



Division of Facilities Development (DFD)
Civil, Site, and Utility Design Guidelines

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DFD views the following guidelines as the minimum design requirements to be incorporated at preliminary and final document reviews. Many projects will require additional information to adequately convey information to the contractor. DFD expects the A/E consultant or the Design/Build team to complete the applicable items in these guidelines together with other civil engineering industry-accepted guidelines and standards. Please use them as a checklist or reference in addition to the DFD Master Specifications and DFD Standard Details.

I. GENERAL GUIDELINES

- A. All Plan Sets should be provided with State, community, campus/institution, and/or other area locator maps on title sheet and/or first page inside cover sheet as necessary for bidders to readily locate the specific site of the proposed project.
- B. The final version of the documents must be stamped, signed, and dated by an A/E registered in the State of Wisconsin.
- C. Provide a graphic scale on all plan and plan/profile sheets compatible with digital use, scanning, and/or photo reduction (including horizontal and vertical scales on profile or cross section sheets).
- D. All Plan Views (including floor plans), on all sheets, should have a consistent North Arrow.
- E. Include horizontal and vertical benchmark / survey control information on drawings.
- F. Arrange sitework sheets in logical order based on the sequence of the work (e.g. site survey, site demolition/clearing plan, grading plan, erosion control plan, etc.).
- G. Based on the quantities of work involved, determine whether the sitework piping/utilities work should be part of the Division 33 (Utilities) or Division 22 (Plumbing) trade and use the appropriate specifications and drawings. The DFD website includes master specifications for both these sections.
- H. Show existing and proposed utility structures and pipe for all site underground utilities on at least one sheet, showing final site design and building footprint, to check for conflicts. Verify clearances from exterior of pipe or outside of structure.
- I. Identify need for easements and coordinate with DFD project manager.
- J. Comply with all applicable codes and associated environmental requirements and regulations.

II. BUILDING SITE DEVELOPMENT

- A. Maintain adequate separation distances between buildings for purposes of controlling fire exposure. Clustered buildings, even with protected window and door openings, add to fire flow demands on the sprinkler and water distribution systems.
- B. Show features surrounding proposed project on a scalable drawing for reference.
- C. Note any routes that must stay open to general vehicles, pedestrians or delivery vehicles.
- D. Note areas or features to be protected.
- E. Show tree preservation fencing.
- F. Show construction equipment and material laydown/storage area.
- G. Coordinate/verify utility building connection location, size, and elevation with MEP designer.
- H. Show areas of potential future expansion to avoid future conflict.

III. SITE SURVEY

All site surveys shall include the following:

I. General

- a. The DFD Project Name, Project Number, Name of the Institution and Agency shall be included on the survey drawing along with the date (initial and revisions).
- b. The following should be included on the survey drawing: A scale (verbal and graphic), legend, north arrow, statement of survey techniques used and certification and datum for elevations (identify local datum and refer to U.S.G.S.)
- c. Location, right-of-way width and names of all existing municipal streets, alleys and other public ways, easements, property lines, railroad and utilities rights-of-way within the exterior boundaries of the project site or immediately adjacent thereto.
- d. Locate all high points, low points, and any other critical spot elevations.
- e. Existing contours at vertical intervals of not more than 1 foot (maximum) labeled at 5-foot vertical intervals (minimum) where the slope of the ground is less than 33% and not more

