Design Criteria Checklist (v1.31.24)

Project Name: _____

Seal Date: _____

Type	Item I.D.	Item Description	Reference	Yes	N/A
General					
General	1	One (1) complete set of digital Civil Construction plans, size ANSI "D" 22 inch by 34 inch, and an engineering report shall be submitted to the NBU Water Engineering for verification of conformance to the NBU Standards, Specifications, and Design Criteria.	W&WW Design Criteria, 6.1(A)		
General	2	Approved easements and/or permits for highway and/or railroad crossings must be provided and shown and labeled on the plans.	W&WW Design Criteria, 6.1(B)		
General	3	A Development Permit must be obtained from regulatory agencies.	W&WW Design Criteria, 6.1(C)		
General	4	All easements must be shown on plans and labeled. All permanent and temporary easements must be shown including recordation volume and page number. All proposed easements must be submitted with documentation (metes and bounds or inclusion on plat), including temporary construction easements.	W&WW Design Criteria, 6.1(E)(9)		
General	5	Permits or approvals where required must be obtained from the applicable regulatory agencies prior to final plan approval. The required approvals must be listed on the plan cover sheet. At a minimum, the following agencies shall be considered: Texas Department of Transportation, Union Pacific or other railroad, CenterPoint Energy or other gas transmission companies, Comal County, Guadalupe County, City of New Braunfels, Texas Department of State Health Services, and Texas Commission on Environmental Quality. Additionally, non-occupancy letters or service extension approvals may be required.	W&WW Design Criteria, 6.1(F)		
General	6	Plans that include fire lines and/or fire hydrants must have approval by the City of New Braunfels Fire Department (NBFD) and other related agencies.	W&WW Design Criteria, 6.1(D)		
General	7	Plan sheets shall show current FEMA Special Flood Hazard Area limits and Floodway limits with labels identifying the hazard zone, panel number, and effective date. Base Flood Elevations shall be shown on the plans when infrastructure is placed within or adjacent to a Special Floow Hazard Area.	W&WW Design Criteria, 6.2(B)(7), 6.3(B)(7)		
General	8	Engineer's dated signature and seal of a Professional Engineer licensed in the State of Texas is required on each plan sheet.	W&WW Design Criteria, 6.1(E)(1)		
General	9	Engineering firm name and registration number (format F-xxxxx) must appear on each plan sheet.	W&WW Design Criteria, 6.1(E)(2)		
General	10	Date of plans and revisions dates must be provided on each plan sheet. All revision subsequent to initial approval must be adequately annotated.	W&WW Design Criteria, 6.1(E)(3)		
General	11	North arrow and scale must be shown. The standard horizontal scale for plan and profile sheets shall be 1"= 50', 40', or 20' for the plan view. The vertical scale shall be 1" = 5', 4', or 2'. The same scale shall be used on all plan and profile sheets. For sheets other than plan and profile, horizontal scales of 1" = 50', 40', or 20' may be used as appropriate.	W&WW Design Criteria, 6.1(E)(4)		
General	12	A general location map shall be included on the cover sheet, drawn at a scale no greater than 1" = 2,000' with project limits, project address, labeled major roadways, and north arrow shown.	W&WW Design Criteria, 6.1(E)(5)		
General	13	NBU work order number(s), as provided by NBU after initial plan review, shall be listed on the cover sheet.	W&WW Design Criteria, 6.1(E)(6)		

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General	14	NBU standard General Notes, Water Notes, and Wastewater notes shall be shown in their entirety within the plan set. The notes shall be consistent with the W&WW Design Criteria. Edits required to the notes to reflect actual design considerations shall be clearly annotated by striking through the original verbiage and highlighting any revised verbiage.	W&WW Design Criteria, 6.1(E)(7)(a), 6.1(E)(7)(b)		
General	15	All plan sets submitted shall include the final plat recording or land status report.	W&WW Design Criteria, 6.1(E)(20)		
General	16	All plan sheets shall show pipe size, length, pipe materials, and location of mains and services relative to easement and rights-of-way boundaries for all existing and proposed water and wastewater lines.	W&WW Design Criteria, 6.1(E)(10), 6.1(E)(16)		
General	17	All plan sheets shall show property lines and dimensions, legal description, lot and block numbers, right-of-way boundary and dimensions, easement boundaries, easement widths, curb and sidewalk locations, street names, and creeks.	W&WW Design Criteria, 6.1(E)(11)		
General	18	Matchlines shall be shown from one sheet to the next sheet, indicating stationing and sheet numbers (e.g.: matchline station 5+00, see sheet xx of xx).	W&WW Design Criteria, 6.1(E)(12)		
General	19	All plan sheets shall show location, size, and description of other utilities where they may conflict with water or wastewater mains or other service lines.	W&WW Design Criteria, 6.1(E)(17)		
General	20	Plan sheets shall show curve data for roads, property lines, water lines, reclaimed water lines, and force mains.	W&WW Design Criteria, 6.1(E)(18)		
General	21	All plan sheets shall show street address for lot(s) where existing structures are located.	W&WW Design Criteria, 6.1(E)(21)		
General	22	Plan sheets shall show pressure zone designation for the subject tract, and zone boundaries where applicable.	W&WW Design Criteria, 6.1(E)(22)		
General	23	Indicate the following on the cover sheet: subdivision file number and/or service extension number and all required permit numbers such as development permit, Texas Department of Transportation permit, railroad crossing permit, etc.	W&WW Design Criteria, 6.1(E)(8)		
General	24	Engineering Reports shall include the following: 1. Water system size and capacity calculations per 10.2(A) for proposed and ultimate development conditions. 2. Wastewater flow determinations per 10.3(A) for proposed and ultimate development conditions. 3. Wastewater pipe size calculations per 10.3(B) for proposed and ultimate development conditions. 4. Lift station and force main calculations per 10.3(H), as applicable for proposed and ultimate development conditions. 5. Full size exhibits (ANSI D paper size) depicting the overall development, utility layouts, service counts, tie-ins, pressure zones, existing topography, proposed topography, and other information as required to illustrate development parameters and boundary conditions.	W&WW Design Criteria, 6.1(G)		

