EXHIBIT 1

Kootenai County
GeoViewer
203979
7881
7885
15053
Basemap Gallery
KC Lakes
KC_2023_Imagery
KC_2024_Imagery
KC_2025_Imagery
KC_2026_Imagery
KC_Color_Hillshac
E BURLEY CT
2395989.55700 2225727.47819 Feet

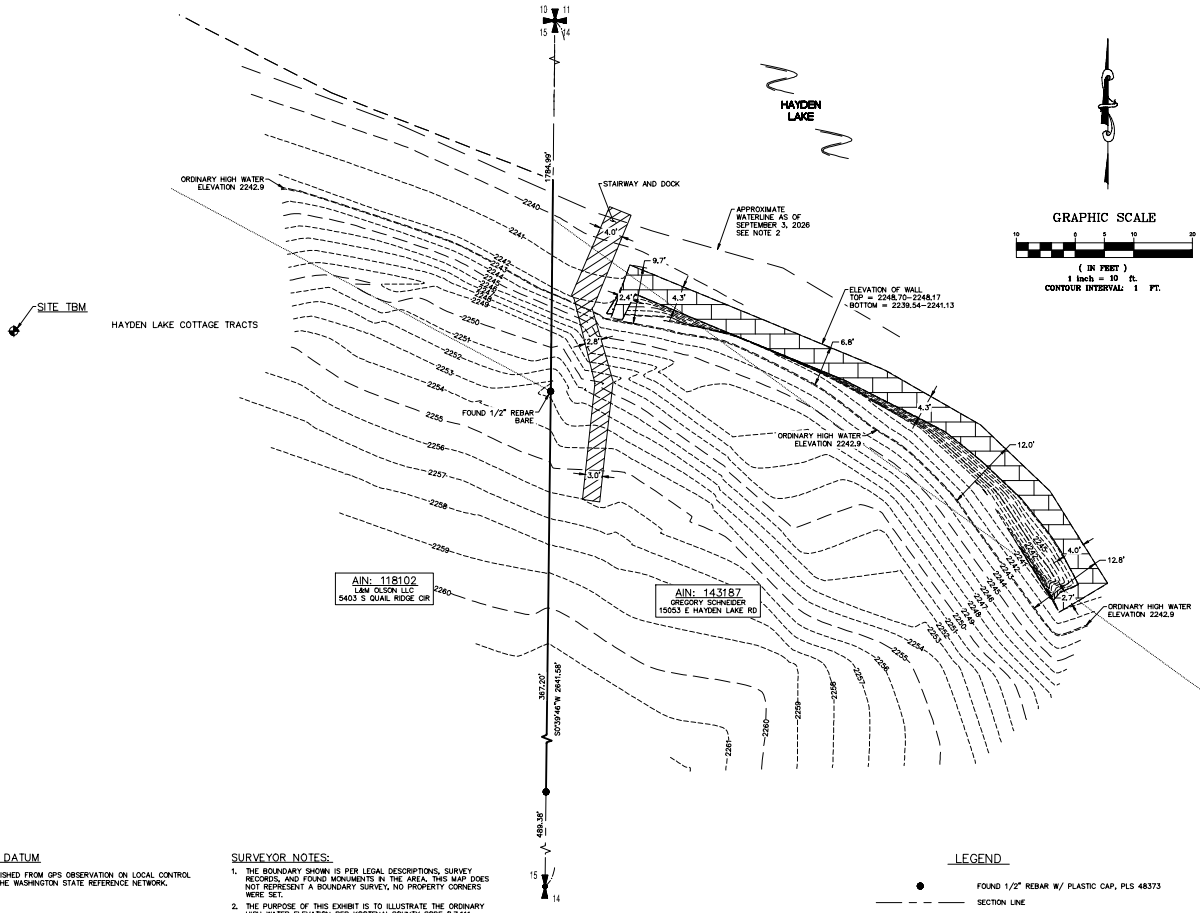
8/2022
1985
Google Earth
Imagery Date: 8/29/2022 47°46'04.96" N 116°40'47.14" W elev 0 ft eye alt 835 ft

5/2023
Image © 2026 Airbus
Google Earth
1985
Imagery Date: 5/19/2023 47°46'05.89" N 116°40'45.98" W elev 0 ft eye alt 835 ft

EXHIBIT 2

TOPOGRAPHIC EXHIBIT

A PORTION OF THE NORTHWEST QUARTER, SECTION 15,
AND THE NORTHEAST QUARTER, SECTION 14,
TOWNSHIP 51 NORTH, RANGE 3 EAST, B.M.,
KOOTENAI COUNTY, IDAHO



TITLE INFORMATION:

NO TITLE REPORT HAS BEEN PROVIDED TO OR REVIEWED BY THE SURVEYOR IN CONJUNCTION WITH THIS SURVEY. IT IS HIGHLY RECOMMENDED THAT A TITLE REPORT BE OBTAINED AND REVIEWED TO ENSURE ANY AND ALL MAPPABLE ENCUMBRANCES ARE IDENTIFIED.

SURVEYOR'S CERTIFICATE

I TROY A. CARLSON, PLS 15434, DO HEREBY CERTIFY THAT THIS TOPOGRAPHIC MAP WAS PREPARED BY ME OR UNDER MY DIRECTION IN ACCORDANCE WITH GENERAL SURVEY PRACTICES.

TROY A. CARLSON
PLS 15434

ELEVATION DATUM

NAVD88 ESTABLISHED FROM GPS OBSERVATION ON LOCAL CONTROL POINTS USING THE WASHINGTON STATE REFERENCE NETWORK.

SITE TBM

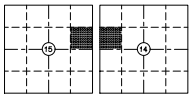
1/2" REBAR W/ PLASTIC CAP, MARKED "STORHAUG CONTROL" 200' WEST OF THE NORTHEAST PROPERTY CORNER.
ELEVATION: 2265.81

SURVEYOR NOTES:

1. THE BOUNDARY SHOWN IS PER LEGAL DESCRIPTIONS, SURVEY RECORDS, AND FOUND MONUMENTS IN THE AREA. THIS MAP DOES NOT REPRESENT A BOUNDARY SURVEY, NO PROPERTY CORNERS WERE SET.
2. THE PURPOSE OF THIS EXHIBIT IS TO ILLUSTRATE THE ORDINARY HIGH WATER ELEVATION PER KOOTENAI COUNTY CODE 8.7.111. DOCK, RETAINING WALL AND OTHER FEATURES NEAR THE NORTH PROPERTY CORNERS OF SUBJECT PARCEL.
3. PROPERTY LINES EXTEND TO THE ORDINARY HIGH WATER LINE.
4. THIS DRAWING DOES NOT ATTEMPT TO SHOW ALL EASEMENT OF RECORD, PRESCRIPTIVE EASEMENTS, OR PHYSICAL FEATURES OF THE PROPERTY.

LEGEND

- FOUND 1/2" REBAR W/ PLASTIC CAP, PLS 48373
- SECTION LINE
- SUBJECT BOUNDARY
- EXISTING PROPERTY LINE
- SURVEY TIE LINE
- 2245 MAJOR CONTOUR
- 2246 MINOR CONTOUR
- ORDINARY HIGH WATER LINE (2242.9')
- RETAINING WALL
- STAIRWAY



SEC.15, T.51N, R.3E., W.M. SEC.14, T.51N, R.3E., B.M.

No.	DESC. / DATE	BY
5		
4		
3		
2		
1		

storhaug
civil engineering | planning
landscape architecture | surveying
510 east third avenue | spokane, wa | 99202
509.242.1000 | www.storhauginc.com

SHEET TITLE: TOPOGRAPHIC EXHIBIT

PROJECT TITLE: 7885 E BURLEY CT/15053 E HAYDEN LAKE RD
HAYDEN, IDAHO

SEAL

DATE	09/14/2026
DRAWN	LEE
CHECKED	TAC
PROJECT NUMBER	26-309
DRAWING NO.	1 OF 1
	TOPO

26-309 BM.dwg 24x36 TOPO

EXHIBIT 3

High water mark on old wall

7/17/22 · 639 of 676

EXHIBIT 4

Hayden Lake
11/26/23, 12:09 PM · 189 of 676
Edit
A Office - Europe

EXHIBIT 5

EXHIBIT 6

JM Engineering
2706 N. Blue Raven Lane
Spokane, WA 99224
Phone (509) 953-9771

INVOICE

INVOICE #1
DATE: OCTOBER 24, 2023

TO:
Greg Schneider
14953 E Hayden Lake Drive
Hayden, ID 83835

FOR:
Schneider Residences
Retaining Wall Design
23-1073

DESCRIPTION	AMOUNT
Retaining Wall Design	$1,200.00
Site Disturbance Plan	$1,500.00
Prepare Application Paperwork	$300.00
Kootenai County Application Fee	$125.00
TOTAL	$2125.00

Payment is due within 15 days.
If you have any questions concerning this invoice, contact John Mckervey, 509-953-9771

Thank you for your business!

EXHIBIT 7

Idaho Department of Lands
3258 W Industrial Loop
Coeur d'Alene ID 83815

ENCROACHMENT NO. ~~L95S5006B~~ NP220096
APPLICANT ~~RTH River~~ Schneider

STATE OF IDAHO
DEPARTMENT OF LANDS
ATTACHMENT FOR ENCROACHMENT

RIPRAP REQUIREMENTS

General requirements are as follows:

1) Riprap used to stabilize shorelines will consist of rock that is appropriately sized to resist movement from anticipated wave heights or tractive forces of the water flow. The rock shall be sound, dense, durable, and angular rock resistant to weathering and free of fines. The riprap shall overlie a distinct filter layer which consists of sand, gravel, or nonwoven geotextile fabric. The riprap and filter layer shall be keyed into the bed below the ordinary or artificial high-water mark, as applicable. If the applicant wishes to install riprap with different standards, they must submit a design that is signed and stamped for construction purposes by a professional engineer registered in the state of Idaho.
2) Riprap used to protect the base of a seawall, or other vertical walls may not need to be keyed into the bed and may not require a filter layer, at the department's discretion.

Please check one and initial:

☐ I have reviewed the application, including the scope and location of the proposed encroachment as depicted. **I consent** to the application and do not wish to participate in a public hearing. _____ (initial)

☒ I have reviewed the application, including the scope and location of the proposed encroachment as depicted. **I object to the application and request a Public Hearing** in which I will be named as an objecting party. I have attached a summary of my objection to this form on a separate page **and a $75 publication fee**. I UNDERSTAND THAT I AM REQUIRED TO SUBMIT MY CONTACT INFORMATION (NAME, PHONE NUMBER, EMAIL ADDRESS) IN ORDER TO SET A HEARING DATE. _____(initial)

***IF YOU HAVE ANY QUESTIONS, PLEASE CONTACT AMIDY FUSON AFUSON@IDL.IDAHO.GOV AS SOON AS POSSIBLE.**

LANCE OLSON 13SEP26
Date

Name

5403 S. QUAIL RIDGE CIRCLE, SPOKANE, WA 99223
Address City State Zip

(509) 710 6693 lance.ols@msn.com
Phone Number Email Address

Phone Number

L&M Olson LLC
5403 S Quail Ridge Circle
Spokane, WA 99223

September 10, 2026

Mica Supervisory Area
3258 W Industrial Loop
Coeur d'Alene, ID 83815

To Whom it Concerns:

This is a letter in response to the proposition for our neighboring property off of Burley Ct., Hayden Lake Idaho regarding the retaining wall that was subsequently built last year. We have several concerns regarding this. The first was that there was no permit granted and/or applied for prior to constructing the current wall that is there and this is therefore not agreeable as a neighboring property understanding this was and an illegitimate structure. We are in agreement with our neighboring colleagues who also had no insight into this construction. We are both in agreement this is very frustrating because it has several problematic issues with regard to current code that were not addressed prior to its original construction.

Our primary concern is that the current retaining wall is below the water line which has been documented by multiple pictures as well as a recent plot survey however the final results have not been completed but they agree this violated the watermark; this was done last week. We have well-documented evidence that this is below the high water line which is not within the code of Kootenai County.

Our second major concern is the proximity to our property line. Originally when they built this retaining wall it forced their access to the dock off of our property which has been mitigated but I am uncertain if this is still within legal limits as to building code with her current stair limits.

Our third concern is the impact this will have on water flow in our local bay. We discussed this with several of the other neighboring owners in the area and this has created increased silk deposition secondary to the fact again it is below the water line creating a larger swamp in the back corner of ARB a which does have significant impact on several different owners docs water depths and access to the lake.

We do object to this proposal understanding that the initial wall was not ever licensed and/or proposed and was built simply without regards to any recent or current water codes in our county. Second concern is that his proposal now is to change but not demolish and recertify the wall and what would be ultimately in accordance with the code but still would not address either of the issues outlined above understanding this is currently below the water line and secondly it will impact the water flow to our bay.

For the reasons stated above, **we object to Encroachment Application NP220096 and request a public hearing**.

We believe there are substantial unresolved questions concerning the existing wall, its location relative to the ordinary high water mark, the impacts of the proposed work on adjacent property and riparian rights, and the potential effects on water flow, sediment deposition, water quality, and access to neighboring docks.

We respectfully request that the Department:

1. Verify the ordinary high water mark and proposed wall elevations using independent survey information;
2. Review the location of the existing wall and document the portion that was constructed below/beyond the OHWM;
3. Determine whether all required permits and approvals were obtained before the original wall was constructed;
4. Verify the proposed wall and associated stairs/landings against the actual property and riparian boundaries;
5. Evaluate the potential effects of the proposed wall on water circulation, sediment deposition, water quality, aquatic habitat, and adjacent properties;
6. Consider whether the proposed project represents the minimum necessary work to address the applicant's stated erosion and structural concerns; and
7. Require appropriate mitigation or modification of the proposal if the evidence demonstrates adverse impacts to neighboring property or lake values.

We appreciate the Department's consideration of our concerns and respectfully request that this objection and the accompanying documentation be made part of the official record for Application NP220096.

Sincerely,

L&M Olson LLC
5403 S. Quail Ridge Circle
Spokane, WA 99223

EXHIBIT 8

Doug McInnis

15050 E Hayden Lake Road
208-659-0128
dpmcinnis@yahoo.com

August 22, 2026

Idaho Department of Lands
Attn: Mike Ahmer

Re: Schneider Seawall Application NP220096

This document is submitted in support of my objection to the proposed Gregory Schneider seawall, application number NP220096. Though I am not a lawyer, I have perused the courtesy notification received from Mr. Ahmer and have reviewed the standards for commercial, community, and non-navigational encroachments found in the link enclosed in Mr. Ahmers letter.

To begin with, the application as written has a number of factual inaccuracies. On page one it states that the proposed project will replace an existing poured in place concrete RetainingWall. It states that the existing wall is failing and will end up falling into the lake, if not addressed. It states that in addition, the shoreline to the south east end of the concrete wall is eroding and rocks and debris are falling into the lake. Only on page 3 of the application does it briefly state that the existing wall has already been removed in its entirety, and the wall in question was constructed well below the ordinary high watermark in the absence of permitting, inspection, or proper Engineering.

I believe that a second objection will be filed by the other neighbor on the west side of the project. When asked if the proposed encroachment beside rip rap be located closer than 10 feet to the riparian/littoral right lines established with the neighbors, the application says no. The existing illegal wall built below the ordinary high watermark I believe will be shown to be well within 10 feet of the littoral right lines at the Schneider -Olson property Boundary.

Page 2/4 section 16 states that the proposed wall will be located in front of the existing failing concrete RetainingWall, which I have already stated has already been removed. It goes on to state that the existing concrete wall will remain, which is obviously not

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SEP 11 2026
IDAHO DEPT. OF LANDS
MICA SUPERVISORY AREA OFFICE

true. I believe that historical photographic evidence will show that the original concrete RetainingWall was built substantially above the ordinary high watermark. The illegal wall was built approximately 10 feet lateral and 2 feet below the ordinary high watermark. I have photographic evidence to prove this.

Though I believe that Mr. Schneider did have an original engineered plan for the wall that he illegally built, he built it by himself without necessarily following that plan. Because it was built illegally, and without a permit, there was never any silt fencing or erosion control measures. There was never any survey to establish the ordinary high watermark. There was never any inspection from the county. To my knowledge, there was never any ongoing input from the engineer after the illegal wall was initiated.

I am the adjoining neighbor to the southeast of the proposed project and it is not true that the shoreline adjacent to the wall was eroding prior to Schneider's destruction of the wall. It is true that the concrete wall was failing. Had Mr. Schneider applied for a permit and followed the regulations established by the state of Idaho we wouldn't be where we are today.

The proposed plan seems to call for retaining the westernmost 55 linear feet of wall. In the absence of a survey, I do not believe it has been established whether or not that section of wall falls above or below the ordinary high watermark.

