Saints Bot #4688
St. Anne High School Robotics Team
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WATER WE DO

Global warming is a real and current threat to our planet. This warming is altering the Earth's climate system and intense storms and floods are becoming more common. These heavier rains cause streams, rivers and lakes to rise and overflow, and melting glaciers are causing ocean levels to rise.

The FLOWERS DAM, built in 1943, is not only showing its age, but it also was not designed to hold the amount of water now flowing into Dean's Lake. The CITIZENS of COAST TOWN, who live downstream of the dam, are not only in danger if the dam were to break, but are also threatened by the high tides battering their coast line.

GAME OVERVIEW

In **WATER WE DO**, two ALLIANCES race to repair FLOWERS DAM and save the CITIZENS of COAST TOWN and themselves from the impending flash flood.

The game begins with a 15 second Autonomous (AUTO) Period, during which, rescuers attempt to score points using pre-programmed instructions to:

1. Place BRICKS to repair FLOWERS DAM
2. Transport CITIZENS to the SHELTER at the top of KAMEN HIGHLANDS, and
3. Move from the start position to cross the SHORELINE.

During the remaining 2 minutes and 15 seconds of the MATCH, rescuers take control of their ROBOTS in their attempt to completely repair the now crumbling dam and save as many people as they can before the dam breaks. ALLIANCES score points by:

1. Continuing to place BRICKS to plug and repair the BREACHES in the FLOWERS DAM
2. Transport as many CITIZENS as they can to the SHELTER
3. Get on the WOODIE BRIDGE
4. LEVEL the bridge

In the final 30 seconds of the MATCH, ALLIANCE members must cross WOODIE BRIDGE to get to higher ground to save their own lives. While crossing the bridge, the inevitable flash flood washes out part of the bridge and they must balance themselves on the bridge to avoid being washed away.

The ALLIANCE with the highest score at the end of the MATCH wins the game and the eternal gratitude of those who were saved.

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EXPECTED ROBOT ACTIONS

AUTONOMOUS PERIOD

Each ALLIANCE can pre-load up to two GAME PIECES prior to the start of the MATCH. ROBOTS begin the MATCH with their bumper making contact with the alliance wall. During AUTO, ROBOTS operate without any drive team control or input. ROBOTS attempt to reach the SHORELINE, plug BREACHES in the FLOWERS DAM and transport CITIZENS to the SHELTER.

TELEOP PERIOD

During the TELEOP period, DRIVERS remotely operate their ROBOTS, retrieving BRICKS from the BRICK YARD to plug BREACHES in the FLOWERS DAM, and rescuing CITIZENS from COAST TOWN and transporting them to the SHELTER. During the ENDGAME, ROBOTS cross WOODIE BRIDGE to get to higher ground and must LEVEL the damaged bridge to save themselves from being washed away by the flash flood.

FLOWERS DAM Scoring

ROBOTS gather BRICKS from the BRICK YARD and deliver them to the BREACHES located at various heights in the FLOWERS DAM. The BRICKS must be fully seated within the BREACH to score. ROBOTS may also insert a second BRICK into each BREACH to push out the opposing ALLIANCE's BRICKS as a form of defense. Filling the FLOWERS DAM with BRICKS and making it WATER TIGHT earns the ALLIANCE a Ranking Point.

SHELTER Scoring

ROBOTS transport up to two CITIZENS at a time from COAST TOWN to the SHELTER atop of KAMEN HIGHLANDS. Citizens must pass through the SHELTER DOOR in order to score.

WOODIE BRIDGE Scoring

During the ENDGAME, ALLIANCE members must cross WOODIE BRIDGE to save themselves. While crossing, the inevitable flash flood washes out part of the bridge and they must LEVEL the bridge to avoid being washed away. ROBOTS use the LIFELINE to help them LEVEL the bridge. Each ROBOT on the WOODIE BRIDGE scores for their ALLIANCE and being LEVEL earns a Ranking Point.

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DESCRIPTION OF NOTABLE FIELD ELEMENTS

FLOWERS DAM: A 36 in. high by 12 in. deep zig-zag shaped wall between each SHELTER with a total of sixty-four (64) BREACH openings, thirty-two (32) in each segment. Each BREACH is fitted with colour sensors to detect the presence of BRICKS and automatically tabulate scoring. Vision targets are located on two corners of each BREACH.

KAMEN HIGHLANDS: Two 42 in. wide by 120 in. long ramps that slope from carpet level up 12 in. to the SHELTER. At the top of the ramp is a 36 in. long level surface. Each ramp is located along the guardrail on opposite sides and ends of the FIELD. The inner edge of the ramp has a 4 in. high metal upstand to prevent ROBOTS from driving off.

SHELTER: A 42 in. wide by 36 in. high by 12 in. deep wall located at each end of the FLOWERS DAM. The SHELTER DOOR is a 9 in. wide by 7 in. high opening through the wall, centered on the KAMEN HIGHLANDS ramp, with the bottom of the SHELTER DOOR flush with the top of the ramp. The bottom of the SHELTER DOOR slopes downward towards COAST TOWN on the opposite side, creating an opening that is 9 in. wide by 10 in. high, allowing CITIZENS to easily slide out the other side. A sensor inside the opening automatically scores each passing CITIZEN.

WOODIE BRIDGE: A 42 in. wide by 108 in. long aluminum check plate platform mounted on a sub-frame assembly which allows it to pivot. The pivot point is 36 in. from one end of the platform, leaving 72 in. on the opposite side of the pivot. Lexan panels are positioned on each of the long sides of the bridge. An overhead structure supports the LIFELINE.

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HOW ELEMENT IS USED

CHAIN ELEMENT

The chain element in WATER WE DO is called the LIFELINE. The LIFELINE is suspended above the WOODIE BRIDGE and may be used by a ROBOT to grasp on to in attempt to LEVEL the bridge during the ENDGAME and earn a Ranking Point.

The LIFELINE is a chain element with a D-style pull handle at the end, suspended 62 inches above the carpet floor. There is only one LIFELINE, centered on the width of the WOODIE BRIDGE and located near the end of the bridge furthest from the pivot point. ROBOTS will have to extend themselves upward and attempt to grasp the handle or somehow hook onto it so that they can then pull down on it.

The length of chain above the pull handle would be approximately 20 inches long which would then attach to a steel cable running up to a pulley suspended by the structure above. The cable would then be routed laterally to another pulley located directly above the outside edge of the bridge, then down to connect to the side of the bridge.

By pulling down on the LIFELINE, ROBOTS would lift the low end of the bridge, bringing it up to LEVEL. They'll have to be careful though, because a ROBOT that is too light may end up just lifting themselves. The other ROBOTS on the bridge may still have to position themselves correctly, so their weight is just where it needs to be to raise the low end of the bridge to LEVEL. If ROBOTS lift too high or too quickly, the bridge may swing too far the other way.

Savvy ALLIANCE members will want to decide which ROBOT is best suited to grab on to the LIFELINE and LEVEL the bridge before the MATCH begins.

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WATER WE DO - Rules

Game Rules

1. ROBOTS may be pre-loaded with up to two GAME PIECES at the start of the MATCH.
2. ROBOTS may not have greater than momentary control of more than two GAME PIECES at a time, either directly or transitively through other objects.
3. ROBOTS may not intentionally eject GAME PIECES from the field.
4. ROBOTS cannot extend any mechanisms or other ROBOT components into the BREACHES or SHELTER DOOR. Only GAME PIECES can be inserted into or through these openings.
5. ROBOTS may only insert BRICKS into the BREACHES and may only pass CITIZENS through the SHELTER DOOR.
6. ROBOTS must be in direct contact with the top, level portion of the KAMEN HIGHLANDS in order to pass CITIZENS through the SHELTER DOOR.
7. ROBOTS may not launch any GAME PIECES over the FLOWERS DAM or SHELTER to the opposing ALLIANCE's side of the field.
8. ROBOTS may not intentionally place GAME PIECES wholly or partly beneath WOODIE BRIDGE.
9. ROBOTS may only remove BRICKS from the FLOWERS DAM using another BRICK.
10. No part of the ROBOT may be touching the carpet in order to earn the points towards crossing the WOODIE BRIDGE.
11. ROBOTS may only drive onto WOODIE BRIDGE once ENDGAME begins.
12. No part of the ROBOT may extend past the boundaries of the field or onto the opposing ALLIANCE's side of the field.

Robot Rules

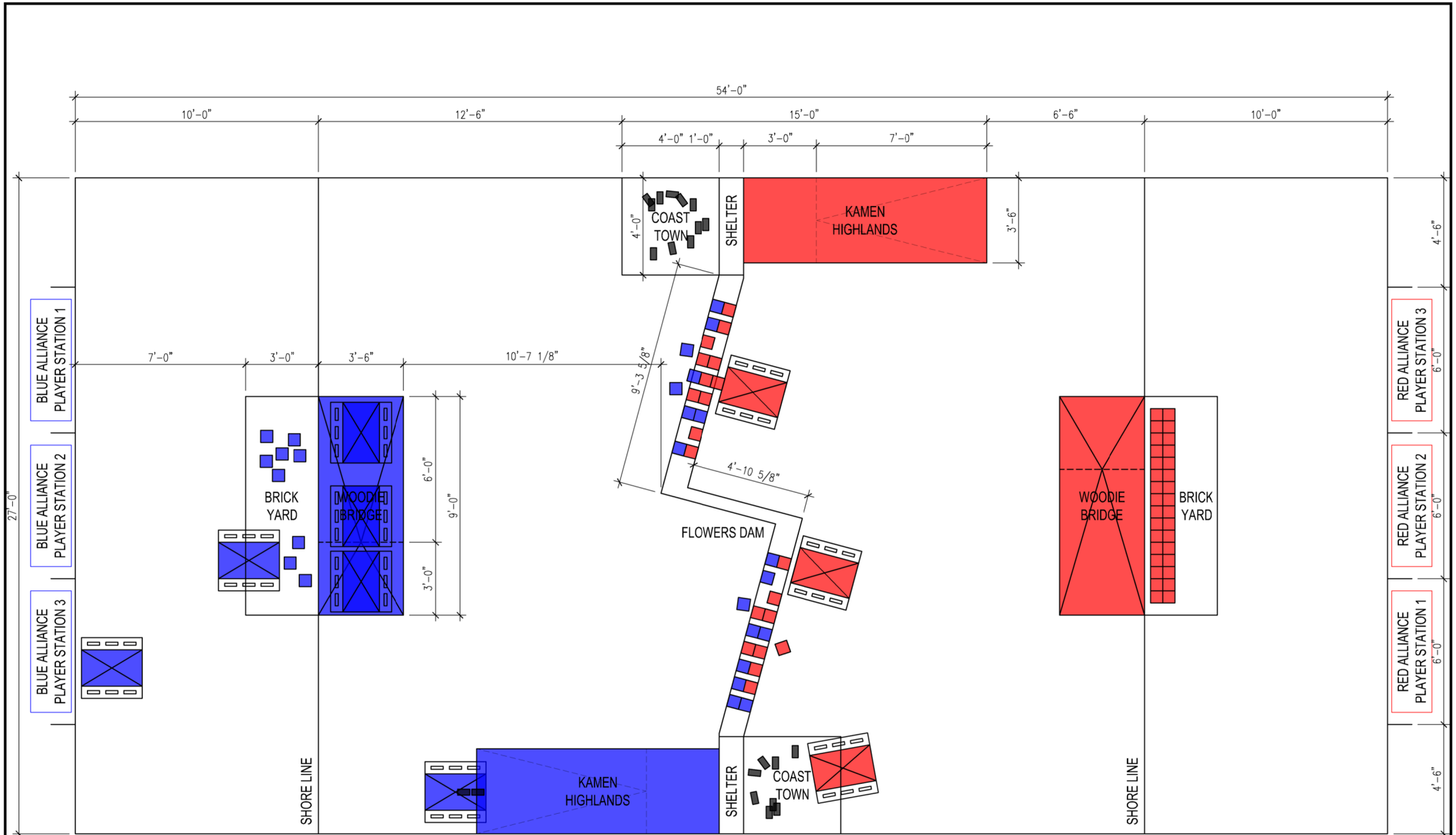
1. The ROBOT weight must not exceed 125 pounds. For the purposes of determining compliance with the weight limitations, the following items are excluded: a) ROBOT Bumpers; b) ROBOT Battery
2. A ROBOT starting configuration may not have a frame perimeter greater than 120 in. and may not be more than 45 in. tall.

SCORING

1. Point values for tasks in WATER WE DO are detailed in Table below.

Award	Awarded for...	AUTO	TELEOP	Qual.
SHORELINE	For each ROBOT that breaks the vertical plane of the SHORELINE with its bumper at any point during the AUTO period	5	-	-
BRICK IN DAM	Plug BREACH in dam (per BRICK)	4	2	-
	Dam WATER TIGHT (all BREACHES plugged)	-	-	1 Ranking Point
CITIZEN IN SHELTER	Scored through SHELTER DOOR	6	3	-
ENDGAME POINTS	Robot on WOODIE BRIDGE (per robot)	-	10	-
	Bridge LEVEL	-	25	-
	Bridge LEVEL with 3 robots on the WOODIE BRIDGE	-	-	1 Ranking Point
Tie	Completing a MATCH with the same number of points as your opponent	-	-	1 Ranking Point
Win	Completing a MATCH with more points than your opponent	-	-	2 Ranking Points

GLOSSARY	
Term	**Definition**
ALLIANCE	A cooperative of up to four (4) FIRST Robotics Competition teams.
AUTO	The first phase of each MATCH is called Autonomous (AUTO) and consists of the first fifteen (0:15) seconds of a MATCH in which ROBOTS operate without any DRIVE TEAM control or input.
BREACH	A 7 in. wide by 7 in. high opening through the FLOWERS DAM. Each BREACH has two (2) colour sensors to detect the presence of BRICKS.
BRICK	A GAME PIECE used to fill a BREACH in the FLOWERS DAM. Each BRICK is a 6 in. by 6 in. by 6 in. red or blue cube made of polypropylene. There are 64 BRICKS used by each ALLIANCE (128 total) during the MATCH.
BRICK PILE	The collection of BRICKS stacked in a linear formation, consisting of two (2) rows of sixteen (16) BRICKS stacked two (2) BRICKS high within the BRICK YARD.
BRICK YARD	A rectangular area 9 ft. wide by 3 ft. deep, along the SHORELINE bounded by the WOODIE BRIDGE and 2 in. white gaffers tape. The BRICK YARD includes the gaffers tape, but excludes the WOODIE BRIDGE.
CITIZEN	A GAME PIECE used to represent a human inhabitant of COAST TOWN. Each CITIZEN is a 6 in. wide by 6 in. high by 3 in. deep green cube made of polypropylene with a decal of a human form adhered to each side. There are 20 CITIZENS used by each ALLIANCE (40 total) during the MATCH.
COAST TOWN	A square area 4 ft. wide by 4 ft. deep, bounded by the guardrail, the SHELTER and 2 in. white gaffers tape.
ENDGAME	The final thirty (30) seconds of TELEOP.
FLOWERS DAM	A 36 in. high by 12 in. deep zig-zag shaped wall between each SHELTER with thirty-two (32) BREACH openings.
GAME PIECE	BRICK or CITIZEN.
KAMEN HIGHLANDS	Two 42 in. wide by 120 in. long ramps that slope from carpet level up 12 in. to the SHELTER. Each ramp is located along the guardrail on opposite sides and ends of the FIELD. The inner edge of the ramp has a 4 in. high upstand.
LEVEL	The WOODIE BRIDGE is considered LEVEL when five seconds after the arena timer displays zero (0) following TELEOP, the bridge is within 2 degrees of horizontal and no ROBOTS on, or in contact with, the WOODIE BRIDGE are in direct contact with the carpet.
LIFELINE	A chain complete with a pull handle which hangs above the WOODIE BRIDGE and is connected via steel cables and pulleys to the WOODIE BRIDGE.
MATCH	A two (2) minute and thirty (30) second period of time which ALLIANCES play WATER WE DO.
SHELTER	A 36 in. high by 12 in. deep wall located at each end of the FLOWERS DAM with the bottom of the SHELTER DOOR at the top of the KAMEN HIGHLANDS.
SHELTER DOOR	A 9 in. wide by 7 in. high opening in the SHELTER facing the KAMEN HIGHLANDS.
SHORELINE	A line of 2 in. , white gaffers tape that is the width of the FIELD and is 120 in. from each ALLIANCE WALL to the leading edge of the tape.
TELEOP	The second phase of each MATCH is called the Teleoperated Period (TELEOP) and consists of the remaining two minutes and fifteen seconds (2:15).
WATER TIGHT	The FLOWERS DAM is WATER TIGHT when, at the end of the MATCH, all BREACHES contain at least one BRICK of their corresponding ALLIANCE colour.
WOODIE BRIDGE	A 42 in. wide by 108 in. long platform with its pivot point at 36 in. from one end of the platform.



WATER WE DO FIELD LAYOUT PLAN

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

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WATER WE DO

FIELD LAYOUT PLAN

ISSUED FOR:	DATE:
FINAL SUBMISSION	MAR, 4, 2021

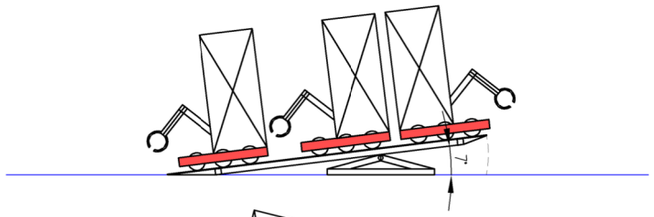
DWN. BY: 4688

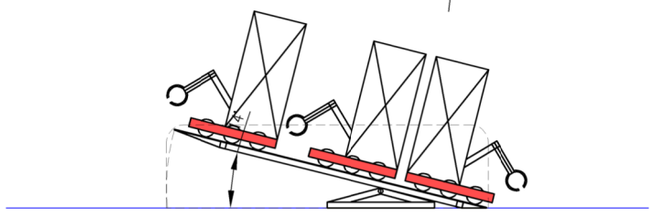
PRINT DATE: MAR. 3, 2021

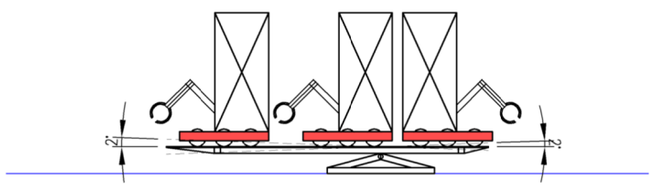
PROJECT NO.: GAME DESIGN

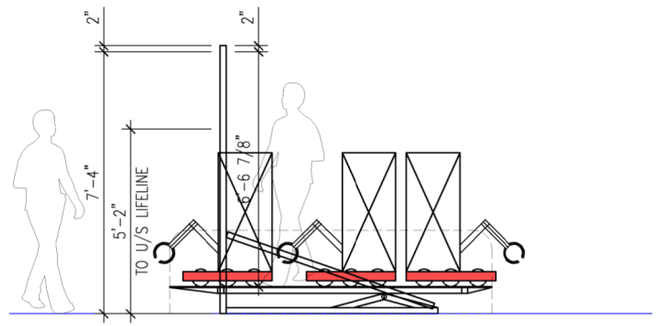
DWG. FILE: 4688 GAME FIELD

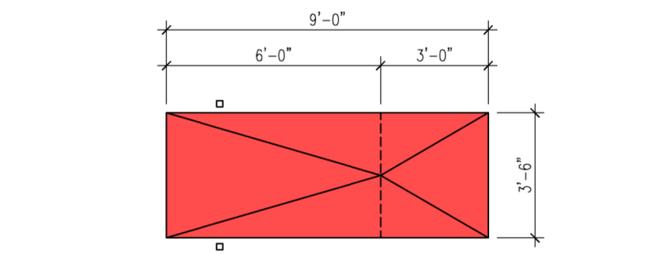
SHEET NO.: 1

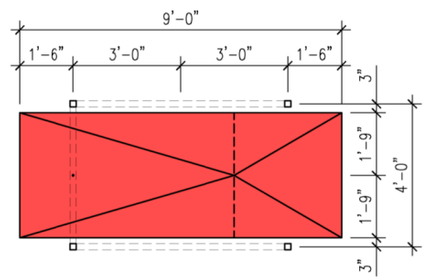


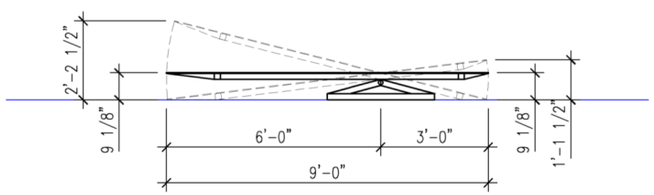


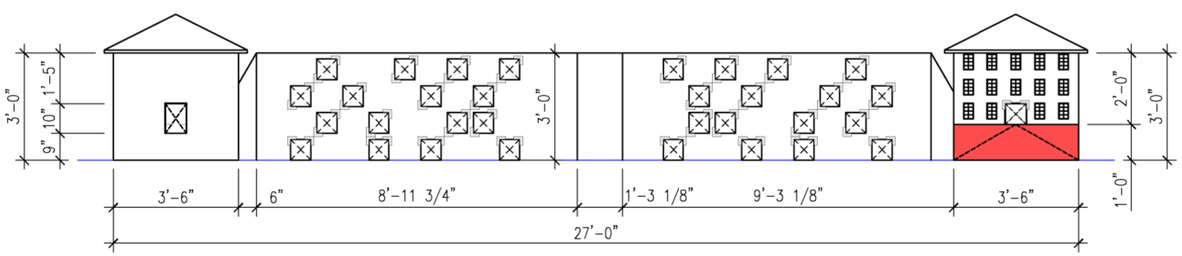






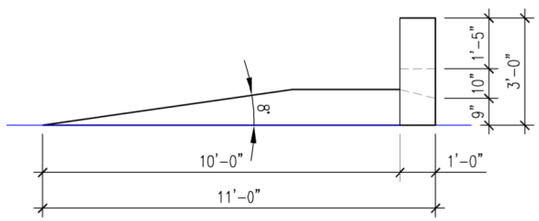






FLOWERS DAM ELEVATION

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



SECTION THRU KAMEN HIGHLANDS / SHELTER

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

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WATER WE DO

ELEVATIONS
SECTIONS AND DETAILS

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