Type	Item I.D.	Item Description	Reference	Yes	N/A
General	25	Insert the following notes on the cover sheet: 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 TCEQ, City of New Braunfels, W&WW Design Criteria, Sound Engineering Judgment, and any other governing entity ordinances or codes. 3. The Engineer of Record acknowledges that the point of delivery for an NBU-owned and maintained water service lateral is the line side from the water main to the water meter. The customer is responsible for the line from the meter to the private plumbing which includes, but may not always be the case, a customer yard cut-off. The customer is responsible for design, construction, operation, and maintenance of customer's installation beyond the point of delivery and has sole control and supervision over customer's installation, including compliance with all city plumbing codes.	W&WW Design Criteria, 3.1 &3.2		
General	26	Insert the following notes on the cover sheet (continued): 4. The Engineer of Record acknowledges that the point of delivery for an NBU-owned and maintained wastewater service lateral is the line side from the wastewater main to the cleanout or property line (in cases where cleanout is not installed or installed properly near the property line). The customer is responsible for the line from the cleanout/property line to the private plumbing. The customer is responsible for design, construction, operation, and maintenance of customer's installation beyond the point of delivery and has sole control and supervision over customer's installation, including compliance with all city plumbing codes. 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 shall be fully responsible for acquiring a fire hydrant meter so that all water used for construction or testing purposes are 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.	W&WW Design Criteria, 3.1 &3.2		

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General	27	PLEASE NOTE: NBU REQUIRES GPS POINS FOR CERTAIN ELECTRIC, WATER AND WASTEWATER ATTRIBUTES, SOME OF WHICH MUST BE TAKEN PRIOR TO BACKFILL DURING CONSTRUCTION. GPS POINTS SHALL BE REQUIRED FROM THE DEVELOPERS CONTRACTOR OR ENGINEER. A MINIMUM OF THREE COORDINATE POINTS FOR GEOREFERENCING SHALL BE REQUIRED. THE WATER AND WASTEWATER GPS POINTS SHALL BE TO SURVEY GRADE AND ELECTRIC GPS POINTS SHALL BE MAP GRADE. REFERENCE NBU'S WATER CONNECTION POLICY FOR ADDITIONAL CAD DELIVERABLE REQUIREMENTS. WATER: VERTICAL BENDS AND EDGE OF STEEL CASING (IF APPLICABLE) PRIOR TO BACKFILL. HORIZONTAL BENDS PRIOR TO BACKFILL TEES PRIOR TO BACKFILL FITTINGS (REDUCERS AND COUPLINGS) PRIOR TO BACKFILL FIRE HYDRANTS (TOP FLANGE) VALVES METER (TOP CENTER OF BOX) BLOW OFF ASSEMBLY CORNER SLAB OF WATER TANK & GATE VALVE ON THE WATER TANK	NBU Water & Wastewater Record Drawing/CAD/GPS Deliverables Submission Standards and Requirements		
General	28	GPS POINT REQUIREMENTS (CONTINUED): WASTEWATER: MANHOLES CLEANOUTS CORNER SLAB OF LIFT STATION ELECTRIC: POLES TRANSFORMERS, BOTH ABOVE AND UNDERGROUND (FRONT LOCK) PULL BOXES STREET LIGHTS COORDINATE GPS REQUIREMENTS WITH NBU INSPECTOR	NBU Water & Wastewater Record Drawing/CAD/GPS Deliverables Submission Standards and Requirements		
General	29	Show cut and replacement limits of existing surface improvements (pavement sidewalk, etc.), if applicable.	W&WW Design Criteria, 6.2(A)(3)		
General	30	If the proposed improvements are over the Edwards Aquifer Recharge Zone, plans must include TCEQ notes and applicable standard details.	W&WW Design Criteria, 6.1(E)(7)(c), 6.1(E)(7)(d)		
General	31	Please include SCS and WPAP documentation provided by Texas Commission on Environmental Quality.			
General	32	Totals of the following structures must be included on the corresponding utility sheet: footages of water and wastewater mains, number and size of water services and meters, number of wastewater services, valves, air releases, fire hydrants and fire lines, manholes, etc.			
General	33	Include Trench Excavation and Safety Protection notes on each plan sheet.	W&WW Design Criteria, 6.1(E)(13)		
General	34	USGS, NBU, or TxDOT Benchmarks shall be shown and called out on each plan sheet.	W&WW Design Criteria, 6.1(E)(15)		
General	35	Erosion and Sedimentation control plan sheets shall be included in the plan set.	W&WW Design Criteria, 6.1(E)(14)		

