

VILLAGE of FRANKFORT
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FRANKFORT, IL 60423
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STORMWATER BASIN DESIGN GUIDELINES

ABSTRACT: In 2002, the Village of Frankfort adopted engineering design standards (Ordinance No. 1945) which established design criteria for stormwater management. The Village included provisions for the utilization of Best Management Practices (BMP) for the design of stormwater management systems. The primary objective of BMP are to improve water quality, utilize natural features on-site, and have no adverse impact to existing water resources. The Village has a preference for wet bottom and wetland designs for detention facilities over dry bottom. The enclosed guidelines are an enhancement to the Village Design Standards. They should be used as an additional tool to aid the developer in designing stormwater management facilities that are functional, maintainable and aesthetically pleasing.

HOW TO USE: Once the volume of required stormwater detention and release rates have been calculated, the designer should layout the stormwater basin based on the enclosed criteria. Two (2) matrix sheets are provided which aid in the selection of the basin type and landscape options. In addition, photographs are included which depict final landscape appearance, water quality enhancement features and plant materials. Example cross sections for each respective basin type are also included. Village staff and our support personnel stand ready to assist the development community throughout the design process. The purpose of the guidelines is to advance creativity of design and promote quality development.

February 10, 2004

Village of Frankfort Stormwater Basin Design Guidelines

The following criteria are proposed as conservative standards for design of stormwater basins within the Village of Frankfort. If a developer wishes to exceed the standards, they (via their landscape contractor/designer) bear the burden of proof that the landscape material will be successful. Any deviation from village standards is subject to approval by the Village of Frankfort. The limits of acceptable fluctuation and drawdown times are based on best professional judgment for landscape treatments typical to wet and dry stormwater basin designs.

I. Wet Basin Design

A. Wet Bottom Pond

Minimum Area:	1.0 acre at NWL
Maximum Area:	No maximum
Depth:	Over 25 percent of the bottom area at least 10.0 ft. deep
Maximum Bounce:	100-year: 5.0 ft. 2-year: 1.0 ft.
Maximum Drawdown Time:	100-year: above NWL by 0.5 ft. for ≤ 72 hrs 2-yr: above NWL by 0.5 ft. for ≤ 36 hrs
Maximum Slopes:	Freeboard elevation to 2-yr water level: 4:1 2-yr water level to NWL: 8:1 NWL to 1.5 ft. below NWL: 20:1 (safety shelf) >1.5 ft. below NWL: 2:1 Freeboard to 1.5 ft. below NWL: 5:1 avg. max.
Safety Shelf:	0.5 to 1.5 ft. inundation at NWL, 10.0 ft. avg. width (variable 8.0 to 12.0 ft.), with 25 percent of the shoreline 2.0 ft. shorter than maximum width
Shoreline Protection:	Natural vegetation (preferred); armoring (conditioned upon Village review and approval); biotechnical stabilization (depending on site-specific conditions); erosion control measures
Water Quality Enhancements:	Maximize distance between inlets and outlets; no low-flow channel to be provided; energy dissipation measures at outlets; measures such as aerators, cascading streams, water falls, etc. are recommended for aesthetic appeal and to promote water circulation and aeration

Landscape Options: Natural, ornamental hybrid, low maintenance turf, and turfgrass (depending on site conditions and adjacent/adjoining land uses); public access via stone outcroppings, groomed areas, etc. are recommended

B. Wetland Bottom

Minimum Area: 8,000 s.f. at NWL

Maximum Area: No maximum

Depth: ranging from 0.5 to 5.0 ft. (average 3.0 ft.); at least 5 percent of the area below NWL having pockets up to 5.0 ft. deep

Maximum Bounce: 100-year: 5.0 ft.
2-year: 1.0 ft.

Maximum
Drawdown Time: 100-year: above NWL by 0.5 ft. for ≤ 72 hrs
2-yr: above NWL by 0.5 ft. for ≤ 36 hours

Maximum Slopes: Freeboard elevation to 2-yr water level: 4:1
2-yr water level to 0.5 ft. below NWL: 8:1
0.5 to 1.5 ft. below NWL: variable 8:1 to 12:1 (safety ledge)
>1.5 ft. below NWL: 2:1
Freeboard to 1.5 ft. below NWL: 5:1 avg. max.

Shoreline Protection: Natural vegetation; biotechnical stabilization (depending on site-specific conditions); erosion control measures

Water Quality
Enhancements: Maximize distance between inlets and outlets; no low-flow channel to be provided; energy dissipation measures at outlets; measures such as aerators, cascading streams, water falls, etc. are strongly recommended to maintain cooler water temperatures, promote water circulation and aeration, and provide aesthetic appeal

Landscape Options: Natural, ornamental hybrid, and low maintenance turf; public access via stone outcroppings, groomed areas, etc. are recommended

II. Dry Basin Design

Minimum Area:	No minimum
Maximum Area:	8,000 s.f., unless approved by the Administrator
Safety Shelf:	Not applicable
Maximum Bounce:	4.0 ft.
Maximum Drawdown Time:	No more than 20 percent of the basin with standing water for more than 72 hours for 100-year storm event
Maximum Slopes:	4:1
Water Quality Enhancements:	Promote sheet flow; no low-flow channel to be provided; maximize distance between inlets and outlets; energy dissipation measures at outlets
Landscape Options:	Naturalized, turfgrass, ornamental hybrid, and low maintenance turf

Last Revised: 30 January 2004

Parameter	Basin Type		
	Wet Bottom	Wetland Bottom	Dry Bottom
Associated Land Use			
Natural Area			
Park			
Residential			
Commercial			
Adjacent Land Use			
Natural Area			
Park			
Residential			
Commercial			
Right-of-Way			
Basin Size			
< 8,000 s.f. with no NWL			
≥ 8,000 s.f. at NWL			
≥ 1.0 ac. at NWL			
Drawdown Time			
Rapid			
Moderate			
Slow			
Level of Fluctuation			
Low			
Moderate			
Extreme			



Compatible



Compatible, with limitations

Village of Frankfort
Stormwater Basin Landscape Options Matrix

Landscape Types	Wet Bottom					Wetland Bottom					Dry Bottom
	Freeboard to 10-yr WL	10-yr WL to 2-yr WL	2-yr WL to NWL	NWL to 0.5' below NWL	Safety shelf (-0.5' to 1.5' below NWL)	Freeboard to 10-yr WL	10-yr WL to 2-yr WL	2-yr WL to NWL	NWL to 0.5' below NWL	More than 0.5' below NWL	
Natural											
Low-profile Prairie											
Mesic Prairie											
Wet-Mesic Prairie											
Shoreline											
Emergent											
Deepwater Emergent (optional)											
Ornamental Hybrid											
Low Maintenance Turf											
Turfgrass											

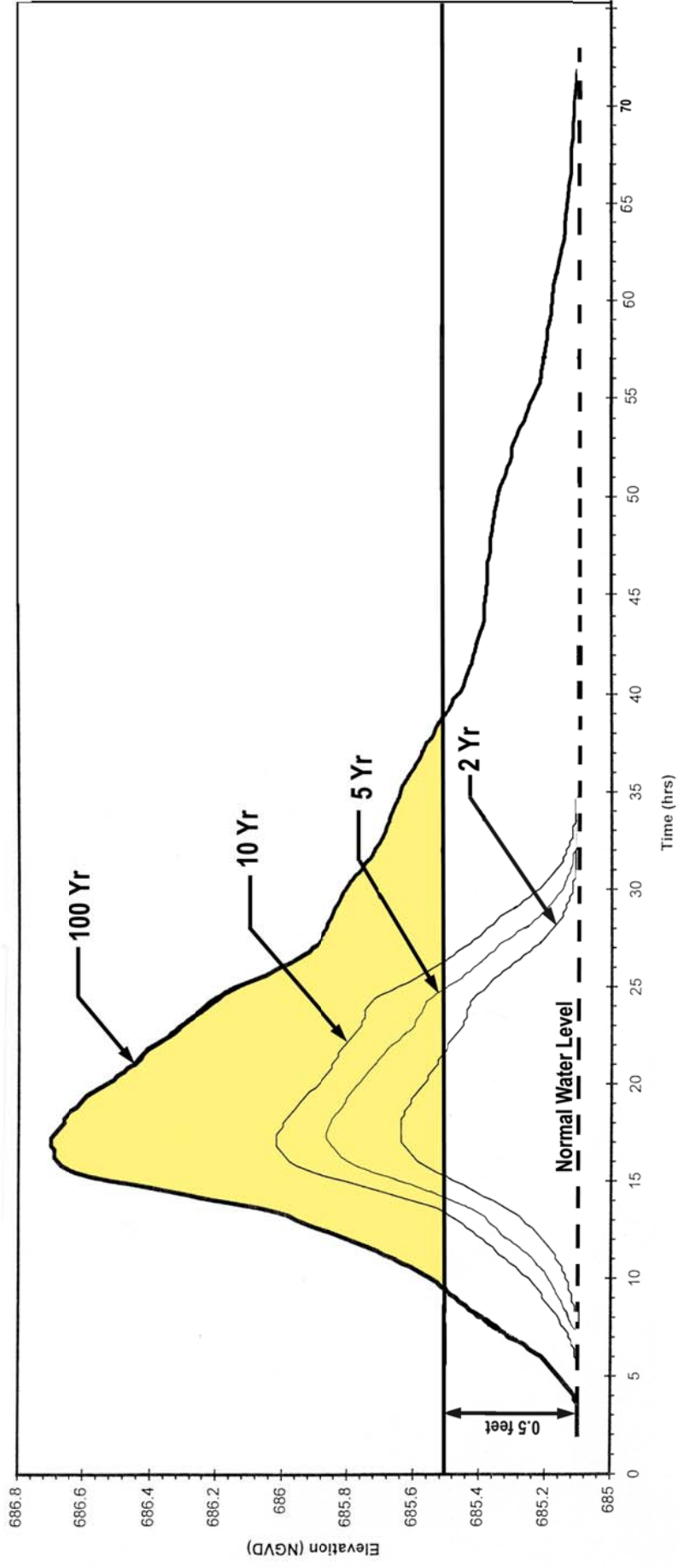


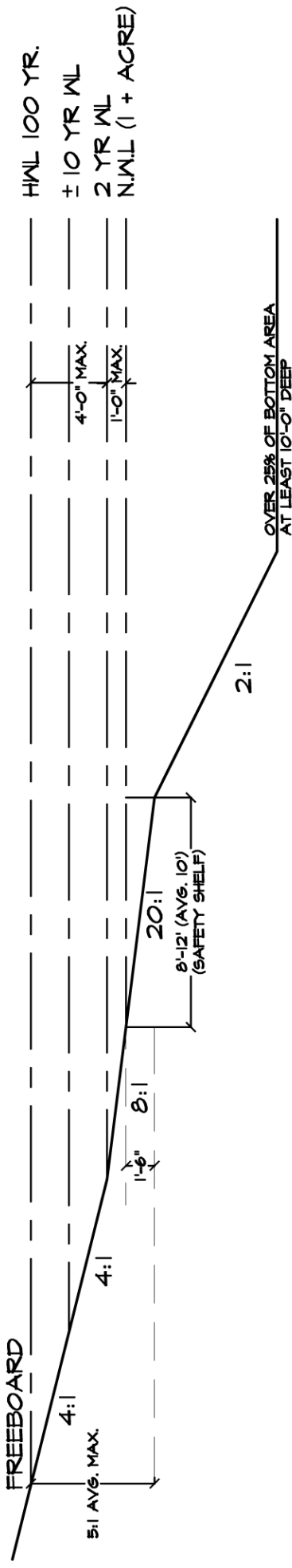
Compatible



Compatible, with limitations

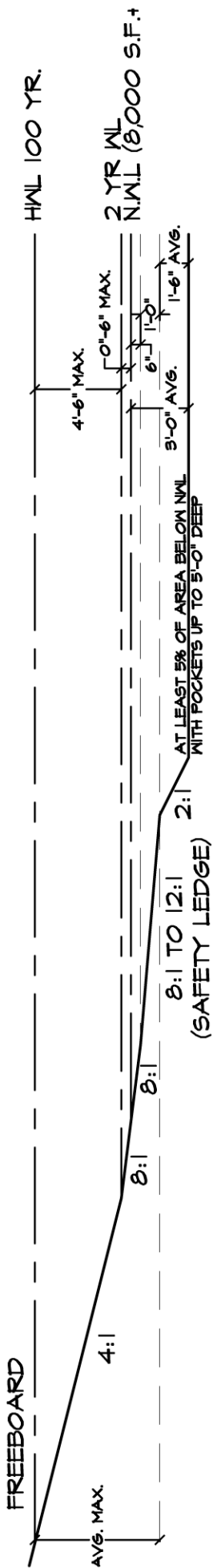
Critical Drawdown Period





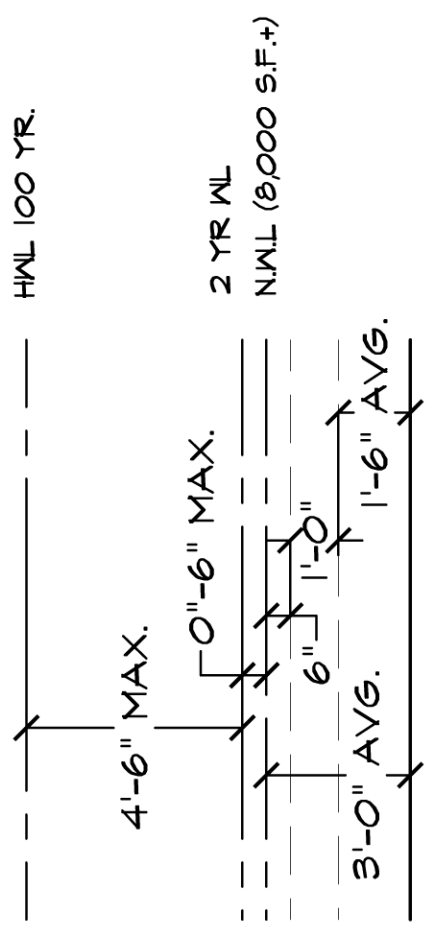
WET BOTTOM POND

SCALE" 1/8"=1'-0"



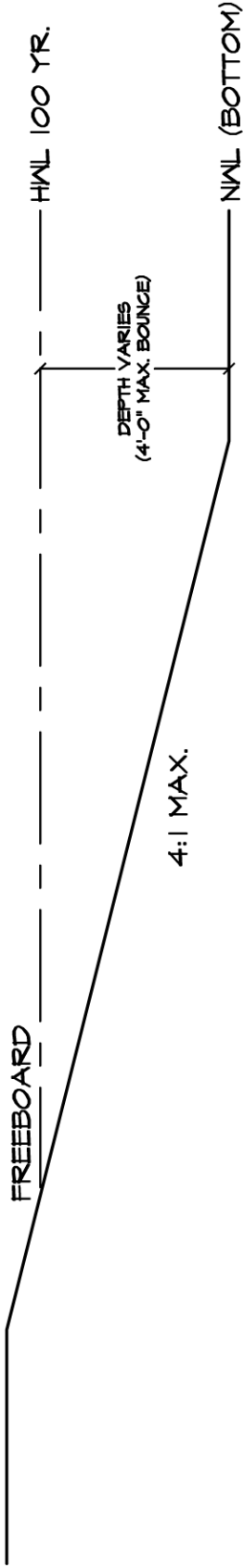
WETLAND BOTTOM POND

SCALE: 1/8" = 1'-0"



ENLARGEMENT PLAN

SCALE: 1/4" = 1'-0"



DRY BOTTOM BASIN

SCALE" 1/8"=1'-0"



Photo 1 – Wet bottom basin with broad emergent shelf and wet-mesic prairie slopes with clusters of woody vegetation. Note the irregular shape of the basin. (early summer)



Photo 2 – Wetland bottom basin with emergent vegetation, minimal open water, and mesic prairie slopes (summer)



Photo 3 – Wet bottom basin with water quality aeration system, a broad emergent zone, and a deepwater emergent zone. Note that a portion of the shallow basin slope is vegetated with traditional turfgrass (summer) [Photo courtesy of EnCAP, Inc.]



Photo 4 – Wet bottom basin with narrow emergent zone, mesic prairie slopes, and clusters of shrubs and trees (fall)



Photo 5 – Ornamental hybrid plantings and water quality enhancement site feature (fall)



Photo 6 – Water quality enhancement features and ornamental hybrid plantings as a component of stormwater management.



Photo 7 – Wetland bottom basin with mesic prairie slopes and variable width emergent and shoreline plantings (early summer)



Photo 8 – Low profile prairie slopes around a wet bottom basin (early summer)



Photo 9 – Wet bottom basin with water quality and aesthetic enhancements



Photo 10 – Water quality enhancement cascade with ornamental landscape as part of stormwater management system



Photo 11 – Cascade and filtration stream with turfgrass and ornamental hybrid landscaping



Photo 12 – Mesic prairie on slopes of wet bottom basin with bicycle path in the background (early summer)



Photo 13 – Recently installed low-profile prairie and ornamental hybrid combination wetland bottom basin



Photo 14 – Mesic prairie slopes on wet bottom basin (fall)



Photo 16 – Cascading stream and ornamental hybrid landscaping for water quality and aesthetics