ENGINEERING DESIGN GUIDELINES for PLAN DEVELOPMENT

City of Oakdale
1584 Hadley Avenue North
Oakdale, MN 55128
651-739-5086

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INTRODUCTION

Developing a proper plan development process is an important objective for developers and the City of Oakdale. The goals of the process are to assure compliance with State and Federal Laws, State Building Codes, Oakdale City Codes and consistent Engineering Design Standards. The process should minimize costly corrective work, and streamline the approval process.

Development plans need to take into consideration the following:

- Land use
- Soil types
- Existing topography
- Building setbacks
- Vegetation
- Relationship to adjoining properties
- Locally adopted engineering guidelines for the community.

A majority of this information is available at City Hall. The following standards have been developed by combining and applying the above noted elements, along with the conditions and regulations that exist in Oakdale, as well as by utilizing the information in tandem with the experience of City Staff.

SITE PLAN ANALYSIS EXHIBIT

The Site Plan Analysis Exhibit is a graphical representation of existing physical features of the development site. This information is necessary in developing plans that respect the natural features of the area, including the needs of flora and fauna.

Site Plan Analysis Exhibit Required

The subdivider shall submit a site plan analysis exhibit (including one (1) electronic version, which is ArcView compatible in Washington County Coordinates Program; and one paper copy), prepared and certified by a Registered Land Surveyor, which shall include the following:

A) Site Conditions: An analysis of the existing site conditions, including the development site and 150 feet of the abutting properties of record, or as authorized by the adjoining land owner, will be presented in graphic format which indicates at a minimum:

1. Topographic map with a contour interval of 2’ or less, north arrow, and date of survey.
2. Location and extent of tree cover, existing easements, pipelines, and power lines.

3. Slope analysis – contour interval not more than 2'.
4. Location and extent of delineated wetlands and streams.
5. Significant rock outcropping.
6. Existing drainage patterns.
7. Soil conditions as they affect development:
    i. Include soil borings if specifically requested by the Public Works Director/City Engineer.
    ii. Soil types.
    iii. Locations, and
    iv. High water table elevations.
8. Other information considered relevant by the Developer or ultimately requested by the Planning Commission and City Council.

B) Schematic drawings of the proposed development concept.

C) Proposed location and appropriate allocations of land expressed as a percent of the total project area, as well as in acres. Uses to be indicated include:

1. Residential (if appropriate).
2. Common open space (if appropriate).
3. Public open space (if appropriate).
4. Streets.
5. Commercial (if appropriate).
6, Industrial or office (if appropriate).

D) Plans indicating the following:

1. All right-of-way elements, both pedestrian and vehicular.
2. All easement and their purpose.
3. All natural open space.
4. Proposed grading.
5. Proposed landscaping.
6. Typical dimensions to be included.

E) A staging plan for any project involving more than one construction season setting forth the anticipated chronological order of construction.

PRELIMINARY PLAT EXHIBITS

Exhibits Required

The developer of a major subdivision shall The subdivider shall submit two (2) copies of an analysis exhibit (including one (1) electronic version, which is ArcView compatible in Washington County Coordinates Program; and one paper copy), of the preliminary plat, which shall include the following individual exhibits:

A) Name and address of:
    a. Owner as well as Contact Person with telephone, cell and fax numbers.

b. Developer.
c. Site Planner.
d. Registered Land Surveyor.
e. Registered Civil Engineer.
f. Property owners within 500 feet of the boundary of the plat.

B) Legal descriptions of the property, the acreage of the proposed subdivision, the date of preparation and the north arrow.

C) Proposed Construction Grading plan with contour interval not more than two feet (2') indicating areas of erosion control and methods. The Construction-Grading Plan shall include an Erosion Control Plan prepared in compliance with the Ramsey Soil and Water Conservation District Erosion and Sediment Control Handbook.

D) Proposed Final Grading Plan, with contour interval not more than two (2') feet. The Final Grading Plan shall indicate block grading types, lot grading types, and minimum basement elevation for each block as determined by the high water table and as described in the Land Planning Data Sheet Handbook 4140.3, prepared by the United States Department of Housing and Urban Development, dated April 1973. Storm water ponds/wetlands shall reflect normal and high water elevations, emergency overflow elevation and location.

E) Existing watermains, storm and sanitary sewer, with invert elevations to a distance of one hundred (100') feet beyond the plat.

F) Preliminary street and utilities plans indicating placement of water, sanitary and storm sewers.

G) Lot and block arrangement and numbering system.

H) Proposed name of subdivision (which shall not duplicate nor be similar in pronunciation to the name of any plat previously recorded with Washington County.

I) The boundary of the proposed subdivision with angle and/or bearings and distances, which are close within a tolerance of one foot in 7,500'.

J) If the preliminary plat is a re-arrangement or a replat of any plat of record, lot and block arrangement of the original plat, its original name and all roadways of said plat, its original name and all roadways of said plat shall be shown by dotted or dashed lines.

K) The location of existing streets, property lines, easements, water bodies, streams and other pertinent feature within one hundred (100') feet of the boundary of the tract.

GENERAL DESIGN CONSIDERATIONS

General Criteria – Watershed District Information

Any grading or filling activity that disturbs one or more acres of land shall meet the standards and design requirements of this Plan.

A) Projects in the "*Valley Branch Watershed District"* (VBWD) that meet one or more of the following are also REQUIRED to obtain a permit from the District:

a) Any subdivision, plat or development project;
b) Any project that creates a new impervious surface of 6,000 square feet or more.
c) Any project that results in a discharge of municipal or industrial storm water to a surface water drainage system;
d) All projects within the floodplain of the VFWD;
e) Any project that impacts a wetland; and
f) Any project that proposes lake augmentation.

B) Projects in the "*South Washington Watershed District"* (SWWD) that proposes augmentation or diversion of surface water to a receiving water are also required to obtain a permit from the District.

C) Any work within a wetland, surface water or FEMA designated floodplain, shall obtain permits from the City, Watershed District, DNR and Corps of Engineers, if applicable to the specific project, prior to commencing and construction, grading, clearing or filling activity.

Wetland Requirements

A) Wetland alteration will only be allowed with the approval of and receipt of appropriate permits and approvals from the City, the appropriate Watershed District, the Department of Natural Resources, and the U.S. Army Corps of Engineers.

B) Water level fluctuations (peak elevation and duration) for wetlands shall be managed in accordance with the specific watershed organization requirements.

C) Buffer Requirements: The following no-disturbance buffer setbacks apply to projects within the applicable Water District:

1) Ramsey-Washington-Metro Watershed District. Wetland mapping is available on www.rwmwd.org.

Wetland Class	Average Buffer Width (feet)	Minimum Buffer Width (feet)
A	75	37.5
B	50	25
C	25	12.5
Storm Pond	10	10

2) South Washington Watershed District. Wetland mapping is available on www.swwdmn.org.

Wetland Class	Wetlands <1 acre Buffer Width (feet)	Wetlands >1 acre Buffer Width (feet)
Protect	75	100
Manage I	50	75
Manage II	25	50

3) Valley Branch Watershed District: a minimum of 16.5 foot buffer around a delineated wetland or the Ordinary High Water level, whichever is greater in elevation. The following average buffers and monument requirements also apply.

Wetland Class	Average Buffer Width (feet)	Monument Required at Buffer Edge
A – Preserve	60	Yes
B – Manage 1	40	Yes
C – Manage 2	30	Yes
D – Manage 3	25	No

D) Wetlands that are identified in Historic Surface Water Management plans as integral to stormwater conveyance and management under full development may be granted a variance from SWWD standards. All other permits and standards still apply.

Storm Water Facility Design Criteria

A) All hydrologic data and computations shall be based on NRCS (formerly SCS) methodology. Computer modeling may be completed using HydroCAD, TR20/TR44, SWMM or comparable City-approved modeling software.

B) An emergency overflow spillway shall be identified and designed to convey storm flows from events greater than the 100-year event. Overflow areas to be protected with “Inkamat” or other erosion control methods.

C) Proper allowance shall be made for future access and maintenance. Access road grade to be no greater than 10%.

D) The facility design shall provide adequate live storage to provide protection from the design storm, consistent with minimum building elevation standards in Appendix B of this Plan. Minimum building elevation is defined as the lowest slab elevation for a home or building, including basements and crawl spaces. Overflow conditions may also be considered.

E). Skimming devices are required to remove oils and floatable materials up to a one-year frequency event. The skimmer should be set four (4) inches below the

normal surface water elevation and should control the discharge velocity to 0.5 fps. Maximize separation between inlets and outlets to prevent short-circuiting of storm flows.

F) Outlets shall be evaluated for the need to dissipate energy so as to reduce velocities to permissible levels as allowed by the soil and vegetation. Outlet velocities shall be reduced to 4 fps or less. At a minimum, flared end sections should be provided with riprap consistent with Mn/DOT standards. For areas with high flows or where excessive erosion occurs or is anticipated, energy dissipation per Federal Highway Administration standards shall be followed.

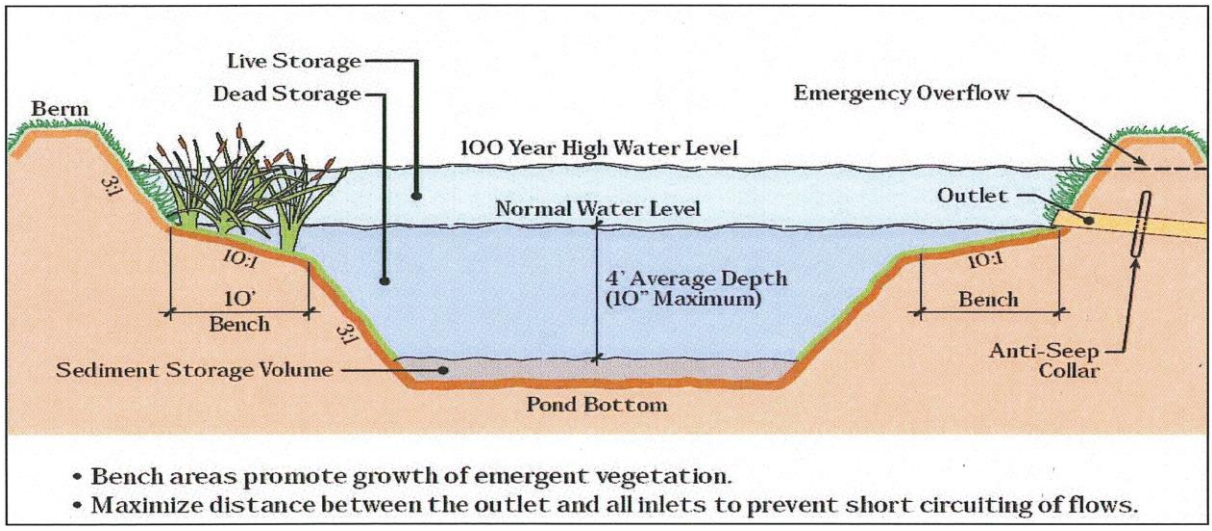
G) Riprap shall be provided below the channel grade and above the outfall or channel bottom to insure the riprap will not be undermined by scour or rendered ineffective by displacement. Riprap consisting of natural angular stone suitably graded by weight shall be designed for anticipated velocities. Riprap shall be placed over a suitable filter material or filter fabric to insure that soil particles do not move through the riprap and reduce its stability.

H) For outlets through berms or roadway embankments and all culverts under public traveled streets, anti-seepage collars shall be used. The collars shall be installed so as to increase the creep distance or seepage line along conduit by 15%. The locations for the use of collars include:

1) All water and pond structures with a pool depth of two feet and a two-day duration.
2) 250 acre watershed or more.
3) Design head of ten (10) feet or more.

I) For wet ponds:

1) Maximum 3:1 (H:V) side slopes (see diagram).
2) 10:1 (H:V) safety bench from normal water level (see diagram).
3) A minimum of four (4) feet of standing water (dead storage depth) and a maximum of ten (10) feet shall be provided (see diagram).
4) Separation between the inlet(s) and outlet shall be maximized to prevent short-circuiting.
5) Inlets shall be placed at or below the normal water level.



J) For infiltration or filtration systems:

1) Infiltration systems are prohibited:
   a. Within 50 feet of public or private water supply well (Minn.Rules, Chapter 4725);
   b. Where the bottom of the infiltration basin is less than three (3) feet to bedrock or the seasonally high water table;
   c. Potential storm water hotspots or contaminated soils;
   d. Low permeability soils (i.e., Hydrologic Soil Group D soils);
   e. Within 10 feet of a property line or building foundation;
   f. Within 35 feet of a septic system tank or drain field.
   h. Where industrial facilities are not authorized to infiltrate industrial Stormwater under an NPDES/SDS Industrial Stormwater Permit issued by the Agency.
   i. Where vehicle fueling and maintenance occur.
   j. Where high levels of contaminants in soil or groundwater will be mobilized by the infiltrating Stormwater.

2) Infiltration practices must be designed to draw down to the bottom elevation of the practice within 48 hours. The maximum ponding depth shall be based on the soil infiltration rate determined from site-specific soils investigation data taken from the location of proposed infiltration practices on the site. The soils investigation requirement may be waived from smaller residential property practices where the maximum ponding depth is less than two (2) feet.

3) Infiltration practices shall provide for pretreatment of the runoff. Examples of pretreatment include a mowed grass strip between a curb cut and a small rain garden, a sump manhole or manufactured sediment trap prior to an infiltration basin and a sediment forebay as the first cell of a two-cell treatment system. Where the infiltration system captures only clean runoff (e.g., from a rooftop) pretreatment may not be required.

4) The design shall incorporate a diversion or other method to keep construction site sediment from entering the infiltration system prior to final stabilization of the entire contributing drainage area.

5) The design shall incorporate provisions that will prohibit construction equipment from compacting the soil where infiltration practices are proposed.

6) Infiltration techniques shall be restricted to prevent adverse impacts to groundwater, by providing a proper engineering review to assure a functional treatment system when constructed in areas:
   a. With predominately Hydrologic Soil Group D (clay) soils.
   b. Within a Drinking Water Supply Management Area as reflected in the Oakdale Well Head Protection Plan.
   c. Where soil infiltration rates are more than 8.3 inches per hour.

K) A vegetative buffer should be established around the perimeter of the pond. Water quality ponds in the RWMWD shall have a minimum buffer of 10 feet, and a grade no greater than 5:1 horizontal to vertical.

Water Quality Treatment and Volume Control Requirements

A) For projects in the *"Ramsey-Washington-Metro Watershed District"*(RWMWD), the project shall provide infiltration or filtration "Best Management Practice's" (BMP's) sufficient to satisfy the requirements of the District's Volume Control Worksheet. The worksheet requires volume reduction practices on-site that treat the runoff from a 1-inch rainfall over the impervious areas of the project. For projects that meet the volume control requirements of the RWMWD, the water quality treatment requirements in Item C are considered to be met.

B) For projects in the *South Washington Watershed District,* the water quality standard is to provide 1-inch of volume control for the site impervious area. In some cases, and based on the total phosphorus export limit, for the downstream water body, a more restrictive treatment level may be required. Table 6.4 in the SWWD WMP specifies the maximum allowable P-load per acre on an annual basis.

C) For projects in the *Valley Branch Watershed District*, the water quality infiltration requirements are ½" new impervious with no increase in 1" – 24 hour event for entire site.

D) For projects or portions of projects not subject to item A thru C, water quality treatment shall be provided that achieve 90% removal of TSS and 60% removal of TP on an annual basis using a standard NURP particle size distribution in the analysis. A permanent pool dead storage volume of at least the runoff from a 2.5 rainfall over the area tributary to the pond shall be provided. The runoff volume shall be determined by evaluating separate subcatchment areas for the pervious and impervious surfaces under assumed fully developed watershed conditions.

Wetlands/Storm Water Ponds

A) Wetlands and storm water ponding areas reflected in the Oakdale Surface Water Management Plan (SWMP) shall be platted as "Outlots" to be deeded to the City. The outlots shall be sized to encompass the delineated wetland limits, plus a minimum 16.5 foot buffer and/or the 100 year flood elevation for the wetland/ponding area, whichever is greater, and extended to public right-of-way for access purposes. The minimum access width of the outlot shall be 15 feet.

Rate Control Requirements

A) No increase in peak discharge may result from a proposed project for the 2-year storm, the 10-year storm and the 100-year storm event and the 100-year, 10-day runoff/snow melt. Variances ***may*** be allowed if computations can be provided which demonstrate no adverse downstream effects will result from the proposed system. If the methodology is inconsistent with City Standards, and the results

are significantly different from the City's - then the City results shall control. Cumulative storm depths for the required events are:

1. 2-Year = 2.8 inches
2. 10-Year = 4.2 inches
3. 100-Year = 5.9 inches (6.3 inches in SWWD)

B) For projects located in the *South Washington Watershed District*, and in addition to the rate control standards above, peak storm water discharge rates shall be consistent with the values shown in the District's Plan. Flows from Oakdale into adjacent cities are limited to the following:

1. To Lake Elmo (at CR13 between 10th and 4th) 135 cfs
2. To Lake Elmo (at CR13 and 4th) 220 cfs
3. To Woodbury (at I-94 from Lake Elmo and Oakdale) 35 cfs

C) No project shall result in an increase in the discharge rates leaving the city into an adjacent city.

Floodplain Management and Storage

A) Flood storage volume must be maintained such that any loss of storage in a FEMA-designated floodplain has no significant net downstream effect.

B) For projects within the Ramsey-Washington-Metro Watershed District, the cumulative affect of all filling must not raise the 100-year flood level of lakes, ponds and wetlands more than 0.1 foot or more than 0.5 feet on streams.

C) For projects within the Valley Branch Watershed District, the cumulative affect of all filling must not raise the 100-year flood level of lakes, ponds and wetlands more than 0.1 foot or more than 0.5 feet on streams.

D) Available storage volume of landlocked areas shall be established by estimating the water surface elevation resulting from a 100-year/10 day runoff (7.2 inches) with CN=100. For landlocked areas, available freeboard and infiltration capacity of in-place soils should be analyzed (if analyzed for unfrozen soil conditions). When freeboard is unavailable, an annual water balance should be used, considering the 100-year annual runoff and average annual losses from evaporation, transpiration and infiltration.

Easements

A) Utilities: Easements of at least twenty (20) feet in width centered on rear or other lot lines shall be provided for utilities where necessary. They shall have continuity of alignment from block to block.

B) Easements: Shall be provided along each side of the centerline of any water course or drainage channel, as designated by the Council, to a width sufficient to

provide proper maintenance and protection and to provide for proper storm water run-off and installation and maintenance of storm sewers.

1) Appropriate access easements for the purpose of maintaining underground utilities in the proposed development shall be provided in accordance with the Public Works Director/City Engineer. Where appropriate, due to topographic conditions, utilities may be placed in locations other than public street right-of-way, as long as appropriate easements are conveyed through the plat. Landscaping plans must respect said easements to minimize service problems in the future.

2) Where appropriate, public access easements for the pedestrian path system within a Planned Unit Development (PUD) may be required.

Lots

Lot size, location and arrangement shall be consistent with the applicable requirements of the City Zoning, PUD, and Mobile Home Park ordinances.

STREET DESIGN CONSIDERATION

Introduction

Any development that contains arterial streets, or abuts existing or proposed arterial streets, shall conform to the community Comprehensive Plan and the official map as to general right-of-way location.

A) The arrangement, character, extent, width and location of all streets and pedestrian ways shall be considered in their relation to existing and planned streets and pedestrian ways.

B) To reasonable circulation of traffic.

C) To topographic conditions.

D) To run-off of stormwater.

E) To public convenience and safety.

F) To the proposed uses of the land to be served by such streets and pedestrian ways.

Street and Utility Layout

The Street and Utility Exhibit plans shall be developed by reviewing and incorporating the Analysis Exhibit with the following information:

A) Avoidance of protected areas, including wetlands and hardwood forested areas.

B) Comprehensive Plan requirements showing the general alignment of the Collector street system, watermain system, sanitary sewer system, and park system.

C) Surface Water Management Plan, which shows the routing of runoff into and out of the development area, and the need for ponding areas.

Design

A) Street width and pavement design shall be a function of the projected traffic volume and parking demand on the proposed street. The minimum street width, as measured from inside the face of the curb to curb, shall be as provided in the following table, unless the City Council determines that greater width is required to meet anticipated parking demand.

All streets shall be provided with a three (3) foot lift of select granular material prior to pavement construction. Substitution of materials for the select granular material may be allowed at the discretion of the Public Works Director/City Engineer. All streets shall be provided with concrete curb and gutter, Minnesota Department of Transportation Design B618, or Design 5 surmountable curb, at the discretion of the Public Works Director/City Engineer (See STRT- 1 & 2).

Pavement Design:

7 Ton: shall consist of placement of four (4) inches of Class 5 gavel base, 1-1/2 (1.5) inches of bituminous base and one (1) one and one-half (1.5) inches of bituminous wearing course, unless the following table requires a greater thickness.

9 Ton: shall consist of placement of eight (8) inches of Class 5 gravel base, two (2) inches of bituminous base, two (2) inch binder, and two (2) inches of bituminous wearing course, unless the following table requires a great thickness.

Project Maximum Traffic Volume Vehicle Per Day	Street Classification	Parking Allowed		Parking Prohibited		Design Load Limits
		Right-of-Way**	Pavement	Right-of-Way**	Pavement	
n/a	Cul-de-sac*	50 feet	28 feet	44 feet	24 feet	7
Up to 2000	Local	50 feet	28 feet	44 feet	24 feet	7
2000-3000	Local	60 feet	32 feet	50 feet	28 feet	7
5,000	Industrial/Commercial	60 feet	44 feet	60 feet	36 feet	9
10,000	Collector	60-80 feet	44 feet	`60-80 feet	32-52 feet	9
20,000	Minor	n/a	n/a	100 feet	52-74 feet	9
Over 20,000	Principal Arterial	n/a	n/a	200-400 feet	Variable	9

* Cul-de-sacs shall have a radius of fifty (50) feet at the property lines and forty-five (45) feet at the curb line. Center islands are not allowed.

** Drainage and Utility easements having a minimum width of ten (10) feet shall be dedicated along all street right-of-ways.

B) Street alignments shall be developed by following Mn/DOT standards, based on the following minimum design speeds:

Street	Minimum Speed	Minimum Centerline Radius*
Local Streets	15 mph	101.14 feet
Minor Collector	30 mph	427.57 feet
Collector Street	35 mph	598.94 feet
Minor Arterial	40 mph	814.51 feet
Arterial Streets	45 mph	1,074.00 feet

C) When intersecting centerline tangents deflect from each other at only one point by more than ten (10) degrees, they shall be connected by a curve with a radius that provides for a fifteen (15) mile per hour, thirty (30) mile per hour, and forty (40) mile per hour design speed for local, collector, and arterial streets, respectively.

D) Street grades shall be a minimum of 0.5% and not more than the following:

1) Local streets shall be at a ten (10%) percent grade; however the City recommends a six (6%) percent grade.

2) Arterials, collectors and commercial/industrial streets shall be a six (6%) percent grade.

3) Approach grades at street intersections shall not exceed 2% within 100' of the intersection.

E) Insofar as practical, streets shall intersect at right angles (within 15 degrees of a right angle; and no less than seventy-five degrees), and be offset at least 150 feet from other intersections.

F) Blocks should be limited to 800 feet in length or ten (10) lots in length, whichever is longer.

G) Tangents on local streets should be limited to ¼ mile in length.

H) Street intersections on arterials should be limited to other arterials at one (1) mile spacing and collectors at one-half (1/2) mile spacing. Intermediate intersections should be limited to right in/out.

I) Access to collectors should be limited to other collectors at ½ mile spacings and local streets at ¼ mile spacings. Intermediate intersections or driveways should be limited to right in/out within 600 feet of arterials, and other collectors.

J) Different connecting street gradients shall be connected with vertical curves. Minimum length in feet of these curves shall be determined for the respective

design speeds in table set out above utilizing Minnesota Highway Department standards, with design speeds not less than 30 mph.

K) Residential driveway access to principal and minor arterials is prohibited.

L) In the platting of small tracts of land fronting on arterials where there is no convenient access to existing entrances to such arterials and where access to such arterial from such plat would be closer than one-fourth (1/4) mile from an existing point of access, every effort shall be made for the connection of roads to neighboring land. As the neighboring land is platted and developed, and access to the arterial becomes possible at a preferred location, direct access to the arterial shall be prohibited.

M) Where necessary or convenient for efficient circulation, continuation of streets into or through a new subdivision from existing or proposed street may be required.

N) No private street(s) shall be allowed unless:

1) An approved Association (see the Zoning Ordinance) or organization, approved by the City Council, capable of providing snow removal service and street maintenance, has been established.
2) Design Standards relative to pavement width, as outlined in this section, are satisfied, and
3) The street is classified as cul-de-sac or local.

O) Signage:

1) City Street Signs:
   a) Street name signs shall be nine (9) inches wide on local streets and nine (9) inches wide on collector streets.
   b) Street name signs shall be ordered through the City of Oakdale Public Works Department to assure uniformity.

2) Construction Signage:
   a) In accordance with City of Oakdale Section 2564 “Traffic Signs and Devices” in conjunction with MN/DOT 2564.

P) Sidewalk/Pedestrian Facilities:

1) Concrete sidewalks shall be a minimum five (5’) feet in width.
2) Bikeway/Pedways shall be bituminous and a minimum eight (8’) feet in width.
3) Pedestrian ramps with truncated domes shall be provided at all street intersections.
4) Boulevard shall be a minimum five (5') feet in width measured from the face of the curb.

UTILITIES

Sanitary Sewer

A) All sanitary sewers should be designed for a minimum velocity of 2 ft/sec.

B) Sanitary sewer depths shall not be less than five and one-half (5.5) feet unless insulated and not more than thirty (30) feet deep.

C) Sanitary sewers over sixteen (16) feet deep shall be designed with a heavier class of pipe.

D) Sanitary sewers shall be generally placed on the centerlines with manholes at intersections and 400-foot spacings. On curves, space manholes to keep the sanitary sewer within ten (10) feet of the centerline.

E) The diameter of the sanitary sewer pipe shall be dependent on the ultimate flow projected to flow through the pipe. The sewer flows shall be based on the following flow rates:

1) Low Density Residential:
2.9 persons/unit x 100 gallons/day = 290 gallons/unit

2) Mid Density Residential:
2.7 persons/unit x 85 gallons/day = 229.5 gallons/unit.

3) High Density Residential:
1.8 persons/unit x 75 gallons/day = 135 gallons/unit.

4) Commercial: 1,200 gallons/acre.

5) Industrial: 1,300 gallons/acre.

6) Institutional: 1,500 gallons/acre.

7) Peaking factors for residential land uses shall be 3.0, and 2.5 for commercial/industrial land uses.

8) The minimum slope in feet per 100 feet and maximum capacity based on Mannings Equation for sanitary sewer pipe is as follows:

Diameter in inches	Minimum Slope ft/100 ft	Capacity* cfs
8	0.4	0.84
10	0.28	1.28
12	0.22	1.83
14	0.17	2.4
15	0.15	2.71
Diameter in inches	**Minimum Slope ft/100 ft**	**Capacity* cfs**
16	0.14	3.11
18	0.12	3.99
21	0.1	5.47

* Based on Mannings Equation with n=0.012

Watermain

A) Watermains shall be valved so as to isolate areas with twenty (20) services or less.

B) Watermains shall be placed on the west and north sides of streets, ten (10) feet off of the centerline.

C) Watermains shall be sized on a case-by-case basis; however, the watermain shall not be less than six (6) inches in diameter in residential areas and eight (8) inches in diameter in commercial/industrial areas.

D) Trunk mains shall be located as reflected in the Comprehensive Water Plan.

E) Hydrants should be spaced no more than 300 feet apart. Hydrant leads shall include a valve and shall not be less than six (6) inches in diameter in residential areas and eight (8) inches in diameter in commercial/industrial areas.

F) Water and Sewer services can be in the same trench provided the water device is a continuous pipe with no joints and is installed 18" above and two (2) feet horizontal from the sewer service.

Stormsewer

A) Storm sewer shall be placed on the east and south side of streets, ten (10) feet off of the centerline.

B) Provide catch basins in the roadway at a minimum of 700-foot intervals. Drain tile to be included as directed by Engineer.

C) Provide storm sewer to pick up lot line drainage if tributary area is greater than one (1) acre or if swale is longer than 400 feet in length.

D) Storm sewer shall be designed for ten (10) year design using the Rationale Method. Ponding and control structures shall be designed for 100 Year Type II AMC-2 design using TR-20 Modeling Method.

Hydraulic Analysis and Design

A) Storm distributions and storm volumes for hydrologic analysis shall be based upon Hershfield, D.M., 1961, Rainfall Frequency Atlas of the United States for Durations of 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years, Technical Publication No. 40 (TP-40).

B) Design of major facilities (e.g., ponds, detention areas, retention areas) shall be based on the U.S.D.A. NRCS methods, 100-year return period, 24-hour duration, Type II distribution with average soil moisture conditions (AMC-2). The analysis of flood levels, storage volumes and discharge rates for detention basins shall utilize the design storm/freeboard evaluation storm concept.

C) Minor drainage systems (storm sewer) shall be analyzed and designed to protect for the 10-year frequency rainfall, and shall be evaluated for the 100-year frequency rainfall. Full pipe flow analysis shall be used unless special conditions can be demonstrated to consider pressure flow.

D) The Rational Method is accepted design method for the design of minor systems (storm sewer). The preferred method of design would be a method utilizing a hydrograph approach with factors for land use and soil moisture conditions. NRCS methodology is not acceptable for minor system design unless approved by the Public Works Director/City Engineer.

Street Lights

A) Streetlights shall be placed at all intersections and at 200-foot mid-block intervals. The lights shall be oriented with the dominant street receiving the majority of the light pattern. On the minor streets, the first light from the corner light shall be a 150-foot spacing. Mid-block lights shall be located at common lot lines.

Note: See Appendix D for general utility locations within Right-of-Way.

GRADING/DRAINAGE

Building Elevations

A) The lowest building floor elevation adjacent to wetlands must meet the criteria in the City's Surface Water Management Plan (SWMP). The minimum building elevation is defined as the lowest slab elevation for a home or building, including basements and crawl spaces. The minimum building elevation for structures adjacent to wetlands and water bodies shall be the greatest of the following:

1) If an emergency overflow is provided from a ponding area, the lowest ground elevation at buildings for lots adjacent to that ponding area needs to be three (3') feet above its 100-year high water level.

2) If NO emergency overflow is provided from a ponding area, the lowest ground elevation at buildings for lots adjacent to that ponding area needs to be five (5') feet above its 100-year high water level.

3) A two (2') freeboard is required above the 100 year high water level of all ponding areas.

4) The lowest ground elevation adjacent to buildings needs to be one (1') foot above any Emergency Overflow high point elevation.

5) Elevation difference between foundation and curb needs to meet the most current Uniform Building Code (UBC) standards.

6) Lowest floor elevation shall be four (4') feet above the water table.

B) All yard drainage should be routed within drainage easements along lot lines, not across private property.

Building Types

Type:	SOG	=	Slab on Grade
	F/FB	=	Flat Full Basement
	FBWO	=	Full Basement Walkout
	D/W	=	Day Light Window

Drainage

A) The Drainage Plan (grading plan) shall utilize natural drainage ways to maximum feasible degree. Lots shall be laid out so as to provide drainage away from all buildings, and individual lot drainage shall be coordinated with the general storm drainage pattern for the area. A two percent (2%) minimum grade shall be provided away from building pads and along drainage swales. Drainage shall be designated so as to avoid concentration of storm drainage water from any lot to or through adjacent lots. On site retention of storm water shall be required unless off site disposal of storm water is approved by the Watershed District and/or the Public Works Director/City Engineer. Whenever offsite disposal of all or any portion of storm water is approved, the Subdivider shall be required to contribute to the City's Surface Water Management Fund an amount as determined by the City Council.

B) Easements shall be provided along each side of the centerline of any watercourse or drainage channel, as designated by the Council, to a width sufficient to provide proper maintenance and protection and to provide for proper storm water run-off and installation and maintenance of storm sewers.

Block Grading

Upon completion of the General Street and Utility layout, the block grading can be developed. The block grading should be developed based on one (1) or a combination

of the four (4) general block grading plans (See Appendix A). The four general block grading types are:

A) Type 1 = Ridge along rear lot lines.
B) Type 2 = Gentle Cross – Slope.
C) Type 3 = Steep Cross – Slope
D) Type 4 = Valley along rear lot line.

The block type shall be developed based on the following parameters**:**

A) The development should balance the material on site – therefore no material should be mined from the site as surplus, nor should material be hauled in for grading purposes.

B) Drainage swales to be a minimum two percent (2%) grade.

C) Runoff accumulated from more than one (1) acre of land shall be discharged into a storm sewer facility (i.e. catch basin, or ponding area).

D) Discharges from ponding areas shall be piped to the downstream ponding area, unless surface streams are required as part of a water quality design. Surface streams shall be platted as an integral part of the ponding area outlot.

E) Runoff shall be routed along property lines and within drainage easements.

Lot Grading

There are three (3) general lot types that can be developed (See Appendix C), they are:

A) Type A = All drainage to the street.
B) Type B = Drainage both to street and rear lot line.
C) All drainage to rear property line.

The lot grading type should be developed considering the following parameters:

A) House pads shall be shown as the total buildable area of the parcel.
B) Driveway grades shall range from two (2%) percent to ten (10%) percent.
C) Grades within the yard areas should not have slopes exceeding 3:1.
D) Grades at side lot lines shall be a minimum six (6) inches lower than the lower house pad at:

    1) A point 20 feet back of the rear corner of the house pad for Type A lots.
    2) A point 20 feet back from the mid-house pad location for Type B lots.
    3) The front corner of the house pad for Type C lots.
    4) Grades of drainage swales around the house pads shall be a minimum two (2%) percent.

These standards were developed consistent with Federal Housing Administration (FHA) standards (See Appendix C).

Construction Grading

The Developer shall submit a Construction Grading and Erosion Control Plan (CGECP) for consideration during the Preliminary Plat process.

The plan is needed for the Building Inspection Department to assure the proper homes are being built as envisioned by the planners of the development. The plan generally shows spot elevations at key locations so that builders, contractors and inspectors can better interpret the grading plans.

The CGECP shall show all lot pad elevations one foot lower than the Finish Grading and Development Plan (FGDP). This hold down is to allow for excavated footing/basement material to be wasted on the parcel not encumbered within drainage easements:

a. Grading Plan.
b. Storm Water Pollution Prevention Plan (SWPPP).
c. SWPPP notes and details.
d. Wetland Impact and Mitigation Plan.
e. Storm Sewer Schedule Plan.

Building Permits

Prior to the issuance of building permits, the following documents must be completed:

A) The Final Plat recorded at Washington County.

B) Certified Grading Plan approved.

C) Developer Agreement entered into between the Developer and the City.

Note: The builder will be required to submit a Certificate of Survey with the permit application. A sample Certificate of Survey information/certificate of survey is included in Appendix C.

ENGINEERING DESIGN GUIDELINES for PLAN DEVELOPMENT

Appendix A

Plan Check List

City of Oakdale
1584 Hadley Avenue North
Oakdale, MN 55128
651-739-5086

March 17, 2015

PLAN CHECK LIST

General Plans

- ☐ All proposed water, sanitary, storm, streetlights, and signs need to be shown on the utility plan.
- ☐ All existing utilities to a distance of 150’ beyond the project boundary need to be shown on the utility plan.
- ☐ Pipe diameters rim and invert elevations to be shown for all sanitary and storm sewer mains.
- ☐ All emergency overflow elevations for streets, ponds, side lot lines and rear yard catch basins to be shown.
- ☐ All utilities need to be placed in the street right-of-way wherever possible in order to minimize side and rear yard utilities.

Sanitary Sewer

- ☐ Sanitary sewer will be placed on the centerline.
- ☐ All sanitary sewers should be designed for a minimum velocity of 2 ft/second.
- ☐ Sanitary sewer depths shall not be less than 5.5 feet, unless insulated, and not more than 30 feet deep.
- ☐ Sanitary sewers over 16 feet deep shall be designed with a heavier class of pipe.
- ☐ Sanitary sewers shall be generally placed on the centerlines with manholes at intersections and 400-foot spacings.
- ☐ The diameter of the sanitary sewer pipe shall be dependent on the ultimate flow projected. (For sewer flows/rates see Page 15)

Watermain

- ☐ Watermains shall be valved so as to isolate areas with twenty (20) services or less.
- ☐ Watermains shall be placed on the west and north sides of streets, ten (10) feet off of the centerline.
- ☐ Watermains shall be sized on a case-by-case basis; however the watermain shall not be less than six (6) inches in diameter.
- ☐ Trunk mains shall be located as reflected in the Comprehensive Water Plan.
- ☐ Hydrants should be spaced no more than 300 feet apart.

Stormsewer

☐ Storm sewer shall be placed on the east and south side of streets, ten (10') feet off of the centerline.

☐ Provide catch basins in the roadway at a minimum of 700 foot intervals.

☐ Provide storm sewer to pickup lot line drainage if tributary area is greater than one (1) acre or if the swale is great than 400 feet in length.

☐ Drain tile will be placed as directed by the Engineer to provide positive drainage of the street subcut (see ST-8).

Trail and Sidewalks

☐ Trails and sidewalks shall be constructed in accordance with Bikeway Design Manual, MN/DOT and Oakdale's Comprehensive Trail Plan.

☐ Avoid long, steep grades: 6.0% maximum slope preferred. A 2.0% maximum slope at 100 feet before intersection with streets or other trails.

☐ Provide positive surface drainage. Use 0.02' per foot cross-slope to street where applicable; 0.04' per foot is maximum cross slope.

☐ Excavate and remove all topsoil, silty soils, muck, etc.; subgrade must meet 95% proctor density – backfill with eighteen (18) inches of select granular, four (4) inches Class 5 and two (2) inches bituminous wear.

☐ Avoid sharp or sudden changes in horizontal and vertical alignment. Provide adequate site distance at intersections and on vertical changes in alignment.

☐ Provide clearance for vertical obstructions (power poles, trees, signs, etc.) four (4) foot preferred, two (2) foot absolute minimum for bicycle facilities.

☐ Bicycle trails to be signed and marked in accordance with the latest edition manual on Uniform Traffic Control Devices.

Streets

☐ All streets shall be provided with concrete curb and gutter.

☐ All streets shall be provided with three (3) foot lift of select granular material.

☐ Pavement design shall be based on design load limits (See Page 13).

☐ Street alignments shall be developed by following MN/DOT standards on design speeds (See Page 13).

☐ Alignment requirements.

☐ Profile requirements.

☐ Spacing/Separation requirements.

ENGINEERING DESIGN GUIDELINES for PLAN DEVELOPMENT

Appendix B

Grading Plan Requirements

City of Oakdale
1584 Hadley Avenue North
Oakdale, MN 55128
651-739-5086

March 17, 2015

GRADING PLAN REQUIREMENTS

A complete grading plan submitted to the City shall consist of three components:

- The grading plan;
- The erosion control plan; and
- The standard detail sheet.

These three (3) elements of the grading plan should be grouped together, but printed on separate sheets to form one copy of the grading plan. The Grading and Erosion Control Plans shall be drawn to scale and shall be of sufficient clarity to indicate the nature and extent of the work proposed, and will show in detail that they will conform to the Engineering Guidelines and all relevant laws, ordinances, rules, and regulations.

Grading Plan

The first sheet of each set of grading plans shall give the location of the work and the name and address of the owner and the person by whom they were prepared.

The grading plans, as a minimum, shall include the following information:

A) Name, address, telephone, mobile and fax numbers of the Engineering firm and Developer.

B) General vicinity of the proposed site.

C) North arrow (up or to the left).

D) Scale 1" = 50' minimum (1" = 20' minimum scale for all wetlands and ponding areas).

E) Area of the proposed site in acres or square feet.

F) Identify all park and wetland mitigation areas. The seeding specifications for these areas should be on the grading plan.

G) Property limits and accurate contours of existing ground and details of terrain and area drainage for the entire parcel and two hundred (200) feet around the parcel.

H) At a minimum, wetlands, ponds, lakes, streams and a 200' strip around the perimeter of the proposed grading area, needs to be field surveyed for horizontal and vertical control, including topographical features such as buildings, trees, fences, etc.

I) Maximum contour interval of two (2) feet. Existing contours shown as dashed lines. Proposed contours shown as solid lines. All contours to be labeled.

J) Indicate site and lot drainage with direction arrows.

K) Show percent grade and elevation for all streets, major drainage swales, overflow areas, and parking areas.

L) Shown street centerline profile.

M) Detailed information will be required for pond and wetland areas disturbed by grading activities. The necessary information is as follows:

1) 1"=20' scale plan

2) 1' contour intervals

3) Show maintenance access and aquatic and maintenance benches

4) Show normal water level and 100-year design storm high water level for all ponds, wetlands and lakes.

5) Where drainage features, ponds, etc., extend beyond the property line, show entire drainage feature and topography extending 200' on all sides of the feature.

6) Ponds may not be over-excavated more than 0.5' unless otherwise approved by the City and/or the appropriate Watershed District**.**

7) Easements adjacent to ponding areas need to be identified on the overall plan and on the pond detail sheets.

N) Show all existing utilities, both public and private.

O) Indicate proposed elevations of the garage floor, lowest floor permitted, lowest opening, and ground at the front and rear of the building, along with the type of structure, on the Grading Plan.

P) Indicate proposed lot corner elevations.

Q) Park pathways need to be graded so as to be in conformance with the "Americans with Disabilities Act" specifications.

R) Details of topsoil removal, stockpile and respreading must be noted on the plan.

S) Details of all proposed surface and subsurface drainage devices, ponds, ditches, storm sewers, swales, walls, cribbing, dams and other protective devices to be constructed with, or as a part of, the proposed work.

T) Emergency overflows along with the high point elevation and direction of overflow shall be provided and clearly marked on the Grading Plan for all interior lot drainage structures, streets, and all ponding areas.

U) The lowest building floor elevation adjacent to wetlands must meet the criteria in the City's Surface Water Management Plan (SWMP). The minimum building elevation is defined as the lowest slab elevation for a home or building, including basements and crawl spaces. The minimum building elevation for structures adjacent to wetlands and water bodies shall be the greatest of the following:

1) If an emergency overflow is provided from a ponding area, the lowest ground elevation at buildings for lots adjacent to that ponding area shall be three (3') feet above its 100-year high water level.

2) If NO emergency overflow is provided from a ponding area, the lowest ground elevation at buildings for lots adjacent to that ponding area shall be five (5') feet above its 100-year high water level.

3) A 2' freeboard is required above the 100-year high water level for all ponding areas.

4) The lowest ground elevation adjacent to building shall be one (1) foot above any Emergency Overflow highpoint elevation.

5) Elevation difference between foundation and curb shall meet the most current UBC standards.

6) Lowest floor elevation shall be four (4) feet above the water table.

V) Location of any buildings, structures or walls on the property where the work is to be performed.

W) Specifications shall contain information covering construction and material requirements.

X) Provide a listing and show on the grading plan all significant trees. A Certified Tree Inventory shall include:

1) The species, diameter, conditions, and location of all deciduous trees measuring twelve (12) feet in diameter or greater.

2) The species diameter, conditions, and location of all coniferous trees measuring eight (8) inches in diameter or greater.

3) A treed area of at least one acre of unplatted land that has trees over eight (8) inches in diameter on at least 25% of the total area.

4) Tree protection fencing needs to be installed five (5) feet outside the drip line.

Y) All Preliminary Plat conditions of approval related to grading need to be addressed on the Final Grading Plan.

Z) Any other information required by the City.

Erosion and Sediment Control

An erosion and sediment control plan shall be created for any land disturbing activity. Erosion and sediment control elements shall be implemented before any grading can begin. A schedule of significant grading work will be required as part of the erosion and sediment control plan. Project proponents and contractors disturbing one (1) acre or more must apply for and comply with all required provisions of the most recent Minnesota Pollution Control Agency (MPCA) National Pollutant Discharge Elimination System (NPDES) Construction Storm Water Permit.

On construction sites where grading disturbs more than one (1) acre, the Developer/Contractor shall meet the following conditions:

A) All erosion control facilities shall be installed prior to any site grading operations. The City's Public Works Director/City Engineer must be notified upon completion of the installation of the required erosion control facilities. This must be done PRIOR to the commencement of any grading operations.

The Contractor is responsible to schedule a pregrading meeting on-site with the Public Works Director/City Engineer. *If damaged or removed during construction, all erosion control facilities shall be restored and in place at the end of each day.*

B) Any additional erosion control facilities deemed necessary by the City, before, during or after the grading activities, shall be installed at the request of the City.

C) No deviations shall be made from the elevations shown on the approved grading plan, without prior approval from the City.

D) Upon completion of the grading work, the Developer shall certify that all grading was performed in accordance with the approved grading permit. An as-built grading plan shall be submitted to the City for review and distribution.

E) Prior to the issuance of building permits, all necessary erosion control devices must be in place and functioning. The City will inspect the site to determine its suitability for building activities. If the public utilities have not been installed at this point, it may be necessary to withhold building permits for various lots to allow the Contractor adequate space to perform this work.

F) The MPCA permit requires that for sites greater than one (1) acre, the Permit Applicant must keep an Erosion Control Inspection and Maintenance log.

1) The contractor must ensure that a trained person will routinely inspect the entire construction site at least once every seven (7) days during active construction and within 24 hours after a rainfall event greater than 0.5 inches in 24 hours. Following an inspection that occurs within 24 hours after a rainfall event, the next inspection must be conducted within seven (7) days after the rainfall event.

2) All inspections and maintenance conducted during construction must be recorded within 24 hours in writing and these records must be retained with the Stormwater Pollution Prevention Program (**SWPPP)**. Records of each inspection and maintenance activity shall include:

a) Date and time of inspections.
b) Name of person(s) conducting inspections.
c) Findings of inspections, including the specific location where corrective actions are needed.
d) Corrective actions taken (including dates, times, and party completing maintenance activities).
e) Date and amount of all rainfall events greater than ½ inch (0.5 inches) in 24 hours. Rainfall amounts must be obtained by a properly maintained rain gauge installed onsite, a weather station that is within 1 mile of your location or a weather reporting system that provides site specific rainfall data from radar summaries.
f) If any discharge is observed to be occurring during the inspection, a record of all points of the property from which there is a discharge must be made, and the discharge should be described (i.e., color, odor, floating, settled, or suspended solids, foam, oil sheen, and other obvious indicators of pollutants) and photographed.
g) Any amendments to the **SWPPP** proposed as a result of the inspection must be documented as required within seven (7) calendar days.

3) Inspection frequency adjustment:

a) Where parts of the project site have permanent cover, but work remains on other parts of the site, the Contractor(s) may reduce inspections of the areas with permanent cover to once per month.
b) Where construction sites have permanent cover on all exposed soil areas and no construction activity is occurring anywhere on the site, the site must be inspected during non-frozen ground conditions at least once per month for a period of twelve (12) months. Following the twelfth month of permanent cover and no construction activity, inspections may be terminated until construction activity is once again initiated unless the Contractor(s) is/are notified in writing by the MPCA that erosion issues have been detected at the site and inspections need to resume.
c) Where work has been suspended due to frozen ground conditions, the inspections may be suspended. The required inspections and maintenance schedule must begin within 24 hours after runoff occurs at the site or 24 hours prior to resuming construction, whichever comes first.

4) The Contractor(s) is/are responsible for the inspection and maintenance of temporary permanent water quality management Best Management

Practices (BMP's), as well as all erosion prevention and sediment control BMPs, until another Contractor(s) has obtained coverage under this Permit according to ******change of coverage, or the project has undergone Final Stabilization, and has NOT been submitted to the MPCA.

******For construction project where the owner or operator changes (e.g., an original developer sells portions of the property to various homebuilders or sells the entire site to a new owner) the current owner and the new owner or operator shall submit a complete permit modification on a form provided by the Commissioner. The form must be submitted prior to the new owner or operator commencing construction activity on site or in no case later than 30 days after taking ownership of the property. The owner shall provide a SWPPP to the new owner and operator that specifically addresses the remaining construction activity.

5) The Contractor(s) must inspect all erosion prevention and sediment control BMPs and Pollution Prevention Management Measures to ensure integrity and effectiveness during all routine and post-rainfall event inspections. All nonfunctional BMPs must be repaired, replaced, or supplemented with functional BMPs by the end of the next business day after discovery, or as soon as field conditions allow access unless another time frame is specified below. The Contractor(s) must investigate and comply with the following inspection and maintenance requirements:

   a) All perimeter control devices must be repaired, replaced, or supplemented when they become nonfunctional or the sediment reaches one-half (1/2) of the height of the device. These repairs must be made by the end of the next business day after discovery, or thereafter as soon as field conditions allow access.

   b) Temporary and permanent sedimentation basins must be drained and the sediment removed when the depth of sediment collected in the basin reaches one-half (1/2) the storage volume. Drainage and removal must be completed within 72 hours of discovery, or as soon as field conditions allow access.

   c) Surface waters, including drainage ditches and conveyance systems, must be inspected for evidence of erosion and sediment deposition during each inspection. The contractor(s) must remove all deltas and sediment deposited in surface waters, including drainage ways, catch basins, and other drainage systems, and restabilize the areas where sediment removal results in exposed soil. The removal and stabilization must take place within (7) days of discovery unless precluded by legal, regulatory, or physical access constraints. The Contractor(s) shall use all reasonable efforts to obtain access. If precluded, removal and stabilization must take place with seven (7) calendar days of obtaining access. The Contractor(s) is/are responsible for contacting all local, regional, state and federal authorities and receiving any applicable permits, prior to conducting any work in surface waters.

d) Construction site vehicle exit locations must be inspected for evidence of off-site sediment tracking onto paved surfaces. Tracked sediment must be removed from all paved surfaces both on and off site within 24 hours of discovery, or if applicable, within a shorter time. Where vehicle traffic leaves any part of the site (or onto paved roads within the site):

1) The Contractor(s) must install a vehicle tracking BMP to minimize the track out of sediment from the construction site. Examples of vehicle tracking BMPs include (but are not limited to) rock pads, mud mats, slash mulch, concrete or steel wash racks, or equivalent systems.

2) The contractor(s) must use street sweeping if such vehicle tracking BMPs are not adequate to prevent sediment from being tracked onto the street.

e) Streets and other areas adjacent to the project must be inspected for evidence of off-site accumulations of sediment. If sediment is present, it must be removed in a manner and at a frequency sufficient to minimize off-site impacts (e.g., fugitive sediment in streets could be washed into storm sewers by the next rain and /or pose a safety hazard to users of public streets).

6. All infiltration areas must be inspected to ensure that no sediment from ongoing construction activity is reaching the infiltration area. All infiltration areas must be inspected to ensure that equipment is not being driven across the infiltration area.

G) All debris created in the process of clearing and grading the site shall be removed from the site. This includes trees, shrubs, and debris from existing buildings, including footings. *Under no circumstances shall this type of material be buried or burned on the site*.

H) Streambank stabilization and streambed control structures shall be designed based on the unique site conditions present including soil conditions, flow rate, slope, and flow velocity.

I) Detention basins may be used for temporary sediment retention during the construction phase. The design should include providing permanent storage volume for construction and restoration phase sediment accumulation or the removal of the sediment to restore the required permanent pool volume in the detention area.

J) Detention areas intended to permanently trap sediments shall provide excess dead storage beyond the required water quality volume, to allow for sediment accumulation. Sediment basins shall be capable of removing coarse suspended sediment from storm water for all runoff events and the greatest practical grain size (#40 typically). Sediment storage volume should be estimated by the universal soil loss equation and 0.5 tons per watershed acre per year. Volume below the outlet can be estimated by using the runoff volume resulting from a 2.5” rainfall.

K) All topsoil shall be stripped and salvaged for respreading on the site prior to seeding and mulching. No topsoil shall be removed from the site. The topsoil stripping, stockpiling and respreading shall be done in accordance to, and noted on, the Approved Grading Plan.

L) All grading operations shall be conducted in a manner to minimize the potential for site erosion. Erosion control measures shall be installed to prevent sediment for running off onto adjacent properties. Any damage to adjacent properties must be corrected and restored as soon as permission is granted from the property owner(s).

M) Specific measures to control erosion based on the grade and length of the slopes on the site shall be provided as follows:

1) Silt fences along the toe of slopes that have a grade of less than three (3) percent and are less than 400 feet long from top to toe shall be supported by sturdy metal or wooden posts at intervals of four (4) feet or less.

2) Flow lengths up-slope from each silt fence shall not exceed 400 feet for slopes that have a grade of less than three (3) percent and are more than 400 feet long from top to toe.

3) Silt fences along the toe of slopes that have a grade of three (3) to six (6) percent and are less than two hundred (200) feet from top to toe shall be supported by sturdy metal or wooden posts at intervals of four (4) feet or less.

4) Flow lengths up-slope from each silt fence shall not exceed 200 feet for slopes that have a grade of three (3) to six (6) percent and are more than 200 feet long from top to toe.

5) Diversion channels or dikes and pipes shall be provided to intercept all drainage at the top of slopes that have a grade of more than ten (10) percent and are less than 100 feet long from top to toe. Sturdy metal or wooden posts shall support silt fencing along the toe of said slopes at intervals of four feet or less.

6) Diversion channels or dikes, terraces, and pipes shall be provided across said slopes if needed to ensure that the maximum flow length does not exceed 100 feet. Silt fencing along the toe of said slopes shall be reinforced and supported by sturdy metal or wooden posts at intervals of four (4) feet or less. Dams, dikes and diversions shall be stabilized within twenty-one (21) days of construction.

7) Reinforced silt fence will be required around all wetlands (see detail Standard Plate DW-1).

8) There shall be a five (5) foot buffer area between the silt fence and any wetland limits.

9) The locations of silt fences will be reviewed as grading occurs and adjustments made as directed by the City.

10) All slopes to be graded in such a fashion so that tracking marks from heavy equipment are perpendicular to the slope.

N) Temporary sedimentation basins are required where ten (10) or more acres of disturbed soil drain to a common location, the Contractor(s) must provide a temporary sediment basin to provide treatment to the runoff before it leaves the construction site or enters surface waters. A temporary sediment basin may be converted to a permanent basin after construction is complete. The temporary basin is no longer required when permanent cover has reduced the acreage of disturbed soil to less than ten (10) acres draining to a common location. The Contractor(s) is encouraged, but not required, to install temporary sediment basins where appropriate in areas with steep slopes or highly erodible soils even if less than ten (10) acres drains to one area. The basins must be designed and constructed according to the following requirements:

1) The basins must provide live storage for a calculated volume of runoff from a two (2) year, 24 hour storm from each acre drained to the basin, except that in no case shall the basin provide less than 1,800 cubic feet of live storage from each acre drained to the basin.

2) Where the calculation in number 1 above, has not been performed, a temporary sediment basin providing 3,600 cubic feet of live storage per acre drained to the basin shall be provided for the entire drainage area of the temporary basin.

3) Temporary basin outlets must be designed to prevent short-circuiting and the discharge of floating debris. The basin must be designed with the ability to allow complete basin drawdown for maintenance activities, and must include a stabilized emergency overflow to prevent failure of pond integrity. The outlet structure must be designed to withdraw water from the surface in order to minimize the discharge of pollutants, except that the use of a surface withdrawal mechanism for discharge of the basin may be temporarily suspended during frozen conditions. Energy dissipation must be provided for the basin outlet.(Pipe outlets must be provided with temporary or permanent energy dissipation within 24 hours after connection to a surface water.

4) Sediment basins must be situated outside of surface waters and any buffer zone required. Buffer zone: the Contractor(s) shall include an undisturbed buffer zone of not less than 100 linear feet from the special water (not including tributaries) and this buffer zone shall be maintained at all times, both during construction and as a permanent feature post construction, except where a water crossing or other encroachment is necessary to complete the project. The Contractor(s) must fully document the circumstance and reasons that the buffer

encroachment is necessary in the SWPPP and include restoration activities. Replacement of existing impervious surface within the buffer is allowed under this permit. All potential water quality, scenic and other environmental impacts of these exceptions must be minimized by the use of additional or redundant BMPs and documented in the SWPPP for the project. It must be designed to avoid draining water from wetlands unless the impact to the wetland is in compliance with the requirements for discharging to wetlands.

5) The temporary basins must be constructed and made operational prior to 10 or more acres of disturbed soil draining to a common location.

6) Where a temporary sediment basin meeting the requirements of this part is infeasible, equivalent sediment controls such as smaller sediment basins, and/or sediment traps, silt fences, vegetative buffer strips, or any appropriate combination of measures are required for all down-slope boundaries of the construction area and for side-slope boundaries as dictated by individual site conditions. In determining whether installing a sediment basin is infeasible, the Contractor(s) must consider public safety and may consider factors such as site soils, slope, and available area on site. The determination of infeasibility must be documented in the **SWPPP**. Documentation of infeasibility: if the Contractor(s) determines(s) that compliance with the requirement for temporary sediment basins is infeasible on the project site; the Contractor(s) must document that determination and the substitute BMPs in the **SWPPP**.

O) Silt fences or hay bales staked with at least two (2) sturdy metal or wooden posts per bale shall be provided in all areas where minor runoff (less than one cfs) may occur.

In areas where concentrated volumes of storm water runoff (greater than one cfs) will occur (such as swales, in front of storm sewer catch basins and intakes, etc.), the erosion control facilities shall be backed by a snow fence or other approved stabilization structure to prevent the destruction of the erosion control facilities by concentrated flows.

P) Flows from diversion channels or pipes shall be routed to sedimentation basins or appropriate energy dissipaters to prevent transport of sediment to outflow or lateral conveyors and to prevent erosion and sedimentation when runoff flows into the conveyors.

Q) Site-access roads (entrances to construction sites) shall be graded or otherwise protected with silt fences, diversion channels, or dikes and pipes to prevent sediment from exiting the site via the access road. Primary site access roads shall be surfaced with crushed rock. The rock entrance shall extend for a distance of 100 feet beginning at existing paved surface. All construction traffic shall utilize the entire length of the rock entrance.

R) Soils tracked from the site by motor vehicles or equipment shall be cleaned from paved surfaces daily throughout the duration of construction. Roadway cleaning shall be the responsibility of the party or parties having a building permit with the City.

S) Dust control measure shall be performed periodically and/or as directed by the City.

T) The Contractor(s) shall implement the following Pollution Prevention Management Measures on the site:

1) Storage, handling, and disposal of construction products, materials, and wastes: The Contractor(s) shall comply with the following to minimize the exposure to stormwater of any of the products, materials, or wastes. Products or wastes which are either not a source of contamination to stormwater or are designed to be exposed to stormwater are not held to this requirement:

a) Building products that have the potential to leach pollutants must be under cover (e.g.,plastic sheeting or temporary roofs) to prevent the discharge of pollutants or protected by a similarly effective means designed to minimize contact with stormwater.
b) Pesticides, herbicides, insecticides, fertilizers, treatment chemicals, and landscape materials must be under cover (e.g., plastic sheeting or temporary roof) to prevent the discharge of pollutants or protected by similarly effective means designed to minimize contact with stormwater.
c) Hazardous materials, toxic waste, (including oil, diesel fuel, gasoline, hydraulic fluids, paint solvents, petroleum-based products, wood preservatives, additives, curing compounds, and acids) must be properly stored in sealed containers to prevent spills, leaks or other discharge. Restricted access storage areas must be provided to prevent vandalism. Storage and disposal of hazardous waste or hazardous materials must be in compliance with Minn. R. ch. 7045 including secondary containment as applicable.
d) Solid waste must be stored, collected and disposed of properly in compliance with Minn. R. ch. 7035.
e) Portable toilets must be positioned so that they are secure and will not be tipped or knocked over. Sanitary waste must be disposed of properly in accordance with Minn. R. ch. 7041.

2) Fueling and Maintenance of Equipment or Vehicles; Spill Prevention and Response: The Contractor(s) shall take reasonable steps to prevent the discharge of spilled or leaked chemicals, including fuel, from any area where chemicals or fuel will be loaded or unloaded including the use of drip pans or absorbents unless infeasible. The Contractor(s) must conduct fueling in a contained area unless infeasible. The Contractor(s) must ensure adequate supplies are available at all times to clean up discharged materials and that an appropriate disposal method is available for recovered spilled materials.

The Contractor(s) must report and clean up spills immediately as required by Minn. Stat. 115.061, using dry clean up measures where possible.

3) Vehicle and equipment washing: If the Contractor(s) wash the exterior of vehicles or equipment on the project site, washing must be limited to a defined area of the site. Runoff from the washing area must be contained in a sediment basin or other similarly effective controls and waste from the washing activity must be properly disposed of. The Contractor(s) must properly use and store soaps, detergents, or solvents. No engine degreasing is allowed on site.

4) Concrete and other washouts waste: The Contractor(s) must provide effective containment for all liquid and solid wastes generated by washout operations (concrete, stucco, paint, form release oils, curing compounds and other construction materials) related to the construction activity. The liquid and solid washout wastes must not contact the ground, and the containment must be designed so that it does not result in runoff from the washout operations or areas. Liquid and solid wastes must be disposed of properly and in compliance with MPCA rules. A sign must be installed adjacent to each washout facility that requires site personnel to utilize the proper facilities for disposal of concrete and other washout wastes.

U) All construction areas disturbed during construction shall be restored as soon as possible. Any areas which have been finished graded or areas that have been disturbed and for which other grading or site building construction operations are not actively underway, shall be seeded and mulched as set forth in the following paragraphs within 14 days.

1) The seeding Contractor must contact the City prior to application of seed and mulch.

2) If the graded area is anticipated to be developed within six (6) months, provide a temporary vegetative cover consisting of Minnesota Department of Transportation Seed Mixture 900 at the rate of 80 pounds per acre. If the graded area will not be developed for a period greater than six (6) months, provide a permanent vegetative cover consisting of Minnesota Department of Transportation (MN/DOT) Seed Mixture 500 or mix approved by the City Inspector, at the rate of 100 pounds per acre. Seeded areas shall either be mulched and disc-anchored or covered by fibrous blankets to protect seeds and limit erosion.

3) Temporary or permanent mulch shall be disc-anchored and applied at a uniform rate of not less than two tons. Temporary or permanent mulch shall be disc-anchored and applied at a uniform rate of not less than two tons per acres and not less than 80% coverage.

4) Financial security shall be retained until turf has germinated and survived a sixty (60) day growing period.

5) Wetland mitigation area will be restored in accordance with the approved wetland replacement plan.

6) Park areas shall be restored to park specifications.

7) All areas that will not be mowed or maintained, as part of the ultimate design, will be permanently restored using Seed Mixture 800 at a rate of 100 pounds per acre.

8) Wetland restoration areas will be restored using Seed Mixture 250 at a rate of 100 pounds per acre.

V) Whenever other erosion and sedimentation control practices are inadequate, temporary on-site sediment basins that conform to the criteria for on-site detention basins shall be provided.

W) Runoff shall be prevented from entering all storm sewer catch basins, except at sump (low point) locations. Where storm sewer catch basins are necessary for site drainage during construction, a silt fence or double ring of staked hay bales backed by snow fence shall be installed and maintained around all catch basins until the area tributary to the catch basins is restored.

X) Grading activities proposed to begin after October 15 will require an approved phasing schedule. The area of land that the City will allow to be disturbed at this time of year will be severely limited. The City will also require additional erosion control devices, dormant seed, and higher rates of application of both seed and mulch.

Y) Filter blanket and riprap shall be installed on the downstream side of all storm sewer outlets. All riprap shall be designed and installed with a filter material meeting the Minnesota Department of Transportation (MN/DOT) specifications for riprap and filter material.

Z) Erosion control facilities shall be installed and maintained around the perimeter of all lakes, ponds, and wetlands within or adjacent to the area to be graded until the area tributary to the lake, pond, or wetland is restored.

AA) Double flotation silt curtains spaced ten (10) feet apart shall be installed and maintained in lakes and major ponding areas within or adjacent to the area to be graded until the area tributary to the lakes and major ponding areas is restored.

BB) To minimize erosion, all 3:1 slopes shall be covered with material approved by the City's Engineering Department, such as Hydro-mulch, fibrous blanket or staked sod.

CC) All sedimentation occurring in storm sewers, ditches, lakes, ponds and wetlands shall be removed prior to the completion of grading activities.

DD) At the time of the preliminary plat or site plan application, a Tree Inventory of existing healthy significant trees and woodlots within the proposed development area shall be provided.

1) Completion of the Tree Inventory shall be the responsibility of the Applicant and submitted as part of the Preliminary Grading Plan. The inventory should clearly indicate which trees will be lost as a result of the grading and which trees will be saved.

2) As part of the application review process, the Community Development Director or designee shall include recommendations regarding significant trees and woodlots to be preserved.

3) The following action shall be taken to ensure that trees within the grading limits that have been designated for saving are protected from construction damage:

a) A snow fence barrier or flags shall be placed at a distance of five (5) feet outside the dripline.

b) No equipment, materials, debris, or fill shall be placed in this area.

4) Through the course of the grading process, it may become necessary to remove additional trees beyond what was previously approved in the grading plan. If this situation arises, it shall be the responsibility of the Applicant to bring this need to the City, and explain the reasons **prior** to the trees being removed, as well as to obtain approval of the Community Development Director or designee(s).

EE) Erosion control items and devices should be removed only as directed by the City.

FF) Dewatering and Basin Draining;

1) The Contractor(s) must discharge turbid or sediment-laden waters related to dewatering or basin draining (e.g., pumped discharges, trench/ditch cuts for drainage) to a temporary or permanent sedimentation basin on the project site unless infeasible. The Contractor(s) may discharge from the temporary or permanent sedimentation basins to surface waters if the basin water has been visually checked to ensure adequate treatment has been obtained in the basin and that nuisance conditions will not result from the discharge. If the water cannot be discharged to a sedimentation basin prior to entering the surface water, it must be treated with the appropriate BMPs, such that the discharge does not adversely affect the receiving water or downstream properties. If the Contractor(s) must discharge water that contains oil or grease, the Contractor(s) must use an oil-water separator or suitable filtration device (e.g. cartridge filters, absorbents pads) prior to discharging the water. The Contractor(s) must ensure that discharge points are adequately protected from erosion and scour. The discharge must be dispersed over natural rock

riprap, sand bags, plastic sheeting, or other accepted energy dissipation measures.

2) All water from dewatering or basin-draining activities must be discharged in a manner that does not cause nuisance conditions, erosion in receiving channels or on downslope properties, or inundation in wetlands causing significant adverse impact to the wetland.
3) If the Contractor(s) is/are using filters with backwash water, the Contractor(s) must haul the backwash water away for disposal, return the backwash water to the beginning of the treatment process, or incorporate the backwash water into the site in a manner that does not cause erosion. The Contractor(s) may discharge backwash water to the sanitary sewer if permission is granted by the sanitary sewer authority. The Contractor(s) must replace and clean the filter media used in dewatering devices when required to retain adequate function.

As-Built Grading Plan

Upon completion of the grading activities, a Development Plan showing the as-built grades on the building pads, lot corners, and wetland/ponding areas shall be prepared and forwarded to the City. The Surface Water Management basins shall reflect the final stage storage/discharge information.

A) All information shown on the Final Grading Plan should be shown on the As-Built Grading Plan – excluding erosion control.

B) All lot corners, emergency overflows, and major drainage swale elevations must be field verified. If elevations are not within +/- 0.2' of those shown on the Final Grading Plan, revised grades, elevations, and contours will need to be shown on the As-Built Grading Plan revisions block.

C) Field verify grades, elevations, and contours of all constructed ponds, wetlands, and mitigation areas. Use 1" = 20' scale detail with one (1') foot contour intervals. If elevations are not within +/- 0.2' of those shown on the Final Grading Plan, revised grades, elevations, and contours will need to be shown on the As-Built Grading Plan. All revisions to the plan must be identified in writing in the As-Built Grading Plan revision block.

D) Identify pond aquatic and maintenance benches.

E) Identify NWL and 100 HWL contours of all ponds, wetlands, and mitigation areas.

F) Verify grades and clearly show pond maintenance access points.

G) Shown easements, adjacent ponds, drainage ways, swales, and wetlands.

H) Show conservation easements for wetlands.

I) Update storm sewer design/location as per approved plan.

J) Verify location of remaining trees – Tree Inventory.

K) Identify any hold down of pond bottoms.

ENGINEERING
DESIGN GUIDELINES
for
PLAN DEVELOPMENT

Appendix C

Sample Certificate of Survey Information
FHA Block & Lot Grading Types

City of Oakdale
1584 Hadley Avenue North
Oakdale, MN 55128
651-739-5086

March 17, 2015

SAMPLE
CERTIFICATE OF SURVEY INFORMATION

1) Scale of drawing, north arrow, and legal description of property.

2) Names of all abutting streets, dimensions of all lot lines, as well as dimensions and locations of all easements of record.

3) Locations of all existing buildings on the subject lot.

4) Locations of sanitary and storm manholes, hydrants, catch basins, power poles, telephone boxes, and curb lines.

5) Location, including front and side yard setback dimensions, to buildings located on adjacent lots.

6) Locations, including front, side yard, and rear yard setback dimensions to the proposed structure. Note that rear yard setbacks on shoreline lots must show the shortest dimension from the structure to the ordinary high water contour line of the body of water.

7) Outside dimensions of proposed structure, including decks and porches, stairways, cantilevers, fireplaces, bay and bow windows.

8) House type:

a. SIG = Slab on Grade
b. F/FB = Flat Full Basement
c. FBWO = Full Basement Walkout
d. D/W = Day Light Window

9) Location of stakes established by the Surveyor along each side lot line at the proposed front and rear building line. The maintenance of these stakes, once established by the Surveyor, shall be the responsibility of the building permit Applicant.

10) Benchmark description, elevations, and location. Some benchmarks are available from the City Engineer's office. If manholes are used as a benchmark, invert elevations must be shown. Top elevations will not be accepted.

11) Grade elevations to mean sea level datum (1929 NGVD) at the following points:

a. Existing and proposed at each lot corner.

b. Crown of street at each lot line extended, or top of curb.

c. Existing and proposed at all major corners of proposed structure.

Certificate of Survey – Site Survey

Each application for a building permit for a new residential principal structure, or for a new or remodeled exterior business or industrial buildings, shall be accompanied by a Certified Land Survey indicating that permanent iron monuments have been set **at each lot corner**. The survey shall show:

a. Front and side setback stakes shall be in place at the time of footing form inspection.

b. All iron monuments shall be visible when the footings are placed, and at the time of final occupancy inspection of the building.

c. A two-inch (2") by two-inch (2") stake shall be placed near the front of the building excavation indicating the elevation of the curb in front of the lot and the proposed elevation of the top of the building foundation.

ENGINEERING DESIGN GUIDELINES for PLAN DEVELOPMENT

Appendix D

General Utility locations within Rights-of-Way for Street Lighting

City of Oakdale
1584 Hadley Avenue North
Oakdale, MN 55128
651-739-5086

March 17, 2015

General Utility locations within Rights-of-Way for Street Lighting