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General	36	Abandonment of water and wastewater mains in ROW shall consist of cutting the main at locations identified in the plans and filling the main with a pumpable grout meeting the requirements of the current specifications. Water and wastewater mains shall be removed when required as a condition of the City or TxDOT ROW permit, or when they will conflict with proposed infrastructure. ROW shall be backfilled to required compaction after removal. Abandonment of water and wastewater mains in private easements shall consist of filling the main with a pumpable grout meeting the requirements of the current specifications. Plans should include methods of abandoning or removing all other mains.	W&WW Design Criteria, 9.1		
Easements					
Easements	37	All utilities installed outside public rights-of-way (ROW) shall be installed in an exclusive utility easement dedicated to NBU. Easements shall comply with NBU Real Estate Services' Requirements for Permanent Water and Sewer Easements, as updated.	W&WW Design Criteria, 6.4		
Easements	38	Easement widths shall be as follows for the given diameters of water and sewer pipes: 21" or smaller pipes: 20 feet or twice the depth of pipe, measured to bottom of pipe 24" pipes: 25 feet or twice the depth of pipe, measured to bottom of pipe Greater than 24" pipes: 30 feet or twice the depth of pipe, measured to bottom of pipe	W&WW Design Criteria, 6.4(A)		
Easements	39	Where the easement is not adjacent to ROW or existing public utility easement, an additional 10 feet of easement width is required.	W&WW Design Criteria, 6.4(B)		
Easements	40	If easements are not parallel and adjacent to the ROW, the main shall be set to one side of the easement to permit excavation while allowing for spoils and haul vehicles on the other side of the easement. The centerline of the main will typically be offset 10 feet frmo the edge of easement. Offset shall be adjusted for large diameter or deep mains as directed by NBU.	W&WW Design Criteria, 6.4(C)		
Easements	41	When utilities are located outside a street ROW or overlapping public utility easement, they must be skewed towards the ROW side to allow for excavation or haul vehicles on the other side of the easement.	W&WW Design Criteria, 6.4(D)		
Easements	42	Wastewater easements shall be configured such that all manholes are accessible by maintenance vehicles such as light-duty trucks and combination vactor units. The surface of all offsite easements must be graded such that slopes in all directions are no greater than 12% without NBU approval. Grade breaks exceeding 8% are not permitted.	W&WW Design Criteria, 6.4(E)		
Easements	43	Additional access easements are required if direct vehicular access to manholes or other features is blocked by creeks, drainage channels, ponds, excessive slopes, retaining walls, or other features. Access easements shall be a minimum 20 feet in width with longitudinal slopes no greater than 12% and side slopes no greater than 5%.	W&WW Design Criteria, 6.4(F)		
Easements	44	Utility easements shall be configured such that all fire hydrants have minimum 10 feet of clearance in all directions.	W&WW Design Criteria, 6.4(G)		
Easements	45	Utility easements provided for meter vaults, wastewater access chambers sampling stations, or air valve assemblies shall extend a minimum of five feet in all directions from the outside wall or footing of the assembly.	W&WW Design Criteria, 6.4(H)		
Easements	46	Easements parallel to lot lines shall be wholly contained on one lot and shall not cross lot lines.	W&WW Design Criteria, 6.4(I)		

Type	Item I.D.	Item Description	Reference	Yes	N/A
Easements	47	All utility easements shall be accessible from public ROW via a City of New Braunfels standard Commercial-Multifamily-Industrial Driveway.	W&WW Design Criteria, 6.4(J)		
Easements	48	No structures, private landscaping, or irrigation shall be installed or placed within NBU easements.	W&WW Design Criteria, 6.4(K)		
Easements	49	Private roadways or pavement will be allowed within NBU eaesments on a case-by-case basis. If pavement is permitted, the property owner shall be responsible for all pavement repairs and restoration within the easement that are damaged as a result of NBU repair or maintenance activities.	W&WW Design Criteria, 6.4(L)		
Easements	50	Minimum vertical clearance to obstructions above NBU easements shall be 25 feet.	W&WW Design Criteria, 6.4(M)		
Easements	51	A minimum 10 foot of clearance shall be provided between proposed NBU lines and existing or proposed structures. Clearance shall be measured from the outside edge of the line to the nearest point of the structure.	W&WW Design Criteria, 6.4(N)		
Easements	52	Gates shall be installed where easements cross existing or proposed fence lines. Gates shall be a minimum 16 feet in width to permit vehicular access and secured with a lock provided by NBU. Gates shall comply with NBU standards.	W&WW Design Criteria, 6.4(O)		
Easements	53	The Developer is responsible for 100% of the cost to acquire offsite easements. Easements shall be recorded in the County Real Property Records prior to acceptance of the construction plans.	W&WW Design Criteria, 6.4(P)		
Easements	54	NBU shall not be responsible to the Developer for any delays, costs, expenses, or damages of any kind during the time that NBU is in the process of acquiring any easements through negotiation and/or condemnation.	W&WW Design Criteria, 6.4(Q)		
Water Plans					
Water	55	All drawings shall include all applicable items listed in the General Plan Requirements.	W&WW Design Criteria, 6.2		
Water	56	Stations of all proposed connections to existing or proposed water mains shall be shown (excluding service laterals).	W&WW Design Criteria, 6.2(B)(1)		
Water	57	The point of connection(s), type of connection, and size of existing water main to be connected to shall be detailed and shown on plan.	W&WW Design Criteria, 10.2		
Water	58	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, 6.2(B)(2)		
Water	59	Station numbers for mains shall be identified for beginning points, ending points, points of curvature, points of tangent, points of reverse curve, points of intersection, valves, fire hydrants, other appurtenances, and grade breaks.	W&WW Design Criteria, 6.2(B)(3)		
Water	60	Station numbers for mains shall be identified for the water mains where they cross any other utility. A standard crossing detail should be provided if a profile is not required.	W&WW Design Criteria, 6.2(B)(4)		
Water	61	Details of appurtenances shall be shown and must be in compliance with NBU Specifications.	W&WW Design Criteria, 6.2(B)(5)		
Water	62	The location of all existing and proposed water services, water mains, valves and fire hydrants shall be identified.	W&WW Design Criteria, 6.2(B)(6)		
Water	63	Reference noting field book notes for the original survey.	W&WW Design Criteria, 6.2(B)(8)		
Water	64	Design velocity at maximum day plus fire flow for all mains shall be shown in the EDR.	W&WW Design Criteria, 6.2(B)(9)		
Water	65	Calculated design static and peak day plus fire pressures at highest and lowest lot served shall be shown in the EDR.	W&WW Design Criteria, 6.2(B)(10)		
Water	66	Thrust restraint, when required, shall be shown on plan view, or a standard detail indicating the required thrust restraint lengths by pipe size and fitting type.	W&WW Design Criteria, 6.2(B)(11)		
Water	67	Culverts, bridges, and other drainage structures shall be shown in plan view.	W&WW Design Criteria, 6.2(B)(13)		
Water	68	Retaining walls, including geogrid, straps, tie-backs, and all other components shall be shown in plan view.	W&WW Design Criteria, 6.2(B)(12)		

Type	Item I.D.	Item Description	Reference	Yes	N/A
Water	69	Profiles shall be required for all water lines 12-inch in diameter and larger.	W&WW Design Criteria, 6.2(C)		
Water	70	Profiles shall show the existing ground profile, proposed street finish grade, and proposed subgrade.	W&WW Design Criteria, 6.2(C)(1)		
Water	71	Profiles shall show station numbers, elevations, diameter, and material of all utility crossings.	W&WW Design Criteria, 6.2(C)(2)		
Water	72	Profiles shall show station numbers and soil geology information at stream crossings to evaluate the need for special surface restoration.	W&WW Design Criteria, 6.2(C)(3)		
Water	73	Profiles shall 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, 6.2(C)(4)		
Water	74	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 at intermediate points every 100 feet.	W&WW Design Criteria, 6.2(C)(5)		
Water	75	Profiles shall show retaining walls, including geogrids, straps, tie-backs, and all other components of potential conflict.	W&WW Design Criteria, 6.2(C)(6)		
Water	76	Profiles shall show culverts, bridges, and other drainage structures crossing the water line alignment.	W&WW Design Criteria, 6.2(C)(7)		
Water	77	Pavement Section in accordance with ROW owner's requirements			
Water	78	Length of all mains from fitting to fitting shall be indicated. The length of the proposed water main is indicated from tie-in to tie-in and/or match line to match line and shall be rounded to the nearest 1-foot increment.	W&WW Design Criteria, 6.2(A)(2)		
Water	79	Water main standard sizes are 8", 12", 16", 24", and 6" multiples thereafter.	W&WW Design Criteria, 10.2(B)(2)		
Water	80	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, 10.2		
Water	81	EDR shall include, at a minimum, pressure and velocity calculations for the system for (1) average day demand (ADD), (2) peak hour demand (PHD), (3) peak day demand (PDD) plus fire, and (4) static pressure. ADD = 0.24 gpm/LUE PDD = 0.48 gpm/LUE PHD = 0.83 gpm/LUE	W&WW Design Criteria, 10.2(A)(2)		
Water	82	Design calculations must demonstrate a maximum static pressure of 150 psi in the system. If the static pressure exceeds 80 psi, a PRV must be installed on the property owner's side of the meter at the time of construction of the development. Pressure reducing valves shall be required on water mains at NBU's discretion.	W&WW Design Criteria, 10.2(A)(1)(b), (c), (C)(10)		
Water	83	Design calculations must demonstrate the minimum operating pressure at the highest-elevation meter is 50 psi using ADD.	W&WW Design Criteria, 10.2(A)(1)(d)		
Water	84	PHD conditions: design calculations must demonstrate the minimum residual pressure at any point in the affected pressure zone must not be less than 35 psi, and the maximum allowable velocity in any one pipe shall not exceed 5 fps.	W&WW Design Criteria, 10.2(A)(3)		
Water	85	PDD plus fire conditions: design calculations must demonstrate the minimum residual pressure at any point in the affected pressure zone shall not be less than 20 psi, and the maximum allowable velocity in any one pipe shall not exceed 10 fps. Fire flow requirements will be determined in accordance with the City of New Braunfels Fire Code and associated rules.	W&WW Design Criteria, 10.2(A)(4)		

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Water	86	Water modeling shall be required for proposed mains. The largest size of pipe, as determined by comparing the service area's peak hour demand and peak day plus fire flow demand, shall be used. Additional storage required for developments with 250 connections or greater will be determined by NBU Water Engineering based on system modeling.	W&WW Design Criteria, 10.2(A)(5), (6)		
Water	87	Minimum main size shall be 8 inches. Transmission line sizes will be determined on a case by case basis. Looped systems are required for service reliability. The maximum length for an 8-inch main is 1000 feet before it must be looped. Looping requires two separate connections to existing water mains.	W&WW Design Criteria, 10.2(B)(1), (3)		
Water	88	The maximum bend for water mains is 45 degrees.	W&WW Design Criteria, 10.2(B)(5)		
Water	89	Mains shall be located as per standard details within the street unless otherwise directed by NBU. In major collector and arterial roadways, mains must be located outside the pavement, curbs, etc., wherever feasible. When mains are located outside of the right of way, they must be within a dedicated utility easement meeting the requirements of section 6.4. Main assignments in such City streets must be approved by NBU. Assignments for lines in County roads must be approved by the County Engineer.	W&WW Design Criteria, 10.2(B)(6)		
Water	90	Minimum depth of cover over the uppermost projection of the pipe and all appurtenances shall be 48 inches. Concrete cap or encasement must be installed if cover is less than 48 inches. Maximum depth will be as approved by NBU for the specific materials, application, and conditions.	W&WW Design Criteria, 10.2(B)(9)		
Water	91	Water mains 16 inches in diameter and larger require automatic air release valves at all high points and at the down-slope side of all valve locations. Air/vacuum and vacuum release valves shall be approved on a case-by-case basis. The engineer shall determine the appropriate location and size of air release valve.	W&WW Design Criteria, 10.2(B)(12)		
Water	92	For mains of 16 inches and larger, drain valves shall be placed at low points.	W&WW Design Criteria, 10.2(B)(10)		
Water	93	Contractors shall install line stoppers at their cost for an outage during construction if system valves are not available or the existing valves do not function. Line stoppers will be required based on the following criteria: a. If the number of residential customers affected is greater than 20 and expected to last more than 4 hours. b. If any commercial customers are affected by the outage then the use of line stoppers will be determined on a case by case basis. c. If any critical care customers are affected by the outage then the use of line stoppers will be determined on a case by case basis. d. System conditions may require a line stopper and may not be known until construction commences.	W&WW Design Criteria, 10.2(B)(13)		
Water	94	No water line shall be deflected either vertically or horizontally, in excess of 50% as recommended by the manufacturer of the pipe or coupling without the appropriate use of bends or offsets. Fittings may be required where more than two pipe lengths are deflected.	W&WW Design Criteria, 10.2(B)(14)		