- than 2 feet (maximum) labeled at 10-foot vertical intervals (minimum) where the slope of the ground is 33% or more. Elevations shall be marked on such contours based on national Geodetic Datum of 1929 (mean sea level).
- f. If a property survey is necessary, document exact length and bearing of State property, bench marks and control points (location and description) and property markers (location and description) within the boundaries of the proposed project shall be included. Show all property lines.
 - g. Limits and elevation of the 100-year recurrence interval flood as shown on local zoning maps and regulatory (FEMA or DNR) floodplain maps.
- J. Paved Surfaces
- a. Description of paved surfaces (concrete, asphalt, brick, gravel, etc.).
 - b. Width and elevation of any existing pavements within the exterior boundaries of the proposed project or immediately adjacent thereto.
 - c. Provide top of curb elevation and flowlines of gutters at breaks in grade and at 50-foot intervals minimum (typical).
 - d. Provide pavement elevations and sidewalk elevations at 50 foot intervals minimum (typical).
 - e. Include the number, width, length and angle of existing parking stall markings.
 - f. Include size and location of handicap accessible parking stalls
 - g. Locate all curb cuts, ramps and transitions.
 - h. Locate the size and height of all stoops at doors.
 - i. Locate the height, length and features for all loading docks.
 - j. Locate all stairs and hand rails.
- K. Buildings and Other Structures
- a. Locate all corners at foundation, jogs, and isolated pillars/posts with respect to any property lines, if property lines are surveyed as part of the project. Establish orientation with respect to reliable baseline or property line.
 - b. Provide measured plan dimensions including heights for all foundations, protruding canopies/awnings, and exterior stairs/platforms/landings/decks.
 - c. Locate service entries for power, telephone, gas, water, etc.
 - d. Locate any known underground features including abandoned foundations or obstructions, tunnels, buried tanks, fill over rubble, etc., and methods of determination if not direct.
 - e. Locate all pedestrian and vehicle entrances to building. Include building entrance stoop and stair elevations as applicable.
 - f. Locate all areaways and window wells. Show elevations at these points.
 - g. Locate all roof drains and downspouts.
- L. Utilities
- a. Location, size and rim elevation and invert elevations of any existing storm sewer drainage pipe, swales, drainage ditches, culverts, cleanouts, manholes or catch basins within the exterior boundaries of the project or immediately adjacent thereto. If no storm sewer is found on site, locate closest storm sewer able to serve the property. Indicate distance to sewer, pipe size and invert elevations on the survey.
 - b. Location, size and rim elevation and invert elevations of any existing sanitary sewer cleanout or manholes within the exterior boundaries of the project or immediately adjacent thereto. If no sanitary sewer is found on site, locate closest sanitary sewer able to serve the property. Indicate distance to sewer, pipe size and invert elevations on the survey.
 - c. Locate any sanitary sewer lift station and provide an inventory of the control panels and electric service.
 - d. Location and size of any existing watermain valves, meters, post indicator valves and hydrants within the exterior boundaries of the project or immediately adjacent thereto. If no water main is located on or immediately adjacent to the project the nearest such mains which might be extended to serve the project shall be indicated by their direction and distance from the project and their size and invert elevations noted on the survey.
 - e. Locate any gas mains, meters, LP tanks and LP fill stations/vaporizers.

- f. Locate all electrical mains and services, electrical hand boxes, electrical transformers and type (pole or pad). Locate light poles approximate height and number of fixtures on each. Locate utility poles and guy wires.
- g. Locate all telephone lines, poles and boxes. Locate CATV lines overhead and underground within the exterior boundaries of the project or immediately thereto.
- h. Locate fiber optic lines and all other communication utilities, including all structures (above and below ground surface and those located on buildings).
- i. Locate any steam tunnels and steam tunnel access hatches.
- j. Locate chilled water mains.

M. Landscape Features

- a. Locate all existing trees 2" diameter or larger, shrubs and hedges (locations, species, and sizes). Plant symbols shall reflect actual size.
- b. Locate edge of tree lines and wooded or natural areas.
- c. Locate the extent of all landscape planting areas.
- d. Locate all creeks, streams and watercourses, and wetlands. Verify if wetlands have been delineated or identified by DNR or regulatory mapping.
- e. Locate rock outcrops or geological features within or immediately adjacent to the project boundary.
- f. Add a description of the natural ground surfaces (grass, rocky, sandy, wet, etc.).
- g. Locate and label any sculptures, art work, and site amenities such as benches, trash cans, bike racks, recycling containers, outdoor tables, kiosks, landscape lighting, flag poles, ash urns, etc.
- h. Locate/identify archeological features or burial sites.
- i. Locate retaining walls. Identify type, height, limits, etc.

N. Miscellaneous Features

- a. Locate all soil borings.
- b. Locate and describe (size, material, and condition) all retaining walls, fences, and gates.
- c. Locate all recorded wells, including monitoring wells.
- d. Locate all private utilities including cisterns, septic tanks, and drain fields including abandoned systems.
- e. Locate all types of signage on the project site or along the adjacent roadways.
- f. Locate all bollards/guard posts, guard rails, and wheel stops.
- g. Locate railroad tracks or any other manmade features within the exterior boundaries of the project or immediately thereto.