Mr. Ahmer has previously told me and other neighbors that the existing illegal seawall is the most egregious violation of encroachment standards currently under review in the county. Because that wall was built by the land owner, mostly neglecting the engineered plan, without silt, fencing or erosion control, irreparable harm to navigation to my dock has already occurred. I have current photographs from today and historic photographs dating back since the wall was built, reflecting a vast plume of sediment and silt moving southeast towards my dock as a result of Schneider's illegal wall. In speaking with Mr. Ahmer, he has told me that he can see this silt plume on the aerial survey routinely performed by the IDAHO Department of lands.

Even if Mr. Schneider is required to remove the existing illegal wall and attempt to restore the damage done to the Lake bed to its original condition, the siltification of my dock has already irreparably occurred. Because of the natural contours of the Lake bed, my dock and that of my adjoining neighbor Mike Silvey normally lie in water quite shallow when compared with the adjacent Docks of the Olson family, the Schneider family, and the Heinrich family to the east. Historically, my family could leave the boat in the water as late as we wished and often didn't remove it until October. Last year, the first summer after Schneider completed the wall, we had to remove our boat in

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MICA SUPERVISORY AREA OFFICE

August. This summer, I'm already having to dive beneath my boat on a weekly basis in order to measure the depth remaining between my boat and the lake bottom. This is a direct effect of the siltification caused by Schneider's illegal wall and the lack of appropriate silt fencing and erosion control. Though it's difficult to measure accurately, I would estimate that the change in currents and the large silt plume created by the existing illegal wall has decreased the depth of water under my dock by approximately 4 to 6 inches

I object to this project in its entirety. As it was constructed, it was a blatant and illegal attempt to create waterfront real estate. The wall as it stands is a blatant violation of the standards for encroachment established by the state of Idaho. Any attempt to bring the project in compliance will be patently incapable of undoing the damage already done. I have been informed by numerous officials at the Department of lands as well as Kootenai County that the government's goal is to bring the project into compliance and not necessarily to punish the illegal behavior that has already occurred. Though I understand this in principle, I find it frustrating that someone can be allowed to flout the law at the expense of others and not be held to account.

At a minimum, I would request that a proper survey be performed at Mr. Schneider's expense in order to properly demarcate the ordinary high watermark as well as properly delineate the property boundaries between the Schneider family and the Olson family as well as the property boundaries between Schneider and myself. Furthermore, I would propose that a variance be granted to both myself and Mike Silvey in order to extend our Docks further into the lake in order to access deeper water and maintain navigability to our Docks. Because Schneider's existing wall has impeded navigability to my dock, I believe that this remediation should be at Schneider's expense.

Sincerely yours,

Douglas P McInnis

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MICA SUPERVISORY AREA OFFICE

EXHIBIT 9

McInnis dock
Text

Boat
Our
Land

McInnis Boat
Wall
flight control tower

EXHIBIT 10

EXHIBIT 11

EXHIBIT 12

AXIS

AXIS

WAKE RESEARCH

NIKE RESEARCH
XIS

DESIGNED TO CREATE PERFECT DAYS.
ENGINEERED TO CREATE PERFECT WAVES.

AXIS

A DECADE OF DOMINANCE

In 2009, Malibu Boats introduced a new brand of performance towboats combining world-class on-the-water performance with exceptional value. They called it Axis Wake Research.

The Axis A22 pickle-fork bow earned immediate praise from customers and professional watersports athletes alike for its striking design and outstanding wake performance.

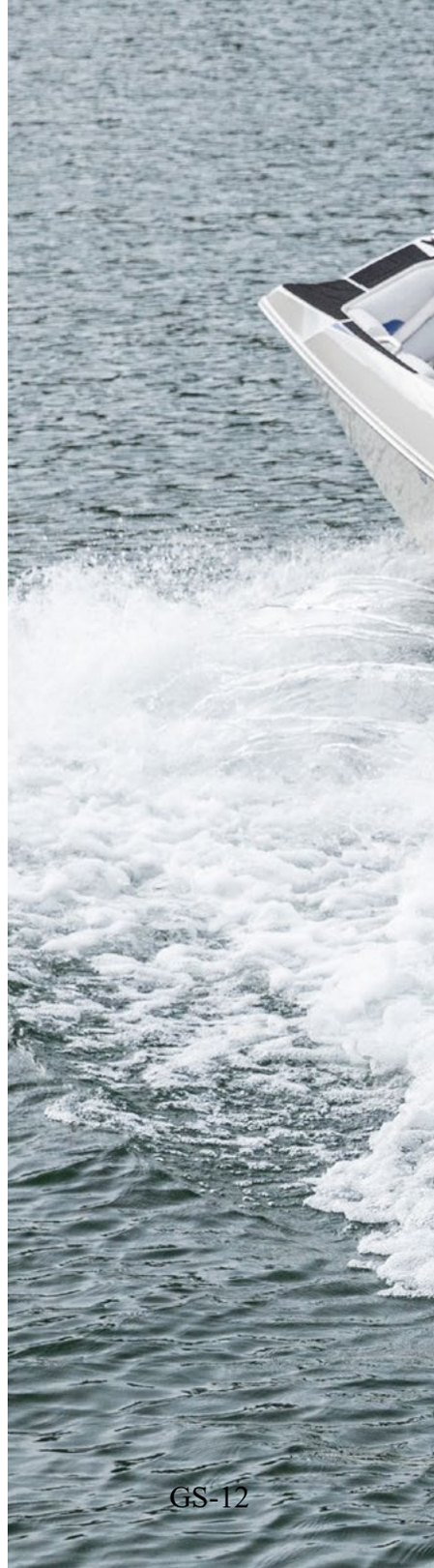
A decade later, Axis is one of the most popular and fastest-growing brands in the performance towboat industry, with five models ranging from 20 to 24 feet in both traditional bow and pickle-fork options.

Every Axis boat is designed by Malibu engineers and handcrafted by Malibu technicians in the Malibu factories, combining a legacy of manufacturing prowess with state-of-the-art technology.

Axis is dedicated to delivering the ultimate watersports experience to families and riders of all ages and skill levels, at an affordable price.

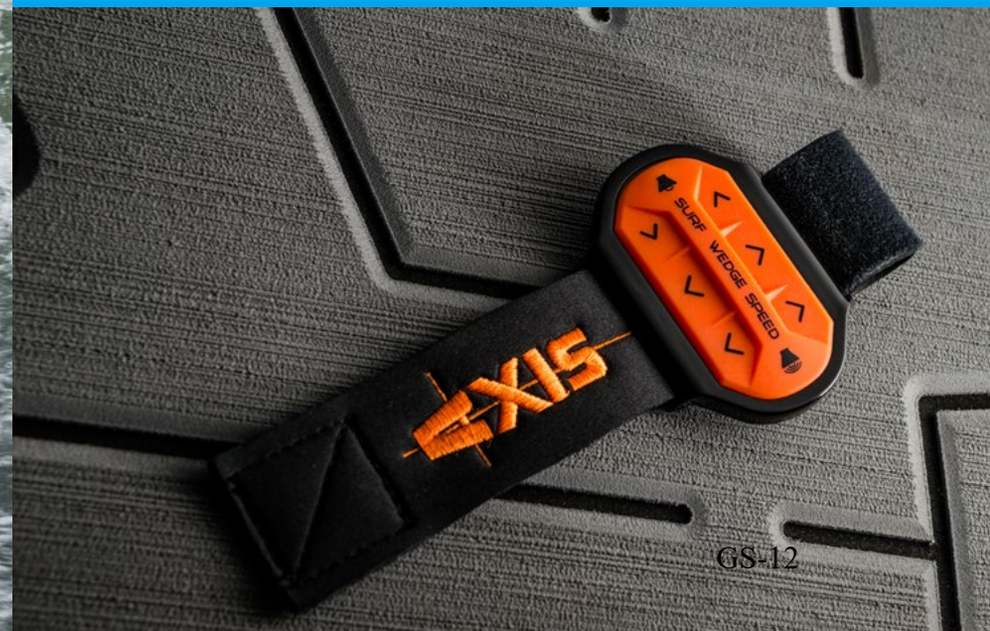
Artistry. Agility. Accessibility. Axis.

#CenteredOnYou



PERFORMANCE SURF PACKAGE

For 2018, the industry-changing Power Wedge II™ is now available on all Axis towboats as part of the Performance Surf Package, which also includes Surf Gate™ and Surf Band™. So, for the first time, all of Malibu's patented wake and surf wave creation technologies are integrated for complete customization with the push of a button.



STANDARD WAKE ENHANCEMENT

Wake Plus™ Hull: Standard in all Axis Towboats, the Wake Plus Hull and running surfaces generate a huge wake while delivering a smooth ride.

Triple Hard Tank™ Ballast System: Add 800 - 1,200 pounds of ballast, depending on model, from the dash panel.

PERFORMANCE SURF UPGRADES

Power Wedge II: Add up to 1,500 pounds of additional wake-generating ballast at the touch of a button with this patented hydrofoil featuring hydraulic actuators.

Surf Gate: High-speed hydraulic actuators drive the patented Surf Gate, redirecting the wake to instantly create an endless wave on either side of the boat, customizable by size, length, shape and speed.

Surf Band: Patented wearable remote that enables riders to control wake and wave settings, boat speed and tower speaker volume from the water.

Plug 'n Play Ballast System: Adds up to 1,500 pounds of ballast in the rear storage lockers and up to 650 pounds of ballast in the bow.

Auto-Set Wedge: Manually operated, reverse hydrofoil design that adds 1,000 pounds of water displacement.

2018 AXIS FAMILY

The 2018 Axis family includes the A-Series, featuring a roomy pickle-fork bow in 20, 22 and 24-foot lengths, and the T-Series, a traditional bow option in 22 and 23-foot lengths.

All 2018 Axis towboats come standard with the patented and streamlined Wake Plus Hull, plush cabin upholstery, convenient walkthrough design, even more gel coat options and new soft grip flooring. In addition, the Skybox Seat™ is available on the A20, A22 and T23, while the innovative new Sliding Skybox Seat™ is available on the T22 and A24.

With two series, five models and countless custom options, there's an Axis towboat for everyone.

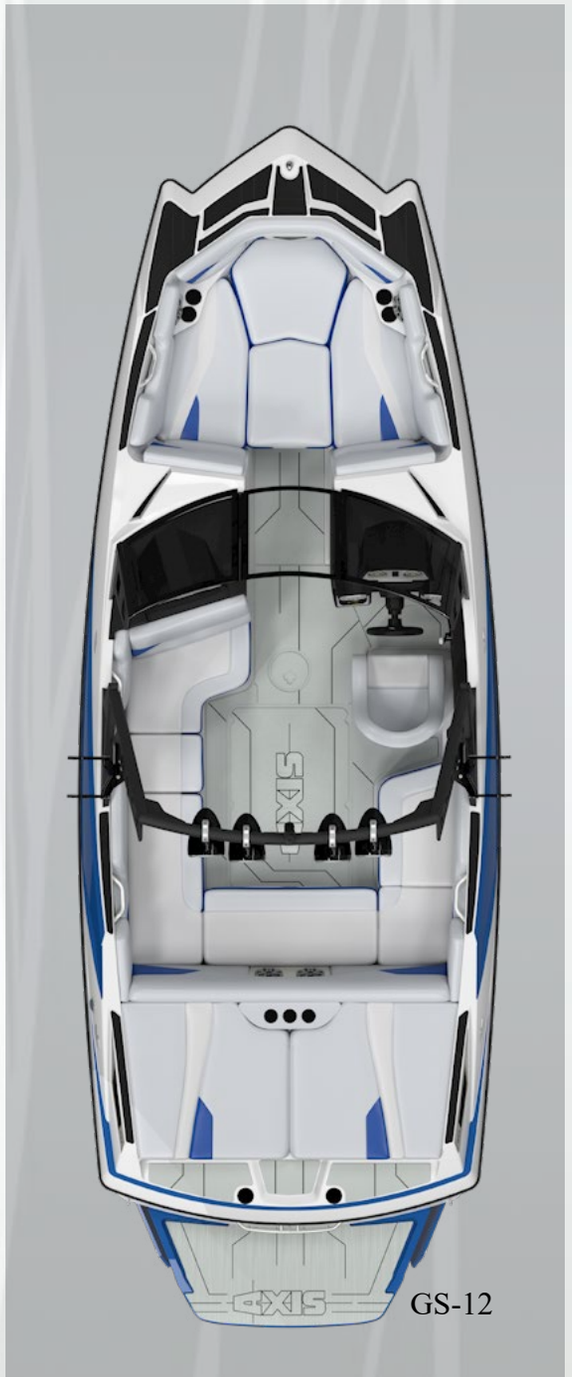
NEW FOR 2018

- Three new gel coat color options
- Rear-facing Sliding Skybox Seat *
- Soft grip flooring
- Plush upholstery
- Power Wedge II (optional)
- Surf Gate (optional)
- Surf Band with tower speaker volume control (optional)
- All-new bungee tower racks (optional)
- PTM clamping board racks (optional)

* Only available on the A24 & T22

A20

A22



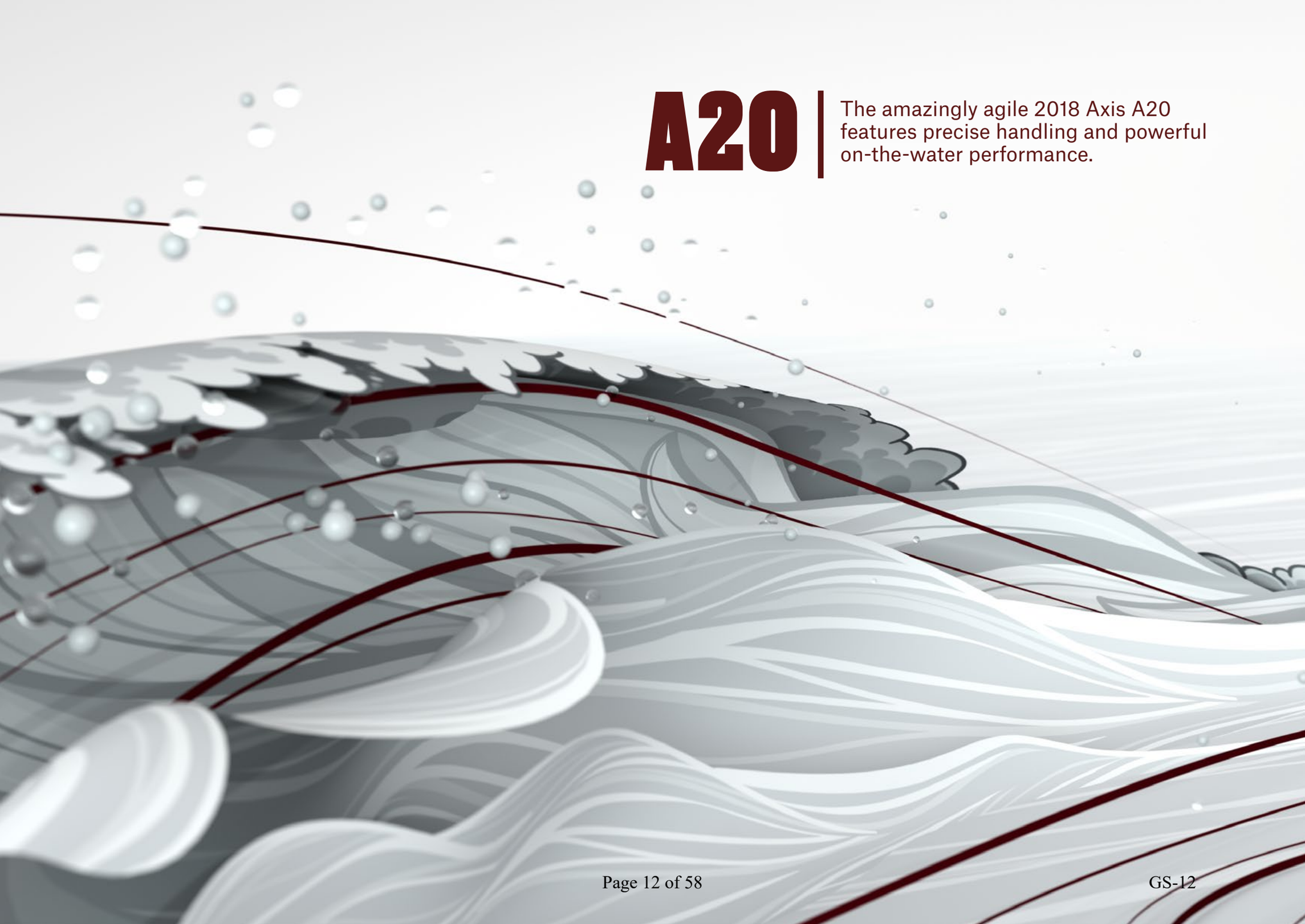
A24

T22

T23

A20

The amazingly agile 2018 Axis A20 features precise handling and powerful on-the-water performance.



XIS

XIS

QUICK & COMPACT

With seating for up to 11 people, the 2018 Axis A20 is roomy enough to accommodate plenty of family and friends but compact enough to fit into the garage.

It also features a luxurious cabin with handstitched vinyl, Skybox Seat, soft grip flooring, swiveling helm chair, illuminating 3-in-1 gauges and dual dash panels with soft key buttons.

With the standard Wake Plus Hull and Triple Hard Tank Ballast System, plus the optional Performance Surf Package, the Axis A20 also delivers the ultimate in wave and wake customization. The Livorsi electronic throttle offers superior response and precise control for the driver.

FEATURES

- Wake Plus Hull
- Triple Hard Tank Ballast System
- Livorsi electronic throttle
- Walkthrough design
- Illuminating 3-in-1 gauges
- Three new gel coat color options
- Skybox Seat
- Soft grip flooring
- Plush upholstery
- Power Wedge II (optional)
- Surf Gate (optional)
- Surf Band with tower speaker volume control (optional)
- All-new bungee tower racks (optional)
- PTM clamping board racks (optional)

LENGTH	20'/6.10m
BEAM	98"/2.49m
DRAFT	27"/0.69m
SEATING CAP	11 people
WEIGHT CAP	1,551 lbs.
WEIGHT*	3,500 lbs./1,588 kg
FUEL CAP	42 gal./159L
STD TORQUE	409
MAX TORQUE	450
HULL TYPE	Wake Plus
MAX BALLAST	3,970 lbs

*Approximate Dry Weight

SIX

A20

A22

An Axis icon, the A22 is the ultimate towboat for families that want room to relax while demanding best-in-class maneuverability and wake creation. Good times are guaranteed.

AXIS

MAXIMUM COMFORT, BREAKTHROUGH PERFORMANCE

With seating for 15, the 2018 Axis A22 delivers the perfect combination of comfort and performance. The pickle-fork bow offers ample lounging space up front, and the Skybox Seat provides an optimal view of all the action behind the boat. Other standard features include more gel coat options, plush upholstery, soft grip flooring and Livorsi electronic throttle.

The Wake Plus Hull, with a unique running surface adapted specifically for the A22, delivers smooth handling, while the Triple Hard Tank Ballast System generates a heavy, versatile wake. The new A22 towboat also includes the optional Power Wedge II as part of the Axis Performance Surf Package, for limitless wake and wave creation for riders of every level with the touch of a button.

XIS

FEATURES

- Wake Plus Hull
- Triple Hard Tank Ballast System
- Livorsi electronic throttle
- Walkthrough design
- Illuminating 3-in-1 gauges
- Three new gel coat color options
- Skybox Seat
- Soft grip flooring
- Plush upholstery
- Power Wedge II (optional)
- Surf Gate (optional)
- Surf Band with tower speaker volume control (optional)
- All-new bungee tower racks (optional)
- PTM clamping board racks (optional)

LENGTH	21'11"/6.68m
BEAM	102"/2.59m
DRAFT	27"/0.69m
SEATING CAP	15 people
WEIGHT CAP	2,115 lbs.
WEIGHT*	4,200 lbs./1,905 kg
FUEL CAP	42 gal./159L
STD TORQUE	409
MAX TORQUE	450
HULL TYPE	Wake Plus
MAX BALLAST	4,180 lbs

*Approximate Dry Weight

LIQUID FORCE

A24

Completely new from the hull up, the 2018 A24 is without question the crown jewel of the Axis line. It boasts unprecedented wave-making capabilities and unmatched comfort.

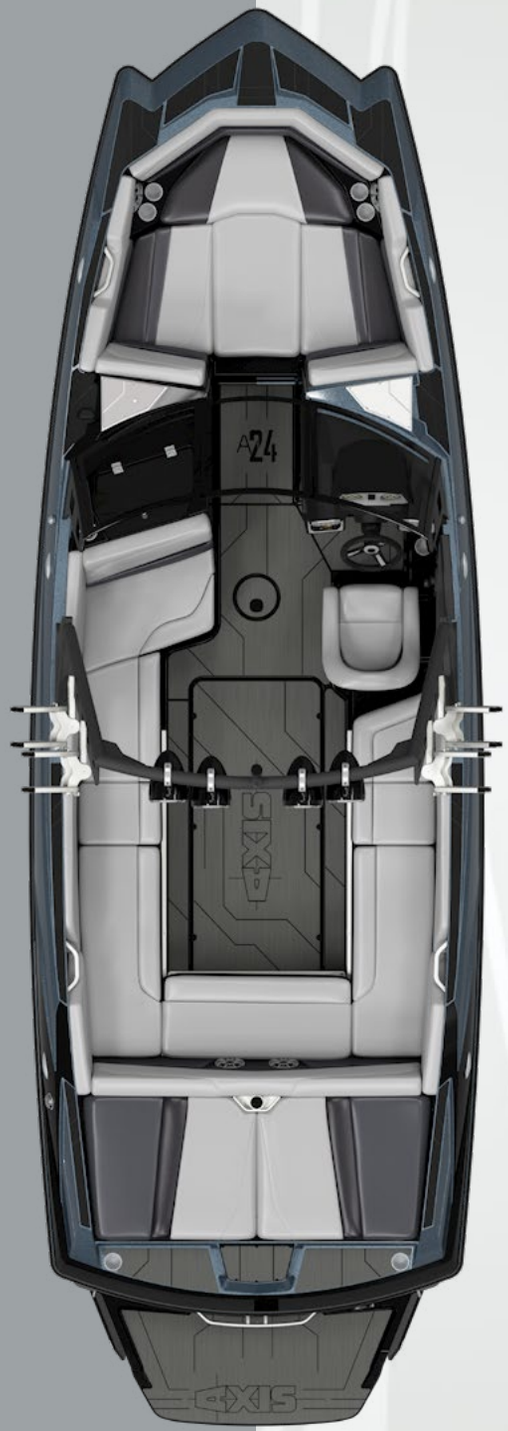
XIS

GROUP THERAPY

All-new for 2018, the A24 is highlighted by a new, state-of-the-art hull profile for enhanced performance and fresh, aggressive styling. This 17-seat pickle-fork towboat has generous storage and standard luxury features such as a rear-facing Sliding Skybox Seat, plush upholstery, swiveling helm chair, soft grip flooring, illuminating 3-in-1 gauges, walkthrough design and dual dash panels with soft key buttons.

The new A24 towboat comes standard with the 6.0 liter Monsoon engine, which generates 409 ft-lbs. of torque. On the water, the Livorsi electronic throttle offers precise speed control while the Triple Hard Tank Ballast System generates an incredibly enjoyable, multipurpose wake for a variety of watersports.

Power Wedge II is available in the A24 as part of the Axis Performance Surf Package. Just push a button to automatically add up to 1,500 pounds of ballast or to customize the size and shape of the wakes and waves for riders of every level.



FEATURES

- Wake Plus Hull
- Triple Hard Tank Ballast System
- Livorsi electronic throttle
- Walkthrough design
- Illuminating 3-in-1 gauges
- Three new gel coat color options
- Rear-facing Sliding Skybox Seat
- Soft grip flooring
- Plush upholstery
- Power Wedge II (optional)
- Surf Gate (optional)
- Surf Band with tower speaker volume control (optional)
- All-new bungee tower racks (optional)
- PTM clamping board racks (optional)

LENGTH	24' 5"/7.44m
BEAM	102"/2.59m
DRAFT	32"/0.81m
SEATING CAP	17 people
WEIGHT CAP	2,397 lbs.
WEIGHT*	5,250 lbs./2,381 kg
FUEL CAP	76 gal./288L
STD TORQUE	409
MAX TORQUE	450
HULL TYPE	Wake Plus
MAX BALLAST	4,875 lbs

*Approximate Dry Weight

T22

All-new from hull to helm, the 2018 Axis T22 towboat is designed to deliver an extraordinary on-the-water experience with precision handling, cutting-edge technology and unparalleled engineering and craftsmanship.

AXIS

STYLING & PROFILING

The all-new 2018 Axis T22 towboat features more style, more performance and more innovations than ever before. A deeper hull and streamlined profile deliver crossover versatility for wakesurfing, wakeboarding or skiing. A new Sliding Skybox Seat gives you a front-row view of the action behind the boat, and with seating for 15, the walkthrough maximizes space. It's loaded with plush upholstery, a swiveling helm armchair, soft grip flooring, illuminating 3-in-1 gauges, dual dash panels with soft key buttons and Livorsi electronic throttle.

The T22 delivers on the water, with the Wake Plus Hull and Triple Hard Tank Ballast System combining to create solid wakes and waves that all riders will appreciate. For even more customization and variety, the Power Wedge II hydrofoil with hydraulic actuators is now an available option for all Axis towboats as part of the Performance Surf Package, adding up to 1,500 pounds of additional ballast with the touch of a button. The package also includes Surf Gate and Surf Band for the ultimate automated wake and wave creation.

FEATURES

- Wake Plus Hull
- Triple Hard Tank Ballast System
- Livorsi electronic throttle
- Walkthrough design
- Illuminating 3-in-1 gauges
- Three new gel coat color options
- Rear-facing Sliding Skybox Seat
- Soft grip flooring
- Plush upholstery
- Power Wedge II (optional)
- Surf Gate (optional)
- Surf Band with tower speaker volume control (optional)
- All-new bungee tower racks (optional)
- PTM clamping board racks (optional)

LENGTH	22'/6.71m
BEAM	102"/2.59m
DRAFT	27"/0.69m
SEATING CAP	15 people
WEIGHT CAP	2,115 lbs.
WEIGHT*	4,200 lbs./1,814 kg
FUEL CAP	48 gal./181L
STD TORQUE	409
MAX TORQUE	450
HULL TYPE	Wake Plus
MAX BALLAST	4,200 lbs

*Approximate Dry Weight

BLOWER
BILGE
INT
NAV/ ANC
BOW
CENTER
PORT
STBD
BALLAST
HEATER
ACC 1
ACC 2
ACC 3
DOCK
UNDER WATER
UNDER SEAT
TOWER
LIGHTS

GXS

T23

Offering bow-to-stern comfort, spacious seating and incredible performance, the 2018 Axis T23 watersports towboat is engineered for families that love to spend time together on the water.

T23
XIS

TABLE FOR 16

The 2018 Axis T23 is a 16-seat beauty that successfully fuses trailblazing performance, conventional design and contemporary style. The immaculately engineered Wake Plus Hull gives this towboat incredibly responsive handling, and together with the Triple Hard Tank Ballast System, it produces a hefty wake that all riders will love.

Innovative styling and numerous cabin optimizations provide extreme comfort and convenience to the T23. Standard amenities include plush upholstery, swiveling helm armchair, soft grip flooring and walkthrough design.

The roomy cockpit includes strategically-placed dash panels with soft-key switches, brilliant 3-in-1 gauges and the Livorsi electronic throttle, which offers superior response and precise control for the driver. Meanwhile, the standard 6.0 liter Monsoon engine generates 409 ft-lbs. of torque.

Plus, for the first time ever, Power Wedge II is available for all 2018 Axis boats as part of the exclusive Performance Surf Package option, which also includes Surf Gate and Surf Band. The state-of-the-art Power Wedge II augments the internal ballast system and can instantly add up to 1,500 pounds of additional wave and wake-creating capability.

FEATURES

- Wake Plus Hull
- Triple Hard Tank Ballast System
- Livorsi electronic throttle
- Walkthrough design
- Illuminating 3-in-1 gauges
- Three new gel coat color options
- Skybox Seat
- Soft grip flooring
- Plush upholstery
- Power Wedge II (optional)
- Surf Gate (optional)
- Surf Band with tower speaker volume control (optional)
- All-new bungee tower racks (optional)
- PTM clamping board racks (optional)

LENGTH	23'5"/7.14m
BEAM	102"/2.59m
DRAFT	27"/0.69m
SEATING CAP	16 people
WEIGHT CAP	2,256 lbs.
WEIGHT*	4,500 lbs./2,041 kg
FUEL CAP	69 gal./261L
STD TORQUE	409
MAX TORQUE	450
HULL TYPE	Wake Plus
MAX BALLAST	4,080 lbs

*Approximate Dry Weight

SURF GATE
POWER

4-XIS

JOHNNY STIEG

Johnny Stieg is recognized for his fluid airs and raw, free-flowing tricks. With his spontaneous approach, this stylish wakesurfer always keeps things interesting. Johnny's aggressive approach stands in contrast to his laid-back Cali personality. He's deeply rooted in his California upbringing and has spent countless days surfing every break up and down his home state's coastline.

STATS

Age	29
Hometown	Templeton, CA
Residence	Santa Barbara, CA
Stance	Regular
Sponsors	AWR, 3D Robotics
Line Length	Non applicable
Top Trick	Heelside, backside air reverse
Boat	Axis T23
Boat Speed	10.8 mph

TOM FOOSHEE

Tom Fooshee embodies everything that's awesome about being a pro wakeboarder. Known as "The King of Cable," Tom's ability behind the boat is just mind-blowing. He's happiest when he's out ripping behind his A22 at Texas Ski Ranch in New Braunfels. A sharp wit and totally approachable, this 2010 Alliance Wakeboard Rider of the Year is always fun to be around.

STATS

Age	32
Hometown	Austin, TX
Residence	New Braunfels, TX
Stance	Both
Sponsors	AWR, Liquid Force, Hoven Vision, BoardCo.com
Line Length	82.5'
Top Trick	A classic Pete Rose
Boat	Axis A22
Boat Speed	24.3 mph

TONY CARROLL

Hailing from the farmland of central California, wakeboarder Tony Carroll left Fresno for Florida and never looked back. Known for putting his unique style on contest passes, Tony can often be seen on Clear Lake in Orlando, riding, filming and training behind his A24.

STATS

Age	27
Hometown	Fresno, CA
Residence	Orlando, FL
Stance	One in, ducked
Sponsors	AWR, Ronix, SP Gadgets, Tommy's
Line Length	75'
Top Trick	Melon Toe 9
Boat	Axis A24
Boat Speed	23 mph

BEC GANGE

For 2018, Axis Wake Research welcomes 2014 World Champion Bec Gange to the team. Bec was raised in Mildura, Victoria, Australia, where she grew up riding the Murray River with friends and family. Today, she spends half the year in Orlando, Fla., and half in Oz. Bec is known for her stylish riding and took the Trick of the Year award in 2013.

STATS

Age	28
Hometown	Mildura, Victoria, Australia
Residence	Orlando, FL
Stance	Regular
Sponsors	AWR, Jet Pilot, Club Marine, Mildura Health
Line Length	77'
Top Trick	Melon Crowmobe
Boat	Axis T22
Boat Speed	23.3 mph

AXIS
GMC
AXIS

THE BEST WAY TO PULL YOUR NEW AXIS

Over 95 percent of customers order a custom Axis Trailer to pull their new boat. That's because not only is every Axis Trailer customizable to match each boat, but they are all structurally engineered to the specific dimensions and weight of your Axis.

The hand-craftmanship is evident—premium industry standard steel for all trailer frame parts, polyurethane bow rollers, jig and fixture application for consistent weld and axle placement, and fender steps that are fully welded to the trailer frame. Plus, Axis Trailers feature a 5-year limited warranty and personalized options such as the Tricked Out package with color-match paint, KMC Rockstar wheels and stainless-steel fenders.

Standard

- 5-Year Limited Warranty
- NMMA-Certified
- Tubular-Steel Design
- Swing Tongue
- Torsion Axles w/ Vault Bearing Lubrication
- Hydraulic Surge Disc Brakes, All Axles
- SS Aluminum-Coated Brake Lines
- 14" Chrome Directional
- Grand Ride Radial Trailer Tires
- Surface Mount GLO-Lamp LED Brake Lamps
- 7-Round Tow Vehicle Plug
- Waterproof Wire Harness
- 1,400-pound XLT Winch
- Bow Safety Strap
- SeaDek Non-Skid Mat
- Polyurethane Bow Roller
- Removable Guidepost
- Prop-Guard Rollers with Stainless Steel Roller
- Detergent/Iron-Phosphate Frame Pre-Treatment
- Urethane Primer
- Urethane Top Coat

Options

- Alloy Wheel Upgrade
- Spare Tire Wheel Assembly, Chrome Directional 14" Tandem Axle
- Spare Tire Wheel Assembly, Galvanized 14" Tandem Axle
- Spare Tire Wheel Assembly, Alloy 14" Tandem Axle
- Spare Tire Wheel Assembly, 18" XD Rockstar 2 (Tricked-Out Package Only)
- Color-Match Paint
- Elite Shield Trailer
- Elite Shield Fenders
- Galvanized Frame
- Painted-Over Elite Shield Galvanized Frame
- SS Retractable Transom Straps

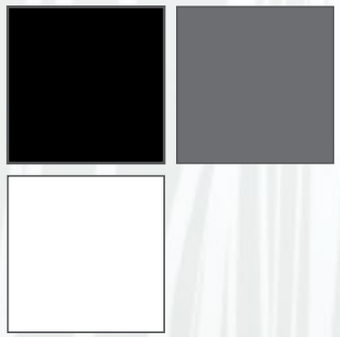
Tricked Out

- Color-Match Paint
- 18" KMC Rockstar 2 Wheels
- 11"-Wide Fenders
- Runway Lighting
- 5-Bar Aluminum Tread on Steps & Fenders
- 2-Tone Paint or Polished Stainless Steel Fenders
- Stainless Retractable Transom Straps
- XR84 Self-Latching Actuator

TOWER OF STRENGTH

Like Axis boats, the Axis AW15 Tower is highly customizable. AW15 Towers are available in black, white or charcoal, with performance options such as a quick release for ultimate convenience or a light bar for night action. Other options include the all-new bungee tower racks, PTM clamping board racks and soft bimini.

Options



MONSOON 450

6.0L

MONSOON 409

6.0L

MONSOON MUSCLE

All Axis models come standard with the Monsoon 409 6.0 liter engine and can be upgraded to the Monsoon 450 6.0 liter, for ultimate torque.

GS-12

MOOD MUSIC

Friends and family cheering and good music blasting from the tower speakers will set the mood for epic wakeboarding and wakesurfing sessions. Axis offers the Wet Sounds stereo with three speaker packages. Streaming is available from Bluetooth-enabled handheld electronic devices, and riders can crank up the volume from the water via the optional Surf Band wrist remote. Onboard, MultiZone volume control enables customized audio settings.

SOUNDPACK I

- Wet Sounds Stereo with Bluetooth
- 4 Wet Sounds 6.5-inch speakers, silver grills
- Optional transom remote

SOUNDPACK II

- Wet Sounds Stereo with Bluetooth
- 6 Wet Sounds 6.5-inch speakers, silver grills
- 4 ICON8 tower speakers, black or white can option
- 10-inch subwoofer
- HT-2 & HT-6 amps
- Transom remote

SOUNDPACK III

- Wet Sounds Stereo with Bluetooth
- 6 Wet Sounds 6.5-inch speakers, black grills
- 2 REV410 tower speakers, black or white can option
- 12-inch subwoofer
- SYN4 & SYN6 amps
- Transom remote

wet sounds

STANDARD AND OPTIONS CUSTOMIZATION

ENGINE	A20	T22	A22	T23	A24
Monsoon 409 6.0L CAT	●	●	●	●	●
Monsoon 450 6.0L HO CAT	○	○	○	○	○
Monsoon Diesel	○	○	○	●	●
Salt Series Available	○	○	○	○	○

TOWER	A20	T22	A22	T23	A24
AW15 Tower Light Bar	○	○	○	○	○
AW15 Tower quick release	○	○	○	○	○
AW 15 Colors: black, white, or charcoal (black is standard)	○	○	○	○	○
Commercial Sewing Bimini with Rope and Surfboard Storage	○	○	○	○	○
Commercial Sewing Bimini with Rope Storage	○	○	○	○	○
Great Lakes Bimini with Surf Board Storage	○	○	○	○	○
Great Lakes Bimini	○	○	○	○	○
Spinner Board Racks	○	○	○	○	○
PTM Clamping Board Racks	○	○	○	○	○
PTM 140° Panoramic Mirror Tower	○	○	○	○	○
14" PTM Black Composite Mirror	●	●	●	●	●

PERFORMANCE	A20	T22	A22	T23	A24
Axis Surf Gate with Surf Band	○	○	○	○	○
Zero Off GPS Speed Control with compass	○	○	○	○	○
Plug 'n Play with Auto Vent	○	○	○	○	○
Plug 'n Play Ballast System	○	○	○	○	○
Power Wedge II	○	○	○	○	○
Auto-Set Wedge	○	○	○	○	○
Speed Prop	○	○	○	○	○
Standard Prop	●	●	●	●	●
High-Altitude/Torque Prop	○	○	○	○	○
Silent Tip Exhaust	○	○	○	○	○
Surf Pipe	○	○	○	○	○

SAFETY, COMFORT & CONVENIENCE	A20	T22	A22	T23	A24
DECKadence Carpet	○	○	○	○	○
Removable Carpet	○	○	○	○	○
Soft Grip Flooring	○	○	○	○	○
Underwater LEDs	○	○	○	○	○
Battery Charger	○	○	○	○	○
Under-Seat LED Lights: red, white, or blue	○	○	○	○	○
Axis-branded Drop-In Igloo Cooler	○	○	○	○	○
Pull-Up Cleats	○	○	○	○	○
Flip-Up Bolster Seats	●	●	●	●	●
Chillax Cockpit Flip-Up Seat	○	○	○	○	○
Skybox Seating	●	●	●	●	●
Rear-Facing, Multi-positioning Sliding Skybox Seat	●	●	●	●	●
Non-Skid Deck Track	○	○	○	○	○
Stainless-Steel Cup Holders	○	○	○	○	○
2-Outlet Heater	○	○	○	○	○
3-Outlet Heater	○	○	○	○	○
5-Outlet Heater	●	●	●	●	○
Docking Lights	○	○	○	○	○
Depth-Finder	○	○	○	○	○
Dual Battery Switch Option	○	○	○	○	○
Ski Pylon	○	○	○	○	○
Second Gorilla Fin	○	○	○	○	○

TRAILERS	A20	T22	A22	T23	A24
Tandem	○	○	○	○	○
Tri-Axle	●	●	●	●	○

STEREO	A20	T22	A22	T23	A24
Sound Pack I (no tower speakers)	○	○	○	○	○
Sound Pack II (includes a set of Icon 8)	○	○	○	○	○
Sound Pack III (WS Rev410 set)	○	○	○	○	○
Transom Remote Option with Sound Pack I, Standard on Sound Pack II and III	○	○	○	○	○

	A20	T22	A22	T23	A24
New glove box	●	●	●	●	●
Speed control	●	●	●	●	●
AW15 Tower	●	●	●	●	●
Livorsi Electronic Throttle (black)	●	●	●	●	●
Above-engine warming bin w/ drain	●	●	●	●	●
Swivel driver's seat	●	●	●	●	●
LED storage lighting	●	●	●	●	●
Ventless fuel-fill system	●	●	●	●	●
Triple Hard-Tank Ballast System	●	●	●	●	●
Single Shark Fin	●	●	●	●	●

STD ●
OPT ○
N/A ●

GARAGE SPECS/PACKAGES

A20:
- Total height on trailer, tower folded down - 6' 10"
- Total width on trailer at guide posts - 8' 6"
- Total length with platform removed, wedge down and trailer tongue folded - 20' 8"
- Total length with platform removed, wedge down and trailer tongue folded w/ Surf Gate - 21' 6"
- Total length with platform installed and trailer tongue folded - 22' 3"

T22:
- Total height on trailer, tower folded down - 6' 10"
- Total width on trailer at guide posts - 9'
- Total length with platform removed, wedge down and trailer tongue folded - 23' 4"
- Total length with platform removed, wedge down and trailer tongue folded w/ Surf Gate - 23' 11"
- Total length with platform installed and trailer tongue folded - 25'

A22:
- Total height on trailer, tower folded down - 6' 11"
- Total width on trailer at guide posts - 8' 11"
- Total length with platform removed, wedge down and trailer tongue folded - 22' 9"
- Total length with platform removed, wedge down and trailer tongue folded w/ Surf Gate - 23' 3"
- Total length with platform installed and trailer tongue folded - 24' 6"

T23:
- Total height on trailer, tower folded down - 7'
- Total width on trailer at guide posts - 9'
- Total length with platform removed, wedge down and trailer tongue folded - 24' 6"
- Total length with platform removed, wedge down and trailer tongue folded w/ Surf Gate - 24' 10"
- Total length with platform installed and trailer tongue folded - 25' 11"

A24:
- Total height on trailer, tower folded down - 6' 11"
- Total width on trailer at guide posts - 8' 11"
- Total length with platform removed, wedge down and trailer tongue folded - 25' 2"
- Total length with platform removed, wedge down and trailer tongue folded w/ Surf Gate - 25' 9"
- Total length with platform installed and trailer tongue folded - 27' 4"

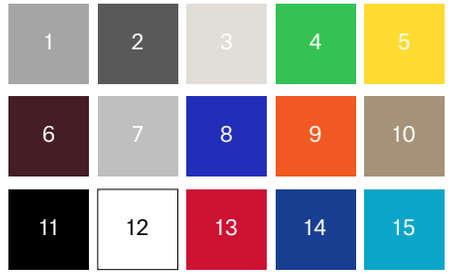
SALT RESISTANCE PACKAGE

- Hydraulic steering
- Freshwater flush kit
- Stainless steel gas shocks
- Anodized seat-base slide assembly
- Warming bin that drains to bilge
- Anodized or stainless steel pylon
- Grounding and bonding of all components below water line
- Sacrificial anodes
- CRC and silicone sealant on all relevant components
- Harnesses and fasteners built for maximum corrosion resistance
- Dripless shaft seal
- SRP badging
- Wash-down tank (n/w with Plug 'n' Play Ballast)

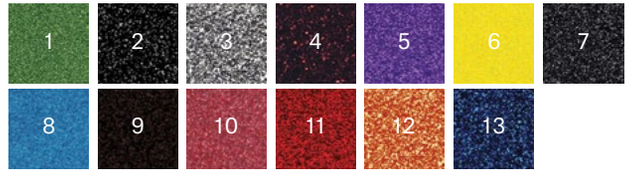
TRICKED-OUT TRAILER PACKAGE

- Color Match Paint (metallic available)
- 18" KMC Rockstar 2 Wheels with paintable inserts
- 11" Wide Fenders
- Axis Wake Runway Lighting (color choice)
- 5-Bar Aluminum Tread on Steps and Fenders
- 2-Tone Paint or Polished Stainless Fenders
- Stainless Retractable Transom Straps
- XR84 Self-Latching Actuator

COLOR OPTIONS



1. Light Graphite 2. Charcoal 3. Sandstone 4. Malibu Green
5. Sunny Summer Yellow 6. Cherry Wine 7. Moonbeam 8. Midnight Blue
9. Hot Orange 10. Driftwood 11. Ebony 12. White 13. Indy Red
14. Dark Blue 15. Vapor Blue



1. Malibu Green Metallic 2. Black Metallic
3. Machine Silver Metallic 4. Cherry Wine Metallic 5. Purple Metallic
6. Sunny Summer Yellow Metallic 7. Gunmetal Charcoal Metallic
8. Stratosphere Blue Metallic 9. Mocha Bronze Metallic
10. Pink Diamond Metallic 11. Crystal Red Metallic
12. Hot Orange Metallic 13. Dark Blue Metallic

EXPERIENCE OUR WORLD-RENOWNED CRAFTSMANSHIP

Every Axis Wake Research boat sold across the globe is meticulously handcrafted by highly trained technicians at our factories in Loudon, Tenn., and Albury, New South Wales, Australia. From spraying the outer gelcoat to laminating seven layers of fiberglass to installing and polishing interior and exterior hardware to hand-stitching and fitting the upholstery, every Axis is built by hand with incredible attention to detail.

We conduct thorough quality inspections after every step in the production process, and we lake-test all boats on site. Our goal is to ensure that your Axis leaves the factory in as perfect condition as human hands can make.

Schedule a tour by calling (865) 458-5478 or email research@axiswake.com

AXIS WAKE RESEARCH

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Australia
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LIQUID

Hyperlite

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axiswake.com

EXHIBIT 13

JM Engineering

Site Disturbance Plan

of

Schneider Residence

15053 E Hayden Lake Road
Hayden, ID

For

Greg Schneider

15053 E Hayden Lake Road
Hayden, ID 83835

JM Engineering – 2706 N. Blue Raven Lane - Spokane, WA 99224 PH: 509-953-9771

Ecological site: F043AY574ID - Warm-Frigid, Udic, Unglaciated, Loamy, Hills and Mountains, Ashy surface (western redcedar) Western Redcedar / Bride's Bonnet - Wild Ginger
Other vegetative classification: western redcedar/queencup beadlily (CN530)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho-Washington-Montana
Survey Area Data: Version 9, Sep 2, 2022

VICINITY MAP

EROSION CONTROL NOTES

1. CONTRACTOR IS TO BE FAMILIAR WITH THE REQUIREMENTS OF SECTION 402(P) OF THE FEDERAL CLEAN WATER ACT AND REGULATIONS ADOPTED BY THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (USEPA). (AMENDMENTS TO TITLE 40 OF THE CODE OF FEDERAL REGULATIONS, PART 122, PUBLISHED IN THE FEDERAL REGISTER ON NOVEMBER 16, 1990 AND ON APRIL 2, 1992.) ALSO, DEQ 1200-C PERMIT FOR THE CONTROL OF STORM WATER ASSOCIATED WITH CONSTRUCTION ACTIVITIES.
2. CONTRACTOR IS TO BE FAMILIAR WITH ALL REQUIREMENTS OF THE EROSION AND SEDIMENT CONTROL PLAN.
3. THE TEMPORARY EROSION CONTROL SYSTEM SHALL BE INSTALLED PRIOR TO ALL OTHER CONSTRUCTION.
4. ALL EXPOSED AND UNWORKED SOILS SHALL BE STABILIZED BY SUITABLE APPLICATION OF BEST MANAGEMENT PRACTICES (BMP'S), SUCH AS VEGETATIVE COVER, MULCHING, PLASTIC COVERING OR APPLICATION OF GRAVEL SURFACES IN AREAS TO BE GRAVELED. NO EXPOSED AND UNWORKED SOILS SHALL REMAIN UNSTABILIZED. ONCE CONSTRUCTION ACTIVITY IS COMPLETED IN AN AREA BETWEEN THE MONTHS OF OCTOBER 1 AND APRIL 30, PERMANENT SEEDING SHALL BE INSTALLED.
5. ALL CLEARING LIMITS AND/OR EASEMENT SETBACKS, SENSITIVE/CRITICAL AREAS AND THEIR BUFFERS, SIGNIFICANT TREES AND DRAINAGE COURSES SHALL BE CLEARLY STAKED AND MARKED AS SHOWN ON PLANS.
6. PROPERTIES ADJACENT TO THE PROJECT SITE THAT ARE SUBJECT TO POTENTIAL EROSION CAUSED BY CONSTRUCTION ACTIVITIES SHALL BE PROTECTED FROM SEDIMENT DEPOSITION THROUGH THE USE OF SILT FENCE, HAY BALES OR OTHER BMP SELECTED BY THE CONTRACTOR.
7. ALL FACILITIES INTENDED TO TRAP SEDIMENT ON-SITE SHALL BE CONSTRUCTED AS A FIRST STEP IN GRADING. THESE FACILITIES SHALL BE FUNCTIONAL BEFORE ANY LAND DISTURBING ACTIVITIES TAKE PLACE. EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS SHALL BE SEEDED AND MULCHED ACCORDING TO THE TIME PERIOD STATED IN #5 ABOVE.
8. ALL CUT AND FILL SLOPES SHALL BE CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION. ALL SLOPES SHALL BE STABILIZED WITHIN THE TIME PERIOD STATED IN #5 ABOVE.
9. ALL STORM DRAINAGE INLETS MADE OPERABLE DURING CONSTRUCTION SHALL BE COVERED WITH FILTER FABRIC TO PREVENT SEDIMENT FROM ENTERING THE SYSTEM. THE FILTER FABRIC MUST BE INSPECTED REGULARLY AND CLEANED WHEN NECESSARY.
10. THE FOLLOWING SHALL APPLY TO CONSTRUCTION OF UTILITY LINES:
    - WHERE FEASIBLE, NO MORE THAN 500' OF TRENCH SHALL BE OPEN AT ONE TIME.
    - WHERE CONSISTENT WITH SAFETY AND SPACE CONSIDERATIONS, EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.
    - TRENCH DEWATERING DEVICES SHALL DISCHARGE AND SHALL REMAIN ON-SITE AND IN NO WAY ENTER PUBLIC PROPERTY OR WATERWAY.
11. WHEREVER CONSTRUCTION VEHICLE ACCESS ROUTES INTERSECT PAVED ROADS, A STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE CONSTRUCTED (SEE DETAIL SHEET) TO MINIMIZE THE TRANSPORT OF SEDIMENT (MUD) ONTO THE PAVED ROAD. IF SEDIMENT IS TRANSPORTED ONTO A ROAD SURFACE, THE ROADS SHALL BE CLEANED THOROUGHLY AT THE END OF EACH DAY. SEDIMENT SHALL BE REMOVED FROM ROADS BY SHOVELING OR SWEEPING AND BE TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA. STREET WASHING SHALL ONLY BE ALLOWED AFTER SEDIMENT IS REMOVED IN THIS MANNER. A MINIMUM OF ONE (1) ON-SITE STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED.
12. ALL TEMPORARY SEDIMENT AND EROSION CONTROL SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED. TRAPPED SEDIMENT SHALL BE REMOVED OR STABILIZED ON-SITE. DISTURBED SOIL AREAS RESULTING FROM REMOVAL SHALL BE PERMANENTLY STABILIZED.
13. ALL POLLUTANTS OTHER THAN SEDIMENT THAT OCCUR ON-SITE DURING CONSTRUCTION SHALL BE HANDLED AND DISPOSED OF IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF STORM WATER OR THE SITE.
14. ALL TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL FACILITIES SHALL BE INSPECTED, MAINTAINED AND REPAIRED BY THE CONTRACTOR AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED USE. ALL ON-SITE EROSION AND CONTROL MEASURES SHALL BE INSPECTED BY THE CONTRACTOR AT LEAST ONCE EVERY SEVEN (7) DAYS AND WITHIN 24 HOURS OF ANY STORM EVENT EQUAL TO OR GREATER THAN 0.5" OF RAIN PER 24 HOUR PERIOD. AN INSPECTION REPORT FILE SHALL BE MAINTAINED BY THE CONTRACTOR AND KEPT ON-SITE.
15. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE ADDITIONAL TEMPORARY SEDIMENT PONDS/TRAPS AS SITE CONDITIONS REQUIRE. CONTRACTOR SHALL COORDINATE WITH THE ENGINEER.
16. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE ADDITIONAL EROSION CONTROL MEASURES, INCLUDING BUT NOT LIMITED TO SILT FENCING, SEDIMENT PONDS/TRAPS, DIVERSION SWALES, CHECK DAMS, SEDIMENT BARRIERS, FILTER FABRIC MULCH AND SEEDING, AS CONDITIONS REQUIRE. THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER.
17. THE AREA BETEWEEN THE WALL AND THE LAKE SHALL BE RETURNED TO EXISTING CONDITION. SOD AND/OR HYDROSEEDING IS NOT PERMITTED WITHIN THE BUFFER ZONE. FERTILIZER IS ALSO NOT PERMITTED WITHIN THE BUFFER ZONE.

GRADING NOTES

1. CONTRACTOR TO VERIFY LOCATION OF ALL EXISTING UTILITIES.
2. ALL FINISH GRADES SHALL BE SMOOTH AND UNIFORM.
3. PROVIDE POSITIVE DRAINAGE AWAY FROM BUILDING.
4. MAXIMUM 2:1 CUT AND FILL SLOPES
5. PROTECT EXISTING TREES WHERE POSSIBLE (TOPO MAP DOES NOT SHOW ALL VEGETATION)

PARCEL STATISTICS

PARCEL NUMBER: 51N03W144020
SEC. 14 T.51N., R.3W., B.M.,
KOOTENAI COUNTY, IDAHO

LOT SIZE: 20,517 SF

ANTICIPATED DISTURBED AREA
TOTAL PROPOSED: 1,500 SF

IMPERVIOUS AREAS:
ADDITIONAL IMPERVIOUS
CREATED BY THIS PROJECT: 450 SF

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

PROFESSIONAL ENGINEER
REGISTERED
12530
STATE OF IDAHO
JOHN E. MCKERVEY
9/19/2023

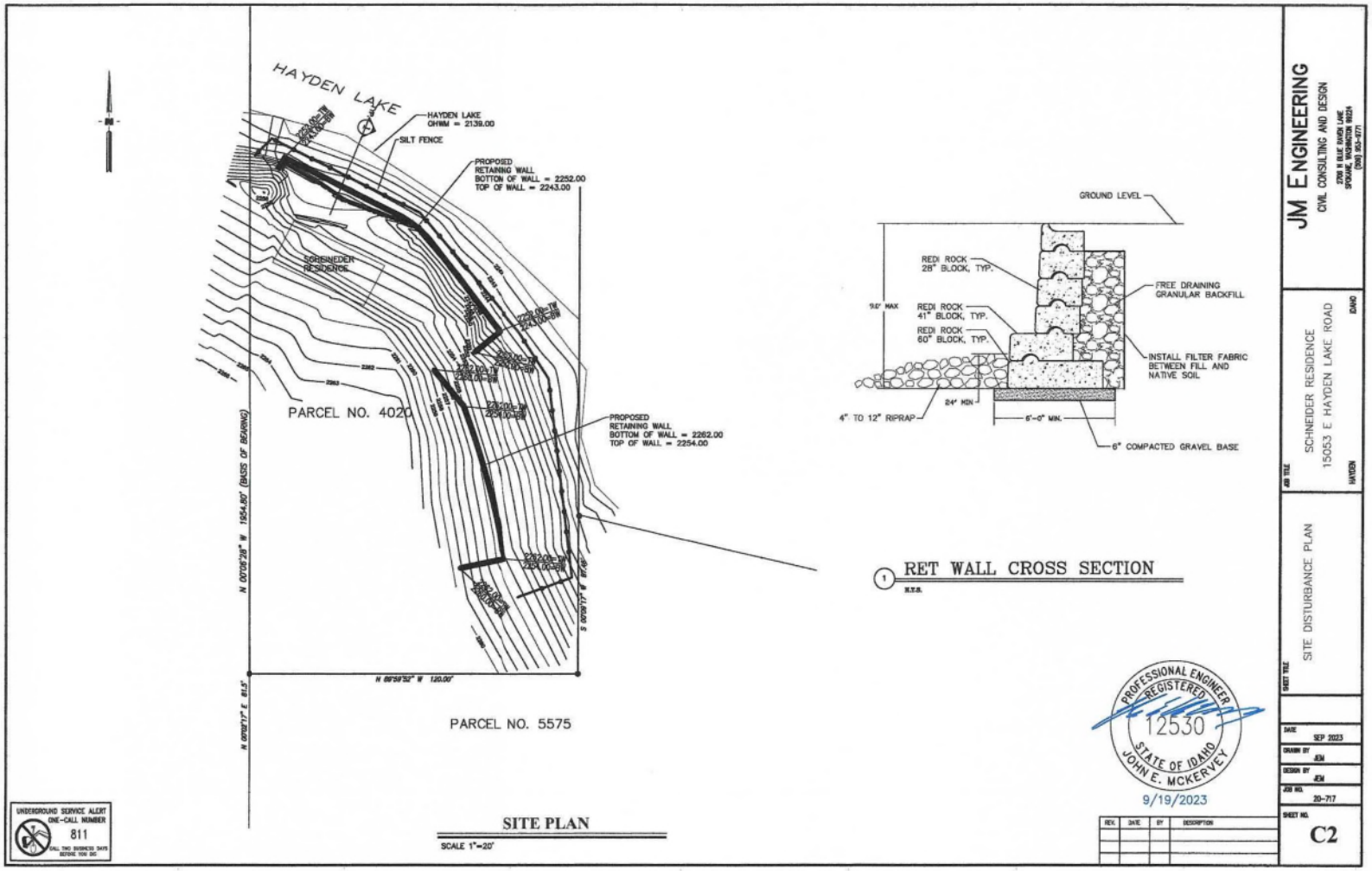
REV.	DATE	BY	DESCRIPTION

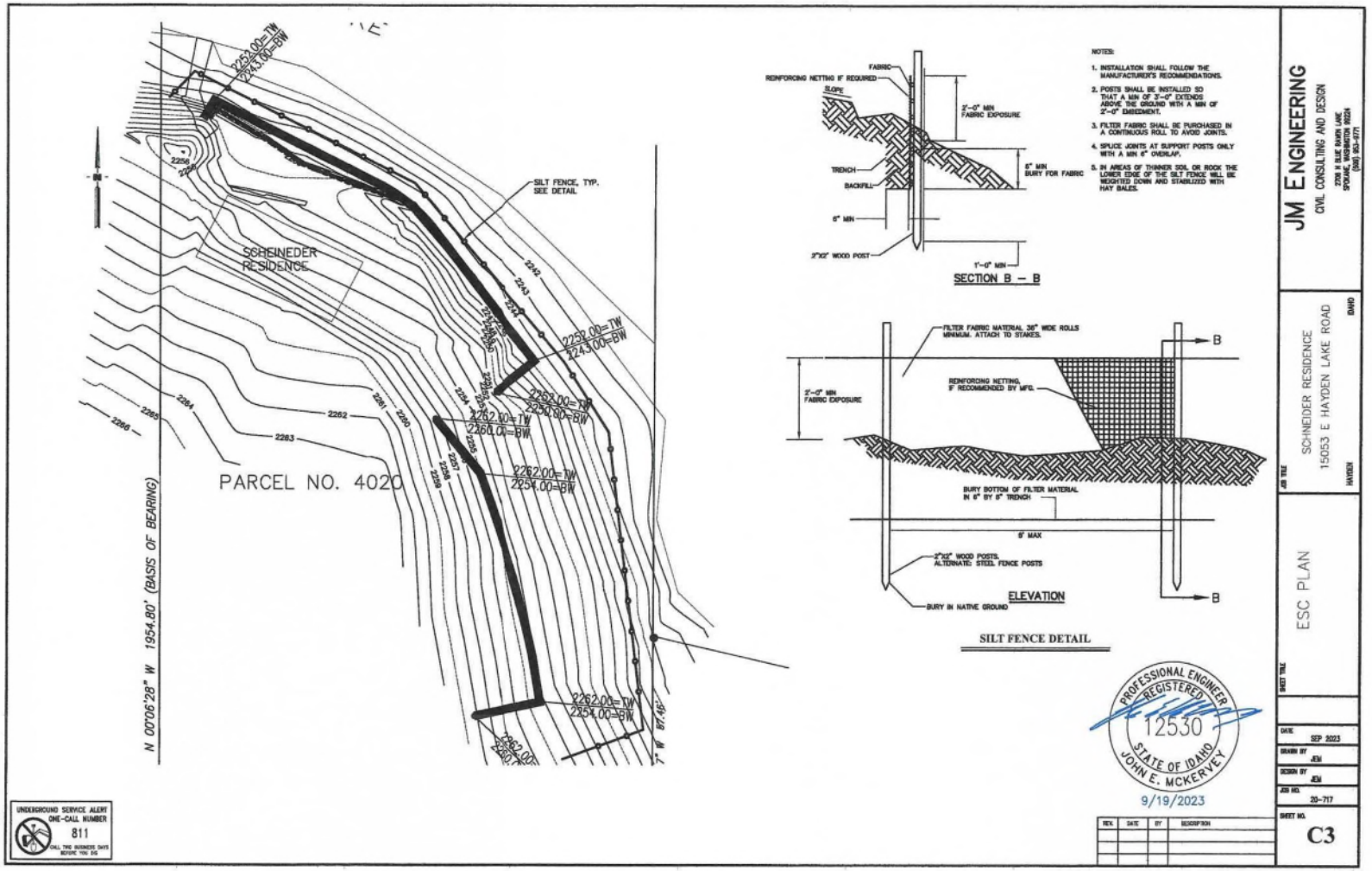
JM ENGINEERING
CIVIL CONSULTING AND DESIGN
STEVE W. RIDGE AVENUE, SUITE 201, POST FALLS, IDAHO
SPOKANE, WASHINGTON 99223
(509) 953-1971

JOB TITLE: SCHNEIDER RESIDENCE
15053 E HAYDEN LAKE ROAD
HAYDEN IDAHO

SHEET TITLE: PROJECT NOTES

DATE: SEP 2023
DRAWN BY: JEM
DESIGN BY: JEM
JOB NO.: 20-717
SHEET NO.: C1


HAYDEN LAKE
HAYDEN LAKE
OHWM = 2139.00
SILT FENCE
PROPOSED
RETAINING WALL
BOTTOM OF WALL = 2252.00
TOP OF WALL = 2243.00
SORENSEDER
RESIDENCE
PARCEL NO. 4020
PROPOSED
RETAINING WALL
BOTTOM OF WALL = 2262.00
TOP OF WALL = 2254.00
N 00°05'29" W 1954.80' (BASIS OF BEARING)
N 89°59'52" W 120.00'
N 00°02'17" E 815'
PARCEL NO. 5575
SITE PLAN
SCALE 1"=20'
GROUND LEVEL
REDI ROCK
28" BLOCK, TYP.
FREE DRAINING
GRANULAR BACKFILL
9'-0" MAX
REDI ROCK
41" BLOCK, TYP.
REDI ROCK
60" BLOCK, TYP.
INSTALL FILTER FABRIC
BETWEEN FILL AND
NATIVE SOIL
24" MIN
4" TO 12" RIPRAP
6'-0" MIN.
6" COMPACTED GRAVEL BASE
1 RET WALL CROSS SECTION
N.T.S.
UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
PROFESSIONAL ENGINEER
REGISTERED
12530
STATE OF IDAHO
JOHN E. MCKERVEY
9/19/2023
REV DATE BY DESCRIPTION
JM ENGINEERING
CIVIL CONSULTING AND DESIGN
JOB TITLE
SCHNEIDER RESIDENCE
15053 E HAYDEN LAKE ROAD
HAYDEN
IDAHO
SHEET TITLE
SITE DISTURBANCE PLAN
DATE
SEP 2023
DRAWN BY
JEM
DESIGN BY
JEM
JOB NO.
20-717
SHEET NO.
C2


SCHEINEDER RESIDENCE
PARCEL NO. 4020
SILT FENCE, TYP. SEE DETAIL
N 00°06'28" W 1954.80' (BASIS OF BEARING)
SECTION B – B
ELEVATION
SILT FENCE DETAIL
NOTES:
1. INSTALLATION SHALL FOLLOW THE MANUFACTURER'S RECOMMENDATIONS.
2. POSTS SHALL BE INSTALLED SO THAT A MIN OF 3'-0" EXTENDS ABOVE THE GROUND WITH A MIN OF 2'-0" EMBEDMENT.
3. FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL TO AVOID JOINTS.
4. SPLICE JOINTS AT SUPPORT POSTS ONLY WITH A MIN 6" OVERLAP.
5. IN AREAS OF THINNER SOIL OR ROCK THE LOWER EDGE OF THE SILT FENCE WILL BE WEIGHTED DOWN AND STABILIZED WITH HAY BALES.
JM ENGINEERING
CIVIL CONSULTING AND DESIGN
SCHNEIDER RESIDENCE
15053 E HAYDEN LAKE ROAD
ESC PLAN
SEP 2023
JEM
JEM
20-717
C3
PROFESSIONAL ENGINEER REGISTERED 12530 STATE OF IDAHO JOHN E. MCKERVEY
9/19/2023
UNDERGROUND SERVICE ALERT ONE-CALL NUMBER 811

BUILDING PERMIT APPLICATION

AGENCY USE ONLY

PERMIT #:

SDP #:

ELECTRONIC SUBMITTAL: YES: NO:

PLEASE **COMPLETE ALL** APPLICABLE FIELDS BELOW

KOOTENAI COUNTY COMMUNITY DEVELOPMENT
451 Government Way, Coeur d'Alene, ID 83814 (208) 446-1070

DESIGNATED CONTACT PERSON

NAME: John McKervey
PHONE: 509-953-9771 CELL: 509-953-9771
EMAIL: johnmckervey@yahoo.com

PARCEL INFORMATION

PARCEL #: 51N03W144020 SERIAL/AIN #: 143187

PROPERTY OWNER

NAME: Gregory Schneider
MAILING ADDRESS: 14953 E Hayden Lake Road, Hayden, ID 83835
CONTACT INFORMATION: Greg Schneider - 208-755-5876
PHONE: EMAIL:

DESIGN TEAM INFORMATION

ARCHITECT: PHONE: EMAIL:
DESIGNER: PHONE: EMAIL:
ENGINEER: JM Engineering PHONE: 509-953-9771 EMAIL: johnmckervey@yahoo.com
CONTRACTOR INFORMATION:
MAILING ADDRESS:
ID REGISTRATION #: PHONE: EMAIL:

JOB ADDRESS: 15053 E Hayden Lake Road
DIRECTIONS TO THE SITE FROM COEUR D'ALENE:

REQUIRED PROJECT INFORMATION

RESIDENTIAL

NEW: ✔ ALTERATION: POLE STRUCTURE: VALUATION:
HABITABLE SQ FT: GARAGE/SHOP SQ FT: DECK SQ FT: COVERED PATIO/PORCH SQ FT:
IF **NEW** DWELLING, NUMBER OF BEDROOMS ON PLAN:
IF **ALTERATION** TO EXISTING DWELLING, # OF EXISTING BEDROOMS: TOTAL # OF BEDROOMS AFTER CONSTRUCTION:

COMMERCIAL

(IDAHO LICENSED ARCHITECT MAY BE REQUIRED)

NEW: ALTERATION: POLE STRUCTURE: VALUATION:
OCCUPANCY CLASSIFICATION 1) CONSTRUCTION TYPE: AREA:
OCCUPANCY CLASSIFICATION 2) CONSTRUCTION TYPE: AREA:
OCCUPANCY CLASSIFICATION 3) CONSTRUCTION TYPE: AREA:

SITE INFORMATION

SNOW ZONE: A: B: C: D: **ENERGY:** NATURAL GAS: PROPANE: ELECTRIC:
DOES THE SITE SLOPE EXCEED 33%? YES: NO: ✔ NUMBER OF EXISTING BUILDINGS ON SITE:
ARE THERE ANY CODE VIOLATIONS ON THIS PARCEL? YES: NO: CV#:

DEVELOPMENT INFORMATION

IS PARCEL LOCATED IN THE SPECIAL FLOOD HAZARD AREA? YES: ✔ NO:
IF YES, WILL FILL BE USED TO ELEVATE THE PROPOSED STRUCTURE? YES: NO: IF YES, HOW MUCH? CUBIC YARDS
IS THE SITE WITHIN 500 FT OF SURFACE WATER? YES: ✔ NO: IF YES, DOES THE SLOPE EXCEED 10%? YES: NO:
WILL THE PROPOSED SITE DISTURBANCE AFFECT MORE THAN 1/3 OF THE PARCEL? YES: NO: ✔
DESCRIBE THE PROPOSED SCOPE OF WORK: Installation of retaining walls

Page 1 of 4

PLAN REQUIREMENT CHECKLIST

SELECTION OF ALL RELEVANT PORTIONS IN THIS CHECKLIST ARE REQUIRED

THE FOLLOWING CHECKLIST CONTAINS THE MOST COMMON MINIMUM REQUIREMENTS FOR CONSTRUCTION PLANS FOR A NEW BUILDING. DEPENDING ON MORE SPECIFIC INDIVIDUAL DESIGN OPTIONS, ADDITIONAL REQUIREMENTS MAY BE NECESSARY. RELEVANT PORTIONS OF THIS LIST ALSO APPLY TO SMALLER CONSTRUCTION PROJECTS SUCH AS DECKS, ADDITIONS, ETC.

1. ELEVATIONS:

_____ PROVIDE AN ELEVATION VIEW OF ALL SIDES OF THE STRUCTURE WHERE THERE IS PROPOSED WORK

_____ ACCURATELY INDICATE THE ADJACENT GRADE AND SLOPE WITHIN 20' IN ALL DIRECTIONS FROM THE STRUCTURE

2. FOUNDATION PLAN AND DETAILS (INCLUDE COMPLETE DIMENSIONS):

_____ ALL FOOTING, STEM WALL, PIER SIZES AND RETAINING WALLS

_____ SIZE AND PLACEMENT OF ALL REINFORCEMENT

_____ DEPTH OF FOOTINGS BELOW GRADE FOR FROST BURIAL

_____ TYPE AND LOCATION OF ALL ANCHORAGE HARDWARE. INCLUDE THE **SPECIFIC** TYPE OF HOLD DOWNS

_____ METHOD AND AMOUNT OF CRAWL SPACE VENTILATION OR CONDITIONING

_____ CRAWL SPACE ACCESS LOCATION AND OPENING SIZE

_____ POST LAYOUT (DECKS, POLE STRUCTURES, ETC.)

_____ POST HOLE SIZE (INCLUDING PUNCH PAD IF APPLICABLE)

3. FLOOR PLANS FOR EACH LEVEL WHICH INDICATE (INCLUDE COMPLETE DIMENSIONS):

_____ THE INTENDED USE OF EACH ROOM INCLUDING BONUS ROOMS

_____ ALL WINDOWS AND DOOR SIZES AND TYPE. INDICATE ALL REQUIRED EMERGENCY EGRESS OPENINGS

_____ THE LOCATIONS OF ALL FIRE PROTECTION ELEMENTS, SMOKE DETECTORS AND CARBON MONOXIDE DETECTORS

_____ REQUIRED SAFETY GLAZING AT ALL HAZARDOUS LOCATIONS IN ACCORDANCE WITH R308.4

_____ LOCATION, TYPE AND FUEL SOURCE OF ALL FUEL BURNING APPLIANCES

_____ THE LOCATION AND TYPE OF VEHICLE IMPACT PROTECTION DEVICES (SUCH AS BOLLARDS)

_____ THE LOCATION AND CFM OF ALL REQUIRED MECHANICAL VENTILATION

_____ ALL REQUIRED FIRE SEPARATION DETAILED ON THE PLAN

4. BUILDING CROSS SECTIONS AS NECESSARY WHICH CLEARLY SHOW ALL LEVELS OF THE STRUCTURE (INCLUDE COMPLETE DIMENSIONS):

_____ IDENTIFY ALL CONSTRUCTION MATERIALS INCLUDING INSULATION

_____ WALL FRAMING COMPONENTS

_____ COMPLETE STAIR, HANDRAIL AND GUARD DETAILS

_____ CLEARANCE FROM GRADE OR SLAB TO FRAMING AND SIDING

5. FLOOR FRAMING PLAN FOR EACH FLOOR AND DECK (INCLUDE COMPLETE DIMENSIONS):

_____ FLOOR JOIST SIZE, SPACING, SPECIES, GRADE, OR MANUFACTURER AND SERIES IF ENGINEERED WOOD

_____ ALL BEAM SIZES ON THE PLAN (INCLUDE DESIGN CALCULATIONS IF MORE THAN 6')

_____ LAYOUT OF SUBMITTED FLOOR TRUSSES MUST MATCH PLAN LAYOUT

_____ DECK FRAMING, STAIR, GUARD, HANDRAIL DETAILS AND SPECIFIC HARDWARE REQUIREMENTS

_____ METHODS OF SUPPORT AND ALL CONNECTING HARDWARE

_____ DECK LEDGER ATTACHMENT AND FLASHING DETAIL

_____ DECK LATERAL RESTRAINT DETAIL

_____ SLAB REQUIREMENTS

6. ROOF FRAMING PLAN (INCLUDE COMPLETE DIMENSIONS):

_____ RAFTER SIZE, SPACING, SPECIES, GRADE, OR MANUFACTURER AND SERIES IF ENGINEERED WOOD
_____ TRUSS LAYOUT DIAGRAM AND SPECIFICATION DETAILS FOR EACH TRUSS (MUST BE CONSISTENT WITH SNOW LOAD CATEGORY)
_____ ALL BEAM SIZES ON THE PLAN. PROVIDE DESIGN CALCULATIONS FOR ANY BEAM EXCEEDING 6' IN LENGTH
_____ ALL OPENING HEADER SIZES AND MATERIAL. PROVIDE DESIGN CALCULATIONS FOR ANY HEADER EXCEEDING 6' IN LENGTH
_____ LAYOUT OF SUBMITTED ROOF TRUSSES MUST MATCH PLAN LAYOUT
_____ COMPLETE DETAILS OF OVER-FRAMING SUPPORT AND CONNECTIONS
_____ METHODS OF SUPPORT AND ALL CONNECTING HARDWARE
_____ ALL METHODS OF UPLIFT RESTRAINT INDICATE **SPECIFIC** HARDWARE TO BE USED

7. BUILDING BRACING PLAN, PRESCRIPTIVE (INCLUDE COMPLETE DIMENSIONS):

METHODS AND LOCATIONS OF ALL WALL BRACING, INCLUDING REQUIRED INTERIOR WALLS:

_____ CONTINUOUSLY SHEATHED METHOD, LOCATIONS, PERCENTAGES OF COUNTABLE PANELS, DETAIL
_____ INTERMITTENT BRACED WALL PANELS, LOCATION, LENGTHS, TYPE, DETAIL
_____ ALTERNATE PANEL, LOCATIONS, LENGTHS, DETAIL
_____ WORKSHEET FOR WIND ADJUSTMENT FACTORS

ALL HOLD DOWN AND OTHER HARDWARE LOCATIONS. INDICATE THE SPECIFIC HARDWARE TO BE USED.

_____ TO FOUNDATION
_____ TO FLOOR BELOW
_____ TO HEADER
_____ BRACING OF TRUSSES TO WALL

8. ENERGY CODE COMPLIANCE (CHECK ONE):

RESIDENTIAL:

_____ DEMONSTRATE COMPLETE PRESCRIPTIVE COMPLIANCE FROM IRC N1102.1 CLIMATE ZONE 5 VALUES ON THE PLAN,
OR
_____ RESCHECK ENERGY COMPLIANCE CERTIFICATE (NOTE: RESCHECK MUST MATCH THE VALUES ON THE PLAN.)
DUCT AND AIR HANDLER LOCATION NOTED (IF LOCATED IN UNCONDITIONED SPACE, DUCT LEAKAGE TESTING IS REQUIRED)

COMMERCIAL:

_____ COMCHECK ENERGY COMPLIANCE CERTIFICATES (NOTE: COMCHECK MUST MATCH THE VALUES ON THE PLAN)

9. HVAC REQUIREMENTS-RESIDENTIAL (CHECK ONE):

_____ HVAC REVIEW FORM
_____ MANUAL J CALCULATIONS
_____ MANUAL D CALCULATIONS AND DUCT LAYOUT SCHEMATIC DRAWING
_____ MANUFACTURER'S PERFORMANCE DATA SHEETS

10. ENVELOPE AIR SEAL METHOD (CHECK ONE):

_____ BLOWER DOOR TEST
_____ INSPECTION PER IRC TABLE 1102.4.2

DUCT LEAKAGE TEST (IF DUCTS ARE LOCATED IN UNCONDITIONED SPACE) (CHECK ONE):

_____ AT ROUGH IN
_____ AT FINAL INSPECTION

11. COMMERCIAL (IDAHO LICENSED ARCHITECT IS REQUIRED)

_____ CODE ANALYSIS (HEIGHT, AREA, TYPE OF CONSTRUCTION, OCCUPANCY CLASSIFICATION, TYPE OF SPRINKLERS IF PROVIDED, SEPARATED/NON-SEPARATED USE)
_____ EXITING PLAN
_____ FIRE RESISTIVE CONSTRUCTION DETAILS
_____ ACCESSIBILITY PLAN AND DETAILS
_____ MECHANICAL PLAN

CONDITIONS

1. THIS APPLICATION IS NOT AUTHORIZATION FOR ANY WORK TO COMMENCE.
2. THIS APPLICATION SHALL BE DEEMED AS BEING CANCELLED IF NOT ISSUED WITHIN 180 DAYS AFTER THE DATE OF FILING, UNLESS SUCH APPLICATION HAS BEEN PURSUED IN GOOD FAITH.
3. ANY PERMIT WHICH MAY BE ISSUED AS A RESULT OF THIS APPLICATION SHALL BECOME INVALID IF THE AUTHORIZED WORK IS NOT COMMENCED WITHIN 180 DAYS FROM THE DATE OF ISSUANCE, OR, IF THE AUTHORIZED WORK IS ABANDONED OR SUSPENDED FOR A PERIOD OF 180 DAYS.
4. IF AUTHORIZED BY A PERMIT, THE PROPOSED WORK MUST COMPLY WITH ALL ADOPTED CODES, ORDINANCES, STATUTES, AND POLICIES OF KOOTENAI COUNTY AND ANY OTHER AUTHORITY HAVING JURISDICTION.
5. INSPECTIONS MUST BE REQUESTED AND APPROVED PRIOR TO CONTINUING TO ANY SUBSEQUENT PHASE OF CONSTRUCTION.
6. ALL PERMITS FOR STRUCTURES OR MODIFICATIONS TO STRUCTURES THAT WILL BE OCCUPIED ARE REQUIRED TO RECEIVE A CERTIFICATE OF OCCUPANCY.
7. PER IDAHO STATUTE, KOOTENAI COUNTY ONE CALL MUST BE CALLED (811) AT LEAST 2 WORKING DAYS PRIOR TO ANY EXCAVATION.

NON-REFUNDABLE PLAN REVIEW FEES ARE DUE AT THE TIME OF SUBMITTAL

BY THIS SIGNATURE, I HEREBY ACKNOWLEDGE THAT THE ATTACHED SITE PLAN IS A TRUE AND ACCURATE REPRESENTATION OF THE SITE. I ATTEST THAT THE BUILDING PERIMETER AND PROPERTY LINES WILL BE CLEARLY MARKED AT THE TIME OF THE FIRST INSPECTION. I ASSUME ALL RESPONSIBILITY FOR ANY INACCURACIES CONTAINED HEREIN.

I HAVE ALSO CAREFULLY READ AND COMPLETED THIS APPLICATION AND ACKNOWLEDGE THAT THE SAME IS TRUE AND CORRECT.

_____ _____

OWNER OR AUTHORIZED AGENT SIGNATURE DATE

_____

(PRINT NAME)

KOOTENAI COUNTY

COMMUNITY DEVELOPMENT

BUILDING • CODE ENFORCEMENT • PLANNING

LETTER OF AUTHORIZATION

Date: _____

To: Kootenai County Community Development
451 N. Government Way
P.O. Box 9000
Coeur d'Alene, ID 83816-9000

Owner Name (Print): Gregory Schneider

Address: 14963 E Hayden Lake Road, Hayden, ID 83835

Email: greg@transplanety.com

Phone Number: 208-755-5876

Property Identification:

AIN: 143187 Parcel Number: 51N03W144020

Job Address: 15053 E Hayden Lake Road

Please be advised that I (we), Gregory Schneider **Owner,** authorize _____

_____

Individual(s) or Company (ies) to act as an agent(s) on my behalf in **all matters** related to obtaining a permit for building, mechanical, demolition and site disturbance work as well as performing the work.

I(we) further understand and agree that I (we) shall remain responsible for all permit conditions, permit provisions, fees, deposits, additional charges and collections resulting from permit application processing, permit issuance and inspection of work.

_____ _____

Owner Signature **Date**

JM Engineering

Structural Design Calculations

of

Gravity Segmental Block Retaining Wall

Schneider Residence
15053 E Upper Hayden Lake Road
Hayden, ID

For

Greg Schneider

15053 E Upper Hayden Lake Road
Hayden, ID 83835

9/13/2023

JM Engineering – 2706 N. Blue Raven Lane - Spokane, WA 99224 PH: 509-953-9771

SCOPE OF WORK

Structural design of gravity retaining walls with respect to direct lateral soil loads and traffic loads and equipment dead loads. All methods of analysis are in accordance with NCMA. The following assumptions are to be verified prior to construction.

Design Loads

Soil Type	Sandy Loam
Native Soil Friction Angle	30 degrees
Native Soil Weight	110 pcf
Native Soil Cohesion	100 pcf
Native Soil Bearing Capacity	2,000 psf

Material

Block Type	Redi-Rock (28"x46"x18") Redi-Rock (41"x46"x18") Redi-Rock (60"x46"x18")
Filter Fabric	US Fabrics US 80NW or equal
Drainage Pipe	4" ADS Single Wall Drainpipe with Sock

INSTRUCTIONS TO CLIENT/CONTRACTOR

During the construction of the retaining wall the client or contractor is required to take photographs of the construction process and provide the photos to the design engineer. The following are items that should be shown in the photos:

1. Preparation of the base gravel
2. Installation of the drainage pipe
3. Installation of free draining backfill
4. Installation of filter fabric
5. Installation of geo-grid (If required by design)
6. Placement and compaction of backfill

Analysis of Redi Rock wall

Input data

Task : Schneider Residence
Description : 4.5 Foot Section
Customer : Greg Schneider
Author : John McKervey
Date : 9/11/2023
Project number : 2020-717

Settings

Standard - safety factors

Wall analysis

Verification methodology : Safety factors (ASD)
Active earth pressure calculation : Coulomb
Passive earth pressure calculation : Caquot-Kerisel
Earthquake analysis : Mononobe-Okabe
Shape of earth wedge : Calculate as skew
Allowable eccentricity : 0.333
Internal stability : Standard - straight slip surface
Reduction coeff. of contact first block - base : 1.00

Safety factors		
Permanent design situation		
Safety factor for overturning :	SF_o =	1.50 [–]
Safety factor for sliding resistance :	SF_s =	1.50 [–]
Safety factor for bearing capacity :	SF_b =	1.50 [–]
Safety factor for sliding along geo-reinforcement :	SF_{sr} =	1.50 [–]
Safety factor for geo-reinforcement strength :	SF_{st} =	1.50 [–]
Safety factor for pull out resistance of geo-reinf. :	SF_{po} =	1.50 [–]
Safety factor for connection strength :	SF_{con} =	1.50 [–]

Blocks

No.	Description	Height h [in]	Width w [in]	Unit weight γ [pcf]
1	Block 28	18.00	27.75	130.00
2	Block 41	18.00	40.50	130.00
3	Block 60	18.00	60.00	130.00
4	Top block 24	18.00	24.00	130.00
5	Planter 41	18.00	40.50	112.00
6	Top block 28	18.00	28.00	120.00
7	Top block 41	18.00	40.50	120.00
8	Top block 24 straight garden	18.00	24.00	80.00
9	Planter 60	18.00	60.00	112.00
10	Block R-5236 HC	36.00	52.00	110.00
11	Block R-7236 HC	36.00	72.00	110.00
12	Block R-9636 HC	36.00	96.00	110.00
13	Block R-41 HC	18.00	40.50	110.00

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[Redi-Rock International | (231) 237 - 9500 ext 3010| engineering@redi-rock.com| www.redi-rock.com]

No.	Description	Min. shear strength F_{min} [lbf/ft]	Max. shear strength F_{max} [lbf/ft]	Friction f [°]
1	Block 28	1700.00	9000.00	75.00
2	Block 41	1700.00	9000.00	75.00
3	Block 60	1700.00	9000.00	75.00
4	Top block 24	1700.00	9000.00	75.00
5	Planter 41	1700.00	9000.00	75.00
6	Top block 28	6061.00	11276.00	44.00
7	Top block 41	6061.00	11276.00	44.00
8	Top block 24 straight garden	6061.00	11276.00	44.00
9	Planter 60	6061.00	11276.00	44.00
10	Block R-5236 HC	4550.00	12000.00	44.00
11	Block R-7236 HC	4550.00	12000.00	44.00
12	Block R-9636 HC	4550.00	12000.00	44.00
13	Block R-41 HC	5358.00	12906.00	37.00

Setbacks

No.	Setback s [in]
1	0.010
2	0.375
3	1.625
4	9.375
5	16.625

Geometry

No. group	Description	Count	Setback s [in]
1	Block 28	1	1.62
2	Block 28	1	1.62
3	Top block 28	1	-

Base

Geometry

Upper setback a_1 = 0.50 ft
Lower setback a_2 = 0.50 ft
Height h = 0.50 ft
Width b = 3.00 ft

Material

Soil creating foundation - Gravel Foundation

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [psf]	γ [pcf]	γ_{su} [pcf]	δ [°]
1	Sandy Loam		30.00	100.0	110.00	52.50	20.00

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No.	Name	Pattern	φ_{ef} [°]	c_{ef} [psf]	γ [pcf]	γ_{su} [pcf]	δ [°]
2	Gravel Foundation		40.00	0.0	135.00	72.50	27.00

All soils are considered as cohesionless for at rest pressure analysis.

Soil parameters

Sandy Loam

Unit weight : γ = 110.0 pcf
Stress-state : effective
Angle of internal friction : φ_{ef} = 30.00 °
Cohesion of soil : c_{ef} = 100.0 psf
Angle of friction struc.-soil : δ = 20.00 °
Saturated unit weight : γ_{sat} = 115.0 pcf

Gravel Foundation

Unit weight : γ = 135.0 pcf
Stress-state : effective
Angle of internal friction : φ_{ef} = 40.00 °
Cohesion of soil : c_{ef} = 0.0 psf
Angle of friction struc.-soil : δ = 27.00 °
Saturated unit weight : γ_{sat} = 135.0 pcf

Backfill

Backfill is not considered.

Geological profile and assigned soils

No.	Thickness of layer t [ft]	Depth z [ft]	Assigned soil	Pattern
1	4.50	0.00 .. 4.50	Sandy Loam	
2	0.50	4.50 .. 5.00	Gravel Foundation	
3	-	5.00 .. ∞	Sandy Loam	

Terrain profile

Terrain behind the structure is flat.

Water influence

Ground water table is located below the structure.

Resistance on front face of the structure

Resistance on front face of the structure: at rest
Soil on front face of the structure - Sandy Loam
Soil thickness in front of structure h = 1.00 ft

Terrain in front of structure is flat.

Earthquake

Factor of horizontal acceleration K_h = 0.1700
Factor of vertical acceleration K_v = 0.0000

Water below the GWT is restricted.

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[Redi-Rock International | (231) 237 - 9500 ext 3010| engineering@redi-rock.com| www.redi-rock.com]

Settings of the stage of construction

Design situation : permanent
Reduction of soil/soil friction angle : do not reduce

Verification No. 1

Forces acting on construction

Name	F_{hor} [lbf/ft]	App.Pt. z [ft]	F_{vert} [lbf/ft]	App.Pt. x [ft]	Design coefficient
Weight - wall	0.0	-2.27	1432.5	1.74	1.000
Earthq.- constr.	246.9	-2.27	0.0	1.76	1.000
FF resistance	-27.5	-0.33	0.1	-0.25	1.000
Weight - earth wedge	0.0	-0.59	2.9	2.88	1.000
Earthquake - soil wedge	0.5	-0.59	0.0	2.88	1.000
Weight - earth wedge	0.0	-4.79	82.3	2.09	1.000
Earthquake - soil wedge	14.0	-4.79	0.0	2.09	1.000
Active pressure	85.4	-0.45	81.7	2.94	1.000
Earthq.- act.pressure	175.4	-3.35	102.7	3.01	1.000

Verification of complete wall

Check for overturning stability
Resisting moment M_{res} = 3223.7 lbfft/ft
Overturning moment M_{ovr} = 1244.0 lbfft/ft

Safety factor = 2.59 > 1.50
Wall for overturning is SATISFACTORY

Check for slip
Resisting horizontal force H_{res} = 1215.35 lbf/ft
Active horizontal force H_{act} = 494.72 lbf/ft

Safety factor = 2.46 > 1.50
Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Dimensioning No. 1

Forces acting on construction

Name	F_{hor} [lbf/ft]	App.Pt. z [ft]	F_{vert} [lbf/ft]	App.Pt. x [ft]	Design coefficient
Weight - wall	0.0	-2.10	1230.0	1.28	1.000
Earthq.- constr.	214.3	-2.08	0.0	1.29	1.000
FF resistance	-6.9	-0.17	0.0	0.00	1.000
Weight - earth wedge	0.0	-4.29	82.3	1.59	1.000
Earthquake - soil wedge	14.0	-4.29	0.0	1.59	1.000
Active pressure	12.0	-0.31	3.1	2.34	1.000
Earthq.- act.pressure	136.7	-3.04	80.9	2.51	1.000

Verification of block No. 1

Check for overturning stability
Resisting moment M_{res} = 1917.0 lbfft/ft

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Overturning moment M_{ovr} = 923.7 lbfft/ft

Safety factor = 2.08 > 1.50
Joint for overturning stability is SATISFACTORY

Check for slip
Resisting horizontal force H_{res} = 1171.70 lbf/ft
Active horizontal force H_{act} = 370.14 lbf/ft

Safety factor = 3.17 > 1.50
Joint for verification is SATISFACTORY

Bearing capacity of foundation soil

Design load acting at the center of footing bottom

No.	Moment [lbfft/ft]	Norm. force [lbf/ft]	Shear Force [lbf/ft]	Eccentricity [–]	Stress [psf]
1	573.6	1702.16	494.72	0.112	731.8

Service load acting at the center of footing bottom

No.	Moment [lbfft/ft]	Norm. force [lbf/ft]	Shear Force [lbf/ft]
1	573.6	1702.16	494.72

Verification of foundation soil

Stress in the footing bottom : rectangle

Eccentricity verification
Max. eccentricity of normal force e = 0.112
Maximum allowable eccentricity e_{alw} = 0.333

Eccentricity of the normal force is SATISFACTORY

Verification of bearing capacity
Max. stress at footing bottom σ = 731.8 psf
Bearing capacity of foundation soil R_d = 2000.0 psf

Safety factor = 2.73 > 1.50
Bearing capacity of foundation soil is SATISFACTORY

Overall verification - bearing capacity of found. soil is SATISFACTORY

Slope stability analysis

Input data (Construction stage 1)

Project

Settings

Standard - safety factors

Stability analysis

Verification methodology : Safety factors (ASD)
Earthquake analysis : Standard

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Settings of the stage of construction

Design situation : permanent
Reduction of soil/soil friction angle : do not reduce

Verification No. 1

Forces acting on construction

Name	F_{hor} [lbf/ft]	App.Pt. z [ft]	F_{vert} [lbf/ft]	App.Pt. x [ft]	Design coefficient
Weight - wall	0.0	-2.75	2158.1	2.01	1.000
Earthq.- constr.	370.2	-2.78	0.0	2.02	1.000
FF resistance	-27.5	-0.33	0.1	-0.25	1.000
Weight - earth wedge	0.0	-0.57	1.5	3.92	1.000
Earthquake - soil wedge	0.3	-0.57	0.0	3.92	1.000
Weight - earth wedge	0.0	-2.46	70.1	3.30	1.000
Earthquake - soil wedge	11.9	-2.46	0.0	3.30	1.000
Weight - earth wedge	0.0	-6.29	82.3	2.22	1.000
Earthquake - soil wedge	14.0	-6.29	0.0	2.22	1.000
Active pressure	316.3	-1.57	356.7	3.66	1.000
Earthq.- act.pressure	300.6	-4.30	239.7	3.32	1.000

Verification of complete wall

Check for overturning stability
Resisting moment M_{res} = 6860.4 lbfft/ft
Overturning moment M_{ovr} = 2926.0 lbfft/ft

Safety factor = 2.34 > 1.50
Wall for overturning is SATISFACTORY

Check for slip
Resisting horizontal force H_{res} = 1949.76 lbf/ft
Active horizontal force H_{act} = 985.82 lbf/ft

Safety factor = 1.98 > 1.50
Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Dimensioning No. 1

Forces acting on construction

Name	F_{hor} [lbf/ft]	App.Pt. z [ft]	F_{vert} [lbf/ft]	App.Pt. x [ft]	Design coefficient
Weight - wall	0.0	-2.61	1888.1	1.51	1.000
Earthq.- constr.	326.5	-2.62	0.0	1.52	1.000
FF resistance	-6.9	-0.17	0.0	0.00	1.000
Weight - earth wedge	0.0	-1.96	70.1	2.80	1.000
Earthquake - soil wedge	11.9	-1.96	0.0	2.80	1.000
Weight - earth wedge	0.0	-5.79	82.3	1.72	1.000
Earthquake - soil wedge	14.0	-5.79	0.0	1.72	1.000
Active pressure	236.4	-1.49	267.5	3.06	1.000

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Name	F_{hor} [lbf/ft]	App.Pt. z [ft]	F_{vert} [lbf/ft]	App.Pt. x [ft]	Design coefficient
Earthq.- act.pressure	248.0	-3.99	195.4	2.79	1.000

Verification of block No. 1

Check for overturning stability
Resisting moment M_{res} = 4555.5 lbfft/ft
Overturning moment M_{ovr} = 2300.1 lbfft/ft

Safety factor = 1.98 > 1.50
Joint for overturning stability is SATISFACTORY

Check for slip
Resisting horizontal force H_{res} = 2100.60 lbf/ft
Active horizontal force H_{act} = 829.87 lbf/ft

Safety factor = 2.53 > 1.50
Joint for verification is SATISFACTORY

Bearing capacity of foundation soil

Design load acting at the center of footing bottom

No.	Moment [lbfft/ft]	Norm. force [lbf/ft]	Shear Force [lbf/ft]	Eccentricity [–]	Stress [psf]
1	1882.6	2908.49	985.82	0.162	1075.0

Service load acting at the center of footing bottom

No.	Moment [lbfft/ft]	Norm. force [lbf/ft]	Shear Force [lbf/ft]
1	1882.6	2908.49	985.82

Verification of foundation soil

Stress in the footing bottom : rectangle

Eccentricity verification
Max. eccentricity of normal force e = 0.162
Maximum allowable eccentricity e_{alw} = 0.333

Eccentricity of the normal force is SATISFACTORY

Verification of bearing capacity
Max. stress at footing bottom σ = 1075.0 psf
Bearing capacity of foundation soil R_d = 2000.0 psf

Safety factor = 1.86 > 1.50
Bearing capacity of foundation soil is SATISFACTORY

Overall verification - bearing capacity of found. soil is SATISFACTORY

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Slope stability analysis

Input data (Construction stage 1)

Project

Settings

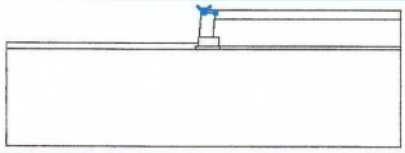
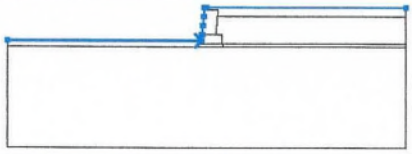
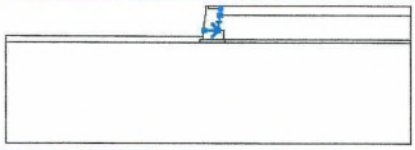
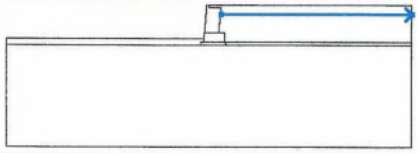
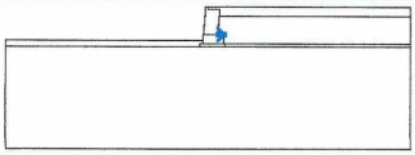
Standard - safety factors

Stability analysis

Verification methodology : Safety factors (ASD)
Earthquake analysis : Standard

Safety factors		
Permanent design situation		
Safety factor :	SF_s =	1.50 [–]

Interface

No.	Interface location	Coordinates of interface points [ft]					
		x	z	x	z	x	z
1		0.00	0.00	0.00	-0.42	1.92	-0.42
2		-32.80	-5.50	-0.82	-5.50	-0.82	-4.50
		-0.69	-4.50	-0.69	-3.00	-0.55	-3.00
		-0.55	-1.50	-0.42	-1.50	-0.42	0.00
		0.00	0.00	32.80	0.00		
3		-0.69	-4.50	1.62	-4.50	1.62	-3.00
		1.76	-3.00	1.76	-1.50	1.92	-1.50
		1.92	-0.42				
4		1.92	-1.50	32.80	-1.50		
5		1.62	-4.50	2.55	-4.50		

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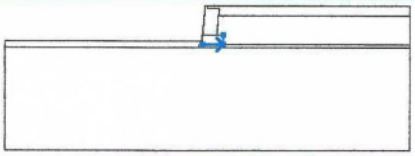
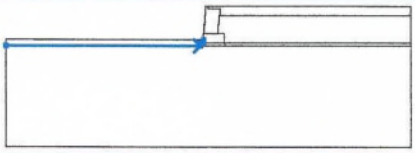
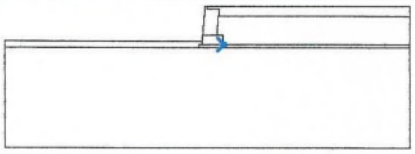
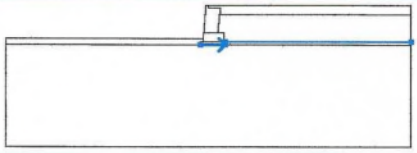
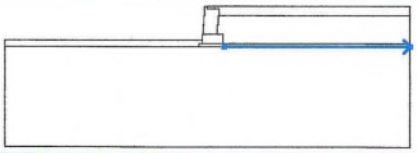
No.	Interface location	Coordinates of interface points [ft]					
		x	z	x	z	x	z
6		-0.82	-6.00	2.55	-6.00	2.55	-4.50
7		-32.80	-6.50	-1.32	-6.50	-1.32	-6.00
		-0.82	-6.00	-0.82	-5.50		
8		2.55	-6.00	2.68	-6.00		
9		-1.32	-6.50	2.68	-6.50	2.68	-6.00
		32.80	-6.00				
10		2.68	-6.50	32.80	-6.50		

Settings of the stage of construction

Design situation : permanent

Results (Construction stage 1)

Analysis 1

Circular slip surface

Slip surface parameters					
Center :	x =	-2.00 [ft]	Angles :	α_1 =	-32.82 [°]
	z =	2.87 [ft]		α_2 =	73.25 [°]
Radius :	R =	9.96 [ft]			
The slip surface after optimization.					