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Water	95	The determination of whether restrained joints or other means of anchorage are required shall be made by a qualified professional engineer with review and approval by NBU. All thrust anchorages shall be designed for a safety factor of not less than 1.50 under maximum pressure loading. Thrust blocks will not be allowed on the system without written approval from NBU. Joints will be restrained with restraining systems approved by NBU and restraint lenghts shall be submitted to NBU at the time of plan submittal. Note that joint restraint length calculations should be based on NBU-required backfill and bedding.	W&WW Design Criteria, 10.2(B)(15)		
Water	96	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, typical spacing should be 500 feet in high-density areas and 1200 feet in residential area. Mains 24 inches and larger shall be valved at intervals not to exceed 2000 ft.	W&WW Design Criteria, 10.2(C)(3)		
Water	97	All isolation valves 18 inches and smaller must be gate valves. Valves larger than 18 inches may be gate valves or butterfly valves.	W&WW Design Criteria, 10.2(C)(1)		
Water	98	Fire lines/leads shall be ductile iron, have restrained joints throughout the entire assembly, an isolation gate valve on the lead restrained to the main, a backflow preventer inside the property line and outside of utility easement (accessible for inspection by NBU and City personnel), and be no longer than 100 feet in length. Valves having "push-on" joints are not permitted for fire hydrant leads and laterals.	W&WW Design Criteria, 10.2(B)(4), (B)(11), (D)(5), (C)(2), (C)(9)		
Water	99	At dead ends, gate valves shall be located one (1) pipe length (10-ft. minimum) from the end points of the main. The Engineer shall provide (and show on drawings) complete restraint for all such valves, pipe extensions, and end caps. Permanent blow-offs are required at the end of 25 feet or longer pipe sections.	W&WW Design Criteria, 10.2(C)(5)		
Water	100	Branch piping (both new and future branches) shall be separated from the main with isolation valves.	W&WW Design Criteria, 10.2(C)(6)		
Water	101	The minimum number of valves at an intersection of water mains is N-1, where N is the number of legs of pipes in the intersection. Valves shall be located so that isolating any intersection of water main requires closing of no more than three valves.	W&WW Design Criteria, 10.2(C)(4), (C)(7)		
Water	102	Valves with valve extensions and those at pressure zone boundaries shall be equipped with a locking type debris cap.	W&WW Design Criteria, 10.2(C)(8)		
Water	103	Hydrants shall be installed at the intersection of two (2) streets and between intersections where necessary, at distances not in excess of 300 feet between hydrants in commercial or other high-density areas (as measured along ROW) and not more than 600 feet in residential areas (as measured by hose lay). In residential areas, hydrants should be placed at lot lines when placed along a roadway/access way.	W&WW Design Criteria, 10.2(D)(1)		
Water	104	Hydrants shall be installed on both sides of all divided road/highways, unless otherwise approved by NBU and NBFD. Roads/highways where opposing lanes of traffic are separated by a curb, safety barrier, drainage channel, or other vehicle obstruction shall be considered a divided road/highway.	W&WW Design Criteria, 10.2(D)(2)		
Water	105	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, 10.2(D)(3)		
Water	106	No private fire hydrants shall be allowed, unless approved by NBU. If a private hydrant is allowed, then a double check detector assembly shall be required at the hydrant tap.	W&WW Design Criteria, 10.2(D)(4)		
Water	107	Water services shall be in accordance with NBU Standard Details. No more than two meters on a single service line (domestic and irrigation meters).	W&WW Design Criteria, 10.2(E)(1)		

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Water	108	Each domestic meter shall have its own service tap. An irrigation meter may be added to a single service other than the domestic meter for services to single-family homes only.	W&WW Design Criteria, 10.2(E)(2)		
Water	109	Each non-residential meter shall have its own individual service tap. Service connections from fire lines are not permitted.	W&WW Design Criteria, 10.2(E)(3)		
Water	110	Individual meter services will not be taken from transmission lines. Transmission lines are generally considered to be 18 inches in diameter or larger. Exceptions must be approved by NBU Water Engineering at time of plan submittal. The Engineer shall submit a letter with this request.	W&WW Design Criteria, 10.2(E)(4)		
Water	111	1-inch service lines shall be constructed of Type K annealed seamless copper tubing meeting the requirements of ASTM B88. AWWA C901 SDR9 Copper Tubing Size HDPE may be used for 1-inch services lines with special approval from NBU only. 2-inch services lines shall be AWWA C901 SDR9 CTS HDPE. All copper and HDPE tubing must be NSF 61 certified.	W&WW Design Criteria, 10.2(E)(5)		
Water	112	Water meters 6 inches and smaller shall be provided by NBU.	W&WW Design Criteria, 10.2(F)(1)		
Water	113	Water meters larger than 6 inches shall be provided by the developer at their own expense and must comply with NBU standards.	W&WW Design Criteria, 10.2(F)(2)		
Water	114	Each individual residence or building shall have a separate NBU water service and water meter as determined by NBU. Offices in the same building under one piping system may have a single NBU water meter. Customer must comply with private submetering requirements established by plumbing code, TCEQ, and the Public Utility Commission of Texas. Individual residences include the following, but does not exclude others: 1) Duplex, triplex, fourplex 2) Build-to-rent 3) Mobile homes 4) Townhome 5) Condominium 6) Others as defined by TCEQ.	W&WW Design Criteria, 10.2(F)(3)		
Water	115	All commercial or residential building(s) of any type with gross square footage over 10,000 square feet, including all stories, shall have (i) a separate NBU meter(s) for irrigation, and (ii) another separate NBU meter(s) for all other common areas and outdoor purposes, including fountains, swimming pools, and any other outdoor use of water. Combined common areas may be combined under one water service and meter; though, each area will need to be itemized when determining the LUEs associated.	W&WW Design Criteria, 10.2(F)(4)		
Water	116	A separate NBU water meter and grease, oil, sand interceptor shall be provided for each restaurant establishment as determined by NBU. Shell buildings shall be designed accordingly if a restaurant establishment is a possible future tenant. Only one tenant connection to a grease trap will be allowed. Each tenant of a shell building must be provided a separate water service and water meter.	W&WW Design Criteria, 10.2(F)(5)		
Water	117	For commercial developments, meter size(s) shall be determined by the Engineer of Record using fixture count data, if available. Water demand by similar developments may be accepted in lieu of fixture count data, at the discretion of NBU Water Engineering. Water meters are not to be sized based on an assumed number of LUEs for a development.	W&WW Design Criteria, 10.2(F)(6)		
Water	118	All commercial buildings, multi-family facilities, and residential dwellings are required to have separate NBU irrigation meters if an irrigation system is installed.	W&WW Design Criteria, 10.2(G)(1)		

Type	Item I.D.	Item Description	Reference	Yes	N/A
Water	119	Water lines shall be installed no closer than nine feet in all directions to wastewater collections facilities (to include manholes and cleanouts). All separation distances shall be measured from the outside surface of each respective piece. If the nine foot separation can not 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 Specifications shall be submitted for consideration.	TCEQ 290.44 (e) (4), and TCEQ 217.53 (d) (3).		
Water	120	The separation between NBU water infrastructure and dry utilities shall be a minimum of 3 feet, outside-to-outside.	W&WW Design Criteria, 10.2(B)(7)(b)		
Water	121	Water mains must maintain a minimum 2 foot vertical clearance where the water main crosses stormwater infrastructure. Steel casings must be used when water mains cross under box culverts, large storm drain pipes (48 inches or greater in diameter), or multiple barrel storm drains of any size. Steel casing sizes shall be in accordance with NBU specifications and must extend 5 feet beyond the outer diameter of the stormwater infrastructure.	W&WW Design Criteria, 10.2(B)(7)(c)		
Water	122	All water service lines (including fire lines) that are being abandoned and not transferred to a new distribution line should be disconnected at the corporation stop and all other valves and appurtenances removed. Any meters to be abandoned shall be removed and delivered to a storage facility as directed by the NBU Inspector.	W&WW Design Criteria, 9.4		
Wastewater Plans					
WW	123	All drawings shall include all applicable items listed in the General Plan Requirements.	W&WW Design Criteria, 6.3		
WW	124	Station numbers at all proposed connections to existing or proposed wastewater mains shall be shown.	W&WW Design Criteria, 6.3(B)(1)		
WW	125	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, 6.3(B)(2)		
WW	126	The location, alignment, and structural features of the wastewater main, including manholes and concrete retards, if applicable, shall be shown.	W&WW Design Criteria, 6.3(B)(3)		
WW	127	Station numbers for beginning points, ending points, manholes, services, cleanouts, stacks, and other appurtenances shall be shown.	W&WW Design Criteria, 6.3(B)(4)		
WW	128	Details of all required appurtenances shall be shown.	W&WW Design Criteria, 6.3(B)(5)		
WW	129	Location of all existing and proposed wastewater services, mains, and manholes shall be shown.	W&WW Design Criteria, 6.3(B)(6)		
WW	130	Reference noting field book notes for the original survey.	W&WW Design Criteria, 6.3(B)(8)		
WW	131	Retaining walls, including geogrid, straps, tie-backs, and all other components shall be shown in plan view.	W&WW Design Criteria, 6.3(B)(9)		
WW	132	Culverts, bridges, and other drainage structures shall be shown in plan view.	W&WW Design Criteria, 6.3(B)(10)		
WW	133	The direction of flow in existing and proposed wastewater mains shall be indicated with flow arrows on all plan sheets.	W&WW Design Criteria, 6.3(A)(3)		
WW	134	Elevations shall be indicated on the profile showing the finish floor elevations of all existing structures. If the structure has an active 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, 6.3(C)(6)		
WW	135	Profiles shall show the existing ground profile and proposed street finish grade or subgrade, or finished grade if not under pavement.	W&WW Design Criteria, 6.3(C)(1)		
WW	136	Profiles shall show station numbers and elevations of all utility crossings.	W&WW Design Criteria, 6.3(C)(2)		

Type	Item I.D.	Item Description	Reference	Yes	N/A
WW	137	Profiles shall show station numbers and soil geology information at stream crossings to evaluate the need for special surface restoration.	W&WW Design Criteria, 6.3(C)(3)		
WW	138	Profiles shall 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, 6.3(A)(3), 6.3(C)(4)		
WW	139	Profiles shall show station numbers and elevations for starting points, ending points, manholes (rims and inverts), services, stacks (if applicable), cleanouts, and at intermediate points every 50 feet.	W&WW Design Criteria, 6.3(C)(5)		
WW	140	Flow rate (gpm), velocity, and depth of flow information (QVD) shall be noted on the profile for minimum flow, peak dry weather flow, and peak wet weather flow. QVD information must be shown on each sheet by individual labels per segment or via a table with this information. A table covering all segments in the set on the overall wastewater layout sheet(s) does not meet this requirement.	W&WW Design Criteria, 6.3(C)(7)		
WW	141	Profiles shall show retaining walls, including geogrids, straps, tie-backs, and all other components of potential conflict.	W&WW Design Criteria, 6.3(C)(8)		
WW	142	Profiles shall show culverts, bridges, and other drainage structures crossing the wastewater line alignment.	W&WW Design Criteria, 6.3(C)(9)		
WW	143	The plan set shall include plan and profiles (P&P) for all gravity and force mains.	W&WW Design Criteria, 6.3(C)		
WW	144	Plans and Profiles shall be oriented from left to right, low point to high point.	W&WW Design Criteria, 6.3(A)(1)		
WW	145	No turns less than 90 degrees or greater than 270 degrees are allowed.	W&WW Design Criteria, 10.3(D)(8)		
WW	146	1. Manhole inverts must be constructed in a way that TV equipment can access the invert and have a minimum drop of 2.5% from invert in to invert out.	W&WW Design Criteria, 10.3(D)(5)		
WW	147	Square footages of proposed structures shall be shown in plans.			
WW	148	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.			
WW	149	Residential connections shall be assumed to produce an average wastewater flow of 200 gallons/day. When designing lift stations, 300 gallons/day shall be used. Non-residential wastewater flows will be evaluated on a case-by-case basis.	W&WW Design Criteria, 10.3(A)(1), (A)(2)		
WW	150	Inflow/infiltration: in sizing wastewater lines, external contributions are accounted for by including 750 gallons per acre per day served for inflow and infiltration. For wastewater lines in the Edwards Aquifer Zone refer to the Texas Commission on Environmental Quality requirements. Strict attention shall be given to minimizing inflow and infiltration.	W&WW Design Criteria, 10.3(A)(3)		

WW	151	Peak dry weather flow: peak dry weather flow is derived from the formula:
		Q_pd=(18+(0.0216× F)^0.5)/(4+(0.0216×F)^0.5)
		Where:
		F=(200 (gal/lue/day)×(# LUE))/1440
		F = average dry-weather flow in gpm
			W&WW Design Criteria, 10.3(A)(4)		

WW	152	Peak wet weather flow: peak wet weather flow is obtained by adding inflow and infiltration to the peak dry weather flow. In designing for an existing facility, flow measurement shall be used in lieu of calculations for the pre-existing developed area.	W&WW Design Criteria, 10.3(A)(5)		
WW	153	Minimum flow: minimum flow is derived from the following formula: Q_min=[0.2*(0.0144×F)^0.198]*F	W&WW Design Criteria, 10.3(A)(6), (A)(7)		
WW	154	Design calculations shall include Average Dry Weather Flow, Peaking Factor, Peak Dry Weather, Anticipated Inflow/Infiltration, and Peak Wet Weather Flow.	W&WW Design Criteria, 10.3		
WW	155	Wastewater main standard sizes are 8", 12", 15", 18", 24", and 6" multiples thereafter.	W&WW Design Criteria, 10.3(B)(1)		

Type	Item I.D.	Item Description	Reference	Yes	N/A
WW	156	For wastewater mains 15 inches in diameter or smaller, use the larger size as determined below: a. The main shall be designed such that the Peak Dry Weather Flow shall not exceed 65% of the capacity of the pipe flowing full. b. The main shall be designed such that the Peak Wet Weather Flow shall not exceed 85% of the capacity of the pipe flowing full. For wastewater mains 18 inches in diameter or larger, the main shall be designed such that the Peak Wet Weather Flow shall not exceed 80% of the capacity of the pipe flowing full.	W&WW Design Criteria, 10.3(B)(2)		
WW	157	The minimum design velocity calculated using the Peak Dry Weather Flow shall not be less than two (2) feet per second (fps). The maximum design velocity calculated using the Peak Wet Weather Flow should not exceed ten (10) fps. Velocities in excess of 10 fps may be considered under special conditions where no other options are available. In such cases, proper consideration shall be given to pipe material, abrasive characteristics of the wastewater flows, turbulence, and displacement by erosion or shock. Wastewater lines shall be designed to minimize turbulence to prevent release of sulfide gases and subsequent corrosion. Polymer manholes will be required at areas of high turbulence.	W&WW Design Criteria, 10.3(B)(3), (C)(8)		
WW	158	Minimum allowable slope for mains in the New Braunfels Utilities service area shall conform with the Texas Commission on Environmental Quality standards.	W&WW Design Criteria, 10.3(B)(4)		
WW	159	The location of the wastewater main shall be in conformance with the NBU Standard Details (location shall be center of street). Alternative assignments must be approved by NBU.	W&WW Design Criteria, 10.3(C)(3)		
WW	160	Separation Distances: a. The separation between water and wastewater mains must comply with TCEQ rules or have a variance approved by TCEQ before submittal to NBU. b. The separation between NBU water and wastewater infrastructure and dry utilities shall be a minimum of 3 feet (outside to outside). c. Maintain a minimum 2-foot vertical clearance where the wastewater main crosses stormwater infrastructure. Steel casing must be used when wastewater mains cross under box culverts, large storm drain pipes (48 inches or greater in diameter), or multiple barrel storm drains of any size. Steel casing sizes shall be in accordance with NBU Specifications and must extend 5 feet beyond the outer diameter of the stormwater infrastructure.	W&WW Design Criteria, 10.3(C)(4)		
WW	161	Wastewater mains shall be laid in a straight alignment with uniform grade between manholes. Curves are not permitted.	W&WW Design Criteria, 10.3(C)(9)		
WW	162	Steep grades: where the pipe grade exceeds 8 percent and the construction is outside of any pavement, concrete retards conforming to the NBU standards will be required at intervals of no more than 25 feet (preferably at joint locations).	W&WW Design Criteria, 10.3(C)(5)		
WW	163	Depth of cover: mains installed in either undisturbed natural ground in easements of undeveloped areas, or installed in existing or proposed streets, roads, or other traffic areas, shall be laid with at least 48 inches of cover below finished grade.	W&WW Design Criteria, 10.3(C)(6)		
WW	164	Laterals shall be laid with at least 36 inches of cover below finished grade.	W&WW Design Criteria, 10.3(C)(6)		

Type	Item I.D.	Item Description	Reference	Yes	N/A
WW	165	Wastewater main and lateral protection: a. Concrete encasement shall be used if there is less than 48 inches of cover between the top of a proposed wastewater main and 36 inches to the top of a proposed wastewater lateral to finished grade. b. Concrete saddle shall be used if there is less than 48 inches of cover between the top of an existing sewer main and 36 inches to the top of an existing service lateral to finished grade. c. Concrete encasement must be used if there is less than 2 feet between outside diameters of existing wastewater main and storm sewer. d. Steel encasement must be provided if the wastewater main is installed under single storm sewer pipes with diameter 48 inches or larger, box culverts of any size, or multiple-barrel storm sewers of any size. Steel encasement will extend 5 feet beyond the outer diameter of the storm sewer.	W&WW Design Criteria, 10.3(C)(7)		
WW	166	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: 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 domestic meter. i. At other locations as required by the City of New Braunfels Industrial Waste Ordinance. j. At the end of all mains.	W&WW Design Criteria, 10.3(D)(1)		
WW	167	Manhole spacing for lines smaller than 24 inches should not exceed 500 feet. Spacing may be increased for mains larger than 24 inches, subject to approval by NBU in writing.	W&WW Design Criteria, 10.3(D)(2)		
WW	168	All manholes shall have bolted, watertight covers. Manholes constructed of polymer concrete shall have composite covers per NBU specifications.	W&WW Design Criteria, 10.3(D)(3)		
WW	169	Manholes shall be constructed of Portland cement concrete with interior lining of a corrosion resistant material or polymer concrete per manufacturers approved on the NBU SPL. Polymer concrete is required for manholes on mains 18-inch diameter and larger, at force main discharge points, or at drop manholes with high corrosion potential. Where new construction ties into an existing manhole, the existing manholes must be lined, coated, or replaced with a corrosion resistant material.	W&WW Design Criteria, 10.3(D)(4), (D)(6)		
WW	170	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, 10.3(D)(9)		
WW	171	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 of drop. Note specifically in callouts on plan sheets which manholes are drop manholes.	W&WW Design Criteria, 10.3(D)(10)		
WW	172	Manholes shall have the following minimum sizing: a. 48” for mains up to 18” in diameter b. 60” for 24” mains c. 72” for 30” and 36” mains d. 84” for mains 48” and larger.	W&WW Design Criteria, 10.3(D)(11)		

Type	Item I.D.	Item Description	Reference	Yes	N/A
WW	173	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" in diameter. Services to lots will terminate at the property line with a cleanout 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. Cleanout shall be installed at the property line. Service to lots have a 5 foot by 5 foot water/wastewater easement will terminate within the easement. All wastewater cleanouts that lead to NBU mains shall be installed with a protective utility shroud and pivoting marker pole. Each unit in a duplex, triplex, or fourplex shall be provided with an individual sewer service.	W&WW Design Criteria, 10.3(G)		
WW	174	Lift stations are discouraged and will only be allowed where conventional gravity service is not feasible. All lift stations shall comply with the requirements of NBU's Lift Station Design Criteria, as amended. Refer to the Lift Station Design Criteria and Water Wastewater Design Criteria for force main design criteria.	W&WW Design Criteria, 10.3(H)		
WW	175	Manhole ventilation shall be provided as shown in NBU Details 333 and 334, and as required by TCEQ Rules and Regulations. Manhole covers with holes are not permitted.	W&WW Design Criteria, 10.3(E)		
WW	176	Existing wastewater invert elevations must be field verified.	W&WW Design Criteria, 10.3(D)(7)		
WW	177	Plan views shall show degree deflections on manholes.			
WW	178	Manholes in roadway ROW to be abandoned shall be removed to a level not less than four feet below grade, inlets and outlets securely plugged, and the structure filled with flowable fill in compliance with current NBU specifications. Manholes outside roadway ROW to be abandoned shall be removed to a level not less than four feet below grade, inlets and outlets securely plugged, flowable fill shall be installed to a level not less than 6 inches above top of pipe, and the remainder of the structure filled with material in compliance with current NBU standards and specifications.	W&WW Design Criteria, 9.2		
WW	179	Abandonment of lift stations shall consist of removing all pumps, motors, couplings, valves, and controls from all wet and/or dry wells and all appurtenances above finished grade. Both the wet well and dry well shall be cut down five feet below grade, filled with cement stabilized sand, and covered with topsoil to grade. The associated force main shall be properly abandoned as per section 9.1. Area shall be re-vegetated. NBU shall be notified prior to abandonment.	W&WW Design Criteria, 9.3		

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

Engineer of Record Seal and Date: