

Design Criteria Checklist



General	20	All plan sheets shall show pressure zone designations and zone boundaries, where applicable.	W&WW Design Criteria, Section 2.6.1. E.17		
General	21	Indicate on cover sheet, the subdivision file number and/or service extension number and all required permit numbers such as the development permit, the Texas Department of Transportation permit, the railroad crossing permit, etc.	W&WW Design Criteria, 2.4.1. E.7		
General	22	New private installations on properties outside the City of New Braunfels zoning jurisdiction shall be inspected in accordance with the requirements of the approving authority.	W&WW Design Criteria, 2.4.1		
General	23	Plans shall be American National Standards Institute "D" size- 24" x 36".	Checklist - Water, 2. d Checklist - Wastewater, 4.c		
General	24	All water and wastewater plans submitted shall include design calculations or be accompanied by a separate Engineering Design Report with design calculations that support the water and wastewater system design, as it is shown. The calculations must be based on the Water and Wastewater Design Criteria as outlined in 2.10.2 and 2.10.3 of the W&WW Design Criteria. Where deviations from the criteria are required, they shall be specifically highlighted. Design calculations must include a summary or exhibit indicating the number of LUEs or the number of water fixture units used to calculate the system demand for the system design as it is shown.			

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General	25	<p>Insert the notes shown below on the Cover Sheet:</p> <ol style="list-style-type: none"> 1. All responsibility for the adequacy of these plans remains with the Engineer of Record. In accepting these plans, New Braunfels Utilities must rely upon the adequacy of the work of the Engineer of Record. 2. The Engineer of Record acknowledges that all proposed water or wastewater improvements must comply with criteria from the Texas Commission on Environmental Quality, the City of New Braunfels, NBU W&WW Design Criteria, any other governing entity ordinances or codes, and sound engineering judgement. 3. The Engineer of Record acknowledges that the point of delivery for the NBU water system is the main side of the service/lateral/lead from the customer's meter, backflow preventer, or easement edge. The customer is responsible for the design, permitting, construction, operation and maintenance beyond the point of delivery and has sole control and supervision over the it's installation. 4. The Engineer of Record acknowledges that the point of delivery for a NBU wastewater system is the main side of the service lateral from the customer's clean out or property line, whichever is nearer. The customer is responsible for the design, construction, operation and maintenance beyond the point of delivery and has sole control and supervision over its installation. 5. Water is a precious commodity in the State of Texas and New Braunfels Utilities (NBU) is passionate about protecting the local resource. The Contractor is fully responsible for acquiring a fire hydrant meter so that all water used for construction or testing purposes is properly accounted for. NBU will not tolerate any water theft, regardless of the amount. If water theft is discovered, the Contractor shall be subject to monetary penalties, criminal charges, and stoppage of all construction activities related to the project. Costs associated with any work stoppage resulting from water theft shall be at the full expense of the Contractor. 			
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	26	<p>PLEASE NOTE: NBU REQUIRES GPS POINTS FOR CERTAIN ELECTRIC, WATER AND WASTEWATER ATTRIBUTES, SOME OF WHICH MUST BE MEASURED PRIOR TO BACKFILL, DURING CONSTRUCTION.</p> <p>GPS POINTS ARE REQUIRED FROM THE DEVELOPER'S CONTRACTOR OR ENGINEER. A MINIMUM OF THREE (3) COORDINATE POINTS FOR GEOREFERENCING ARE REQUIRED. THE WATER AND WASTEWATER GPS POINTS SHALL BE TO SURVEY GRADE AND ELECTRIC GPS POINTS SHALL BE MEASURED TO MAP GRADE. PLEASE REFERENCE NBU'S WATER CONNECTION POLICY FOR ADDITIONAL CAD DELIVERABLE REQUIREMENTS.</p> <p>REQUIRED MEASUREMENTS FOR THE WATER SYSTEM INCLUDE:</p> <ol style="list-style-type: none"> 1. VERTICAL BENDS AND EDGES OF STEEL CASINGS (IF APPLICABLE) PRIOR TO BACKFILL. 2. HORIZONTAL BENDS PRIOR TO BACKFILL. 3. TEES PRIOR TO BACKFILL. 4. FITTINGS (REDUCERS AND COUPLINGS) PRIOR TO BACKFILL. 5. FIRE HYDRANTS (TOP FLANGE). 6. VALVES. 7. METERS (TOP CENTER OF BOX). 8. BLOW OFF ASSEMBLIES. 9. CORNER SLAB OF ALL WATER TANKS AND THE ISOLATION GATE VALVE ON THE WATER TANK. <p>REUIRED MEASUREMENTS FOR THE WASTEWATER SYSTEM INCLUDE:</p> <ol style="list-style-type: none"> 1. MANHOLES. 2. CLEANOUTS. 3. CORNER SLAB OF ALL LIFT STATIONS. <p>REQUIRED MEASUREMENTS FOR THE ELECTRIC SYSTEM:</p> <ol style="list-style-type: none"> 1. POLES. 2. TRANSFORMERS, BOTH ABOVE AND UNDERGROUND (FRONT LOCK). 3. PULL BOXES. 4. STREET LIGHTS. <p>COORDINATE GPS REQUIREMENTS WITH NBU INSPECTOR</p>			
General	27	<p>Show cut and replace of existing asphalt or concrete, if applicable. Provide dimensions for the areas to be replaced. Also provide a cross-section of the pavement so that pavement, base, and subgrade thicknesses can be determined. If concrete pavement is to be replaced, provide details regarding reinforcement.</p>	<p>Checklist - Water, 2. l Checklist - Wastewater, 4.t</p>		

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General	28	If the proposed improvements are within the Edwards Aquifer, plans must include Texas Commission on Environmental Quality (TCEQ) notes and applicable standard details.	Checklist - Water, 2. w. ii & iii Checklist - Wastewater, 4.w.ii & iii TCEQ 213.2		
General	29	Please include SCS and WPAP documentation provided by Texas Commission on Environmental Quality.			
General	30	Totals of the following structures must be included on water and wastewater utility sheets: length of water and wastewater mains, number and size of water services and meters, number of wastewater services, valves, air release valves, fire hydrants and fire lines, manholes, etc.	Checklist - Water, 2.a		
General	31	Include Trench Excavation Safety note on applicable water and wastewater sheets.	Checklist - Water, 2. q Checklist - Wastewater, 4. k		
General	32	USGS, NBU, or TxDOT benchmarks are to be shown and identified.	Checklist - Water, 2. r Checklist, Wastewater, 4. l		
General	33	Erosion and Sedimentation Control sheet is included if the project is located over the Edwards Aquifer Recharge Zone.	Checklist - Water, 2. s Checklist - Wastewater, 4. n		
Water Plans					
Water	34	The point of service delivery is the water meter. NBU is responsible for maintenance from the water main to the water meter. The customer is responsible for the line from the water meter to private plumbing. This includes design, construction, operation, and assuring compliance with all city codes.	W&WW Design Criteria, 2.3.1		
Water	35	All plan view sheets shall include all applicable items listed in the General Plan Requirements.	W&WW Design Criteria, Section 2.6.2. A		
Water	36	The stations of all proposed connections to existing or proposed water mains shall be shown (excluding service laterals) on the plans.	W&WW Design Criteria, Section 2.6.2. A.1		
Water	37	The point of connection(s), type of connection, and size of existing water main to be connected to shall be fully detailed and shown on plans.	Checklist - Water, 1. n		
Water	38	For proposed connections to water mains or facilities to be constructed by others: identify the project by name, the design engineer, and service extension number.	W&WW Design Criteria, Section 2.6.2. A.2		
Water	39	Station numbers for mains shall be identified for beginning points, ending points, points of curvature, points of tangency, points of	W&WW Design Criteria, Section 2.6.1.E.13 & 2.6.2. A.3		

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		reverse curve, points of intersection, valves, fire hydrants, all other appurtenances, and grade breaks.			
Water	40	Station numbers for mains shall be identified at the points where they cross any other utility. A standard crossing detail should be provided if a profile is not required.	W&WW Design Criteria, Section 2.6.2. A.4		
Water	41	Details of appurtenances shall be shown and must be in compliance with NBU Specifications.	W&WW Design Criteria, Section 2.6.2. A.5 Checklist - Water 2. j		
Water	42	The location of all existing and proposed water services, water mains, valves and fire hydrants shall be identified.	W&WW Design Criteria, Section 2.6.2. A.6		
Water	43	Provide references that identify the field book notes from the original survey	W&WW Design Criteria, Section 2.6.2. A.8		
Water	44	Design velocities at maximum day plus fire flow for all mains and fire leads shall be shown in the Engineering Design Report (EDR).	W&WW Design Criteria, Section 2.6.2. A.9		
Water	45	The calculated design static and peak day plus fire flow pressure at the highest and lowest lot served, shall be shown in the EDR.	W&WW Design Criteria, Section 2.6.2. A.10		
Water	46	Thrust restraint (type and length), when required, shall be shown on plan view.	W&WW Design Criteria, Section 2.6.2. A.11		
Water	47	Culverts, bridges, and other drainage structures shall be shown in plan view.	W&WW Design Criteria, Section 2.6.2. A.13		
Water	48	Retaining walls, including geogrid, straps, tie-backs and all other components shall be shown in plan view.	W&WW Design Criteria, Section 2.6.2. A.12		
Water	49	Profiles are required for all water lines 12-inches in diameter and larger.	W&WW Design Criteria, Section 2.6.2. B		
Water	50	Profiles shall show the existing ground profile and proposed street finish grade and subgrade.	W&WW Design Criteria, Section 2.6.2. B.1		
Water	51	Profiles shall show station numbers and elevations of all utility crossings.	W&WW Design Criteria, Section 2.6.2. B.2		
Water	52	Profiles shall show station numbers and soil geology information at stream crossings to evaluate the need for special surface restoration and to inform the contractor of subsurface conditions.	W&WW Design Criteria, Section 2.6.2. B.3		
Water	53	Profiles will identify pipe size, percent grade, and pipe material to be used including ASTM and/or AWWA designation. If an alternate material is to be allowed, both should be listed (example "D.I. or DR14 PVC").	W&WW Design Criteria, Section 2.6.2. B.4		

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Water	54	Profiles shall show station numbers and elevations for starting points, ending points, point of intersection, grade breaks, valves, fire hydrants, air release valves, pressure/flow regulating valves and waterline elevations at intermediate points every 100 feet.	W&WW Design Criteria, Section 2.6.2. B.5		
Water	55	Profiles shall show retaining walls, including geogrids, straps, tie-backs, and all other components that may potentially conflict with the water line.	W&WW Design Criteria, Section 2.6.2. B.6		
Water	56	Profile shall show culverts, bridges and other drainage structures crossing water line alignment.	W&WW Design Criteria, Section 2.6.2. B.7		
Water	57	The pavement section will be in accordance with the right-of-way (ROW) owner's requirements.	Checklist - Water, 1.c		
Water	58	The length of all mains from fitting to fitting is to be shown. The length of the proposed water main is indicated from tie-in to tie-in and shall be rounded to the nearest 1-foot increment.	Checklist - Water, 2.i & n		
Water	59	Plans shall indicate match lines from one sheet to the next sheet and shall indicate stationing and sheet number (example, match line station 5+00, see sheet xx of xx).	Checklist - Water, 2.m		
Water	60	Water main standard sizes include: 8", 12", 24", 30", and 6" multiples thereafter.	Water-Wastewater Extension Policy Exhibit A Checklist - Water, 2.h		
Water	61	No turns less than 90 degrees or greater than 270 degrees are allowed.	Checklist - Water, 2. v		
Water Design					
Water	62	Design calculations must include a summary or exhibit indicating the number of LUEs or the number of water fixture units used to calculate the system demand for the system design as shown.	W&WW Design Criteria, Section 2.10.2		
Water	63	Design calculations shall include average day demand, peak hour demand, peak day plus fire and static pressure.	W&WW Design Criteria, Section 2.10.2. A.1		
Water	64	Design calculations must demonstrate a maximum static pressure of 150 psi in the system. If the static pressure exceeds 90 psi within the system, a pressure reducing valve (PRV) must be installed on the property side of the meter.	W&WW Design Criteria, Section 2.10.2.A.1.e & f & C.10		
Water	65	Design calculations must demonstrate the minimum operating pressure within the system is 50 psi using average day demand ADD).	W&WW Design Criteria, Section 2.10.2. A.1.g		

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Water	66	Design calculations must demonstrate the minimum allowable residual pressure within the system is greater than 35 psi and the maximum velocity in any one pipe is less than 5 fps during peak hour demand (PHD) conditions.	W&WW Design Criteria, Section 2.10.2. A.2		
Water	67	Design calculations must demonstrate the minimum residual pressure within the system is greater than 20 psi and the maximum velocity in any one pipe is less than 10 fps during peak day plus fire demand conditions.	W&WW Design Criteria, Section 2.10.2. A.3		
Water	68	The minimum water main size is 8 inches in diameter. Looped systems are required for reliability. The maximum length for an 8-inch main is 1,320 feet before it must be looped. Water mains greater than 12-inches in diameter will require a profile drawing.	W&WW Design Criteria, Section 2.10.2.B.1 & 2.6.2. B Water-Wastewater Extension Policy Exhibit A		
Water	69	Minimum depth of cover over the uppermost projection of the water pipe and all of its appurtenances shall be 42-inches. Add a concrete cap or encasement if the cover is less than 42-inches.	W&WW Design Criteria, Section 2.10.2. B.2		
Water	70	When mains are located outside of the rights-of-way, they shall be within a dedicated utility easement.	W&WW Design Criteria, Section 2.10.2. B.2		
Water	71	All mains 16-inches or larger are to have an appropriately sized air release valves at the high point of the main and on the down slope side of valves. The Engineer shall determine the appropriate location and size of air release valve.	W&WW Design Criteria, Section 2.10.2.B.5, Checklist - Water, 1.d (high point)		
Water	72	All mains 16-inches or larger are to have drain valves installed at their low points.	W&WW Design Criteria, Section 2.10.2. B.3		
Water	73	Thrust blocking is not allowed without specific approval. All joint restraints' lengths and calculations must be detailed, sealed by the Engineer of Record, and provided to NBU for review with the plan submittal. Note that joint restraint length calculations should be based on NBU-required backfill and bedding.	W&WW Design Criteria, Section 2.10.2. B.8		
Water	74	Vertical bends on ductile iron (DI) pipe should be reinforced with retainer glands and located at each bend joint.	Checklist - Water, 1. I		
Water	75	Valves shall be located at the intersection of two or more mains and shall be spaced so that no more than 30 customers will be without water during a shutout. For lines smaller than 24 inches, valve spacing should be no greater than 500 feet in high density areas and no greater than 1,200 feet in residential areas. On mains 24 inches and greater, the valves shall be spaced no more than 2,000 feet apart.	W&WW Design Criteria, Section 2.10.2. C.2		

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Water	76	Gate valves shall be placed as necessary to isolate the water distribution system (e.g. street intersections).	Checklist - Water, 1. k		
Water	77	Each fire hydrant lead shall have a valve. The entire fire hydrant assembly from the main to the fire hydrant is to be restrained.	W&WW Design Criteria, Section 2.10.2. C.1		
Water	78	All valves 16-inch and smaller shall be resilient seated gate valves. In-line valves, 16-inches and larger, may be of the butterfly type.	W&WW Design Criteria, Section 2.10.2. C.1		
Water	79	Fire hydrant leads shall be ductile iron, class 350, restrained joints, and a gate valve at the main connection. Fire lines shall have a backflow preventer inside the property line (accessible for inspection and no more than 50 feet from tap) and no longer than 100 feet total.	W&WW Design Criteria, Section 2.10.2.B.4 & C.9 & D.5 Backflow Policy, pp 11-12, 14-16		
Water	80	Dead ends water mains require a valve to be located one pipe length (10 feet minimum) from the end point of the main.	W&WW Design Criteria, Section 2.10.2. C.3		
Water	81	Branch piping shall be separated from the main with gate valves (butterfly for larger than 16-inch).	W&WW Design Criteria, Section 2.10.2. C.4		
Water	82	Valves shall be located so that isolating any intersection of water main requires the closing of no more than three (3) valves.	W&WW Design Criteria, Section 2.10.2. C.5		
Water	83	Horizontal gate valves and butterfly valves larger than 16-inches shall have their operating bonnet (gate valves) or actuator (butterfly valve) located in a vault.	W&WW Design Criteria, Section 2.10.2. C.8		
Water	84	Fire hydrants shall be installed at the intersection of two or more streets, spaced no greater than 600-feet in a residential area and no more than 300-feet in a commercial area. In residential areas, hydrants should be placed along lot lines, and are to be installed on both sides of a divided road. No private fire hydrants will be allowed without specific NBU approval.	W&WW Design Criteria, Section 2.10.2.D.1 & 2 & 4 Checklist - Water, 1. f		
Water	85	Permanent blow-offs are required at the end of 25-foot or longer pipe sections	Checklist - Water, 1. g		
Water	86	Fire hydrants located (off tee fittings) at the end of dead-end mains and cul-de-sacs will be required in place of a permanent blow-off.	W&WW Design Criteria, Section 2.10.2. D.3 Checklist -Water. 1.j		
Water	87	Each domestic meter shall have its own service tap.	W&WW Design Criteria, Section 2.10.2. E.2		
Water	88	The irrigation meter can be teed off of the domestic meter service line.	W&WW Design Criteria, Section 2.10.2. E.2		

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Water	89	Individual service meters shall not be taken from transmission lines (Generally 24-inch and larger) without NBU approved exception.	W&WW Design Criteria, Section 2.10.2. E.3		
Water	90	Each unit in a duplex, triplex, quadplex, or condominium shall have an individual meter. Common areas (e.g. swimming pool, laundry, irrigation) shall have separate meters.	W&WW Design Criteria, Section 2.10.2.F.1 & 2		
Water	91	Large commercial (over 10,000 sqf) and all multi-family residential customers shall have a separate meter on a separate tap for all outdoor water uses (e.g. swimming pool, irrigation, fountain).	W&WW Design Criteria, Section 2.10.2. F.3		
Water	92	Small commercial (10,000 sqf or less) and all single-family residential customers shall have an irrigation meter if an irrigation system is installed. Separate taps are not required for irrigation meters; irrigation meters may be tee'd off the single domestic service tap.	W&WW Design Criteria, Section 2.10.2. G		
Water	93	Irrigation meters require reduce pressure (R/P) backflow preventers.	Backflow Policy, p 12		
Water	94	Whenever possible, the water main shall be aligned a minimum of 5-feet from the back of curb, within the proposed pavement section.			
Water	95	Fire hydrants shall not be installed within nine (9) feet vertically or horizontally of any wastewater main, wastewater lateral, or wastewater service line.	TCEQ 290.44 (e) (6)		
Water	96	Water lines shall be installed no closer than nine (9) feet in all directions to wastewater collection facilities (to include manholes and cleanouts). All separation distances shall be measured from the outside surface of each respective piece. If the nine (9)-foot separation cannot be achieved, the location shall be specifically identified and an alternative detail meeting the most restrictive requirements of TCEQ 290.44 (e) (4), TCEQ 290.44 (e) (5), TCEQ 217.53 (d) (3), and NBU Specification 510.3 shall be submitted for consideration.	Specification 510.3, TCEQ 290.44 (e) (4), and TCEQ 217.53 (d) (3).		
Water	97	The top of pipe elevation of a water main must maintain a minimum 2-foot vertical clearance where the water main crosses under existing and proposed utilities, including storm drains.	Checklist - Water, 1.h		
Water	98	Steel or reinforced concrete pipe (RCP) conduits shall be used when water mains cross under multi-box culverts or large storm drain pipes (48" or greater in diameter). Conduit sizes shall be selected in accordance with NBU construction specifications.	Checklist - Water, 1. i		

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Water	99	Verify inclusion of proper lot layout detail. Most likely, NBU Standard Detail #410 will be used for small lot subdivisions.			
Wastewater Plans					
WW	100	The point of delivery is determined by NBU and may not be a cleanout. Typically, it is property line or easement boundary. NBU is responsible for line maintenance from the sewer main to the clean out or property line. The customer is responsible for line maintenance from the cleanout and property line to private plumbing. This responsibility includes design, construction, operation, and assuring compliance with city codes.	W&WW Design Criteria, 2.3.2		
WW	101	All plan view sheets shall include all applicable items listed in the General Plan Requirements.	W&WW Design Criteria, Section 2.6.3. A		
WW	102	Station numbers at all proposed connections to existing or proposed wastewater, mains shall be shown.	W&WW Design Criteria, Section 2.6.3. A.1		
WW	103	For proposed connections to wastewater mains or facilities to be constructed by others, identify the project name, the design engineer, and the service extension number.	W&WW Design Criteria, Section 2.6.3. A.2		
WW	104	The location, alignment, and structural features of the wastewater main, including manholes and concrete retards, if applicable, shall be shown.	W&WW Design Criteria, Section 2.6.3. A.3		
WW	105	Station numbers for beginning points, ending points, manholes, cleanouts, service laterals, stacks, and all other appurtenances shall be shown.	W&WW Design Criteria, Section 2.6.3. A.4 Checklist - Wastewater, 1. i		
WW	106	Details of all required appurtenances shall be shown.	W&WW Design Criteria, Section 2.6.3. A.5		
WW	107	Location of existing and proposed wastewater service connections, mains, and manhole shall be shown	W&WW Design Criteria, Section 2.6.3. A.6		
WW	108	Provide references identifying field book notes for the original survey.	W&WW Design Criteria, Section 2.6.3. A.8		
WW	109	Plans shall show retaining walls, including geogrid, straps, tie-backs and all other components.	W&WW Design Criteria, Section 2.6.3. A.9		
WW	110	Plans shall show culvert, bridges, and other drainage structures.	W&WW Design Criteria, Section 2.6.3. A.10		

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WW	111	The direction of flow in existing and proposed wastewater mains shall be indicated with flow arrows on all plan sheets, as well as all plan and profile sheets.	W&WW Design Criteria, Section 2.6.1. E.9 Checklist - Wastewater, 4.m		
WW	112	Elevations shall be shown on the plan showing the finish floor elevations of all existing structures. If the structure is connected to a septic tank or other disposal system, the flow line elevation of the plumbing where it exits from the structure is to be indicated. If a lot or tract is vacant, side shots may be required from the middle of each lot to ensure gravity service is possible from the lot to the main.	W&WW Design Criteria, Section 2.6.3. B.6		
WW	113	Profiles shall show the existing ground elevation and proposed street finish grade or subgrade or finished surface grade if the line is not under pavement.	W&WW Design Criteria, Section 2.6.3. B.1		
WW	114	Profiles shall show station numbers and elevations of all utility crossings.	W&WW Design Criteria, Section 2.6.3. B.2		
WW	115	Profiles shall show station numbers and soil geology information at stream crossings to evaluate the need for special crossing conditions or special surface restoration requirements.	W&WW Design Criteria, Section 2.6.3. B.3		
WW	116	Identify the pipe size, percent grade, main length (manhole-to-manhole), and pipe material to be used, including ASTM and/or AWWA designation. If an alternate material is to be allowed, both should be listed (example "D.I. or DR14 PVC").	W&WW Design Criteria, Section 2.6.3. B.4 Checklist - Water, 1b (Similar) Checklist - Wastewater, 4. i		
WW	117	Profiles shall show station numbers and elevations for starting points, manholes, service lines, cleanouts, and at intermediate points every 50 feet.	W&WW Design Criteria, Section 2.6.3. B.5 Checklist - Wastewater, 1.i, 4. f		
WW	118	Design flows, minimum and maximum, and flow velocities at minimum and maximum dry weather flows shall be shown on profiles.	W&WW Design Criteria, Section 2.6.3. B.7		
WW	119	Profiles shall show retaining walls, including geogrids, straps, tie-backs, and all other components of potential conflict.	W&WW Design Criteria, Section 2.6.3. B.8		
WW	120	Profile shall show culverts, bridges and other drainage structures crossing wastewater line alignment.	W&WW Design Criteria, Section 2.6.3. B.9		
WW	121	Wastewater laterals are to have a 2% minimum slope.	Checklist - Wastewater, 1. b		

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WW	122	The point of connection of proposed main to existing main shall be identified with station number and existing pipe material, size, and invert elevation are to be indicated.	Checklist - Wastewater, 1. j		
WW	123	The plan set shall include plan and profiles (P&P) for all gravity and force mains from the point of delivery.	W&WW Design Criteria, Section 2.6.3.B & TCEQ 217.13 (c)		
WW	124	Plans and Profile sheets shall be oriented from left to right and from low point to high point.	Checklist - Wastewater, 4. d		
WW	125	Plans should indicate the matchline from one sheet to the next sheet and indicate stationing and Sheet No. (example, matchline station 5+00, see sheet xx of xx).	Checklist - Wastewater, 4. r		
WW	126	No turns less than 90 degrees or greater than 270 degrees are allowed.	Checklist - Water, 1. v Checklist - Wastewater, 4. s		
WW	127	Provide the inlet and outlet inverts and rim elevations at every manhole and invert elevations at 50-foot intervals between manholes. Manholes shall have a tenth foot drop from inlet to outlet.	Checklist - Wastewater, 4. e		
WW	128	Square footages of proposed structures shall be shown in plans.			
Wastewater Design					
WW	129	Design calculations must include a summary or exhibit indicating the number of LUEs or the number of water fixture units used to calculate the system demand for the system design as shown.	W&WW Design Criteria, Section 2.10.3. A		
WW	130	Design calculations shall include Average Dry Weather Flow, Peaking Factor, Peak Dry Weather, Anticipated Infiltration, and Peak Wet Weather Flow.	W&WW Design Criteria, Section 2.10.3. A		
WW	131	The minimum wastewater main size shall be 8-inches.	W&WW Design Criteria, Section 2.10.3. B.1 Water-Wastewater Extension Policy Exhibit A Checklist - Wastewater, 1.c		
WW	132	The calculations must demonstrate that the design for 15-inch and smaller pipes does not exceed 65% of the pipe capacity flowing full for Peak Dry Weather Flow and does not exceed 85% of the pipe capacity following full for peak Wet Weather Flow.	W&WW Design Criteria, Section 2.10.3. B.2		

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		For pipes 18 inches and larger, the Peak Wet Weather Flow shall not exceed 80% of the pipe capacity flowing full.			
WW	133	The minimum design velocity calculated using the Peak Dry Weather flow shall not be less than two (2) fps and the maximum design velocity calculated using the Peak Wet Weather Flow should not exceed 10 fps. Exceptions to this require approval by NBU.	W&WW Design Criteria, Section 2.10.3. B.3		
WW	134	Minimum and maximum pipe slopes shall conform to TCEQ standards. Refer to figure 217.53(1)(2)(A).	W&WW Design Criteria, Section 2.10.3. B.4 TCEQ Figure 217.53(1)(2)(A)		
WW	135	Where slopes exceed 12-percent and the sewer pipe is located outside of the pavement, concrete retards are required.	W&WW Design Criteria, Section 2.10.3. C.5		
WW	136	Wastewater main alignments shall be in the center of the street.	W&WW Design Criteria, Section 2.10.3. C.3		
WW	137	Curves are not permitted on wastewater mains unless given written approval by the NBU Engineer. If permitted, curve data must be shown on plans.	W&WW Design Criteria, Section 2.6.1. E.14 Checklist - Wastewater, 1. n		
WW	138	Wastewater piping installed in natural ground in easements or other undeveloped areas, which are not within existing or planned streets, roads or other traffic areas shall be laid with at least 36-inches of cover for wastewater service. Wastewater piping installed in existing streets, roads or other traffic areas shall be laid with at least 60-inches of cover. Wastewater piping installed in proposed streets shall be laid with at least 42-inches of cover below the actual subgrade.	W&WW Design Criteria, Section 2.10.3. C.6 Checklist - Wastewater, 1.k, 2. a		
WW	139	Wastewater laterals shall be laid with at least 36-inches of cover.	Checklist - Wastewater, 1. l		
WW	140	All manhole ring and covers shall have ring covers locked into place by a one (1) foot wide concrete collar per Standard Detail Drawing No. 329. All manholes shall be constructed so that the top of the ring is two inches (2") above surrounding ground except when located in paved areas. In paved areas, the manhole ring shall be flush with pavement.	W&WW Design Criteria, Section 2.10.3. D		

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WW	141	<p>Manholes shall be located and spaced so as to facilitate inspection and maintenance of the wastewater main. Manholes shall be placed at the following locations:</p> <ul style="list-style-type: none"> a. Intersections of mains. b. Horizontal alignment changes. c. Vertical grade changes. d. Change of pipe size. e. Change of pipe material. f. The point of discharge of a force main into a gravity wastewater main. g. Intersection of service lines to main lines 24-inches and larger. h. The point of connection of a building service line to the public wastewater service stub for multi-family projects exceeding fifteen (15) dwelling units and for commercial developments with a 2-inch or larger meter. i. At other locations as required by the City of New Braunfels Industrial Waste Ordinance. j. At the end of all pipes 	W&WW Design Criteria, Section 2.10.3. D.1 Checklist -Wastewater, 1.2, 3.a, 3. b and TCEQ 217.55 (a)		
WW	142	Manhole spacing for lines smaller than 24-inches should not exceed 500-ft. For larger mains, spacing may be increased, subject to approval by NBU in writing.	W&WW Design Criteria, Section 2.10.3. D.2 Checklist - Wastewater, 3.c		
WW	143	New manholes must be constructed of or lined with a corrosion resistant material. Where new construction connects to an existing manhole that is not constructed of a corrosion resistant material, the exiting manhole must be lined with or replaced with a corrosion resistant material.	W&WW Design Criteria, Section 2.10.3. D.4		
WW	144	All lines into manholes, including drop connections, shall match crown-to-crown, where feasible. Any deviation must be approved in advance by NBU in writing.	W&WW Design Criteria, Section 2.10.3. D.5		
WW	145	Drop manholes will have a maximum of 8-feet of drop and are not allowed where main size exceeds 15-inches. The minimum vertical distance before requiring a drop pipe is two (2) feet. Note specifically in callouts on plan sheets, which manholes are drop manholes.	W&WW Design Criteria, Section 2.10.3. D.6 Checklist - Wastewater, 3. e		
WW	146	<p>Manholes shall have the following minimum sizing:</p> <ul style="list-style-type: none"> a. 48-inches for mains up to 18" in diameter b. 60-inches for 24-inch mains c. 72-inches for 30-inches and 36-inches mains d. 84-inches diameter for mains 48-inches and larger. e. Box manholes are acceptable for mains larger than 30-inches. 	W&WW Design Criteria, Section 2.10.3. D.7		

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WW	147	Wastewater service lines, between the main and property line, shall have an inside diameter not less than six (6) inches. The minimum grade allowed for service lines is two (2) percent. In all new systems, grade breaks exceeding allowable joint deflection must be made with approved fittings and shall not exceed a cumulative total of 45 degrees. No service connections shall be made to mains larger than 15-inches in diameter. Services to lots will terminate at the property line with a clean out or will extend four (4) feet past the underground electric conduit if electric is installed in the front easement. Services should have a minimum of 36- inches of cover. Cleanouts shall be installed at the property line. All wastewater cleanouts that lead to NBU mains shall be installed with a protective utility shroud and pivoting marker pole.	W&WW Design Criteria, Section 2.10.3. G Checklist - Wastewater, 1.m		
WW	148	Prior to the design or plan submittal of a lift station, two (2) copies of a detailed engineering report shall be submitted to NBU meeting the requirements outlined in W&WW Design Criteria Section 2.8.1.	W&WW Design Criteria, Section 2.8.1. A		
WW	149	Manhole ventilation shall be provided as required by TCEQ 217.55. Collection systems must be vented at least every 1500-feet. All proposed manholes shall be watertight. Where watertight manhole covers are used, every third manhole will be vented and equipped with manhole rain infiltration inserts. Call out and label which manholes are to be vented in plans.	W&WW Design Criteria, Section 2.10.3. E Checklist - Wastewater 4. o TCEQ, Section 217.55(n)		
WW	150	The Engineer is to field verify the existing wastewater invert elevations.	Checklist - Wastewater, 1. g		
WW	151	Wastewater inverts and manholes shall be constructed to allow TV inspection equipment access.	Checklist - Wastewater, 1.h		
WW	152	Whenever possible wastewater lines must be located below the water lines. If a wastewater line cannot be located below a water line, the Engineer of Record must justify why it is not possible.	TCEQ 217.53 (d)		
WW	153	When mains and/or manholes are located outside of the right-of-way, they shall be within a 20-foot dedicated utility easement.	Checklist - Wastewater, 1. o		
WW	154	Wastewater lines and wastewater manholes shall be installed no closer than nine (9)-feet, in all directions, to water lines (to include manholes and cleanouts). All separation distances shall be measured from the outside surface of each respective piece. If the 9-foot separation cannot be achieved, the location shall be specifically identified and an alternative detail meeting the most restrictive requirements of TCEQ 290.44 (e) (4), TCEQ 290.44 (e) (5), TCEQ 217.53 (d) (3), and NBU Specification 510.3 shall be submitted for consideration.	Specification 510.3, TCEQ 290.44 (e) (4), and TCEQ 217.53 (d) (3).		

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WW	155	Show degree of deflection on all manholes.			
WW	156	Concrete encasement should be used if there is less than 2-feet between the outside diameters of existing wastewater mains and storm sewers.	Checklist - Wastewater, 2. b		

I, _____, certify that this checklist is complete and accurately reflects the design plans presented.

Engineer of Record Seal and Date: