developing water trails in IOWA

SIGNAGE

Experienced paddlers, as well as new users, say that a successful paddling experience in Iowa includes consistent standards for wayfinding and communication. Therefore, signs used on and for state-designated water trails in Iowa are intentionally consistent in color, size, and graphics. The standards included in this manual apply to all state-designated water trails.

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6A WATER TRAILS SIGNAGE

Water trails signage includes all signs associated with wayfinding, navigation, and use information viewed from both on-land and on-water. Users should be able to drive to the water trail launches they seek, as well as understand their locations while on-water.

Iowa's water trails program provides the mechanism and the challenge to create seamless recreational experiences for users across jurisdictions. Locations on state-designated trails, therefore, are identified with river mile numbers, much like the Interstate Highway System. Each launch location references both an access number, representing the river mile where the launch is located, and the launch's formal name, such as Albright's Access. River miles are calculated beginning with 0 (zero) at the mouth of a stream and progressing upstream. Consecutive numbering stops at Iowa state boundary limits.

ON-LAND NAVIGATIONAL SIGNAGE

Wayfinding to launch locations is the first experience users have with Iowa water trails. A straightforward and minimal signage sequence is used to communicate driving directions. Wayfinding signs are consistently used for state-designated trails, regardless of the type of road or road jurisdiction. The Iowa Department of Transportation (DOT) approved these standards to provide identity for the water trails program and to use the fewest signs needed to communicate with drivers looking for launch locations.

All launch entrance-drive locations are consistently signed in both directions using the river mile of the launch as the access number. A minimal sequence of signs is suggested but not required for remaining aspects of launch wayfinding (Figure 6A-1). The series of wayfinding signs is particularly encouraged when multiple turns are required, beginning at the last primary road for both rural and urban routes. Figure 6A-2 illustrates the sequence in a typical rural setting. Wayfinding signage specifications are included in Figure 6A-3.

Sign Locations	Signage at last primary road turn-off to launch (optional)	Signage at all subsequent turns to reach launch (optional)	Signage at launch turn-in (required)
Sign Combinations			
DOT Sign Titles	1. Water Trail Symbol 2. Access Point Identifier 3. Arrow Sign with Miles	1. Water Trail Symbol 2. Arrow Sign	1. Water Trail Symbol 2. Access Point Identifier

Figure 6A-1.
Wayfinding Signage Typical Sequence

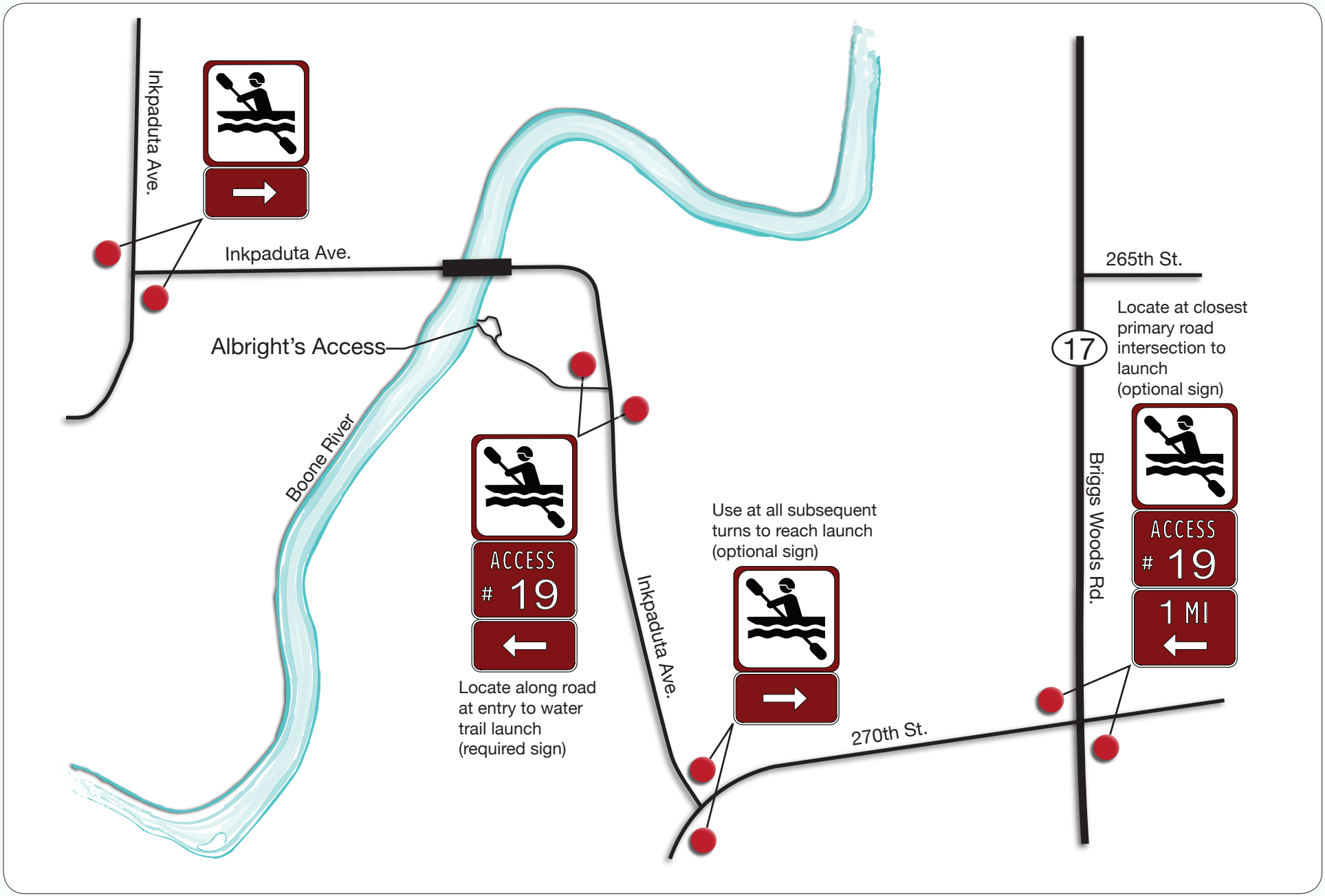
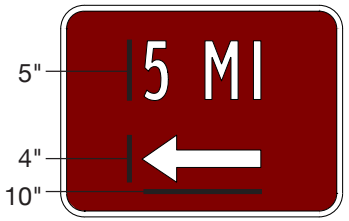


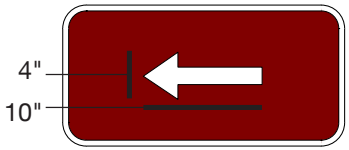
Figure 6A-2.
Wayfinding Signage Location Map (Typical Rural Site)

1. Water Trail Symbol
Iowa Prison Industry Part #: FDNR41524X24EA
Size: 24"x24"
Color: Black on White with Brown Border
Reflective: Yes
Material: Aluminum

2. Access Point Identifier
Iowa Prison Industry Part #: FDNR41924X18EA
Size: 24"x18"
Color: White on Brown
Reflective: Yes
Material: Aluminum
Additional Information:
Specify access number corresponding to river mile



3. Arrow Sign with Miles
Iowa Prison Industry Part #: FDNR420A24X18EA
Size: 24"x18"
Color: White on Brown
Reflective: Yes
Material: Aluminum
Additional Information:
Specify miles to water access and direction of arrow



4. Arrow Sign
Iowa Prison Industry Part #: FDNR420B24X12EA
Size: 24"x12"
Color: White on Brown
Reflective: Yes
Material: Aluminum
Additional Information: Specify direction of arrow

Figure 6A-3.
Wayfinding Sign Specifications

Launch locations are often included inside existing recreation sites. When appropriate river locations are included within existing recreational land parcels, this is often an efficient use of maintenance equipment, surveillance, and shared facilities such as parking. Figure 6A-4, Signage at Access Points Already Signed, illustrates how the standard water trail launch icon and access number are used in conjunction with existing recreational signage.

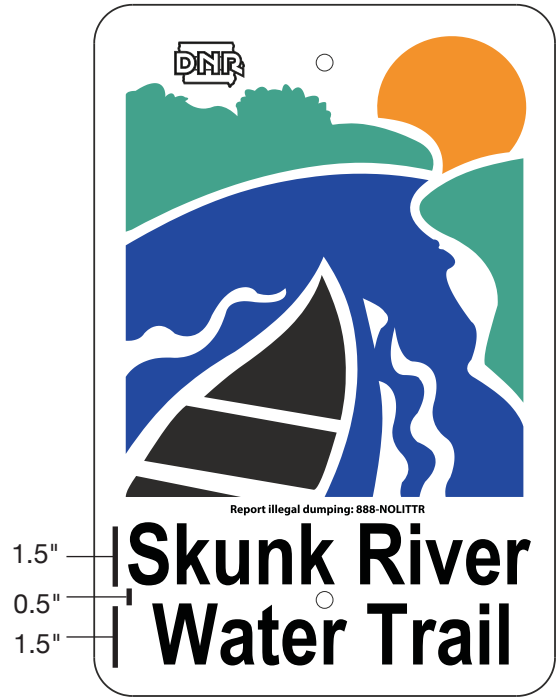
Existing County Arrowhead Sign
Attach water trail symbol to post

Existing Park Sign within Cities Attach water trail symbol to bottom of sign

Figure 6A-4.
Signage at Access Points Already Signed

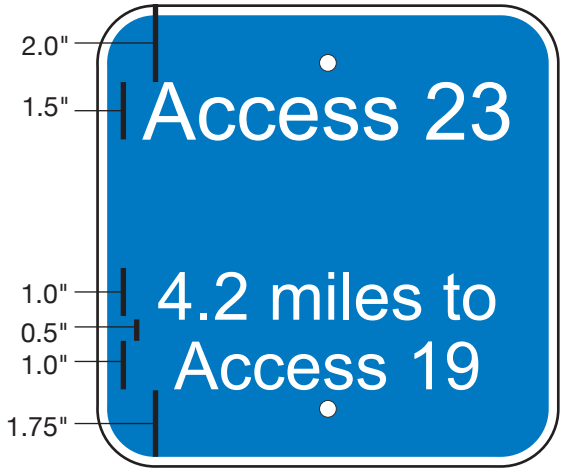
Additional signage at the launch site visible from on-land includes:

- Launch identification at parking area (required), Figure 6A-5, State-Designated Water Trail Logo and Trail Identification
- Identification and distance to next downstream launch (required), Figure 6A-6, Next Downstream Launch Identification and Distance
- Identification of onsite amenities (optional), Figure 6A-7, Onsite Amenity Signage



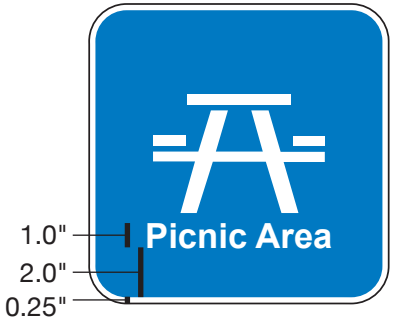
Water Trail Name and Logo
Iowa Prison Industry Part #: FDNR40012X18EA
Size: 12"x18"
Color: Blue, Green, Orange, and Black on White
Reflective: Yes
Material: Aluminum
Additional Information:
Place at head of carry-down trail in launch parking area

Figure 6A-5.
State-Designed Water Trail Logo and Trail Identification

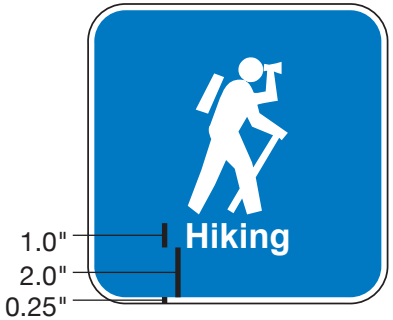


Next Downstream Launch Identification and Distance
Iowa Prison Industry Part #: FDNR40112X12EA
Size: 12"x12"
Color: White on Blue
Reflective: Yes
Material: Aluminum
Additional Information:
Place at head of carry-down trail in launch parking area; can share post with Water Trail Name and Logo sign

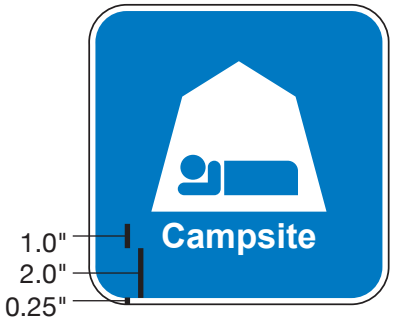
Figure 6A-6.
Next Downstream Launch Identification and Distance



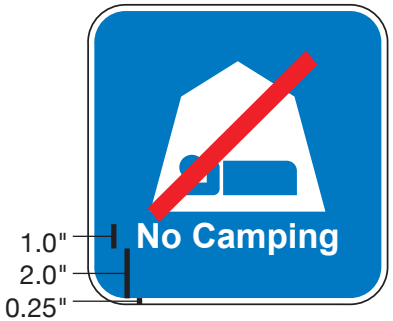
Picnic Area
Iowa Prison Industry Part #: FDNR40512X12EA
Size: 12"x12"
Color: White on Blue
Reflective: Yes
Material: Aluminum
Additional Information:
Place as needed; can share post with Water Trail Name and Logo sign



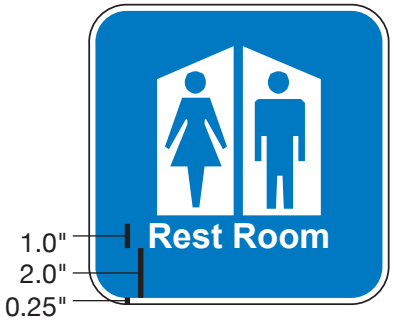
Hiking Trail
Iowa Prison Industry Part #: FDNR40612X12EA
Size: 12"x12"
Color: White on Blue
Reflective: Yes
Material: Aluminum
Additional Information:
Place at trail heads and along trail as needed



Camping
Iowa Prison Industry Part #: FDNR40312X12EA
Size: 12"x12"
Color: White on Blue
Reflective: Yes
Material: Aluminum
Additional Information: Place as needed



No Camping
Iowa Prison Industry Part #: FDNR40412X12EA
Size: 12"x12"
Color: White, Red on Blue
Reflective: Yes
Material: Aluminum
Additional Information: Place as needed



Rest Room
Iowa Prison Industry Part #: FDNR40712X12EA
Size: 12"x12"
Color: White on Blue
Reflective: Yes
Material: Aluminum
Additional Information: Place as needed; can share post with Water Trail Name and Logo sign

Figure 6A-7.
Onsite Amenity Signage

ON-WATER NAVIGATIONAL SIGNAGE

Land ownership rights in Iowa allow agricultural producers to graze livestock with free access to water on streams classified as non-meandered. While many producers have excluded livestock from streams and provided off-stream watering devices, water trail users can still encounter both grazing animals and also barbed-wire fencing running across the stream to contain them. Figure 6A-8, Passable High Fence in Deep Water, illustrates a functional approach for this type of fencing. Disruption of fencing and the safety of water trail users passing under it are both valid concerns. Positive relationships between the water trail sponsor and landowners and renters on the water trail route are critical to ensuring that fencing remains functional for livestock and safe for paddlers.

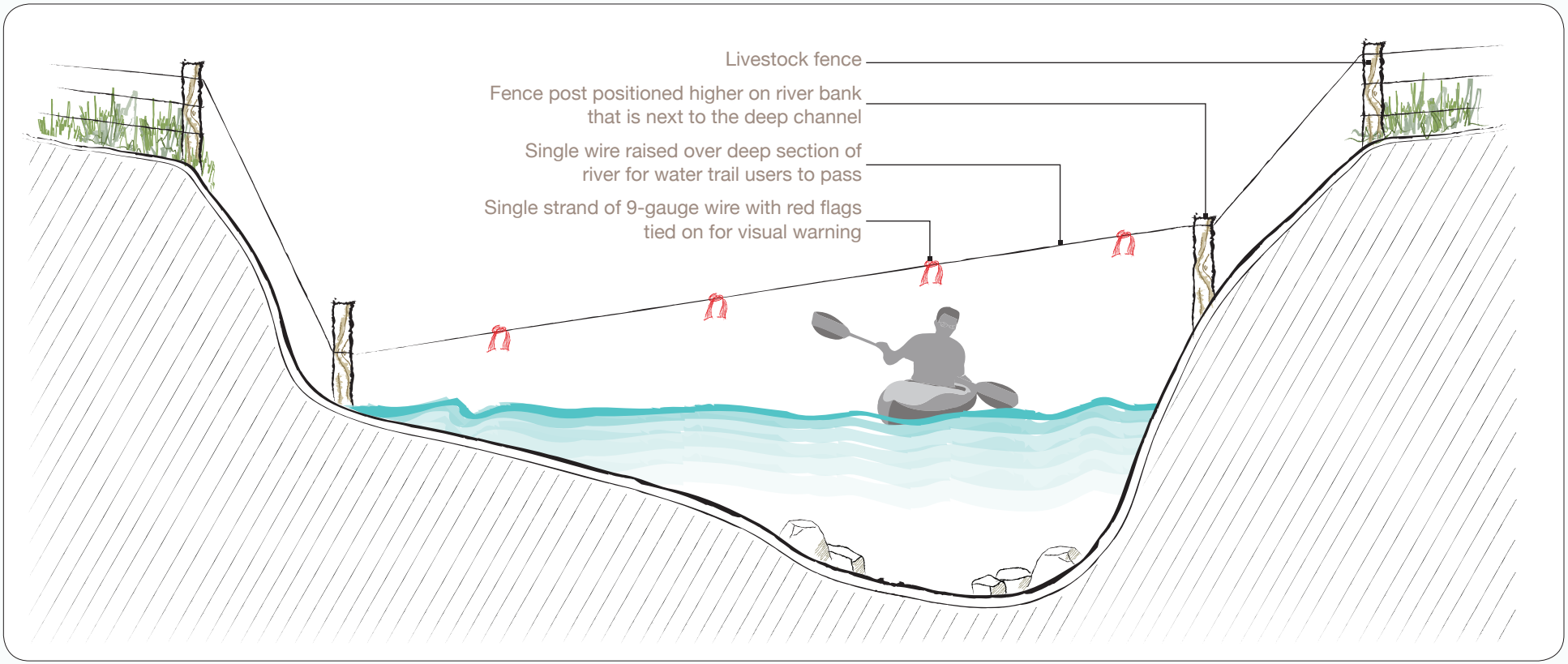
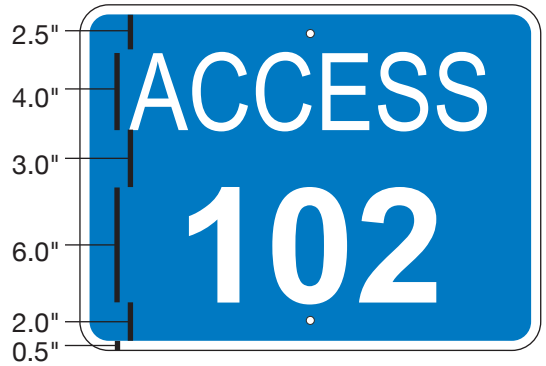


Figure 6A-8.
Passable High Fence in Deep Water

Paddlers unsure of a water trail route and those paddling longer distances indicated they would benefit from location information visible from on-water. Additional signage visible from on-water includes:

- Identification of the next upcoming launch (Figure 6A-9)
- Bridge identification (Figure 6A-10)
- Portage trail wayfinding (Figure 6A-11)
- Boat navigation arrow (Figure 6A-12)
- Water Trail Rules (Figure 6A-13)



On-Water Launch Sign
Iowa Prison Industry Part #: FDNR40224X18EA
Size: 24"x18"
Color: White on Blue
Reflective: Yes
Material: Aluminum

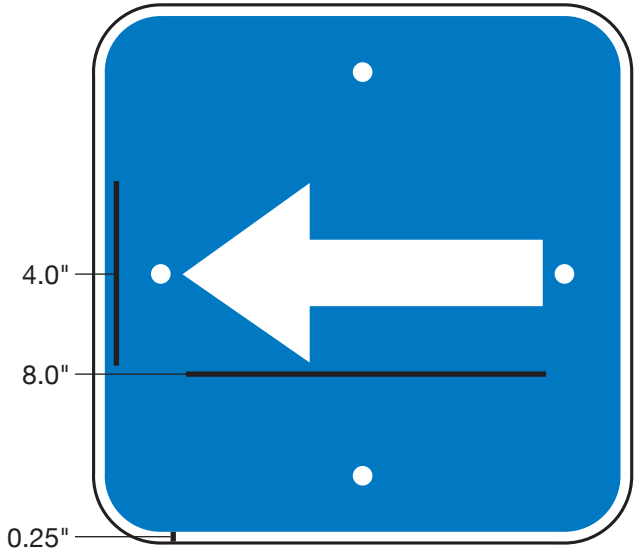
Figure 6A-9.
On-Water Launch Identification

Bridge Signage for Navigation
Iowa Prison Industry Part #: FDNR416BRIDGEEA
Size: 18" height, width varies per text
Color: Black on White
Reflective: Yes
Material: Aluminum
Additional Information: Sign size may be adjusted for amount of text; stencils may be used in lieu of this sign

Figure 6A-10.
Bridge Signage for Navigation

Portage Arrows
Size: 8”x8”
Color: White on Blue
Reflective: Yes
Material: Aluminum
Additional Information: Use as an on-water identifier for trailhead to the portage; also use for trail blazes on the portage trail

Figure 6A-11.
Portage Arrows



Boat Navigation Arrow
Iowa Prison Industry Part #: FDNR41712X12EA
Size: 12"x12"
Color: White on Blue
Reflective: Yes
Material: Aluminum
Additional Information:
Place in water or along bank when marking a specific route through a body of water (i.e., navigating a lake or wetland to reduce confusion). Holes punched on all four sides for installation with any orientation.

Figure 6A-12.
Boat Navigation Arrow

Water Trail Rules
Iowa Prison Industry Part #: FDNR41312X12EA
Size: 12"x12"
Color: White on Blue
Reflective: Yes
Material: Aluminum
Additional Information:
Place at launches, especially where landowner relations are sensitive, or where there have been other problems

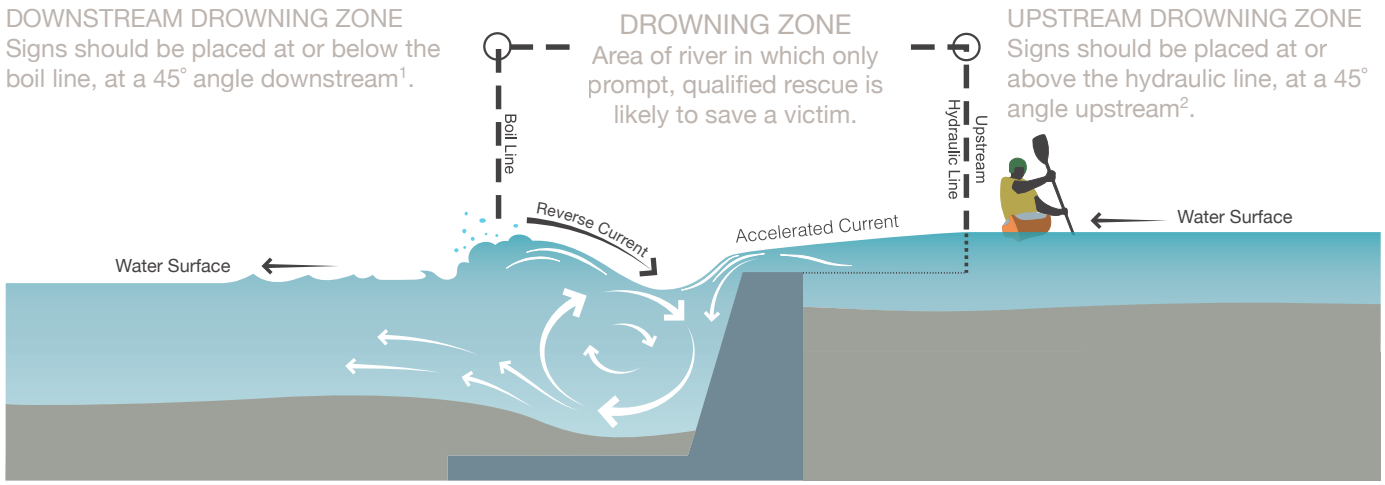
Figure 6A-13.
Water Trail Rules

6B

LOW-HEAD DAM SIGNAGE

LOW-HEAD DAM WARNING SIGN
SIZING & PLACEMENT

Figure 6B-1.
Drowning Zone Profile



[1] Typically within 50' downstream of dam
[2] Distance upstream is typically 3 times the vertical head, often within 20' of the dam.

GENERAL LOCATIONS OF HAZARD SIGNS

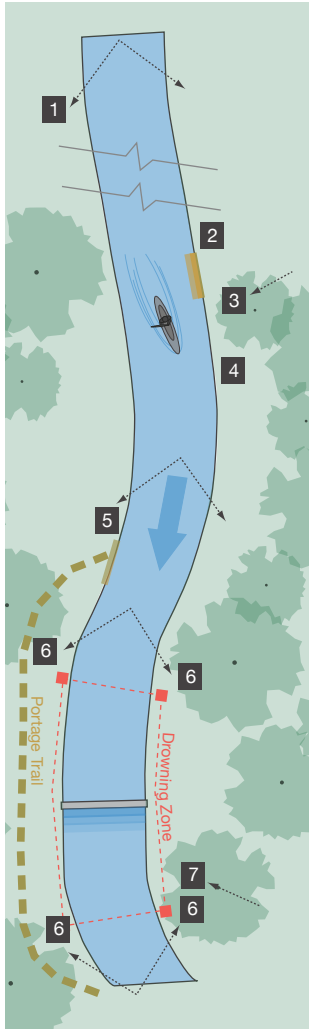
The specific types and sizes of warning signs needed for each hazard on a state-designated water trail are determined individually using a consistent set of criteria. Once the sign design and size is determined, each sign is located adjacent to the hazard based on hydraulic criteria and other local conditions. Low-head dams, for example, include unsafe currents upstream, downstream, and at the site of the dam for boaters and those wading (Figure 6B-1). These high-current areas are known as "drowning zones." Signs identifying drowning zone limits surrounding a hazard must allow a boater to reach shore before being carried by currents over the dam.

All signs viewed from the water are typically sited on the bank at a 45-degree angle facing upstream. The exception to this is the *Drowning Zone* sign placed below a dam facing downstream and offset at a 45-degree angle. Any sign placed on the banks should be as far above the bankfull water elevation as possible. Depending on local conditions, alternative mounting systems such as buoys, overhanging cables, or bridges may be used, in which case the signs may face directly upstream or downstream.

Signs included in this manual can be ordered from vendors, including Iowa Prison Industries (IPI). Note that size, color, and design of all signs corresponds to standards in this manual. Optional features include vandal proof coating using 3M™ Premium Protective Overlay Film Series 1160.

HAZARD SIGN SCENARIOS

River users are minimally provided with two upstream warnings to prepare to leave the stream before reaching a drowning zone and dam. Because rivers often damage signs during flood times and because sign vandalism can be a regular occurrence, some redundancy is programmed into this system to allow time for maintenance responses. River users are directed to a specific side of a stream to reach portage routes or launch locations to avoid the drowning zone. The sequence of signs included for each dam is summarized in Figure 6B-2. Note that differences in sign wording exist based on the course of action available to paddlers as they near hazards. Options include portage trails around the hazards or launches before the drowning zones (which may or may not be the end of the water trail).



SCENARIOS POSSIBLE FOR RIVER USERS TO AVOID A DROWNING ZONE AND DAM	Water Trail Includes Portage Around Dam	Water Trail Launch Available Upstream of Dam to Exit River	Water Trail Launch Available Upstream of Dam to Exit River; Water Trail Ends Here
1 EARLY WARNING SIGN To alert river users to the upcoming dam and cue them to watch for instructions about exiting safely. Required only if landing or egress is located 300 feet or less upstream of a dam, although it may be used optionally to be conservative IPI Part Number: FDNR408EA	Warning Dam Ahead 1,500 Feet	Warning Dam Ahead 1,500 Feet	Warning Dam Ahead 1,500 Feet
2 LAST LANDING ABOVE SIGN To alert river users of the last landing above the dam IPI Part Number: FDNR410EA	Warning Dam Ahead 1.4 Miles Last Landing Portage Ahead Left Bank	Warning Dam Ahead 1.4 Miles Last Boat Landing	Warning Dam Ahead 1.4 Miles Last Landing Water Trail Ends Here
3 LAND-BASED LAST LANDING ABOVE SIGN To alert those staging watercraft or putting in at the launch IPI Part Number: FDNR411EA	Warning Dam Ahead 1.4 Miles Last Landing Portage Ahead Left Bank	Warning Dam Ahead 1.4 Miles Last Boat Landing	Warning Dam Ahead 1.4 Miles Last Boat Landing
4 MOVE LEFT OR RIGHT SIGN To cue river users to move over for last safe exit and/or portage (20/20 vision) IPI Part Number: FDNR414EA	Warning Dam Ahead Move Left For Portage	Warning Dam Ahead Move Left For Safe Exit	Warning Dam Ahead Move Left For Safe Exit
5 LAST SAFE EXIT SIGN To mark the last safe exit and/or portage (20/20 vision) IPI Part Number: FDNR421EA	Danger Dam Ahead Last Safe Portage Here Exit Now! →	Danger Dam Ahead Exit Now! →	Danger Dam Ahead Exit Now! →
6 DROWNING ZONE, UP/DOWNSTREAM LIMITS SIGN To mark the area beyond which no one should enter because of dangerous currents. Exact placement based on field conditions (20/40 Vision) IPI Part Number: FDNR422EA	Dam	Dam	Dam
7 PEDESTRIAN DROWNING ZONE WARNING SIGN Placed at pedestrian approaches to drowning zone areas. Exact placement based on field conditions IPI Part Number: FDNR40918X24EA	Danger! Recirculating Currents Below Dam Trap And Drown Victims	Danger! Recirculating Currents Below Dam Trap And Drown Victims	Danger! Recirculating Currents Below Dam Trap And Drown Victims

Figure 6B-2.
General Sign Locations for Use with Dams

SIGN LETTER HEIGHT CALCULATIONS

Criteria used to size all aspects of signs viewed from the water are related to river width at the sign location and includes text height, sign panel size, and text spacing. Text is based on a modified version of the Army Corps of Engineers sign manual standards. The minimum text height for the main message for all water-viewed signs is 4 inches, regardless of river width. The font for all text is Arial.

Begin calculations for text height by determining river width where each sign is to be located. Width can be measured on the Iowa DNR Interactive Mapping Site using aerial photographs (www.iowadnr.gov/mapping/index.html).

The formula for calculating text height is illustrated on the right. Figure 6B-3 and Table 6B-1 are provided to calculate the 20/40 vision viewing distance (V). This value is used to calculate the height of the capital letter text (A) that would be legible from the viewing distance. The sign panel size is then determined based on proportions of the capital letter height and text-spacing requirements.

V (ft) = (M1 - M2) / cos 45°
M1 - M2 = 0.5 river width (ft) (for 45° only)
V (ft) = (0.5 river width (ft)) / 0.707
A (in) = V28

20/40 A (in) x 0.50 = 20/20 A (in)
20/40 A (in) x 0.75 = 20/30 A (in)
(Always round up to nearest inch.)

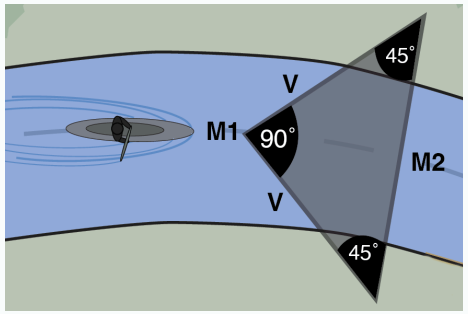


Figure 6B-3.
Calculating Viewing Distance Based on River Width

20/40-VISION CHART FOR DROWNING ZONE SIGNS

River Width (ft)	Capital Letter Height (in)	River Width (ft)	Capital Letter Height (in)	River Width (ft)	Capital Letter Height (in)
0-158	4	791-830	21	1464-1503	38
159-197	5	831-870	22	1504-1543	39
198-236	6	871-909	23	1544-1582	40
237-276	7	910-949	24	1583-1622	41
277-315	8	950-988	25	1623-1661	42
316-355	9	989-1028	26	1662-1701	43
356-395	10	1029-1068	27	1702-1741	44
396-434	11	1069-1107	28	1742-1780	45
435-474	12	1108-1147	29	1781-1820	46
475-513	13	1148-1186	30	1821-1859	47
514-553	14	1187-1226	31	1680-1899	48
554-592	15	1227-1266	32	1900-1939	49
593-632	16	1267-1305	33	1940-1978	50
633-672	17	1306-1345	34	1979-2018	51
673-711	18	1346-1384	35	2019-2057	52
712-751	19	1385-1424	36	2058-2097	53
752-790	20	1425-1463	37	2098-2137	54

Table 6B-1.
Capital Letter Height for 20/40 Vision (Required for all drowning zone signs)

Drowning Zone signs use 20/40 vision standards. In most other locations, 20/20 vision signs are sufficient, as field testing shows they are visible across the river's width. However, larger 20/30 vision signs are recommended in settings where high-speed motorized boat traffic is common, or where local land managers determine a high hazard.

20/30-VISION CHART FOR DROWNING ZONE SIGNS

River Width (ft)	Capital Letter Height (in)	River Width (ft)	Capital Letter Height (in)	River Width (ft)	Capital Letter Height (in)
0-197	4	1029-1107	21	1940-1978	38
198-236	5	1108-1147	22	1979-2057	39
237-315	6	1148-1186	23	2058-2097	40
316-355	7	1187-1266	24	2098-2137	41
356-395	8	1267-1305	25	2138-2216	42
396-474	9	1306-1345	26	2217-2255	43
475-513	10	1346-1424	27	2256-2295	44
514-553	11	1425-1463	28	2296-2374	45
554-632	12	1464-1503	29	2375-2414	46
633-672	13	1504-1582	30	2415-2453	47
673-711	14	1583-1622	31	2454-2492	48
712-790	15	1623-1661	32	2493-2572	49
791-830	16	1662-1741	33	2573-2612	50
831-870	17	1742-1780	34	2613-2651	51
871-949	18	1781-1820	35	2652-2731	52
950-988	19	1821-1899	36	2732-2770	53
989-1028	20	1900-1939	37	2771-2810	54

Table 6B-2.
Capital Letter Height for 20/30 Vision (Optional when greater visibility is desired)

20/20-VISION CHART FOR DROWNING ZONE SIGNS

River Width (ft)	Capital Letter Height (in)	River Width (ft)	Capital Letter Height (in)	River Width (ft)	Capital Letter Height (in)
0-315	4	1583-1661	21	2881-2958	38
316-395	5	1662-1741	22	2959-3036	39
396-475	6	1742-1820	23	3037-3114	40
476-553	7	1821-1899	24	3115-3192	41
554-632	8	1900-1978	25	3193-3271	42
633-711	9	1979-2057	26	3272-3349	43
712-790	10	2058-2137	27	3350-3427	44
791-870	11	2138-2176	28	3428-3505	45
871-949	12	2177-2254	29	3506-3583	46
950-1028	13	2255-2332	30	3584-3662	47
1029-1107	14	2333-2410	31	3663-3740	48
1108-1186	15	2411-2489	32	3741-3818	49
1187-1186	16	2490-2567	33	3819-3896	50
1267-1345	17	2568-2645	34	3897-3974	51
1346-1424	18	2646-2723	35	3975-4053	52
1425-1503	19	2724-2801	36	4054-4131	53
1504-1582	20	2802-2880	337	4132-4209	54

Table 6B-3.
Capital Letter Height for 20/20 Vision (Appropriate for most settings, with the exception of drowning zone signs)

ANNOTATED
SIGN GUIDELINES

EARLY WARNING (ON-WATER) SIGN

Purpose:
To alert river users about an upcoming dam.

Band Color: Orange
Reflective: Yes
Material: Aluminum

This sign is optional. If the last launch is less than 300 feet upstream from the dam, then this sign, along with the **Last Landing Above (On-Water)** sign, is required. It may also be used as an extra precaution where high-speed boat traffic is common, or areas where local land managers determine a high hazard.

Figure 6B-4 describes required dimensions and spacing. “Warning” is in Arial bold font.

Placement is guided by local site conditions. There is no minimum length upstream of dam. The sign may be placed anywhere along the river. More than one sign may be needed, depending on site conditions.

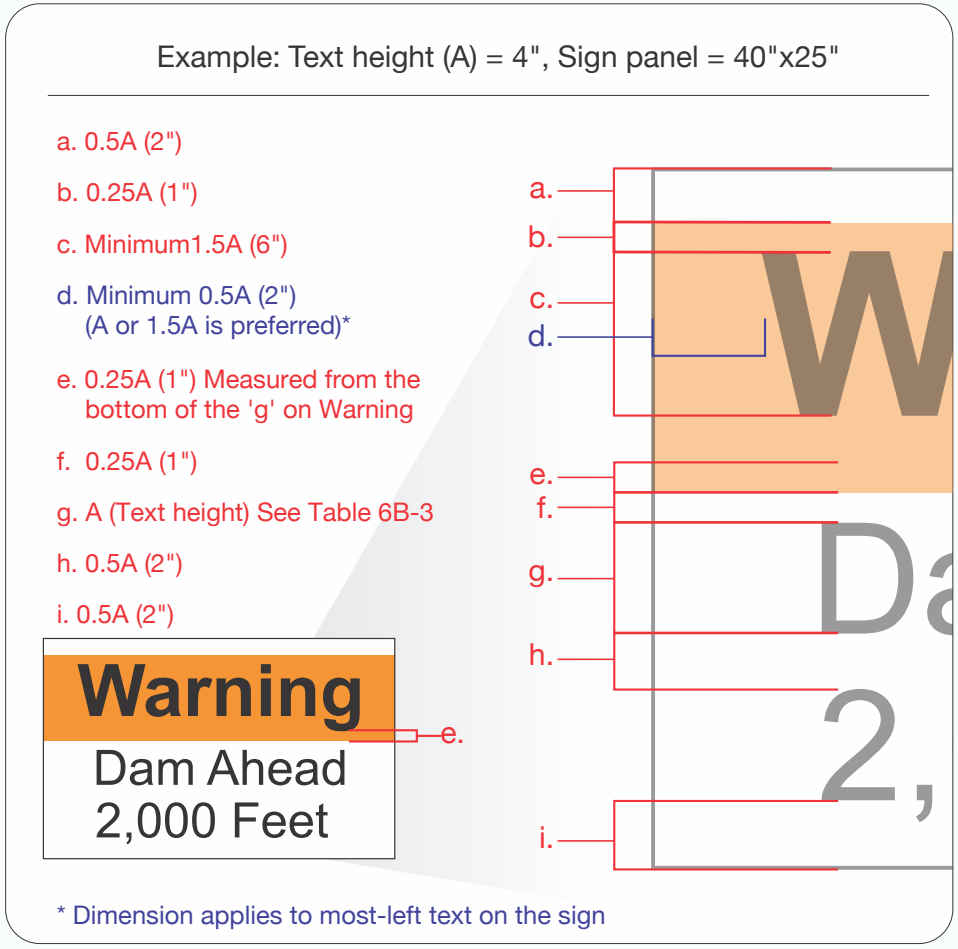


Figure 6B-4.
“Early Warning (On-Water) Sign” Face Dimensions

LAST LANDING ABOVE (ON-WATER) SIGN

Purpose:
To alert river users of the upcoming dam and to cue them to watch for instructions about exiting safely.

Band Color: Orange
Reflective: Yes
Material: Aluminum

This sign is required unless the last launch is more than 300 feet upstream from the dam and the **Last Launch Above (On-Land)** sign is implemented. In this case the sign is optional and could be used as an extra precaution.

Figure 6B-8 describes required dimensions and spacing. “Warning” is in Arial bold font. Three message variations are possible for this sign, depending on the site. Figures 6B-5, 6B-6, and 6B-7 show these alternatives.

Figure 6B-5
Sign Face to Identify End of Designated Water Trail Ahead

Figure 6B-6
Sign Face for Site Without Portage Trail/With Last Landing Ahead

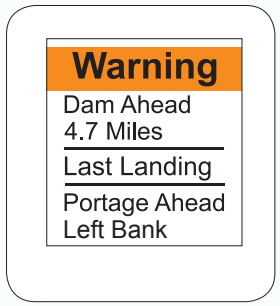


Figure 6B-7
Sign Face for Site with Portage Trail Ahead

Example: Text height (A) = 4", Sign panel = 40"x40"

a. 0.5A (2")

b. 0.25A (1")

c. Minimum 1.5A (6")

d. 0.25A (1") Measured from the bottom of the 'g' on Warning

e. 0.25A (1")

f. 0.5A (2")

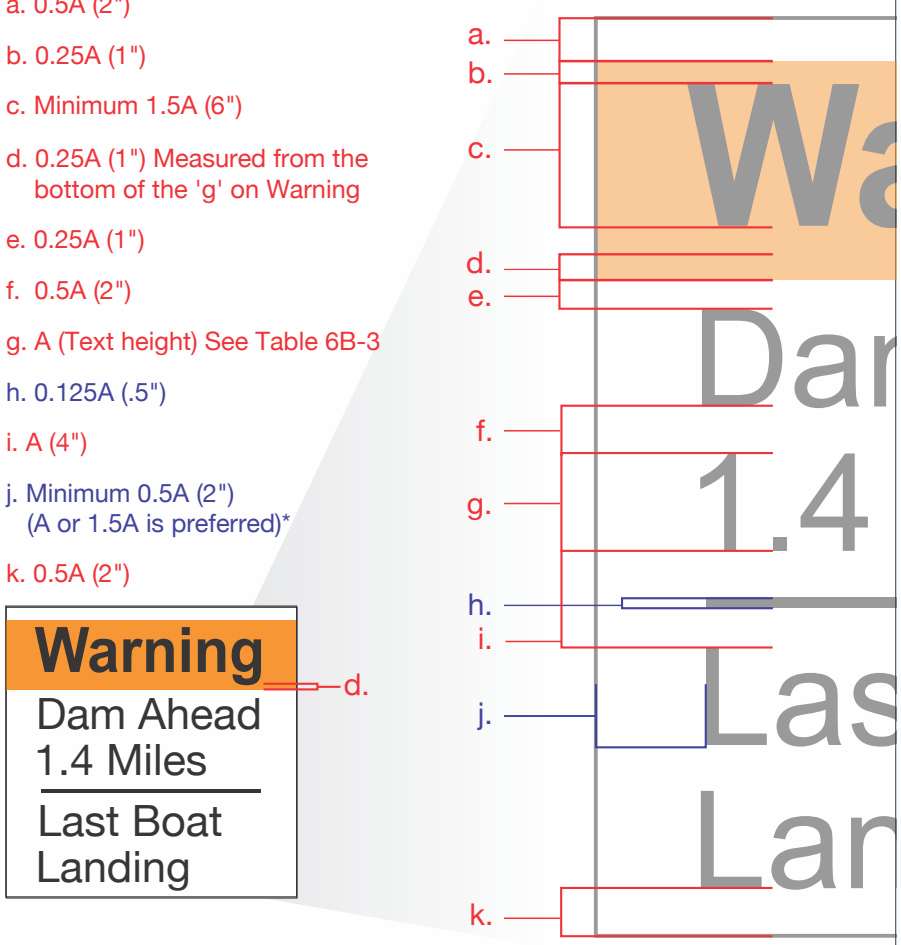
g. A (Text height) See Table 6B-3

h. 0.125A (.5")

i. A (4")

j. Minimum 0.5A (2") (A or 1.5A is preferred)*

k. 0.5A (2")



* Dimension applies to most-left text on the sign

Figure 6B-8
“Last Landing Above (On-Water) Sign” Face Dimensions

LAST LANDING ABOVE (ON-LAND) SIGN

Purpose:
To alert river users putting in at the launch about the upcoming dam and to cue them to watch for instructions about exiting safely.

Band Color: Orange
Reflective: Yes
Material: Aluminum

This sign is required and meant to be viewed from land at a launch. The capital text height is 2 inches, regardless of river width.

Figure 6B-11 describes required dimensions and spacing. Two message variations are possible for this sign, depending on the site. Figure 6B-9 and Figure 6B-10 show these options. “Warning” is in Arial bold font.

Proper radii to prevent injury on sign corners is determined by sign manufacturer.

Figure 6B-9
Sign Face for Site Without Portage Trail/ With Last Landing Ahead (On-Land)

Figure 6B-10
Sign Face for Site with Portage Trail Ahead (On-Land)

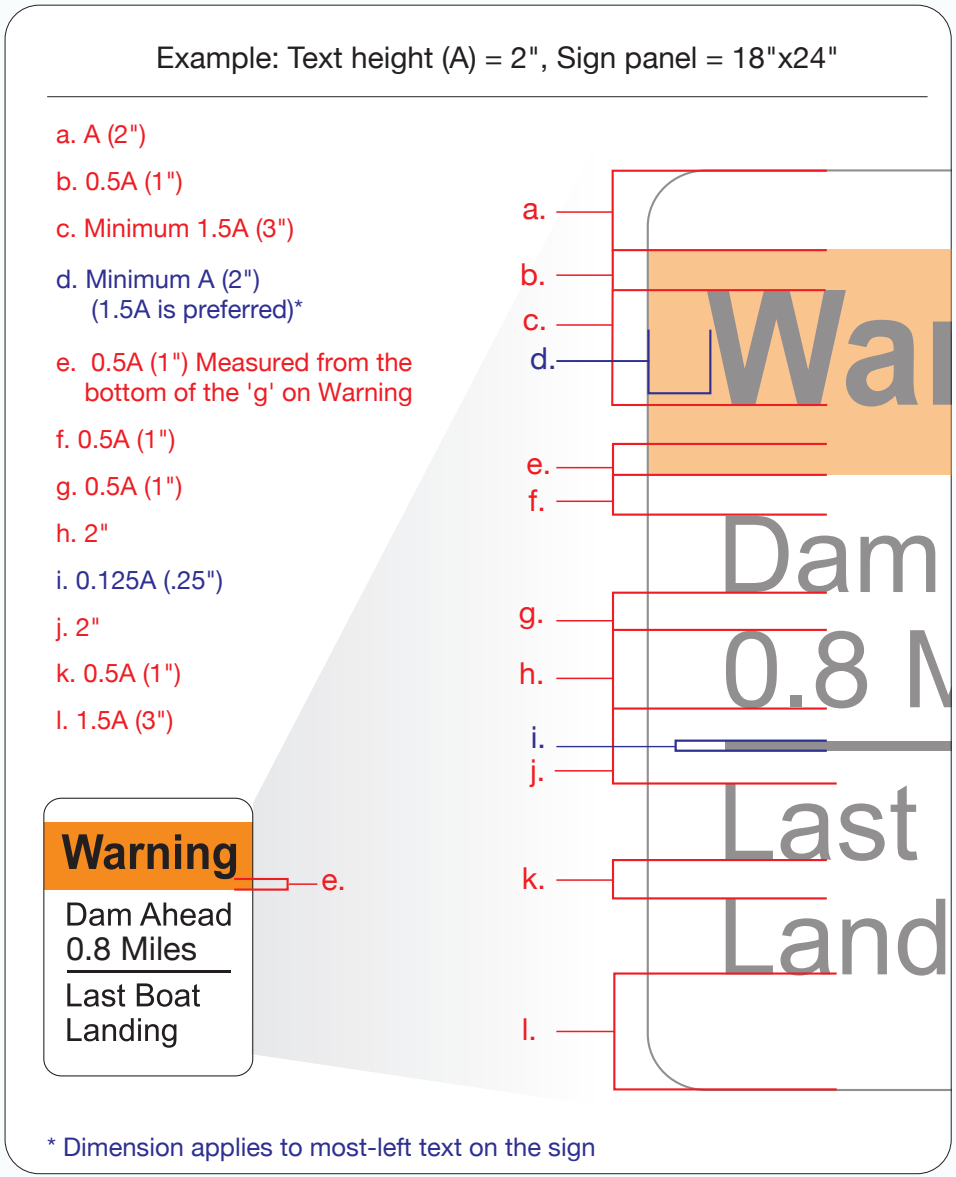


Figure 6B-11
“Last Landing Above (On-Land) Sign” Face Dimensions

MOVE LEFT/RIGHT (ON-WATER) SIGN

Purpose:
To alert users of the upcoming dam and cue them to move to either the left or right side of the river to exit safely.

Band Color: Orange
Reflective: Yes
Material: Aluminum

This sign is required, unless exit is possible on both sides of the river. The sign should be placed a minimum of 3 times the river width upstream from the Last Safe Exit sign so river users have enough reaction time to move over for the portage and/or last safe exit.

Figure 6B-14 describes required dimensions and spacing. Two message variations are possible for this sign, depending on the site. Figure 6B-12 and Figure 6B-13 show these options. “Warning” is in Arial bold font.

Figure 6B-12
Sign Face to Identify Bank for Last Safe Exit

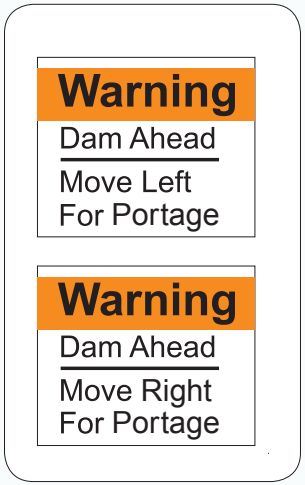


Figure 6B-13
Sign Face to Identify Bank for Portage Trail

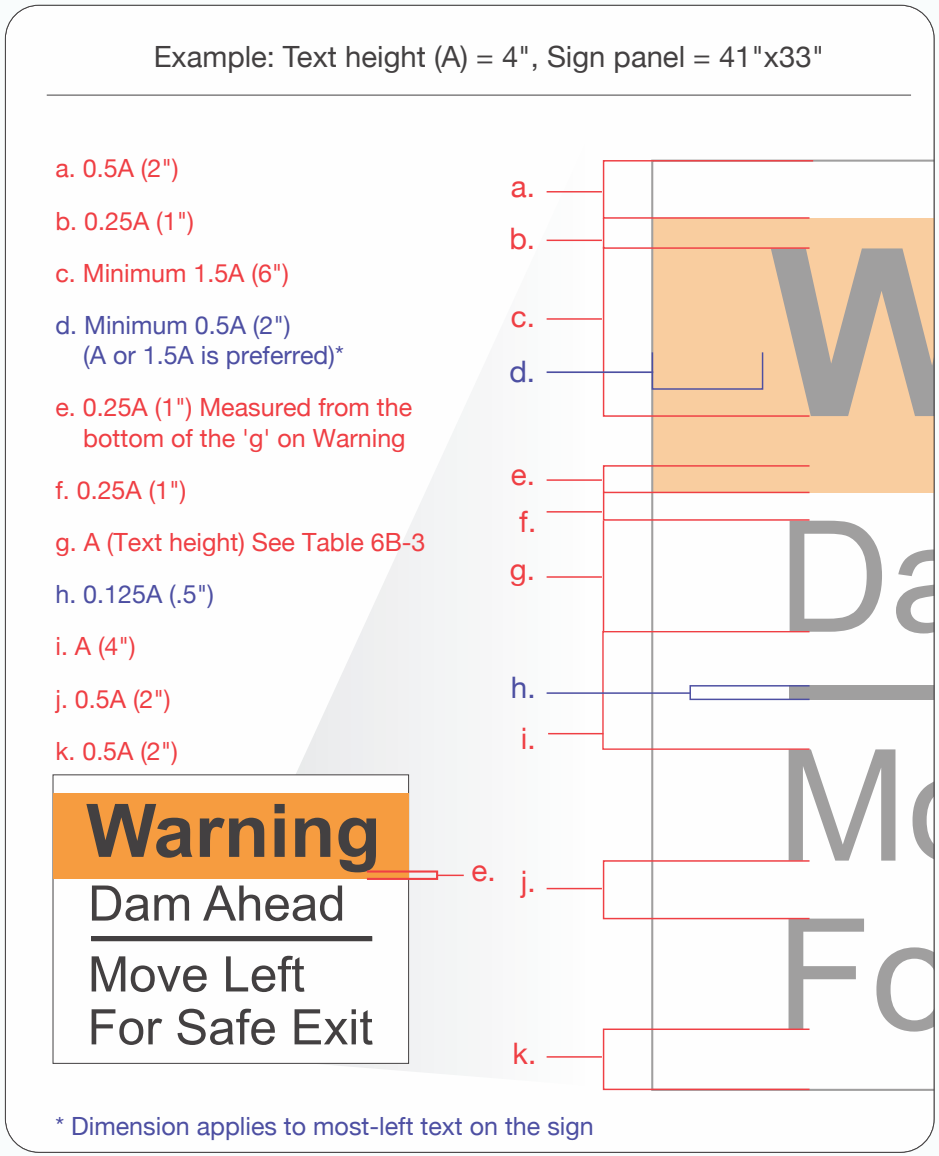
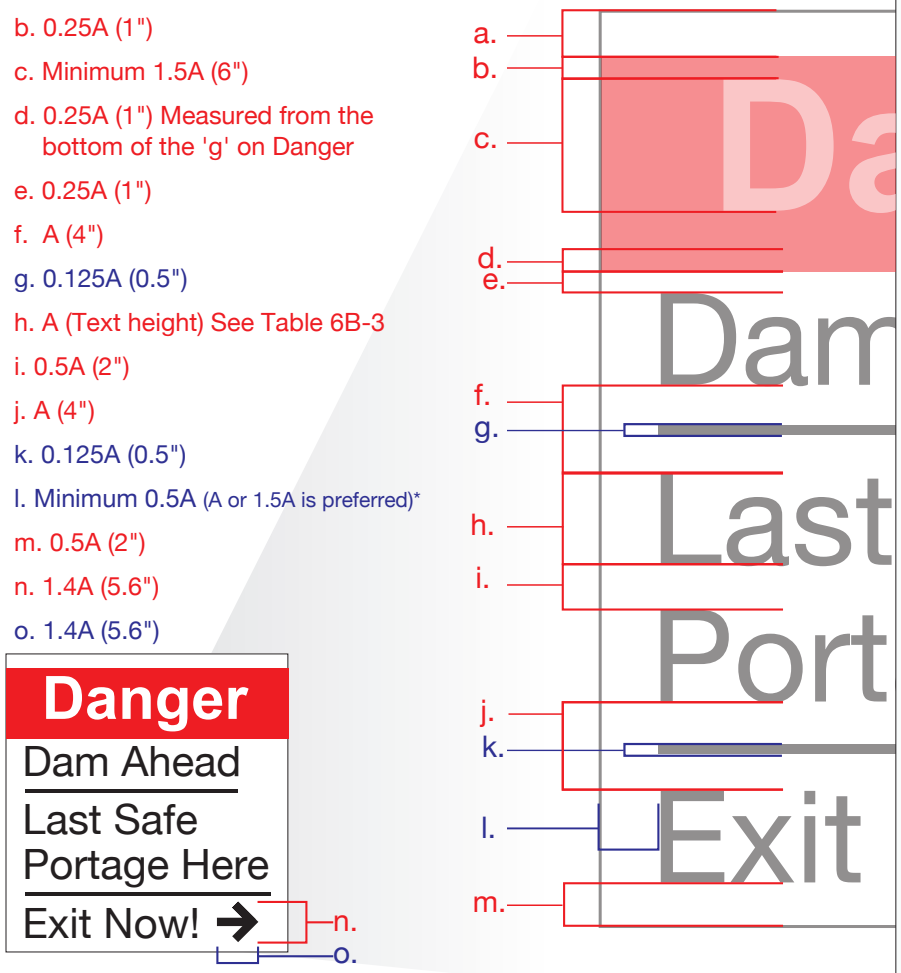


Figure 6B-14
“Move Left/Right (On-Water) Sign” Face Dimensions

Example: Text height (A) = 4", Sign panel = 40"x40"

a. 0.5A (2")
b. 0.25A (1")
c. Minimum 1.5A (6")
d. 0.25A (1") Measured from the bottom of the 'g' on Danger
e. 0.25A (1")
f. A (4")
g. 0.125A (0.5")
h. A (Text height) See Table 6B-3
i. 0.5A (2")
j. A (4")
k. 0.125A (0.5")
l. Minimum 0.5A (A or 1.5A is preferred)*
m. 0.5A (2")
n. 1.4A (5.6")
o. 1.4A (5.6")



* Dimension applies to most-left text on the sign

Figure 6B-17
"Last Safe Exit (On-Water) Sign" Face Dimensions

LAST SAFE EXIT (ON-WATER) SIGN

Purpose:
To mark the last safe exit and/or portage route before the dam.

Band Color: Red
Reflective: Yes
Material: Aluminum

This sign is required. The "Last Safe Portage Here" message should only be used on the side of the river that the portage is on.

Figure 6B-17 describes required dimensions and spacing. Two message variations are possible for this sign, depending on the site. Figure 6B-15 and Figure 6B-16 show these options. "Danger" is in Arial bold font.

Figure 6B-15
Sign Face to Identify Last Safe Exit

Figure 6B-16
Sign Face to Identify Last Safe Portage

DROWNING ZONE, UP/DOWNSTREAM LIMITS (ON-WATER) SIGN

Purpose:
To mark the upstream and downstream limits beyond which no one should enter because of dangerous currents.

Band Color: Red
Reflective: Yes
Material: Aluminum

This sign is required. The diamond shape, as well as the "X" in the center, is a universal symbol of a dangerous hazard.

Figure 6B-18 describes required dimensions and spacing. Sign panel size is determined based on required text height. (See below.) Text is Arial bold font with a black outline.

Sign Size Based on Text Height

A (in.)	Sign Dim.	A (in.)	Sign Dim.
4	17"x17"	13	54"x54"
5	21"x21"	14	58"x58"
6	25"x25"	15	62"x62"
7	29"x29"	16	66"x66"
8	33"x33"	17	70"x70"
9	37"x37"	18	74"x74"
10	41.5"x41.5"	19	78"x78"
11	46"x46"	20	82"x82"
12	50"x50"		

Example: Text height (A) = 4", Sign panel = 17"x17"

a. 45° Rotation

b. 0.5A (2")

c. A (Text height) See Table 6B-1

d. 0.125A (.5")

e. 0.25A (1")

f. 0.125A (.5")

g. 0.0625A (.25)

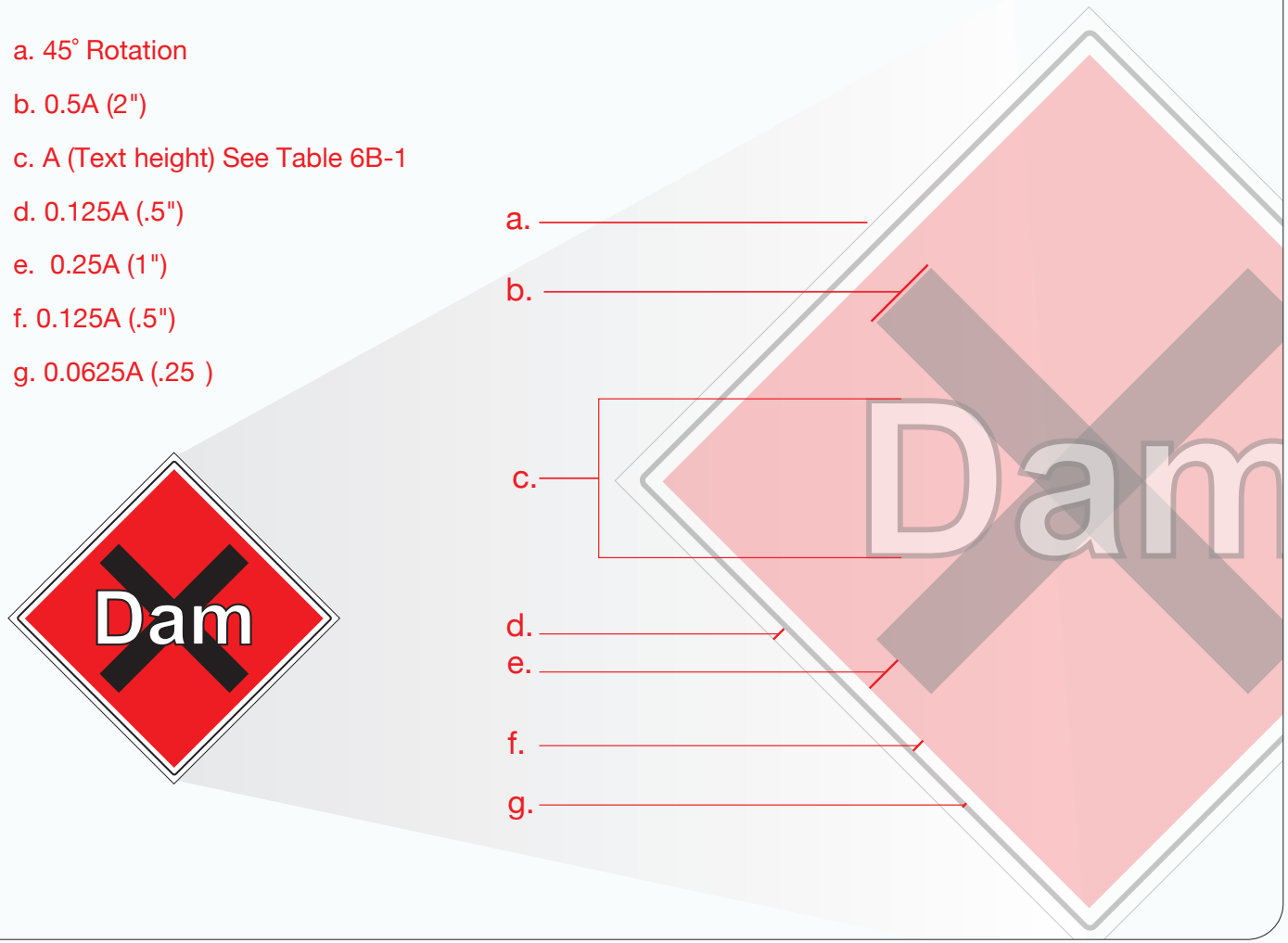


Figure 6B-18.
"Drowning Zone, Up/Downstream Limits (On-Water) Sign" Face Dimensions

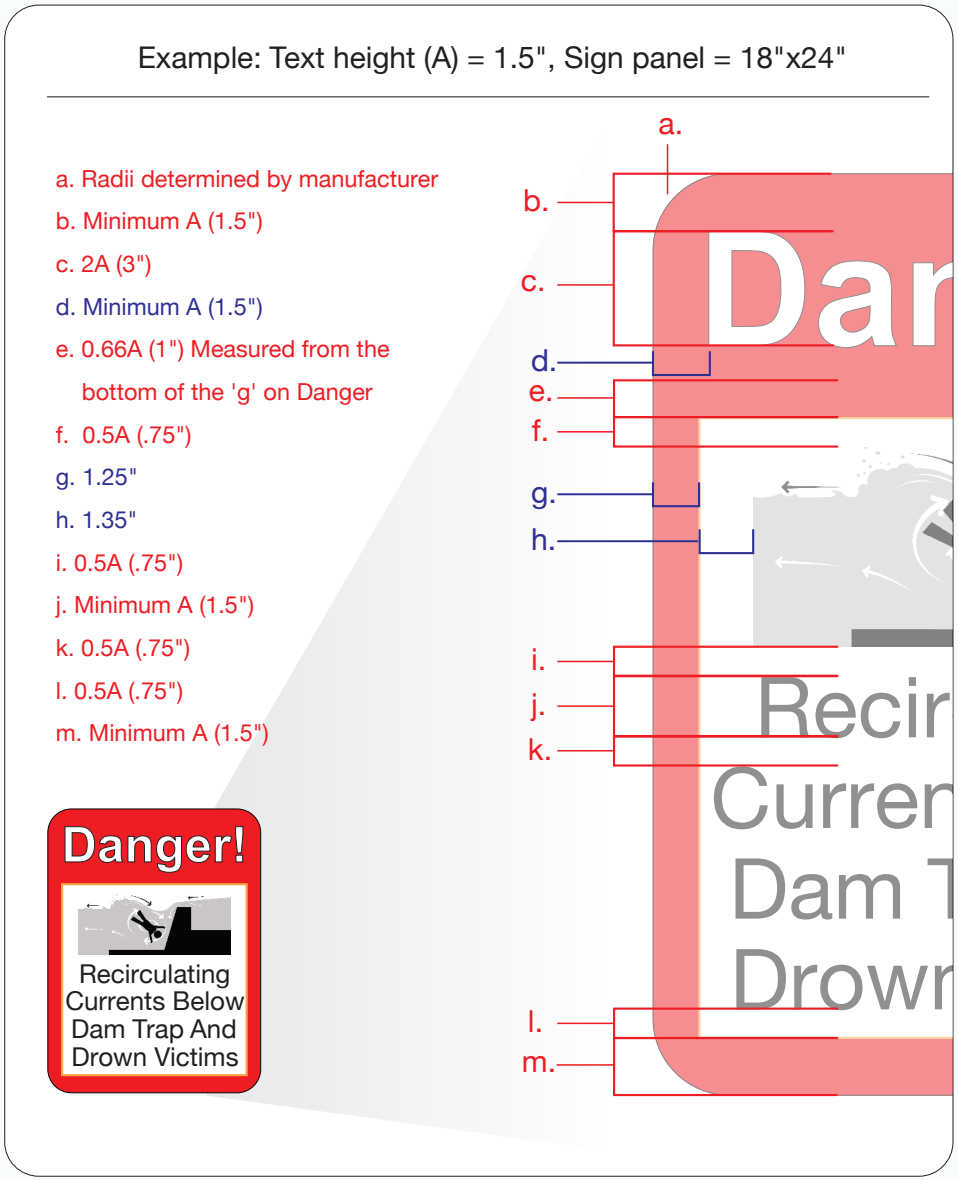


Figure 6B-19
"Pedestrian Drowning Zone Warning (On-Land) Sign"
Face Dimensions

PEDESTRIAN DROWNING ZONE WARNING (ON-LAND) SIGN

Purpose:
To alert people attempting to wade or otherwise access the river about the dangers of the recirculating currents within the drowning zone.

Band Color: Red
Reflective: Yes
Material: Aluminum

These signs are required at all pedestrian approaches above and below the dam and are meant to be viewed from land.

Figure 6B-19 describes required dimensions and spacing. The capital text height is 1.5 inches, regardless of river width. "Danger!" is in Arial bold font with a black outline.

SITE PLAN EXAMPLES

DES MOINES CASE STUDY:
Water Works Boat Launch On The Raccoon River

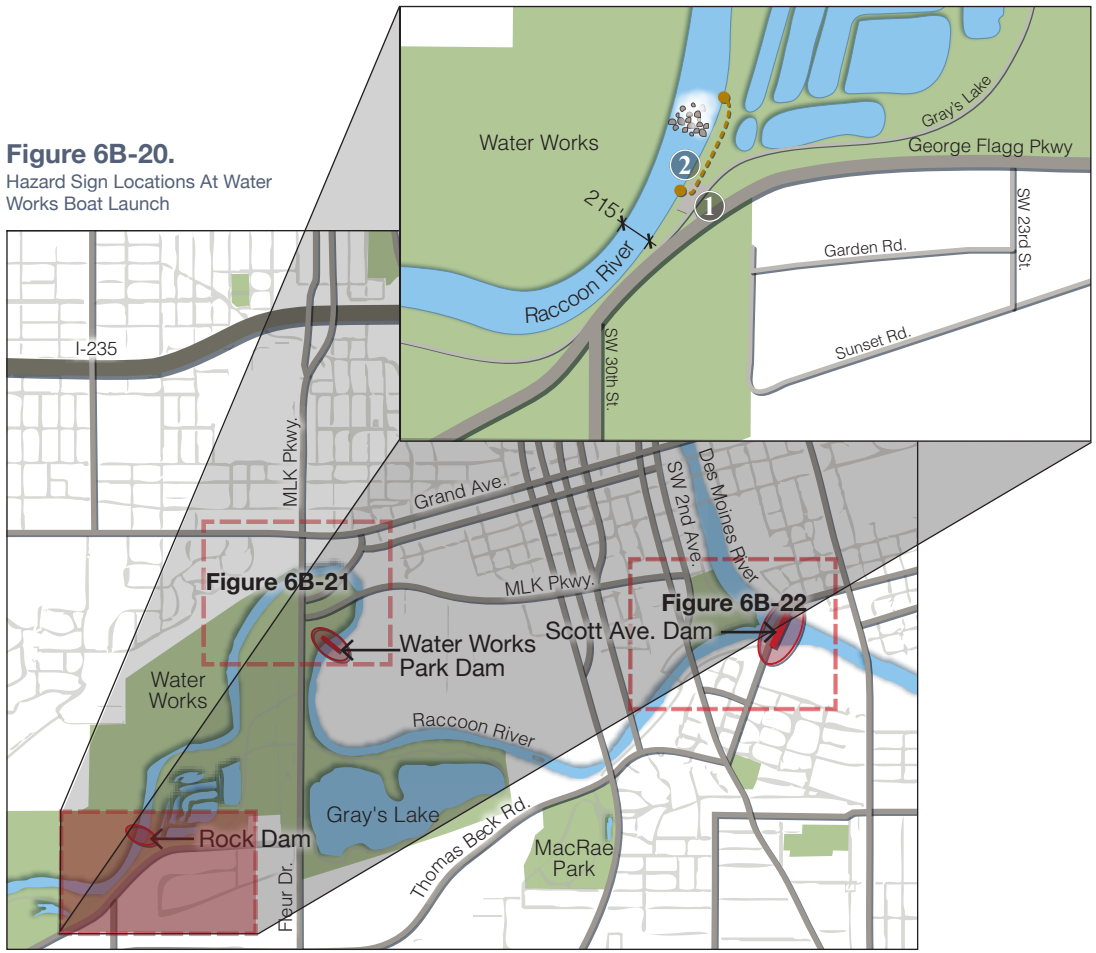


Figure 6B-20.
Hazard Sign Locations At Water Works Boat Launch

Table 6B-4.
Signs Used Near Water Works Boat Launch

Hazard Signs Near Water Works Boat Launch			
Sign Type and Location	Example	Sign Size	Text Height
1 LAST LANDING ABOVE (ON-WATER) SIGN Placed at top of boat ramp facing parking lot	Warning Rock Dam 300 Feet Low-Head Dam 1.7 Miles Both Portages On Right Bank	24"×32"	2"
PORTAGE ARROW SIGN (ON-LAND) Placed at top of boat ramp facing parking lot	Portage Trail	8"×8"	.75"
2 LAST LANDING ABOVE (ON-LAND) SIGN Placed immediately downstream of Waterworks boat ramp, visible from upstream.	Warning Rock Dam 300 Feet Low-Head Dam 1.7 Miles Both Portages On Right Bank	60"×66"	5"

NOTES EXPLAINING HOW STANDARD SIGNAGE SEQUENCE WAS MODIFIED AT THIS LOCATION

A number of factors led to customization of signs in the vicinity of the Des Moines Water Works boat ramp.

- The rock dam immediately downstream of the boat ramp would not typically be signed; however, Water Works staff wanted to sign it as a low-head dam for liability reasons and to reduce confusion between the rock dam and the low-head dam ahead.
- Sign No. 2 is closely associated with the boat ramp at the top of the bank on its downstream edge; this was the clearest location to direct river users to the landing.

DES MOINES CASE STUDY:
Water Works Park Dam On The Raccoon River

Figure 6B-21.
Hazard Sign Locations At Water Works Dam

Table 6B-5.
Signs Used Near Water Works Dam

Hazard Signs Near Water Works Dam			
Sign Type and Location	Example	Sign Size	Text Height
1 EARLY WARNING SIGN Placed on MLK Pkwy bridge piers	Warning Dam Ahead 1/2 Mile	48"×30"	5"
2 MOVE RIGHT SIGN Placed on Fleur Dr bridge	Warning Dam Ahead 1,500 Feet Move Right For Portage	48"×50"	5"
3 LAST SAFE EXIT SIGN Placed slightly upstream of portage on bank at 45°	Danger Dam Ahead Last Safe Portage Here Exit Now! →	48"×54"	5"
4 DROWNING ZONE UP/DOWNSTREAM LIMITS SIGN Placed on banks at 45° or on cables upstream and downstream of the dam the river	Dam	25"×25"	
5 PEDESTRIAN DROWNING ZONE WARNING SIGN Placed at pedestrian approach from bike trail and on SE-side levee facing away from dam	Danger! Recirculating Currents Below Dam Trap And Drown Victims	18"×24"	

NOTES EXPLAINING HOW STANDARD SIGNAGE SEQUENCE WAS MODIFIED AT THIS LOCATION

Sign No. 2 includes two messages that would typically be on separate signs. Des Moines Water Works staff wanted a second early warning, and there was a need to advise paddlers to move right for the portage at the same location, so the signs were combined for clarity.

DES MOINES CASE STUDY:
Scott Avenue Dam On The Des Moines River

The Scott Avenue Dam in Des Moines is located at the intersection of the Raccoon River and the Des Moines River.

Figure 6B-22.
Hazard Sign Locations At Scott Avenue Dam

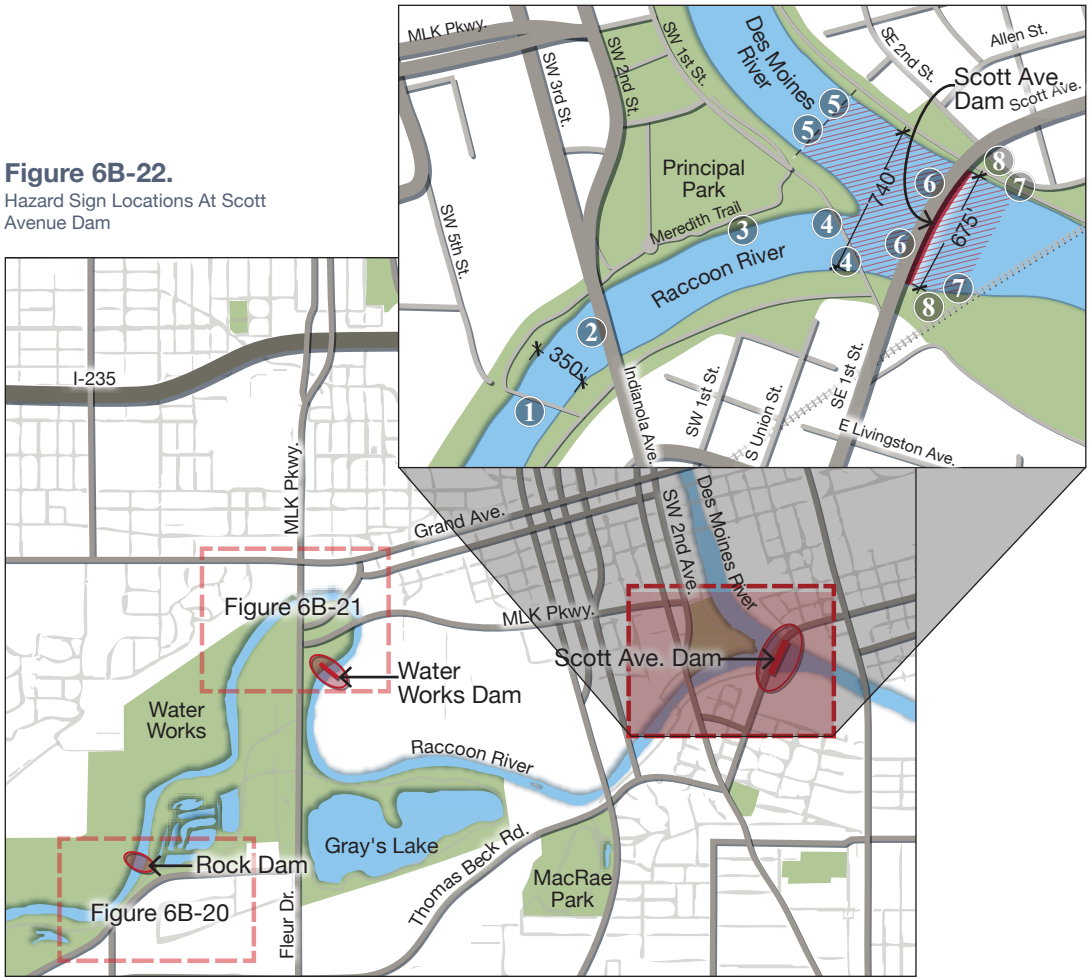


Table 6B-6.
Signs Used Near Scott Avenue Dam

Hazard Signs Near Scott Avenue Dam			
Sign Type and Location	Example	Sign Size	Text Height
1 EARLY WARNING SIGN Placed on trail bridge	Warning Dam Ahead 2,000 Feet	72"×44"	7"
2 MOVE LEFT SIGN Indianola Ave bridge	Warning Dam Ahead 1,700 Feet Move Left For Safe Exit	72"×68"	7"
3 LAST SAFE EXIT SIGN Placed slightly upstream of portage on bank at 45°	Danger Dam Ahead Exit Now!	82"×61"	7"
4 DROWNING ZONE UP/DOWNSTREAM LIMITS SIGN Raccoon River trail bridge	Dam	37"×37"	
5 DROWNING ZONE UP/DOWNSTREAM LIMITS SIGN Des Moines River on cables	Dam	46"×46"	
6 DROWNING ZONE UP/DOWNSTREAM LIMITS SIGN Scott Avenue Bridge Piers	Dam	75"×75"	
7 DROWNING ZONE UP/DOWNSTREAM LIMITS SIGN Des Moines River levee tops 70' downstream with sign face @ 45°	Dam	66"×66"	
8 PEDESTRIAN DROWNING ZONE WARNING SIGN Placed at all pedestrian approaches to dam	Danger! Recirculating Currents Below Dam Trap And Drown Victims	18"×24"	

NOTES EXPLAINING HOW STANDARD SIGNAGE SEQUENCE WAS MODIFIED AT THIS LOCATION

A number of factors led to customization of signs at this location.

- The last boat landing on the Raccoon River is within 300 feet of the dam, and the dam is in an urban area flanked by high-use recreational trails. In this case, the **Last Landing Above (On-Water)** sign was implemented, along with two **Early Warning** signs.
- Sign No. 2 contained two messages that would typically be on separate signs. City of Des Moines staff wanted a second early warning, and there was a need to advise paddlers to move right for the portage at the same location, so the signs were combined for clarity.

DES MOINES CASE STUDY:
Birdland Park Boat Launch On The Des Moines River

Figure 6B-23.
Hazard Sign Locations At
Birdland Park Boat Launch

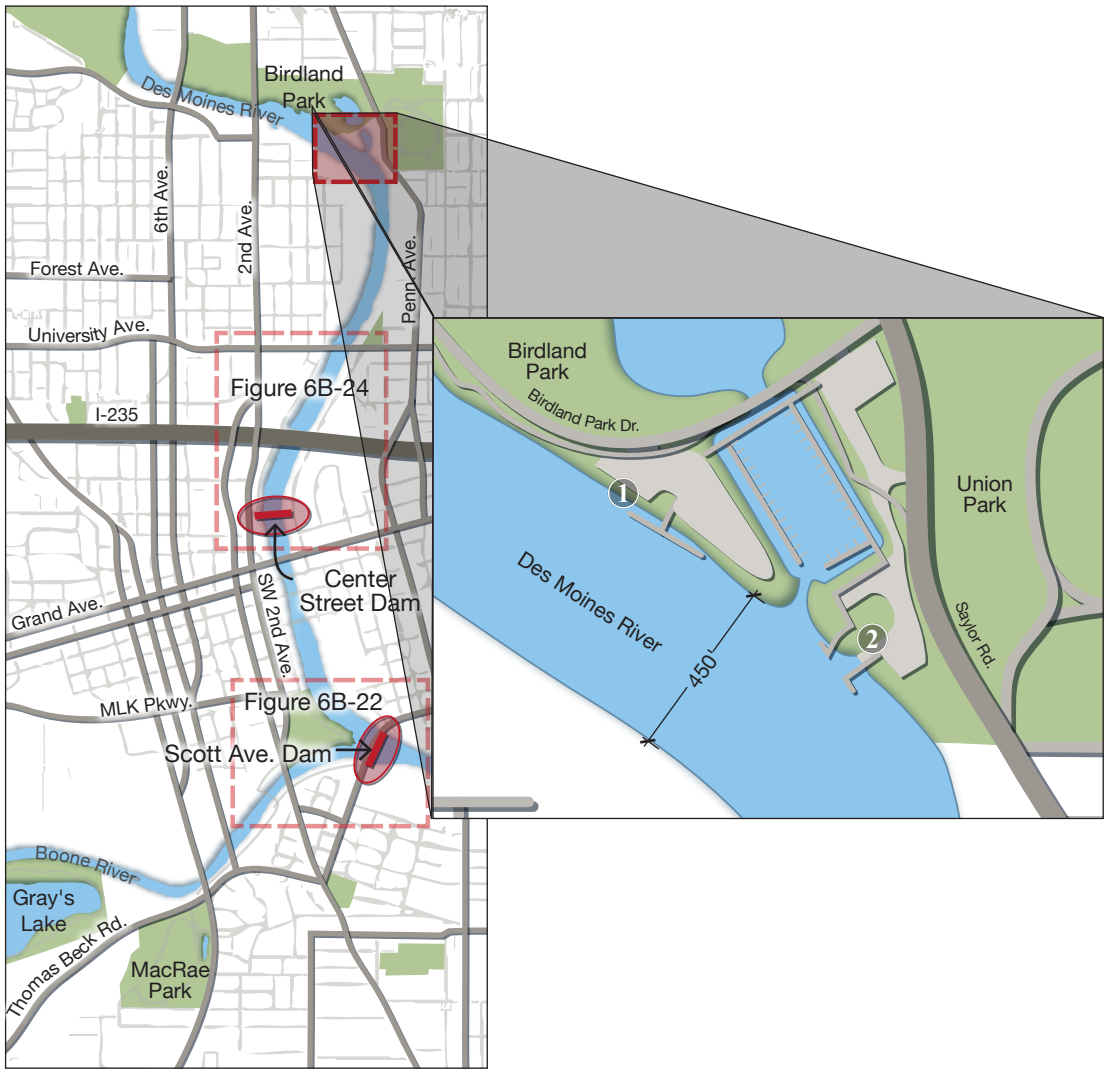


Table 6B-7.
Signs Used Near Birdland Park Boat Launch

Hazard Signs Near Birdland Park Boat Launch			
Sign Type and Location	Example	Sign Size	Text Height
1 LAST LANDING ABOVE (ON-WATER) SIGN Placed on bank upstream of boat launch	Warning Dam Ahead 1.4 Miles Last Landing Water Trail Ends Here	92"×108"	9"
2 LAST LANDING ABOVE (ON-LAND) SIGN Placed at top of boat launch	Warning Dam Ahead 1.4 Miles Last Boat Landing	18"×24"	2"

NOTES EXPLAINING HOW STANDARD SIGNAGE SEQUENCE WAS MODIFIED AT THIS LOCATION

The Birdland Marina is in an urban setting with high-speed boat traffic, so the 20/30 vision chart was used to develop appropriate letter heights for sign No.1.

DES MOINES CASE STUDY:
Des Moines River / Center Street Dam

Figure 6B-24.
Hazard Sign Locations At Center Street Dam

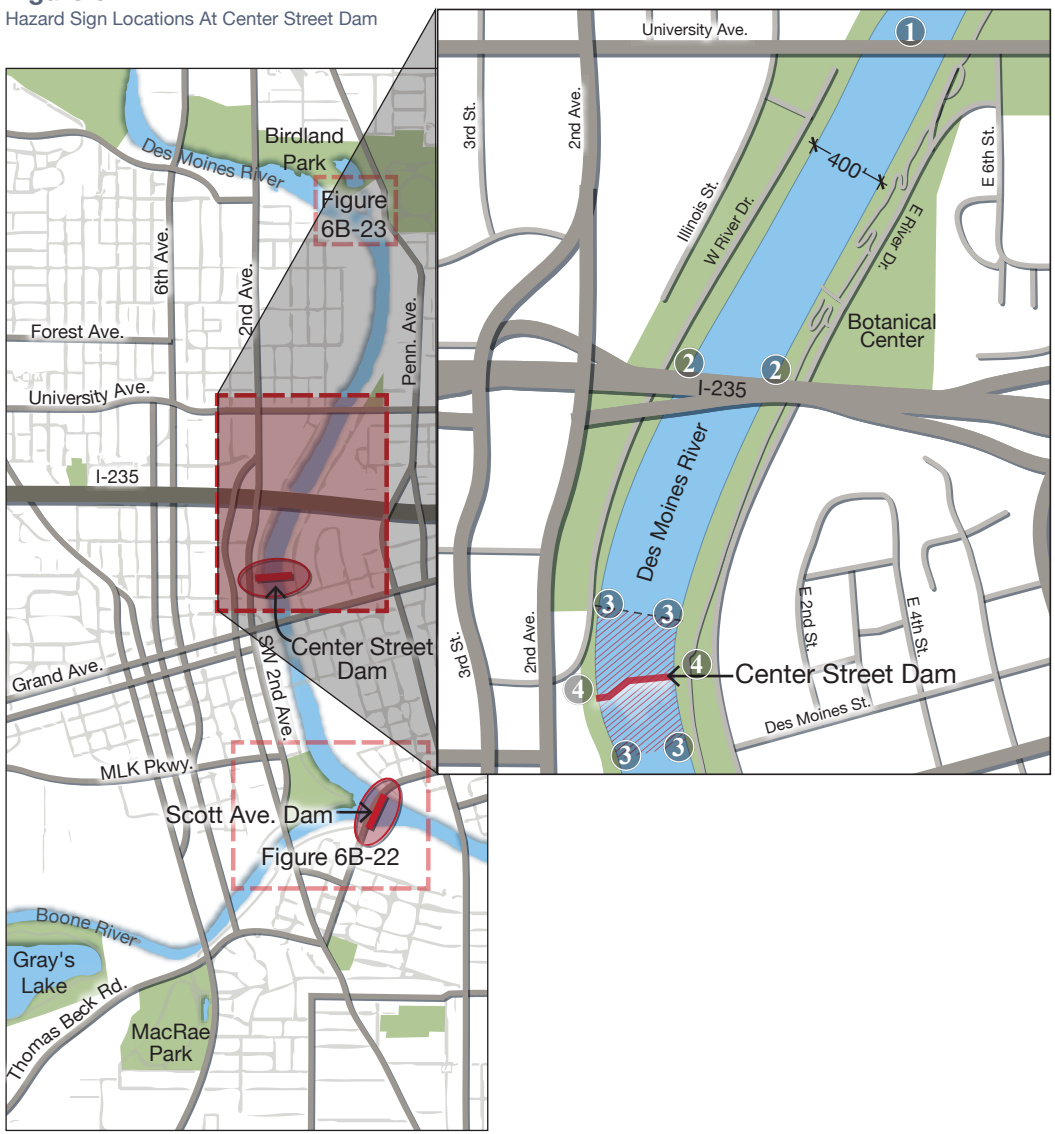


Table 6B-8.
Signs Used Near Center Street Dam

Hazard Signs Near Center Street Dam			
Sign Type and Location	Example	Sign Size	Text Height
1 EARLY WARNING SIGN Placed on University bridge	Warning Dam Ahead 3,500 Feet	66"×44"	7"
2 LAST SAFE EXIT Placed on East and West banks at 45° or on I-235 bridge	Danger Dam Ahead Exit Now! → Danger Dam Ahead ← Exit Now!	84"×60"	7"
3 DROWNING ZONE UP/DOWNSTREAM LIMITS SIGN Placed upstream on cables over river. Placed 200' downstream of dam on levee tops at 45°	Dam	46"×46"	
4 PEDESTRIAN DROWNING ZONE WARNING SIGN Placed at all pedestrian approaches to dam	Danger! Recirculating Currents Below Dam Trap And Drown Victims	18"×24"	

NOTES EXPLAINING HOW STANDARD SIGNAGE SEQUENCE WAS MODIFIED AT THIS LOCATION

An optional early warning sign (No. 1) was added on the University Avenue Bridge. Well downstream of the end of the water trail, additional emergency egress is delineated in an area where it would be possible for boaters to get out of the river channel if they were in distress.

WINNESHIEK COUNTY CASE STUDY: Upper Dam on the Upper Iowa River

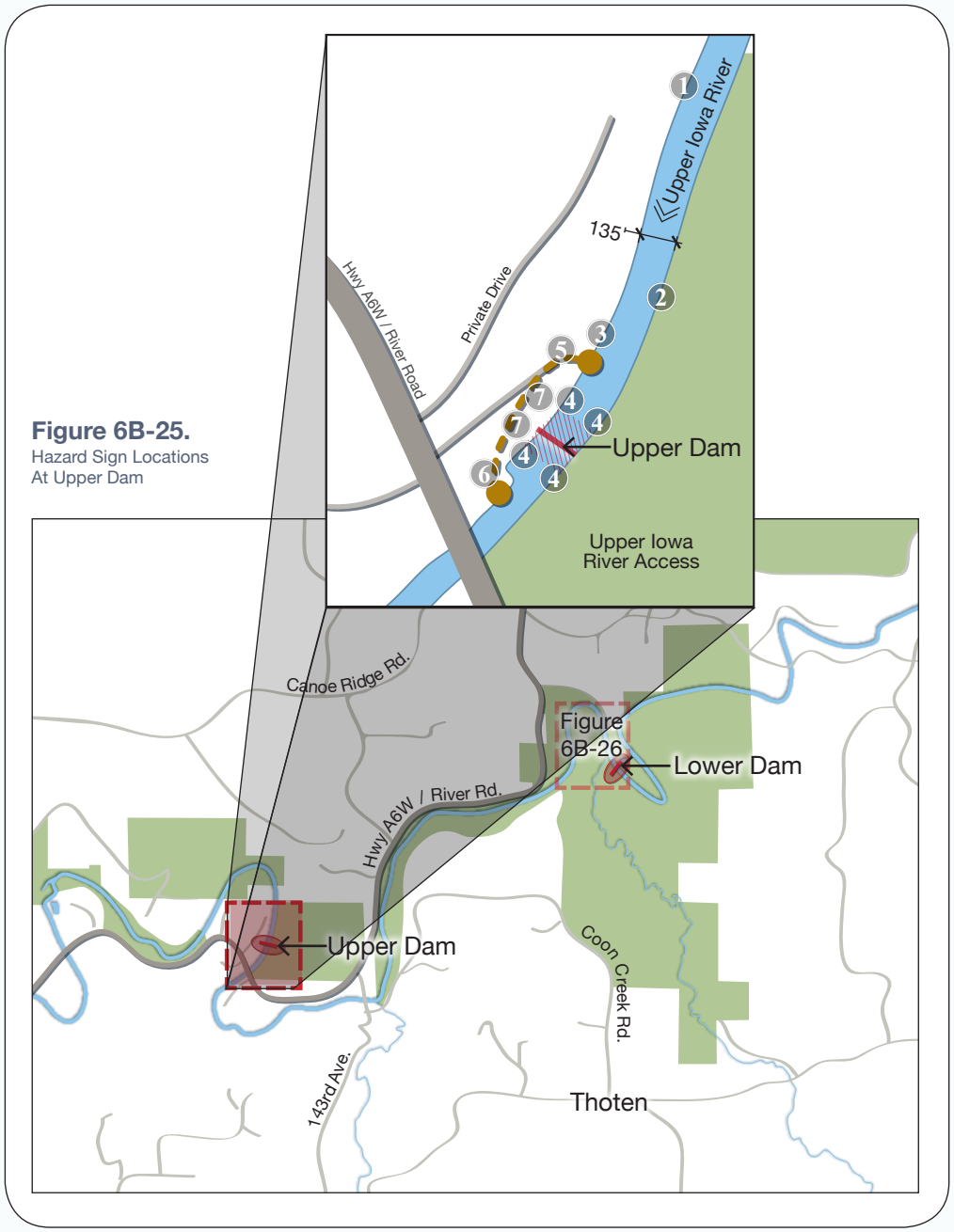


Figure 6B-25.
Hazard Sign Locations
At Upper Dam

The two dams shown here on the Upper Iowa River are classic examples of dams on a small river in a rural setting in which 20/20 vision signs are used. This dam is not visible on-water. As such, three upstream warning signs are required, rather than the two typical series of two signs.

The upper dam has boat ramps located downstream of the dam and within 300 feet upstream of the dam. Sign No. 3 in Table 6B-9 performs the function of two signs: **Last Landing Above (On-Water)** and **Last Safe Exit** sign. Combining the messages in this way is encouraged when signs would otherwise be placed at approximately the same location. The red color is used because the sign is near the drowning zone.

The launch located just below the upper dam is also the last launch before the lower dam, 4.7 miles downstream.

Table 6B-9.
Signs Used Near Upper Dam

Hazard Signs Near Upper Dam			
Sign Type and Location	Example	Sign Size	Text Height
1 EARLY WARNING SIGN Placed 1,500' upstream of dam on bank at 45°	Warning Dam Ahead 1,500 Feet	40"×25"	4"
2 MOVE RIGHT SIGN Placed 335' upstream of portage on bank at 45°	Warning Dam Ahead Move Right For Safe Exit	42"×33"	4"
3 LAST SAFE EXIT SIGN Placed slightly upstream of portage on bank at 45°	Danger Dam Ahead 260 Feet Last Boat Landing Exit Now! →	37"×47"	4"
4 DROWNING ZONE UP/DOWNSTREAM LIMITS SIGN Placed upstream and downstream of dam on banks at 45°	Dam	17"×17"	
5 LAST LANDING ABOVE (ON-LAND) SIGN Placed at the top of the upper boat launch facing inland	Warning Dam Ahead 260 Feet Last Boat Launch	18"×24"	2"
6 DROWNING ZONE UP/DOWNSTREAM LIMITS SIGN Placed at the top of the lower boat launch facing inland warning users of the Lower Dam	Warning Dam Ahead 4.7 Miles Portage Ahead On Left Bank	24"×24"	2"
7 PEDESTRIAN DROWNING ZONE WARNING SIGN Placed at all pedestrian approaches to dam	Danger! Recirculating Currents Below Dam Trap And Drown Victims	18"×24"	

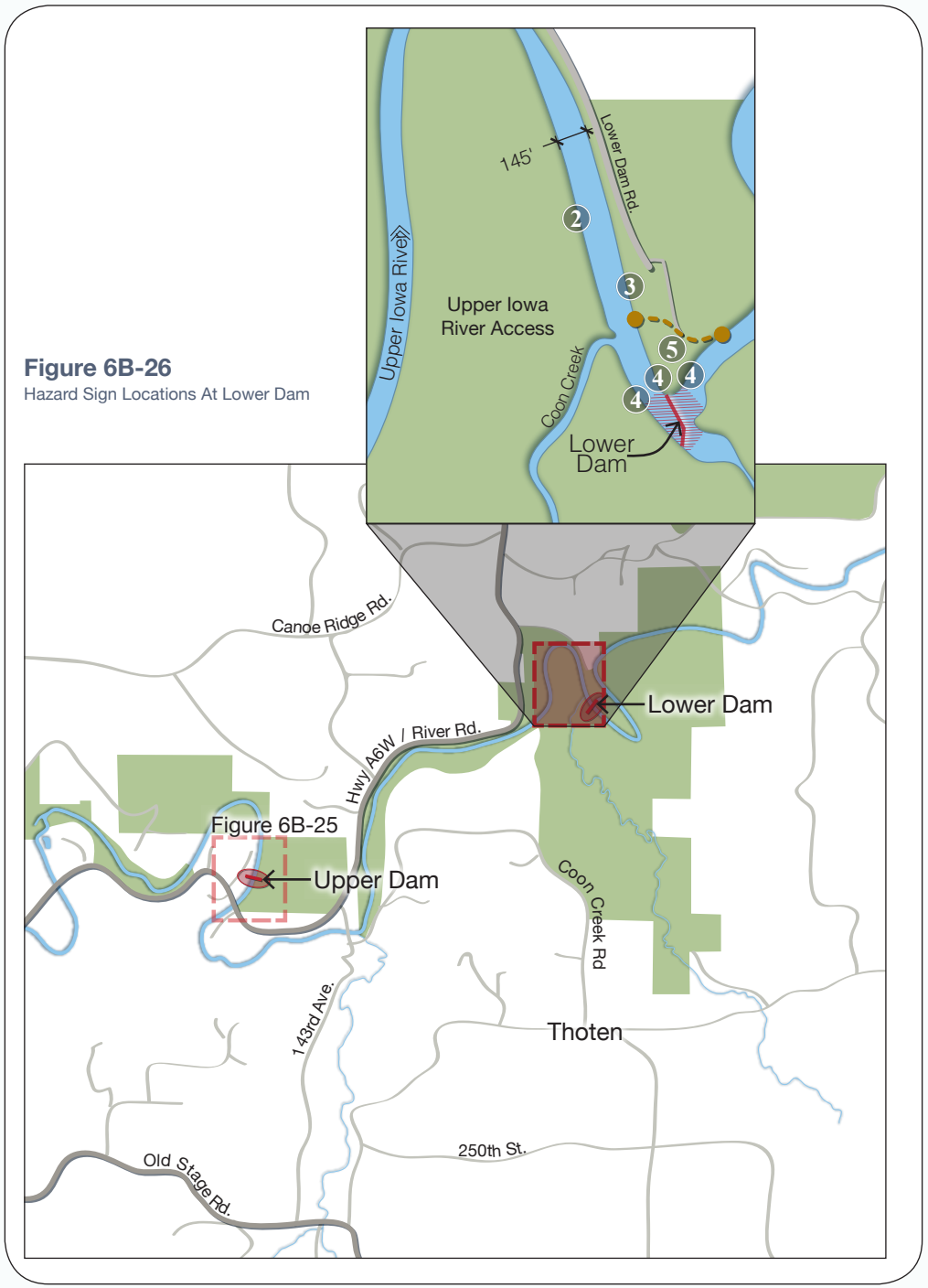


Figure 6B-26
Hazard Sign Locations At Lower Dam

WINNESHIEK COUNTY CASE STUDY: Lower Dam On The Upper Iowa River

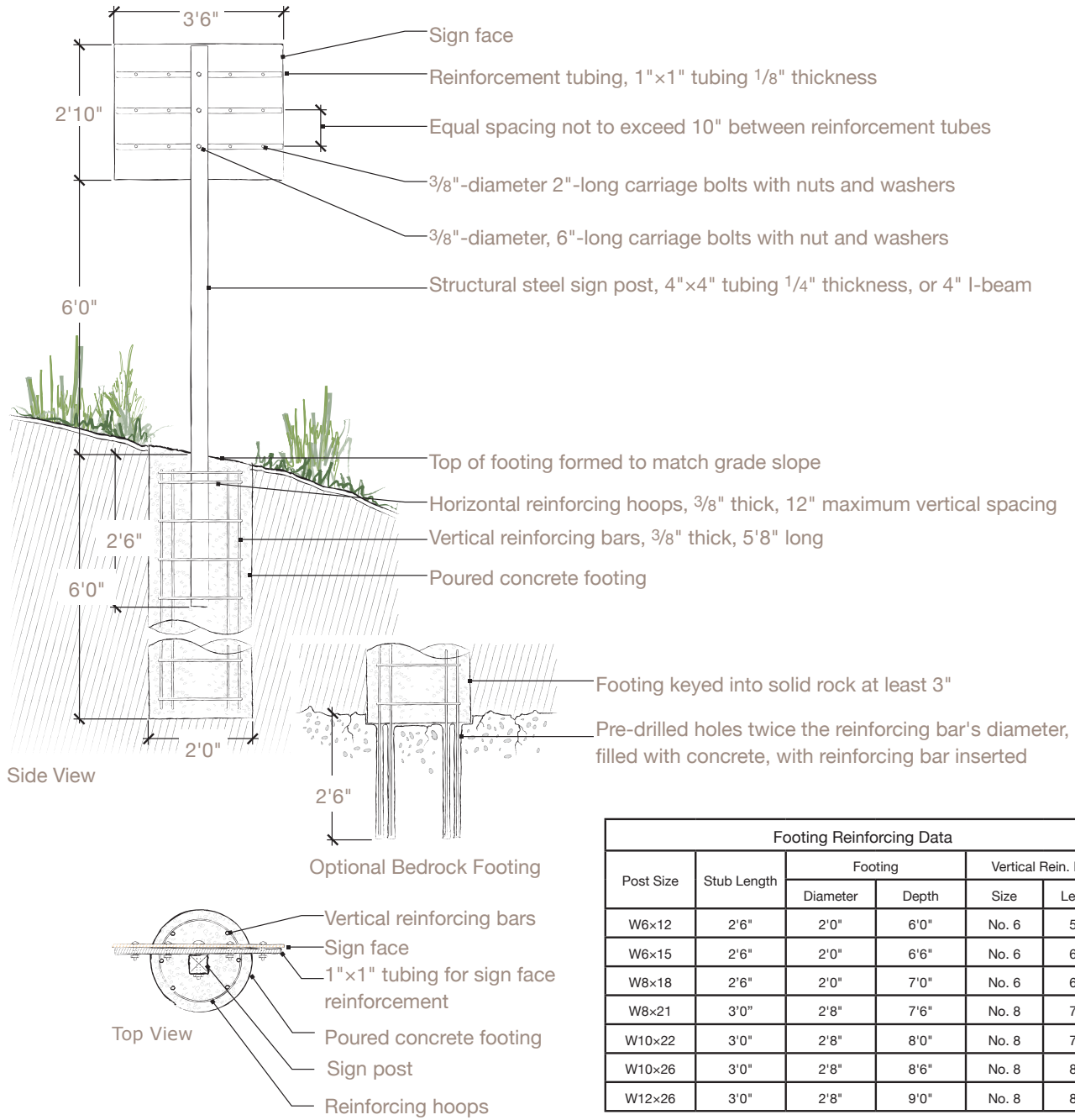
There is only one Drowning Zone Downstream sign located on the north bank downstream of the dam to mark the lower limits of the drowning zone. The existing site conditions on the south bank area below Lower Dam are both highly erosive and depositional during flood events. The lower limit Drowning Zone sign was not implemented on the south bank at this site because of this difficulty. The remote location of this site also makes it unlikely that power boats will approach the dam from downstream.

Table 6B-10.
Signs Used Near Lower Dam

Hazard Signs Near Lower Dam

	Sign Type and Location	Example	Sign Size	Text Height
1	EARLY WARNING SIGN Placed 2,100' upstream of dam on bank at 45°	Warning Dam Ahead 2,100 Feet	42"×26"	4"
2	MOVE LEFT SIGN Placed 435' upstream of portage on bank at 45°	Warning Dam Ahead Move Left For Portage	42"×34"	4"
3	LAST SAFE EXIT SIGN Placed slightly upstream of portage on bank at 45°	Danger Dam Ahead Last Safe Portage Here ← Exit Now!	40"×42"	4"
4	DROWNING ZONE UP/DOWNSTREAM LIMITS SIGN Placed upstream and downstream of dam on banks at 45°	Dam	17"×17"	
5	(2) PEDESTRIAN DROWNING ZONE WARNING SIGN Two signs placed inland north of the dam facing away from dam at pedestrian approaches facing inland	Warning Dam Ahead 260 Feet Last Boat Launch	18"×24"	

6C SIGNAGE INSTALLATION



Footing Reinforcing Data					
Post Size	Stub Length	Footing		Vertical Rein. Bar	
		Diameter	Depth	Size	Length
W6×12	2'6"	2'0"	6'0"	No. 6	5'8"
W6×15	2'6"	2'0"	6'6"	No. 6	6'2"
W8×18	2'6"	2'0"	7'0"	No. 6	6'8"
W8×21	3'0"	2'8"	7'6"	No. 8	7'2"
W10×22	3'0"	2'8"	8'0"	No. 8	7'8"
W10×26	3'0"	2'8"	8'6"	No. 8	8'2"
W12×26	3'0"	2'8"	9'0"	No. 8	8'8"

Figure 6C-1
Single or Double Steel Post Installation

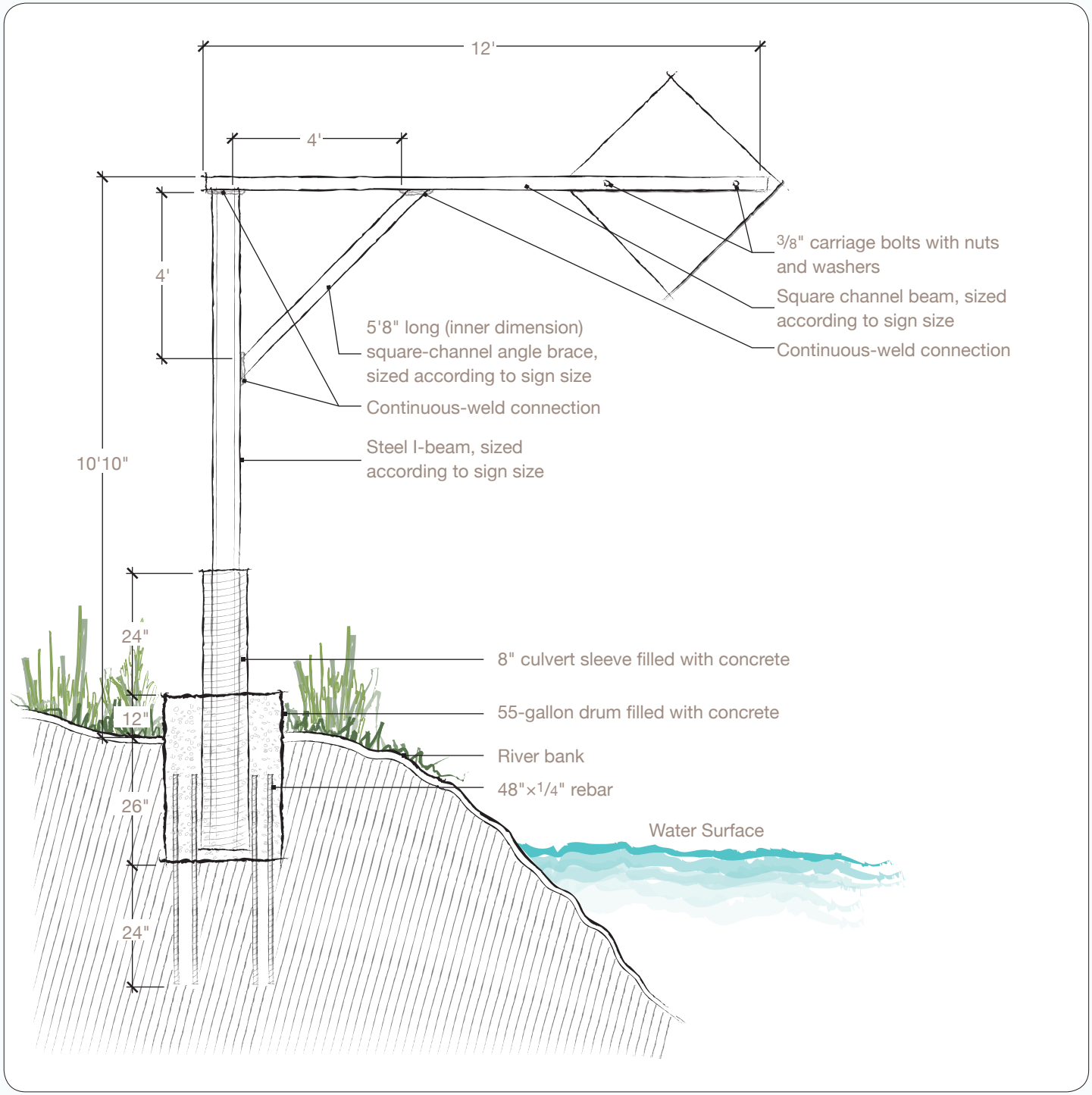


Figure 6C-2
Cantilevered Sign Installation

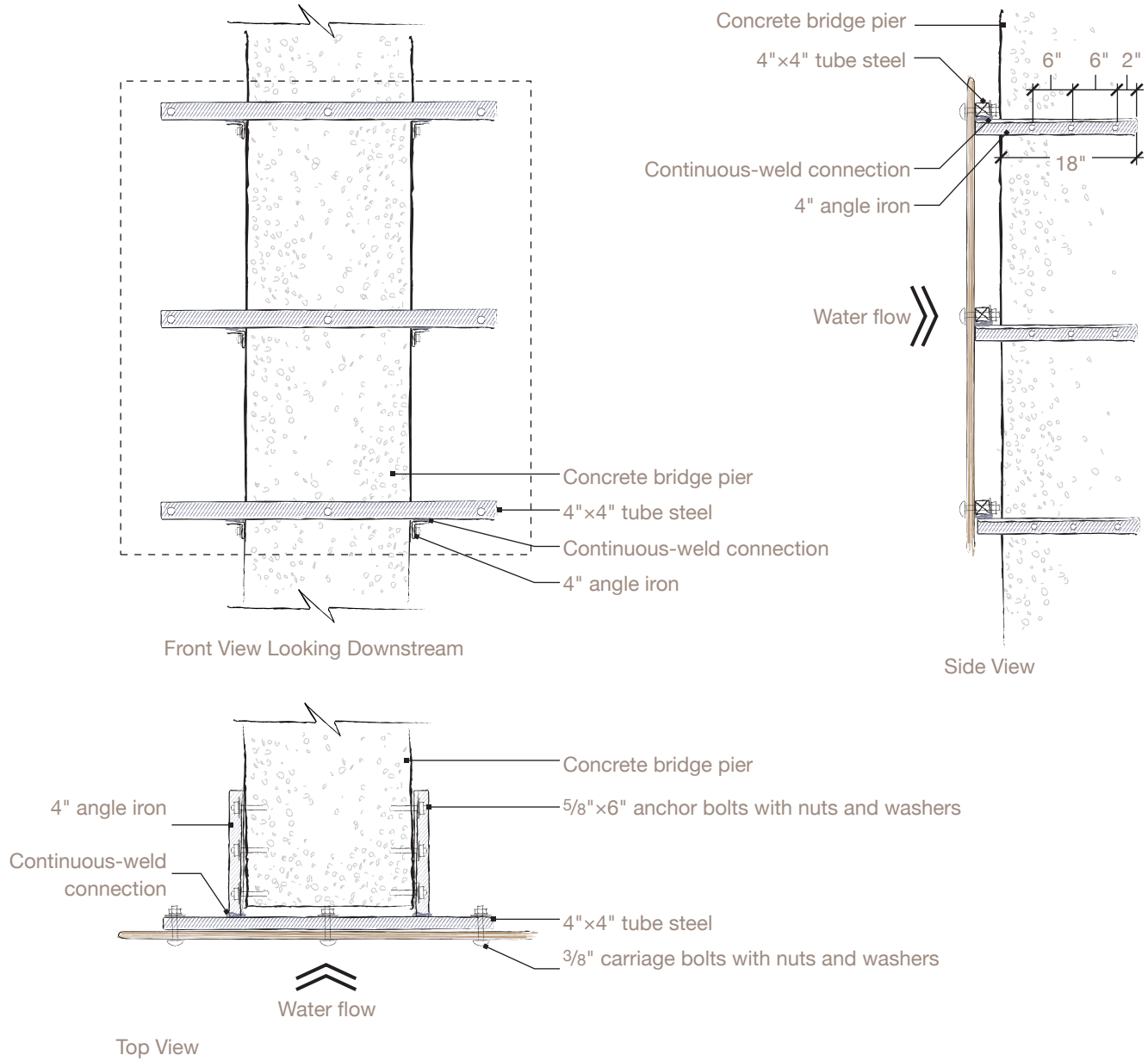


Figure 6C-3
Mounting Signs On Bridge Piers

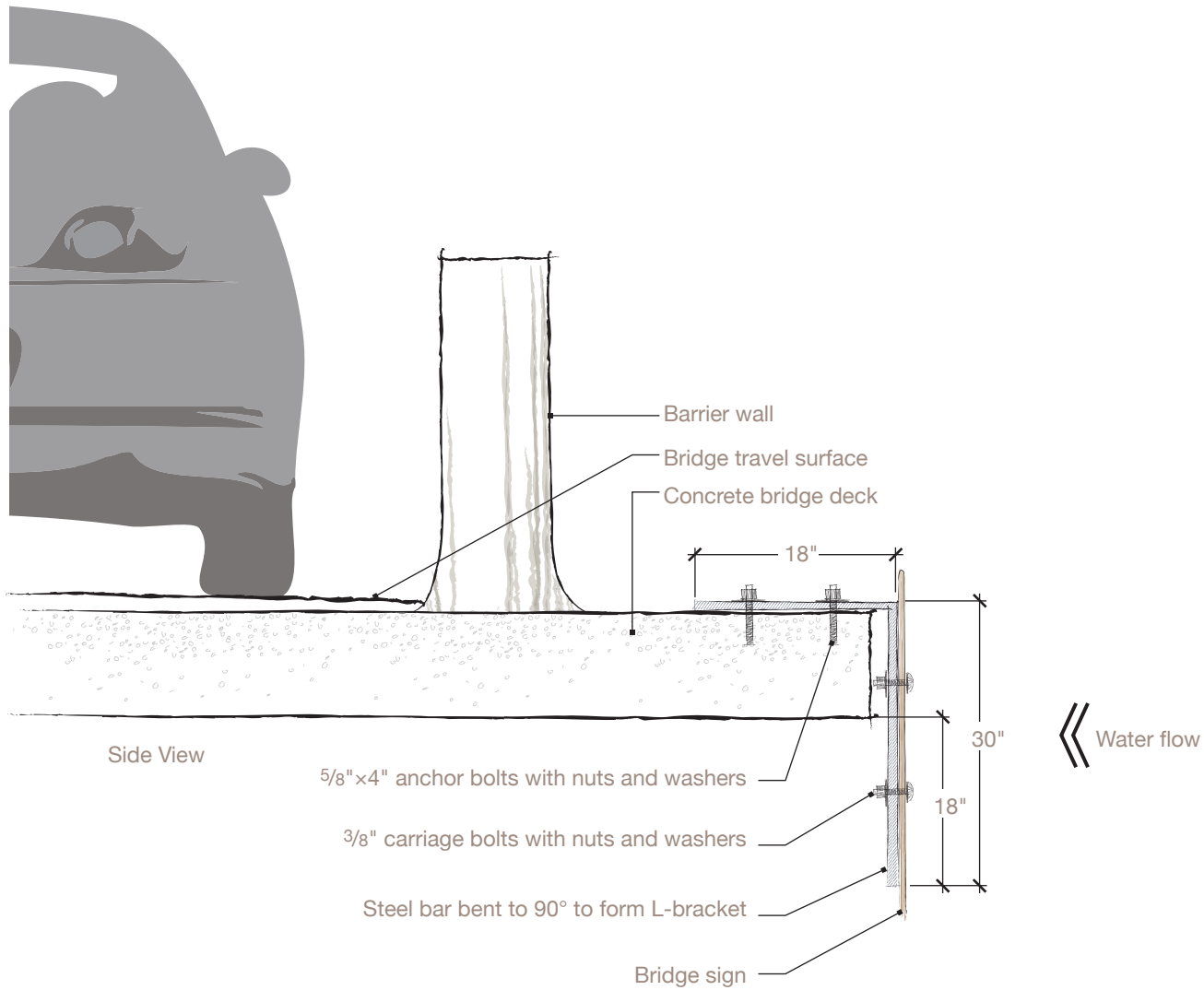


Figure 6C-4
Concrete Bridge Deck Sign Installation

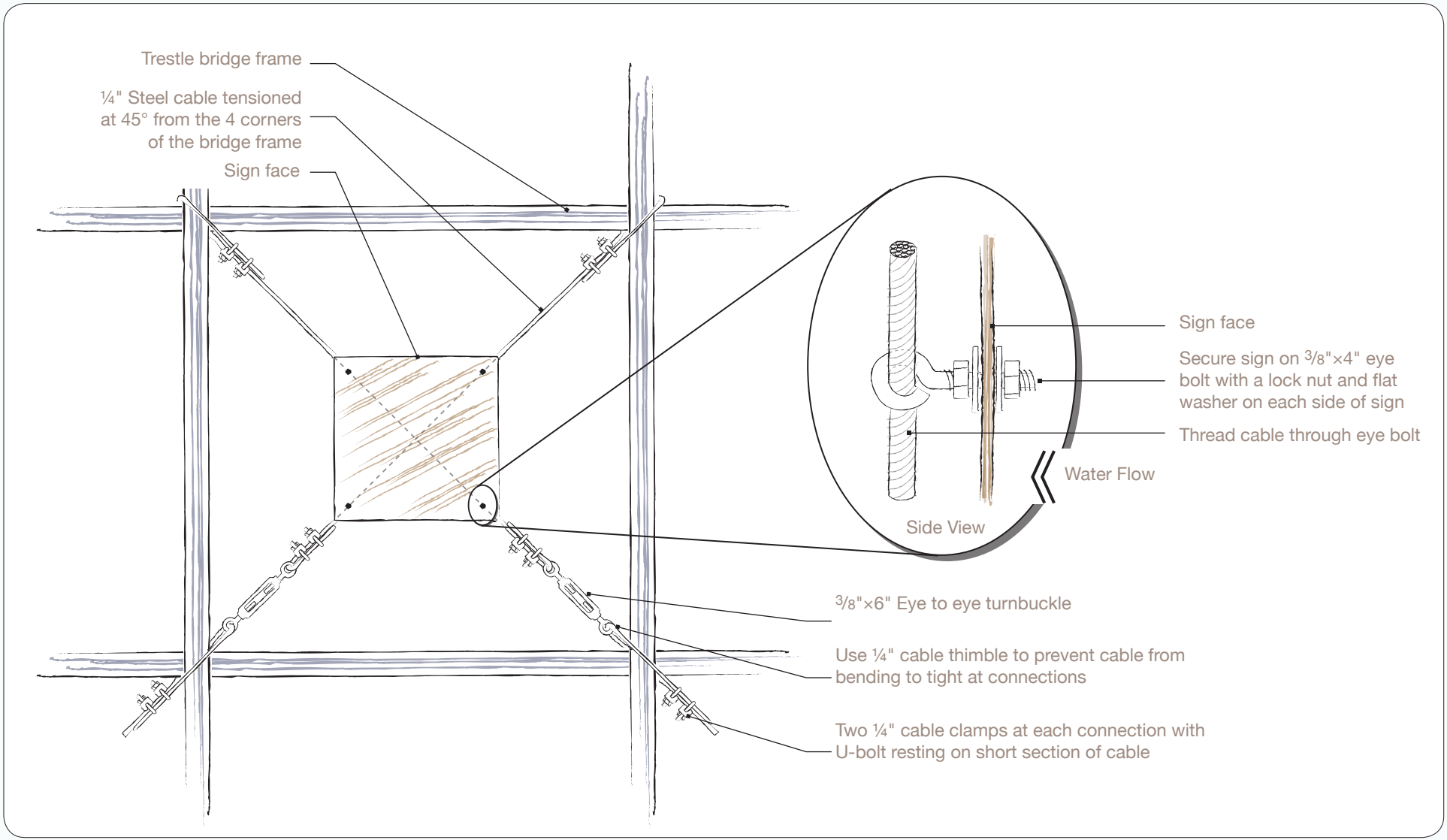


Figure 6C-5
Trestle Bridge Sign Installation

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