSF is 100 years & there is no limit for the maximum time of concentration. Note: When the maximum time of concentration is exceeded, the design shall be based on a 100 year frequency.
		8.	Part 1, Chapter 47 of the City of Irving, Texas Development Standards and Construction Codes shall be enforced for all FEMA 100-year flood zones.
		9.	Provide analysis showing that the 100-year storm event is contained within all dedicated right-of-way and drainage easements.
		10.	For cumulative runoff, show tabular hydraulic calculations.
		11.	NCTCOG iSWMM Hydraulics and Hydrology manuals shall be used for all hydraulic calculations to determine Time of Concentration, rainfall intensity, permeability C factor, inlet design, closed conduit design, etc.
		12.	Indicate all crest, sags, and street intersections with flow arrows.



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		13.	Provide the calculations for inlet time and flow time in pipe.
		14.	Provide legend.
		15.	Include a hydrology summary table.
		16.	Design criteria meet City requirements and NCTCOG iSWMM Hydraulics and Hydrology Manuals.
		17.	Grate inlets not allowed unless approved otherwise.
		18.	Tabulate street and R-O-W capacities.
		19.	On-site and offsite contour topography must show total drainage area for project.
		20.	Show all existing fences.
		21.	Show areas of dense tree coverage.
		22.	Show flow arrows for surface drainage.
		23.	Show delineation of drainage areas sufficient for review.
		24.	Provide cross sections of open channels and show limits of grading.
		25.	Detention/retention may be required.
		26.	Written permission or acquisition of drainage easements may be required from adjacent owners and/or downstream owners to construct needed offsite downstream drainage improvements.
		27.	Show that existing downstream drainage systems are adequate. If downstream drainage is not adequate, then developer may be required by the City to improve downstream systems or detain drainage on-site.
<b>K. STORM DRAINAGE IMPROVEMENTS - PLAN VIEW</b>			
		1.	Plan of all existing and proposed storm drainage pipelines and laterals.
		2.	Specify at least Class III reinforced concrete pipe (Class IV, etc if needed).
		3.	Provide inlets such that the spread of water in the street shall not exceed 7.5 feet for 2 lane undivided and 3 lane undivided roadways and 12.0 feet for all other roadways.
		4.	All inlets shall be cast in place. Pre-cast inlets are not permitted.
		5.	Indicate property lines and easements.
		6.	Indicate location, size, and type of easements along proposed storm drainage lines
		7.	The edge of an existing or proposed drainage inlet, curb or recessed, should not be closer than 10 feet from a driveway or intersection curb return.
		8.	Indicate size of inlet, lateral size and flow line elevation, paving station, and top of curb elevation.
		9.	Indicate the runoff concentrating at all inlets and direction of flow. Show runoff concentration for all stub outs, pipes, and intakes.
		10.	Show locations and cross sections of positive overflow swales required at low points. (One foot deep & ten foot wide minimum)

		11.	Show minimum finished floor building elevations at least 2 vertical feet above the 100 year floodplain elevation where lots are adjacent to floodplain, creeks, and any area subject to flooding. These elevations must match final plat.
		12.	Show general notes pertaining to storm drainage improvements.
		13.	Show location of existing and proposed R-O-W and pavement.
		14.	Show type and size of existing and proposed headwalls: use TxDOT headwall standards.
		15.	Show flow arrows for surface drainage.
		16.	Show all utility crossings.
		17.	90-degree bends in storm drainage system or outfall are discouraged. Junction box or manhole must be provided in all cases.
		18.	Velocities of the storm sewer system shall prevent excessive depositing of soil within the system due to low velocities and shall be limited to prevent excessive erosion due to high velocities at the outfall.
		19.	Show location and size of concrete/rock rip-rap at outfalls.
		20.	Show location and size of energy dissipaters, if required.
		21.	Show storm drainage pipe profile discharge at flow lines of creeks and channels with the last 20-feet at a slope not to exceed one-half percent, unless otherwise authorized.
		22.	Intercept laterals at 60 degrees with trunk lines, if possible.
		23.	Recessed curb inlets shall be required on all Principal Arterials, Major Arterials, and Minor Arterials as defined by the latest edition of the Master Thoroughfare Plan.
		24.	Curb inlets shall have a minimum throat opening of 10 feet wide, unless otherwise approved.
		25.	Show Note stating the Contractor shall install one or more a permanent bench mark monuments, furnished by the City, in inlets per plans as directed by the City. The Owner's surveyor (RPLS) shall establish the bench mark elevation for "As Built".
		26.	Manholes shall be provided at least every 650' for pipes 42-inches and smaller and at least every 1,150' for pipes 48-inches and larger.
		27.	Provide a manhole at all locations where the diameter of the trunk line pipe changes or where the cross-sectional dimensions of the trunk line box changes.
		28.	Provide a manhole at all locations where the spacing between two or more laterals intersecting the trunk line is equal to or less than 10 feet.
		29.	Show all earthen channels lined with erosion control blanket such as "Curlex Blanket" unless approved otherwise by the City Engineer.
		30.	Show Type A Trench wall section to be installed along drainage easement adjacent to creeks and channels.
		31.	Show discharge into public conveyance or new easements as necessary.
		32.	Collection of runoff at an inlet to an underground system will be required if a point discharge is greater than five (5) cfs unless approved otherwise by the City Engineer.

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		33.	In alleys, the preferred design is a curbed inlet with a transition swale to the edge of the pavement.
		34.	All storm pipe in ROW, alleys and drainage easements shall be RCP. Connections to public lines must be made with concrete pipe.
		35.	Concentrated runoff must be controlled by either rock berms or sediment basins as part of erosion control plan.
		33.	When the project borders, touches or impacts flood control facilities, lakes, walls, levees, etc. owned/maintained by either Dallas County Utilities and Reclamation District, Irving Flood Control District No. 1, Irving Flood Control District No. 3 or Dallas County Flood Control District No.1.. Submit two (2) extra copy of plans to the City Floodplain Administrator.
<b>L. STORM DRAINAGE IMPROVEMENTS - PROFILES</b>			
		1.	Show all hydraulics, velocity head changes, hydraulic gradients, computations and profile outfall with typical section and computations.
		2.	Show laterals on trunk lines with stations.
		3.	Show applicable 25 year, 50 year or 100 year water surface elevation at outfall of storm drainage system.
		4.	Show grades of existing and proposed pavement.
		5.	Show vertical and horizontal "bar scale" of drawing.
		6.	Show proposed grades of existing and proposed storm sewer lines.
		7.	Closed conduit storm sewer systems shall have a minimum of two (2) feet of cover unless approved otherwise by the City Engineer.
		8.	Show location and elevation of applicable 25 year, 50 year or 100 year H.G.L. in all pipe mains and laterals. The H.G.L. of the DSF shall not be higher than the elevation of an inlet throat.
		9.	Show elevation of existing and proposed ground over proposed pipelines.
		10.	Show top and flow line elevations of inlets.
		12.	Show top and flow line elevations of area drop inlets.
		13.	Show flow line elevations at 100-foot intervals (Max).
		14.	Show fill areas & compaction note(s).
		15.	Show length, type, slope, and size of pipe between inlets and junction boxes.
		16.	Dimension proposed junction boxes.
		17.	Show location and elevation of water mains crossed by storm sewer lines and inlets (Steel encase if less than 2-foot clearance).
		18.	Show location and elevation of wastewater crossed by storm sewer lines (Encase sewer in 20 LF steel pipe centered on storm pipe.)
		19.	Show locations of concrete encasement and/or concrete caps.
		20.	Show location and elevation of existing and/or proposed pavement sections crossed.
		21.	Provide profiles for all laterals.

		22.	Provide 8" minimum diameter grouted rock rip-rap at all outfall conditions.
		23.	Street crossings are preferred by bore, not open cut. If open cutting a concrete street, pavement shall be removed & replaced to the closest adjacent saw joint or expansion joint.
<b>M. STORM DRAINAGE IMPROVEMENTS - DETAILS</b>			
		1.	Drainage system construction meets all standard City requirements.
		2.	Show standard trench backfill details and state compaction requirements.
<b>N. PAVING IMPROVEMENTS – PLAN VIEW</b>			
		1.	<b>CITY USE ONLY:</b> The street widths and rights-of-ways meet the minimum requirements of the Master Thoroughfare Plan.
		2.	Show General Notes for paving.
		3.	Show centerline stationing and dimensions to ROW and back of curb.
		4.	Roadways shall be placed in the center of the ROW. The centerline of curves shall be tangent to the centerline of street at each end of curve.
		5.	Show all lot and block numbers, addresses & property owners.
		6.	Show sidewalk location & width along streets.
		7.	Label intersecting streets.
		8.	Show material, thickness, and width of pavement.
		9.	Show spot elevations in ditches.
		10.	Show concrete pavement headers at concrete to asphalt transitions.
		11.	Show location and size of inlets.
		12.	Show paving station at the center of each inlet.
		13.	Show top of curb elevation at each inlet.
		14.	Show pavement properly dimensioned to R-O-W.
		15.	Show radii & curve data at all centerline curves.
		16.	Show top of curb elevations at quarter points on cul-de-sacs.
		17.	Show top of curb elevations at PC's.
		18.	Show top of curb elevations at PT's.
		19.	Show top of curb elevations at High Points and Low Points
		20.	Show drainage flow arrows and/or spot elevations.
		21.	Transition areas through intersections shall be designed in such a manner as to ensure ridability of the pavement while maintaining proper drainage (i.e. no "valley gutters" across intersection).
		22.	Topographical representations of each proposed intersection at a 0.1 foot contour interval (unless approved otherwise by the City Engineer) to ensure proper drainage and shall be included in the plans.
		23.	Show barrier free sidewalk ramps at street intersections (three sidewalk ramps are required at tee intersections. Show R.O.W. corner clips.
		24.	If required by the City of Irving, coordinate with the Transportation Department and show traffic control details (i.e. stop bars, striping, and buttons).

		25.	The Transportation Department shall set the design speed of all proposed streets. Unless otherwise directed by the Transportation Department, the design speed of existing streets shall be five miles-per-hour (5 mph) above the posted speed.
		26.	Show that horizontal curves meet City of Irving design criteria for design speed.
		27.	Show that proper sight distance is provided at intersections with screening walls in place.
		28.	Low point inlets shall be located at the geometric low point of a vertical curve sag.
		29.	Driveways and intersecting streets shall be located to avoid the low point of a vertical curve sag and the need for grate inlets. Grate inlets are not allowed unless approved otherwise by the City Engineer.
		30.	Check ends of project for positive drainage and concentrated flows over 10 cfs.
		31.	Design median modifications on existing thoroughfares to meet Transportation Department requirements.
		32.	Show existing driveways and inlets on both sides of street at all proposed median openings.
		33.	Interlocking concrete pavers shall be placed in all medians six-feet (6') wide or less. A four-inch (4") thick non-reinforced sleeper slab shall be installed underneath all interlocking concrete median pavers.
		34.	Medians wider than six-feet (6') shall be sodded natural ground and/or landscaped as directed by the City Engineer. Any trees proposed to be installed in medians should be done in accordance with recommendations provided by the City's Geotechnical Engineering firm. All proposed landscaping shall be reviewed and approved by the Traffic Engineer, and no landscape shall be installed which could potentially create a current or future sight visibility obstruction.
		35.	All median noses shall be variable height concrete monolithic in accordance with the relevant "Standard Detail".
		36.	Provide pavement headers at ends of streets to be extended in future.
		37.	Dowel bars into existing pavement where required when abutting with new construction.
		38.	The Project Engineer shall submit plans to the Transportation Department for coordination with TXDOT, Trinity Railway Express (TRE), DART, etc.
<b>O. PAVING IMPROVEMENTS – PROFILES VIEW</b>			
		1.	Show that vertical curves meet design speed criteria. Vertical curves shall meet minimum sight distance requirements for design speed per the requirements of the Transportation Department.
		2.	Show profile at existing left and right ROW and proposed left and right top of curb.
		3.	Check fill areas for positive drainage.
		4.	Minimum street grades are 0.65%. Double-check minimum grade in cul-de-sacs. Maximum street grades are 6%. Steeper grades may be permitted on local residential streets and where required by topographical and/or natural features, as approved by the City Engineer.

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		5. The surface of a driveway approach will typically rise at least 0.5 feet (6") above the street gutter elevation at the centerline of the driveway unless otherwise approved by the City Engineer.
		6. A driveway profile grade of no greater than 2% and no less than 1% shall cross the path of the public sidewalk paralleling the street in accordance with current accessibility standards.
		7. The maximum gradient for single-family resident land use access shall be 10% except that an exception allowing a maximum grade of up to 15% may be granted by the City Engineer.
		8. The maximum gradient for driveways serving multi-family and commercial land uses shall be 8% except that an exception allowing a maximum grade of up to 12% may be granted by the City Engineer.
		9. Driveways providing access for industrial land use properties shall have a maximum profile grade of 6% although an exception allowing a grade of up to 10% may be granted by the Director.
		10. The maximum grade for driveways designated as fire lanes shall be 6% unless a variance is granted by the Fire Marshall.
		11. The maximum algebraic difference in successive grades without a vertical curve ("breakover") shall be twelve percent (12%) crest and eight percent (8%) sag for single-family residential driveways and eight percent (8%) crest or sag for other driveways. A single grade must be maintained for a minimum distance of twelve feet (12') for single family residential driveways and for a distance of at least twenty feet (20') for multi-family and commercial driveways.
		12. Vertical curves will be required for larger or more erratic grade changes, and for all grade changes greater than 4% on driveways serving industrial land uses and for high-capacity driveways serving commercial land uses, except for the initial ramp at the connection with the street.
		13. Show vertical curves at all longitudinal street grade breaks greater than 1% change.
		14. Detail of pavement cross section, reinforcing, and subgrade shown if greater than City minimum standards.
		15. Provide cross section sheets with cross sections cut at least every 50 feet. (CIP related infrastructure improvements only)
		16. Turn lanes shall meet the requirements of the City of Irving Access Management Manual unless directed otherwise by the Director of Transportation.
		17. ROW drains towards pavement.
		18. During design, a City of Irving approved Geotechnical Professional Engineer will recommend to the City of Irving any additional requirements for subgrade and pavement cross sections based on a 30 year design life and anticipated traffic loading as approved by the City of Irving.
		19. New alleys shall not intersect any streets identified as Arterials or Collectors on the "Master Thoroughfare Plan". All alley intersections with streets shall be perpendicular or radial, within a five-degree (5°) tolerance, at the intersection of the right-of-way lines.
		20. Alleys shall be a minimum of twelve-feet (12') in width, with a three-inch (3") invert.

<b>P. SIDEWALK IMPROVEMENTS</b>		
		1. <u>Sidewalk Width and Location:</u> Sidewalks are required to be installed along both sides of the street. A minimum five-foot (5') wide sidewalks shall be installed on both sides of the street, with a four-foot (4') wide parkway between the sidewalk and the back-of-curb. If approved by the City Engineer, a minimum six-foot (6') wide sidewalk may be installed adjacent to the back of curb.
		2. <u>Obstructions:</u> The layout of proposed sidewalk shall take into account and gently meander around proposed and existing fire hydrants, street light poles, traffic signal poles, traffic signs poles, and trees. Existing or proposed manholes, water meters or water valves shall not be located within the proposed sidewalk.
		3. <u>Curb Inlet Tops Utilized as Part of Sidewalk:</u> Any sidewalk directly adjoining a curb inlet top to be utilized as part of the pedestrian pathway shall be doweled into the inlet top.
		4. <u>Texas Accessibility Standards (TAS):</u> It is the responsibility of the Design Engineer to verify that the Project complies with the requirements of the Texas Department of Licensing and Regulations (TDLR).
		5. <u>Paver Sidewalks:</u> As an alternative to the standard concrete sidewalk, an interlocking concrete paver sidewalk may be installed. Paver sidewalks shall have a reinforced concrete sleeper slab with #3 bars eighteen-inches (18") on center. The required width and locations of proposed paver sidewalks shall be the same as those of a concrete sidewalk.
		6. <u>Crosswalks:</u> Pavers crosswalks shall be installed at all signalized intersections, and across all public streets intersecting an Arterial (Principal, Major or Minor) as defined by the "Master Thoroughfare Plan". Paver crosswalks shall be ten feet (10') wide (1' border+8' walk+1'border). The edge of the crosswalk shall be two feet (2') behind the projected face-of-curb.
		7. <u>Bus Stop Pads:</u> Bus stop pads shall be installed at all marked DART bus stop locations. Dual bus stop pads shall be installed in areas where there is an existing bus shelter. See <a href="http://www.dart.org">www.dart.org</a> for bus route information.
		8. <u>Bus Stop Pads:</u> Bus stop pads shall be installed at all marked DART bus stop locations. Dual bus stop pads shall be installed in areas where there is an existing bus shelter. See <a href="http://www.dart.org">www.dart.org</a> for bus route information.