IV. GRADING AND EARTHWORK

A. Slopes

- a. Slopes shall be no flatter than:
 - i. 2% across turf areas, or
 - ii. 1% across pavements.
- b. Slopes shall be no steeper than:
 - i. 4 horizontal : 1 vertical for mowed turf slopes, or
 - ii. 3 horizontal : 1 vertical for turf slopes that are not mowed, or
 - iii. 12% on short driveways that will be snow plowed, or
 - iv. 10% on sustained grades on long driveways and minor roads that will be snow plowed, or
 - v. 8% on sustained grades on major roads that will be snow plowed.

B. Grades

- a. Outside of Paved Areas – provide spot grades at all low/high points and as needed or required to clarify the grading plan and drainage patterns (including sidewalks, paths, and trails). Flow arrows designating the drainage flow path should also be included. Show existing grades at edge of project limits to ensure proposed grades coordinate with existing adjacent site grades accordingly.
- b. Paved Surfaces – At all low/high points and as needed or required to clarify the grading plan and drainage plan. Show existing grades at edge of project limits to ensure proposed grades coordinate with existing adjacent site grades accordingly. At a minimum provide spot grades every 50 feet along curb and gutter sections of asphalt edges. All existing and

proposed storm inlets or manholes shall be shown on the grading plan with the rim elevation and any necessary adjustments noted. Flow arrows designating the drainage flow path should be included with the pavement slope next to the arrow.

- c. ADA accessible routes and parking slopes shall be noted.
- C. Plan Information:
- a. Show limits of grading activities and construction limits on plans. Show/locate construction fencing if required.
 - b. Designate staging/stockpile areas available to Contractor.
 - c. Clearly label areas that shall not be disturbed.
 - d. Clearly label areas to be used for ingress/egress.
 - e. Show tree protection/preservation fencing around trees or groups of trees at proposed locations.

V. STORM WATER MANAGEMENT AND EROSION CONTROL

- A. A storm water management report must be included with all applicable State projects. The report shall include the following
- a. A narrative of the design must be included in the storm water report. The narrative should include a description of the existing site and how it currently drains (including drainage through the site).
 - b. Pre-development and post-development hydrology and pollutant loading (if applicable) data for the project, such as peak flows and runoff volumes, as needed to meet the requirements for any local ordinance. All major assumptions used in developing the input parameters shall be clearly stated and cross referenced to the drawings.
 - c. Hydraulic and hydrologic data summaries for all existing and proposed pipes, channels, grade stabilization structures and other runoff conveyance systems and the necessary documentation to demonstrate compliance with DNR and local site drainage requirements. Include soils data for infiltration.
 - d. BMP design data for each proposed BMP showing how it complies with applicable technical standards and the requirements for any DNR and local ordinance.
 - e. Include pre and post construction quantities of pervious and impervious areas.
- B. General Drainage
- a. Site improvements should be designed to minimize runoff from leaving the site.
 - b. Direct drainage **away** from buildings, adjacent private properties or building sites, and toward nearest available public drainage facilities of adequate capacity. If the public drainage facilities lack adequate capacity, the drainage system and other site improvements must be designed to not exceed the capacity of the public drainage facilities.
 - c. Identify the design storm(s) used for storm sewer design in the design report.
 - d. Verify stability of receiving facilities is adequate for the design storm flows.
 - e. Verify the receiving facilities will not erode or be damaged by the design storm flows.
 - f. Identify overflow routes of storm water during major storm events exceeding capacity of the drainage features. These routes must not go toward buildings or flood parking lots to a depth of more than 6 inches.
- C. Detention and Retention Basins
- a. Detention and retention facilities shall be designed in accordance with DNR Technical Standards.
 - b. Incorporate onsite storm water detention as necessary to prevent damage to site or receiving property / facilities. Check requirements of local ordinance and comply when feasible. DFD is not required to abide by local ordinances except for zoning land use requirements. However, facilities shall be designed to prevent flooding, erosion, or other storm water damage to downstream property.
 - c. If a basin is planned for the site, design overflow outlets to operate safely without damaging the basin or outlets during storms up to and including the 100-year, 24-hour storm. Overflow overtopping a road shall be prevented if possible. All basins shall have an overflow outlet including those basins that are designed as infiltration basins.
 - d. Detention basins should be designed to minimize maintenance, while maximizing water quality.
- D. Erosion Control

- a. If the size of the disturbed areas is greater than 1 acre, a Notice of Intent to Construct will have to be filed in accordance with NR 216. The erosion control plan shall be included in the plans. A/E shall submit NOI and Storm Water Pollution Prevention Plan (SWPPP) to DNR (DFD will pay application fee as a reimbursable expense under A/E contract). This provides the basis for the contractors' bids.
 - b. Design and specify erosion control during construction and permanent storm water measures. Do not disturb more of site cover than is necessary at any one time. Provide Erosion Control Plan as a separate drawing on large projects.
 - c. Erosion control measures shall be in accordance with the DNR Technical Standards. The plan shall specifically describe erosion control measures to be used to protect sensitive areas of the site.
 - d. Erosion control and stabilization measures for seeded areas shall be designed and specified in accordance with the WisDOT Facilities Development Manual (FDM) procedures, the WisDOT Product Acceptability List for Erosion Control (PAL), and DFD requirements.
 - e. Turf areas that receive runoff directly from a culvert, storm sewer outfall or retention/detention basin outlet or overflow shall be stabilized with riprap. The size of the pieces of riprap and the dimensions of the riprap pad shall be determined in accordance with the procedures in the drainage section of the WisDOT FDM. All riprap shall be underlain with geotextile fabric appropriate for the weight of the riprap.
- E. Storm Sewer
- a. Culverts and storm sewers in security locations shall be reinforced concrete pipe to preclude security breaches in the pipe. Any openings into the piping system having dimensions greater than 5 inches shall be provided with security grates. Where debris/security grates are used on inlet structures, the surface area of the grating should be several times the end area of the pipe to minimize flooding and to keep flood velocities at the grate down. Manhole covers must be lockable both inside and outside the secure perimeter to avoid a security breach from outside the secure perimeter. Check with the institution for any preferences on the types of lockable covers. DO NOT use strap-type manhole cover locks in pavement areas subject to snow plowing.
 - b. Inlet frames and grates, and manhole frames and covers manufacturer and models should be consistent with those currently in use on the site UNLESS the site wants to change, and can identify problems with the existing items.

VI. TRAFFIC CONTROL DURING CONSTRUCTION

- A. Discuss the interruption of any traffic or deliveries with the occupants/owners of nearby buildings/properties to determine how work can be accomplished with minimum disruption. Indicate in the specifications if work is required outside of regular work hours. Add specific information regarding locations, hours, lengths of disruption, etc.
- B. Plan driveway(s) to account for adequate stacking of exit traffic without blocking on-site traffic patterns, and adequate stacking of entrance traffic without blocking the road.
- C. Show proposed traffic signage and pavement markings on the plans. All signs and markings shall be in accordance with the Wisconsin Manual of Uniform Traffic Control Devices (MUTCD).
- D. Yellow pavement markings shall be used to separate vehicles traveling in opposite directions and where there are traffic restrictions that need to be highlighted. White pavement markings shall be used to separate lanes traveling in the same direction.
- E. Traffic signage and barricades in construction areas should be in accordance with the MUTCD. **Note:** Traffic cones are temporary measures to be used only during daylight hours and when the danger to motorist or construction workers is minimal. All traffic control utilized during darkness must be reflectorized at a minimum, and should be equipped with flashers or steady burn lights depending upon the amount and type of traffic and ambient nighttime lighting levels.
- F. If possible, separate access points for car traffic and truck or bus traffic (typically applicable to parks, historic sites, and schools).
- G. Treat the driveway(s) as an intersection and designate a vision triangle restricting the height of landscaping, signage or other obstacles (including snow storage) near the driveway.
- H. Assume that all larger buildings will need an access suitable for maneuvering of semi-trailer traffic for delivery of furniture and equipment (even if only for the initial occupancy of the building).

- I. Plan a dedicated travel path for waste removal vehicles including means to access dumpsters and turn around.
- J. Show construction vehicle routes and/or restrictions on the site. If construction vehicles will be routed over existing roadways, paths or shallow underground utilities, specifications shall include provisions for repair/replacement prior to project acceptance and closeout.

VII. ADA / PEDESTRIAN / BICYCLE CIRCULATION AND BUS STOPS

- A. Show and label accessible routes from designated accessible parking and bus stops to main building entry.
- B. If the site is located in a community with bus service, a location suitable for a bus stop should be included along the fronting road. The bus stop should have a walk and enough space for a shelter.
- C. Do not locate a walk between rows of parking unless it is part of a raised median area. The median should be wide enough to accommodate the over-hang of parked cars and a 4-foot wide walk (minimum).
- D. Avoid narrow strips of lawn less than 3-feet.
- E. Maintain existing pedestrian circulation or redesign access as appropriate.
- F. Pedestrian walks shall be paved in areas requiring snow removal.
- G. Provide bicycle parking racks near entrances. Verify institution and agency standards.
- H. Bicycle routes shall be designed in accordance with WisDOT or American Association of State Highway Transportation Officials (AASHTO) design procedures.
- I.

VIII. ROADS, DRIVEWAYS, AND PARKING LOTS

- A. Curb & Gutter and Medians
 - a. Match existing curbing or curb and gutter used on the site, or match community or institution standard.
 - b. Plowable ends are required at the termination of curb. 6-inch high curb may taper down to the ground over a distance of 3 feet (minimum).
 - c. Some medians will also require plowable or mountable noses (see WisDOT standard for Concrete Median Nose, Sloped Nose Detail).
- B. Pavement
 - a. Drive aisles and pavement areas receiving high volumes of truck or bus traffic, or heavily loaded vehicles (e.g. loading docks, bus stops, bus parking, refuse and recycling dumpster locations etc.) shall be paved with a thicker pavement section. The actual pavement structure (aggregate base course and asphalt or concrete pavement) shall be designed based on the soil conditions at the site and the type of traffic to be encountered (heavy vehicles and/or large quantities of vehicles). The WisDOT FDM design procedure for flexible or rigid pavements may be used.
 - b. The minimum pavement structure for typical asphalt pavement shall be 3 inches of WisDOT Type E-0.3, E-1, or E-3 (A/E to note most suitable type in specifications) asphalt pavement over 8 inches of gravel base course. The pavement structure for paved parking lots shall be designed based on the soil conditions at the site.
 - c. The minimum section for concrete walks is 5 inches of concrete over 6" of gravel base course.
 - d. Concrete roadways or walks subject to vehicular traffic (snowplows, service trucks, delivery trucks, fire lanes, etc.) shall be a minimum of 7 inches thick. A/E shall determine need for required reinforcement and doweled joints based on traffic and site conditions.
 - e. If concrete pavement is used, include a diagram or information regarding joint location and spacing.
 - f. The use of brick pavers as an exterior paving material is NOT recommended for vehicular traffic areas.
 - g. Where new pavements abut existing pavements, the existing pavement shall be sawcut full depth to form a clean vertical edge and a good butt joint between the new and existing pavements. Pavement removal shall be taken to the nearest joint.
 - h. Existing bituminous pavements may be recycled for use as fill material. Milled or pulverized pavements may be used as base course if the milled or pulverized material meets the same requirements set for the based material.

C. Pavement Marking and Traffic Signage

- a. Reflective glass beads are not necessary in the paint unless warranted as a safety measure on an individual project. Avoid using other pavement paint colors since white and yellow are the only two colors in the MUTCD and are readily available. Yellow paint shall be used to separate vehicles traveling in opposite directions. White paint shall be used to separate lanes traveling in the same direction.
- b. Permanent traffic signage may be specified for purchase from Badger State Industries (the Department of Corrections industries program). Signs should be made from aluminum blanks.
- c. Show proposed traffic signage and pavement markings on the plans. All regulatory signs and markings shall be in accordance with the MUTCD.

D. Parking

- a. Full time vehicle parking is generally not desirable in front of the main building entrance. Pedestrian loading / unloading is acceptable.
- b. Typical parking stall dimensions are 9 feet wide by 18 feet deep.
- c. Where parking stalls abut the edge of the parking lot, and adjacent landscaping will allow vehicles to overhang the edge of the parking lot pavement, the stall depth may be reduced to 16 feet if curbing or wheel stops are present for drainage and/or landscape protection.
- d. One way traffic patterns should use diagonal parking as a means to reinforce the one-way traffic patterns.
- e. Angle parking shall use either 45-degree or 60-degree parking layout (other angles or irregular layouts will not be accepted).
- f. Typical parking lot aisle widths should be 24 feet for two-way traffic patterns. A 20-foot-wide travel path is the minimum. Narrower aisles will be accepted for one-way traffic where the aisle still provides sufficient back-out space. Maneuvering/turning space at the ends of the aisles should not be less than 24 feet unless it can be shown that the vehicles using the parking lot can traverse a lesser space.
- g. Van accessible stalls shall be 11 feet wide with a 5 foot wide access aisle (per ADA design standards), together with a "van accessible" sign.
- h. Motorcycle parking areas shall be paved in concrete.

E. Snow Removal and Storage

- a. Design paved roads and parking areas for snow removal using the methods employed by the agency. Provide sufficient openings in curbs to access areas designated for snow storage.
- b. Design paved paths for snow removal with tractor-type (riding) snow blowers, brooms/brushes and loaders. Path width and curvature should allow the operator to stay on the pavement.
- c. Show snow storage areas on plans.
- d. Do not locate snow storage areas across the parking lot or road/path from the drainage facilities or on the uphill side of the normal drainage pattern.

F. Emergency Vehicle Access

- a. Fire lane and emergency access requirements shall be coordinated with local municipality or fire district.

IX. REFUSE/RECYCLE CONTAINERS & LOADING DOCKS

- A. Refuse and recycle containers shall be covered containers located in a designated storage area.
- B. The storage area shall be graded to drain.
- C. The storage pad for the containers shall be concrete pavement.
- D. Screening around refuse and recycle containers is generally desirable.
- E. Avoid placing pedestrian routes where they may conflict with truck access (specifically during backup).
- F. Loading dock areas shall be graded such that they can accommodate the size vehicles using the dock.

X. UNDERGROUND UTILITIES – GENERAL

- A. Locate underground utilities in dedicated utility corridors where possible.

- B. Utility pipe locations shall be evaluated with respect to future construction and site enhancements such as building additions, landscaped areas, fence construction or signpost installation.
- C. Utility pipes shall be located far enough away from buildings and structures that future excavation along the building will not require special protection (sheeting, shoring, piling) of the pipe, and future excavation of the pipe will not require special protection of the building foundation.
- D. Do not plant trees over utility pipes. Allow adequate space on either side of pipe to perform future excavation and maintenance. Locate and cluster utilities to maximize spaces for trees and landscape planting areas that will avoid future excavation and maintenance of utilities.
- E. Insulate water and sanitary utility pipelines at depths less than 6.5 feet (above crown of pipe) crossing roadways, sidewalks or other pavements where snow will be removed.
- F. Insulate water and sanitary utility pipelines adjacent to storm sewer inlets and culverts. Do not insulate *under* pipes since this may actually promote freezing by blocking heat from the ground below.
- G. Any structures or manholes with hatch covers (easily open by one person) or containing electrical or plumbing/hydraulic equipment that requires frequent monitoring or service (typical on wastewater lift stations) shall be posted as confined spaces.
- H. Accommodate future utility extension(s) as necessary to avoid disturbance of new infrastructure.
- I. Comply with applicable code requirements with respect to horizontal and vertical separation of utilities.
- J. Utility and fire protection services will be installed to the inside of the building wall by a single contractor. Services may be installed by either the site utility contractor, plumbing contractor or fire protection contractor. Coordinate the bid documents with other designers to clearly indicate the contractor responsible for installation of services and site features. Design service and provide detail that allows for testing by utility contractor and continuation of utility system piping by plumbing and/or fire protection contractors.
- K. Confined Spaces:
 - a. Posting may be accomplished by a sign at the entrance to the confined space stating the following or something similar (a permit may not be required):

**DANGER – (PERMIT REQUIRED)
 CONFINED SPACE
 AUTHORIZED ENTRANTS ONLY**

- b. The sign must be placed in a location readily visible to anyone try to enter the space such as the inside of the hatch cover. Do not post the sign on the exterior top of the lid if the structure is in a driving or snow plow area. Do not post the sign on a building adjacent to the confined space if people unfamiliar with the confined space use the area. The sign material and printing must stand up to the environment in the sign location.

XI. SANITARY SEWERAGE FACILITIES

- A. Wastewater Treatment
 - a. Design in accordance with current DNR regulations and present and future waste load and flow requirements. Consider industry, food service, and laundry facilities that may be provided on the site in the future. Discuss present and future uses with agency and project manager. A 20 year design period is suggested.
- B. Sanitary Sewer Lift Station
 - a. Plan for future upgrades or expansion where possible.
 - b. Location should be considered to maximize the service area.
 - c. Determine who will operate and maintain the lift station.
 - d. Meet site's requirements for features that simplify maintenance and operation. This may include using specific brands, models or types of equipment and/or materials; specifying valves for operation with a specific type of wrench; or locating generator connections for easy access by personnel and equipment.
 - e. Determine and specifically state how the lift station is communicating with the owner/operator, and who is responsible for completing connections to the owner/operator's communication and operational monitoring system.

- f. Pumps may be selected such that the impellers or motors could be changed out to increase capacity in the future without having to modify the pump seating in the bottom of the wet well.
 - g. Lift station pumping systems may need to be provided with protection from debris that typically finds its way into the sewers of institutional users. Determine whether the rules of the receiving municipal sewer system or sanitary district require this material to be removed from the sewage stream or whether a sewage grinder system may be used as part of the pump protection system.
- C. Sanitary Sewer Collection System
- a. Manhole frames and covers:
 - i. Manufacturer's make and model should be consistent with those currently in use on the site UNLESS the site wants to change, and can identify problems with the existing items.
 - ii. Shall match those currently in use at the site **except:**
 - a) Areas prone to flooding or surcharging shall have frame and cover assembly that is flood proof.
 - b) Security areas shall have frames and covers that are lockable and anchored to the concrete structure (both inside and outside the perimeter fence). *Strap type locking mechanisms shall not be used in pavement areas subject to snow plowing.*
 - c) Lids shall have closed pick holes and "O"-ring seals to minimize infiltration of surface water.

XII. WATER SYSTEMS

- A. If the property includes drinking water wells, refer to DNR Public Water Supply information for regulatory requirements.
- B. When connecting to a municipal water supply verify the available capacity is adequate, determine connection requirements, and document utility rates or utility service contract.
- C. Wells
 - a. Wells operated by the site
 - i. If a project includes construction of a new well, abandonment, or rehabilitation of an existing well, the A/E shall determine whether the site is a high capacity property and notify the DFD Project Manager. In this case, A/E is responsible for completion of all required permitting from DNR.
 - b. Private Well
 - i. High Capacity well information:
 - a) High Capacity regulations apply if this is a high capacity property.
 - b) A high capacity well system is defined as one or more wells, drillholes or mine shafts on a property that have a combined approved pump capacity of 70 or more gallons per minute.
 - c) A property is defined as contiguous or adjacent land having the same owner.
 - d) The wells do NOT have to be connected by a single water distribution system to be considered High Capacity.
 - e) High capacity well systems are regulated by DNR. Information can be found at DNR's website. Adding a new well, abandoning an existing well or rehabilitating an existing well will require DNR permitting, written concurrence or amendment to the site's current DNR permit.
 - f) Prior to siting a new well, check the DNR High Capacity Well database and the Public Water Supply database for information on wells in the area.
 - g) If the water supply in the area may be questionable (capacity or quality), consider bidding the well drilling as a separate contract in advance of any building construction. This will allow the DFD Project Manager and the design team to plan for treatment, piping to the project site or supplying electricity to the well.
- D. Water Pumping and Storage Facilities
 - a. Design to accommodate planned or current site water use and in accordance with DNR regulations and fire flow requirements at a minimum.
 - b. Increase water pressure above DNR minimums as needed for equipment operation and normal use.

- E. Water Distribution System
 - a. Water distribution system shall be “looped” if serving facilities such as hospitals or research laboratories.
 - b. Valves shall be located on the distribution system to allow unidirectional flushing from a supply point or transmission main where possible.
 - c. Terminate “dead end” mains with a flushing hydrant and pipe section with a restrained plug.
 - d. Fire hydrant spacing shall be in accordance with DNR and DSPPS regulations at a minimum. Additional hydrants may be considered based on the use of the structures and accessibility of the site. Confirm spacing with local fire marshal.
 - e. Insulate all water lines with less than 6.5 feet of cover over the top of the pipe.
 - f. Valves, hydrants, and other fittings manufacturer and models should be consistent with those currently in use on the site unless the site wants to change.
- F. Water and Fire Protection Building Services
 - a. Coordinate type and location of isolation valve with plumbing designer to ensure compliance with National Fire Protection Association (NFPA).
 - b. Services that supply fire protection (dedicated or combined with domestic water) shall be pressure tested by the installing contractor. The service shall be tested to 200 psi for 2 hours showing no leakage. If the fire protection system design pressure exceeds 150 psig, test at a pressure 50 psig above system design pressure. Pressure test results shall be recorded on NFPA Underground Contractor’s Material and Test Certificate forms.
 - c. Services that supply fire protection shall be flushed as required by NFPA 13. The fire protection contractor shall be responsible for flushing the fire protection service. Documentation of the flushing operation shall be on NFPA Underground Contractor’s Material and Test Certificate forms.

XIII. LANDSCAPING AND RESTORATION

- A. Irrigation Systems
 - a. Existing irrigation systems shall be maintained during work if possible. Specify that contractor shall plan access and haul routes to prevent or minimize crossing irrigation lines, valves or sprinkler heads.
 - b. Show areas of irrigation and lawn to be restored on the plans.
 - c. Any damage shall be repaired to a condition equal to or better than preconstruction.
- B. Restoration of Vegetation
 - a. Document existing plants prior to removal to assist in determining restoration requirement.
 - b. All disturbed and unpaved areas shall be restored to lawn or landscape areas. Lawn areas shall be seeded or sodded and protected from erosion while becoming established. Discuss the required maintenance and watering responsibilities with the site staff.
 - c. Use grasses and planting that will tolerate the planting location and minimize maintenance if possible.
 - d. If using natural grasses and forbs provide a buffer from buildings or structures.
 - e. Vegetated areas that receive runoff directly from pavement shall be reinforced. Erosion mat shall be designed and specified in accordance with the WisDOT Facilities Development Manual (FDM), the WisDOT Product Acceptability List for Erosion Control (PAL), and DFD specifications.
- C. Restoration of Pavement
 - a. Pavement that has been cracked, tipped, rutted, settled or otherwise damaged during construction and areas where pavement has been removed shall be patched. The patch shall transition into pavement in good condition (at a full-depth saw cut) and shall match the existing pavement in type and depth. The quality of paving materials used for patching shall meet or exceed the quality of the remaining pavement. Consider the shape and size of pavement patches with regard to drainage in construction area. Correct standing water problems if possible.
- D. Wayfinding and Identification Signage
 - a. Follow agency or institution guidelines and standards.
 - b. Verify ADA signage requirements as applicable.
 - c. Coordinate signage requirements with other disciplines as needed.

XIV. PRELIMINARY REVIEW PHASE REQUIREMENTS

- A. Completed Design Report Appendix with detailed cost estimate.
- B. Preliminary civil drawings should include the following:
 - a. Provide a complete existing site conditions plan showing all current utilities, exterior features, surface types, and existing contours. A/E should exercise due diligence in order to obtain complete and accurate records and locations for existing subsurface utilities (identify any additional investigation or testing required to verify existing conditions).
 - b. Provide sheet showing locations of control points and benchmarks used during the site survey on the project. Include a table with X, Y, and Z coordinates of each.
 - c. Provide a demolition plan showing all surfaces and utilities to be removed, abandoned, and/or taken out of service.
 - d. Provide general site layout plan identifying proposed buildings, structures, surface types, roadways/pathways, etc.
 - e. Provide general site plan showing proposed staging, temporary vehicle and pedestrian traffic control including route closures and temporary routes.
 - f. Identify finish floor elevation of all buildings.
 - g. Provide general grading plan showing surface water path of travel. Identify stormwater management measures (detention, bioretention, storm water piping conveyance, etc.) and overflow routes.
 - h. Provide utility plan showing routes of proposed utilities, as well as proposed connection points to existing utility systems. Full utility profiles/cross sections are not required for Preliminary Review. However, elevation information may be required to verify adequate vertical separation between utilities.
 - i. All standard details do not need to be developed and drafted for Preliminary Review set. However, A/E should identify all standard details that should be expected in Final Review and Bidding Document sets (show a “placeholder” for details in Preliminary Review set that are anticipated but not yet developed).
 - j. Note any phasing/sequencing requirements that are critical to the site/civil construction, service outages, and constructability. Provide plan(s) showing temporary utilities if required to maintain service.
- C. Preliminary Master Specifications should include the following:
 - a. Provide a complete Table of Contents. This shall indicate master specification sections not being used on this project (indicate by strikeout), sections being used on this project edited by the consultant, and sections added by the consultant.
 - b. Provide a marked-up copy of the latest version of the master specifications. Markups are required to be done electronically. Cross out unused portions. Show additions by consultant. Do not include unused specification sections and construction verification checklists. Do not edit out the DFD Master Specification revision date located under the section name at the beginning of each specification section.
 - c. Identify any testing and quality control requirements and testing frequencies in the appropriate specification sections.

XV. FINAL REVIEW PHASE REQUIREMENTS

- a. Provide 100% complete civil engineering drawings and master specifications that are complete and accurate in every detail. See previous sections of this document for more comprehensive requirements.
- b. Provide engineering data and calculations covering utility pipe sizing and storm water control if requested by DFD project manager or technical reviewer.

End of Civil, Site, and Utility Design Guidelines