Total weight of soil above the slip surface: 5573.3 lbf/ft

Slope stability verification (Bishop)

Sum of active forces : F_a = 2592.4 lbf/ft

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Sum of passive forces : F_p = 5013.8 lbf/ft

Sliding moment : M_a = 25820.3 lbfft/ft

Resisting moment : M_p = 49937.3 lbfft/ft

Factor of safety = 1.93 > 1.50

Slope stability ACCEPTABLE

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Analysis of Redi Rock wall

Input data

Task : Schneider Residence
Description : 7.5 Foot Section
Customer : Greg Schneider
Author : John McKervey
Date : 10/15/2021
Project number : 2020-717

Settings

Standard - safety factors

Wall analysis

Verification methodology :	Safety factors (ASD)
Active earth pressure calculation :	Coulomb
Passive earth pressure calculation :	Caquot-Kerisel
Earthquake analysis :	Mononobe-Okabe
Shape of earth wedge :	Calculate as skew
Allowable eccentricity :	0.333
Internal stability :	Standard - straight slip surface
Reduction coeff. of contact first block - base :	1.00

Safety factors		
Permanent design situation		
Safety factor for overturning :	SF_o =	1.50 [–]
Safety factor for sliding resistance :	SF_s =	1.50 [–]
Safety factor for bearing capacity :	SF_b =	1.50 [–]
Safety factor for sliding along geo-reinforcement :	SF_{sr} =	1.50 [–]
Safety factor for geo-reinforcement strength :	SF_{st} =	1.50 [–]
Safety factor for pull out resistance of geo-reinf. :	SF_{po} =	1.50 [–]
Safety factor for connection strength :	SF_{con} =	1.50 [–]

Blocks

No.	Description	Height h [in]	Width w [in]	Unit weight γ [pcf]
1	Block 28	18.00	27.75	130.00
2	Block 41	18.00	40.50	130.00
3	Block 60	18.00	60.00	130.00
4	Top block 24	18.00	24.00	130.00
5	Planter 41	18.00	40.50	112.00
6	Top block 28	18.00	28.00	120.00
7	Top block 41	18.00	40.50	120.00
8	Top block 24 straight garden	18.00	24.00	80.00
9	Planter 60	18.00	60.00	112.00
10	Block R-5236 HC	36.00	52.00	110.00
11	Block R-7236 HC	36.00	72.00	110.00
12	Block R-9636 HC	36.00	96.00	110.00
13	Block R-41 HC	18.00	40.50	110.00

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No.	Description	Min. shear strength F_{min} [lbf/ft]	Max. shear strength F_{max} [lbf/ft]	Friction f [°]
1	Block 28	1700.00	9000.00	75.00
2	Block 41	1700.00	9000.00	75.00
3	Block 60	1700.00	9000.00	75.00
4	Top block 24	1700.00	9000.00	75.00
5	Planter 41	1700.00	9000.00	75.00
6	Top block 28	6061.00	11276.00	44.00
7	Top block 41	6061.00	11276.00	44.00
8	Top block 24 straight garden	6061.00	11276.00	44.00
9	Planter 60	6061.00	11276.00	44.00
10	Block R-5236 HC	4550.00	12000.00	44.00
11	Block R-7236 HC	4550.00	12000.00	44.00
12	Block R-9636 HC	4550.00	12000.00	44.00
13	Block R-41 HC	5358.00	12906.00	37.00

Setbacks

No.	Setback s [in]
1	0.010
2	0.375
3	1.625
4	9.375
5	16.625

Geometry

No. group	Description	Count	Setback s [in]
1	Planter 41	1	16.62
2	Block 28	1	1.62
3	Block 28	1	1.62
4	Block 28	1	1.62
5	Top block 28	1	-

Base

Geometry

Upper setback a_1 = 0.50 ft
Lower setback a_2 = 0.50 ft
Height h = 0.50 ft
Width b = 4.00 ft

Material

Soil creating foundation - Gravel Foundation

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [psf]	γ [pcf]	γ_{su} [pcf]	δ [°]
1	Sandy Loam		30.00	100.0	110.00	52.50	20.00

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No.	Name	Pattern	φ_{ef} [°]	c_{ef} [psf]	γ [pcf]	γ_{su} [pcf]	δ [°]
2	Gravel Foundation		40.00	0.0	135.00	72.50	27.00

All soils are considered as cohesionless for at rest pressure analysis.

Soil parameters

Sandy Loam

Unit weight : γ = 110.0 pcf
Stress-state : effective
Angle of internal friction : φ_{ef} = 30.00 °
Cohesion of soil : c_{ef} = 100.0 psf
Angle of friction struc.-soil : δ = 20.00 °
Saturated unit weight : γ_{sat} = 115.0 pcf

Gravel Foundation

Unit weight : γ = 135.0 pcf
Stress-state : effective
Angle of internal friction : φ_{ef} = 40.00 °
Cohesion of soil : c_{ef} = 0.0 psf
Angle of friction struc.-soil : δ = 27.00 °
Saturated unit weight : γ_{sat} = 135.0 pcf

Backfill

Backfill is not considered.

Geological profile and assigned soils

No.	Thickness of layer t [ft]	Depth z [ft]	Assigned soil	Pattern
1	7.50	0.00 .. 7.50	Sandy Loam	
2	0.50	7.50 .. 8.00	Gravel Foundation	
3	-	8.00 .. ∞	Sandy Loam	

Terrain profile

Terrain behind the structure is flat.

Water influence

Ground water table is located below the structure.

Resistance on front face of the structure

Resistance on front face of the structure: at rest
Soil on front face of the structure - Sandy Loam
Soil thickness in front of structure h = 1.00 ft

Terrain in front of structure is flat.

Earthquake

Factor of horizontal acceleration K_h = 0.1700
Factor of vertical acceleration K_v = 0.0000

Water below the GWT is restricted.

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Settings of the stage of construction

Design situation : permanent
Reduction of soil/soil friction angle : do not reduce

Verification No. 1

Forces acting on construction

Name	F_{hor} [lbf/ft]	App.Pt. z [ft]	F_{vert} [lbf/ft]	App.Pt. x [ft]	Design coefficient
Weight - wall	0.0	-3.54	2517.9	2.86	1.000
Earthq.- constr.	430.7	-3.49	0.0	2.85	1.000
FF resistance	-27.5	-0.33	0.1	-0.25	1.000
Weight - earth wedge	0.0	-0.56	1.2	3.92	1.000
Earthquake - soil wedge	0.2	-0.56	0.0	3.92	1.000
Weight - earth wedge	0.0	-7.79	82.3	3.61	1.000
Earthquake - soil wedge	14.0	-7.79	0.0	3.61	1.000
Active pressure	287.3	-1.25	148.3	3.99	1.000
Earthq.- act.pressure	436.0	-5.35	192.6	4.47	1.000

Verification of complete wall

Check for overturning stability
Resisting moment M_{res} = 8966.6 lbfft/ft
Overturning moment M_{ovr} = 4296.0 lbfft/ft

Safety factor = 2.09 > 1.50
Wall for overturning is SATISFACTORY

Check for slip
Resisting horizontal force H_{res} = 2016.30 lbf/ft
Active horizontal force H_{act} = 1140.82 lbf/ft

Safety factor = 1.77 > 1.50
Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Dimensioning No. 1

Forces acting on construction

Name	F_{hor} [lbf/ft]	App.Pt. z [ft]	F_{vert} [lbf/ft]	App.Pt. x [ft]	Design coefficient
Weight - wall	0.0	-3.43	2247.9	2.47	1.000
Earthq.- constr.	388.4	-3.34	0.0	2.45	1.000
FF resistance	-6.9	-0.17	0.0	0.00	1.000
Weight - earth wedge	0.0	-7.29	82.3	3.11	1.000
Earthquake - soil wedge	14.0	-7.29	0.0	3.11	1.000
Active pressure	187.6	-1.25	42.9	3.53	1.000
Earthq.- act.pressure	373.7	-5.05	168.0	3.99	1.000

Verification of block No. 1

Check for overturning stability
Resisting moment M_{res} = 6626.2 lbfft/ft

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Overturning moment M_{ovr} = 3518.6 lbfft/ft

Safety factor = 1.88 > 1.50
Joint for overturning stability is SATISFACTORY

Check for slip
Resisting horizontal force H_{res} = 2132.26 lbf/ft
Active horizontal force H_{act} = 956.82 lbf/ft

Safety factor = 2.23 > 1.50
Joint for verification is SATISFACTORY

Bearing capacity of foundation soil

Design load acting at the center of footing bottom

No.	Moment [lbfft/ft]	Norm. force [lbf/ft]	Shear Force [lbf/ft]	Eccentricity [–]	Stress [psf]
1	1214.4	2942.47	1140.82	0.103	926.9

Service load acting at the center of footing bottom

No.	Moment [lbfft/ft]	Norm. force [lbf/ft]	Shear Force [lbf/ft]
1	1214.4	2942.47	1140.82

Verification of foundation soil

Stress in the footing bottom : rectangle

Eccentricity verification
Max. eccentricity of normal force e = 0.103
Maximum allowable eccentricity e_{alw} = 0.333

Eccentricity of the normal force is SATISFACTORY

Verification of bearing capacity
Max. stress at footing bottom σ = 926.9 psf
Bearing capacity of foundation soil R_d = 2000.0 psf

Safety factor = 2.16 > 1.50
Bearing capacity of foundation soil is SATISFACTORY

Overall verification - bearing capacity of found. soil is SATISFACTORY

Slope stability analysis

Input data (Construction stage 1)

Project

Settings

Standard - safety factors

Stability analysis

Verification methodology : Safety factors (ASD)
Earthquake analysis : Standard

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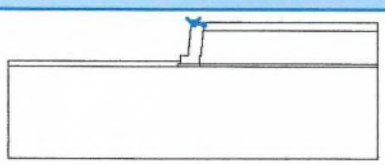
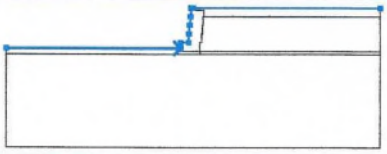
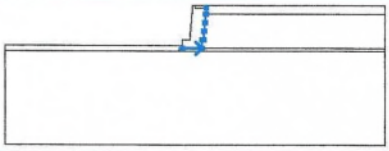
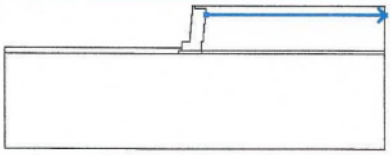
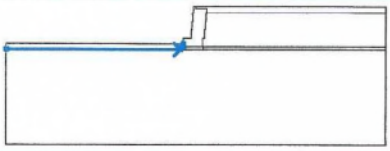
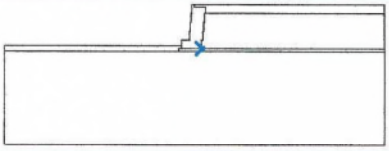
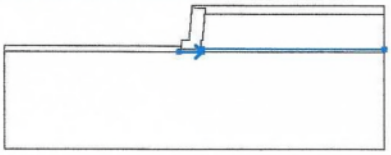
Safety factors		
Permanent design situation		
Safety factor :	SF_s =	1.50 [–]

Interface

No.	Interface location	Coordinates of interface points [ft]					
		x	z	x	z	x	z
1		0.00	0.00	0.00	-0.42	1.92	-0.42
2		-32.80	-7.00	-2.21	-7.00	-2.21	-6.00
		-0.82	-6.00	-0.82	-4.50	-0.69	-4.50
		-0.69	-3.00	-0.55	-3.00	-0.55	-1.50
		-0.42	-1.50	-0.42	0.00	0.00	0.00
		32.80	0.00				
3		-2.21	-7.50	1.17	-7.50	1.17	-6.00
		1.49	-6.00	1.49	-4.50	1.63	-4.50
		1.63	-3.00	1.76	-3.00	1.76	-1.50
		1.92	-1.50	1.92	-0.42		
4		1.92	-1.50	32.80	-1.50		
5		-32.80	-8.00	-2.71	-8.00	-2.71	-7.50
		-2.21	-7.50	-2.21	-7.00		
6		1.17	-7.50	1.29	-7.50		
7		-2.71	-8.00	1.29	-8.00	1.29	-7.50
		32.80	-7.50				

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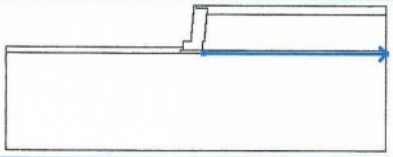
No.	Interface location	Coordinates of interface points [ft]					
		x	z	x	z	x	z
8		1.29	-8.00	32.80	-8.00		

Settings of the stage of construction

Design situation : permanent

Results (Construction stage 1)

Analysis 1

Circular slip surface

Slip surface parameters					
Center :	x =	-2.19 [ft]	Angles :	α_1 =	-24.22 [°]
	z =	3.36 [ft]		α_2 =	72.80 [°]
Radius :	R =	11.36 [ft]			
The slip surface after optimization.					

Total weight of soil above the slip surface: 6702.1 lbf/ft

Slope stability verification (Bishop)

Sum of active forces : F_a = 3342.7 lbf/ft

Sum of passive forces : F_p = 5641.5 lbf/ft

Sliding moment : M_a = 37972.6 lbfft/ft

Resisting moment : M_p = 64087.3 lbfft/ft

Factor of safety = 1.69 > 1.50

Slope stability ACCEPTABLE

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Analysis of Redi Rock wall

Input data

Task : Schneider Residence
Description : 9.0 Foot Section
Customer : Greg Schneider
Author : John McKervey
Date : 10/15/2021
Project number : 2020-717

Settings

Standard - safety factors

Wall analysis

Verification methodology : Safety factors (ASD)
Active earth pressure calculation : Coulomb
Passive earth pressure calculation : Caquot-Kerisel
Earthquake analysis : Mononobe-Okabe
Shape of earth wedge : Calculate as skew
Allowable eccentricity : 0.333
Internal stability : Standard - straight slip surface
Reduction coeff. of contact first block - base : 1.00

Safety factors		
Permanent design situation		
Safety factor for overturning :	SF_o =	1.50 [–]
Safety factor for sliding resistance :	SF_s =	1.50 [–]
Safety factor for bearing capacity :	SF_b =	1.50 [–]
Safety factor for sliding along geo-reinforcement :	SF_{sr} =	1.50 [–]
Safety factor for geo-reinforcement strength :	SF_{st} =	1.50 [–]
Safety factor for pull out resistance of geo-reinf. :	SF_{po} =	1.50 [–]
Safety factor for connection strength :	SF_{con} =	1.50 [–]

Blocks

No.	Description	Height h [in]	Width w [in]	Unit weight γ [pcf]
1	Block 28	18.00	27.75	130.00
2	Block 41	18.00	40.50	130.00
3	Block 60	18.00	60.00	130.00
4	Top block 24	18.00	24.00	130.00
5	Planter 41	18.00	40.50	112.00
6	Top block 28	18.00	28.00	120.00
7	Top block 41	18.00	40.50	120.00
8	Top block 24 straight garden	18.00	24.00	80.00
9	Planter 60	18.00	60.00	112.00
10	Block R-5236 HC	36.00	52.00	110.00
11	Block R-7236 HC	36.00	72.00	110.00
12	Block R-9636 HC	36.00	96.00	110.00
13	Block R-41 HC	18.00	40.50	110.00

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No.	Description	Min. shear strength F_{min} [lbf/ft]	Max. shear strength F_{max} [lbf/ft]	Friction f [°]
1	Block 28	1700.00	9000.00	75.00
2	Block 41	1700.00	9000.00	75.00
3	Block 60	1700.00	9000.00	75.00
4	Top block 24	1700.00	9000.00	75.00
5	Planter 41	1700.00	9000.00	75.00
6	Top block 28	6061.00	11276.00	44.00
7	Top block 41	6061.00	11276.00	44.00
8	Top block 24 straight garden	6061.00	11276.00	44.00
9	Planter 60	6061.00	11276.00	44.00
10	Block R-5236 HC	4550.00	12000.00	44.00
11	Block R-7236 HC	4550.00	12000.00	44.00
12	Block R-9636 HC	4550.00	12000.00	44.00
13	Block R-41 HC	5358.00	12906.00	37.00

Setbacks

No.	Setback s [in]
1	0.010
2	0.375
3	1.625
4	9.375
5	16.625

Geometry

No. group	Description	Count	Setback s [in]
1	Block 60	1	1.62
2	Planter 41	1	16.62
3	Block 28	1	1.62
4	Block 28	1	1.62
5	Block 28	1	1.62
6	Top block 28	1	-

Base

Geometry

Upper setback a_1 = 0.50 ft
Lower setback a_2 = 0.50 ft
Height h = 0.50 ft
Width b = 6.00 ft

Material

Soil creating foundation - Gravel Foundation

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Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [psf]	γ [pcf]	γ_{su} [pcf]	δ [°]
1	Sandy Loam		30.00	100.0	110.00	52.50	20.00
2	Gravel Foundation		40.00	0.0	135.00	72.50	27.00

All soils are considered as cohesionless for at rest pressure analysis.

Soil parameters

Sandy Loam

Unit weight : γ = 110.0 pcf
Stress-state : effective
Angle of internal friction : φ_{ef} = 30.00 °
Cohesion of soil : c_{ef} = 100.0 psf
Angle of friction struc.-soil : δ = 20.00 °
Saturated unit weight : γ_{sat} = 115.0 pcf

Gravel Foundation

Unit weight : γ = 135.0 pcf
Stress-state : effective
Angle of internal friction : φ_{ef} = 40.00 °
Cohesion of soil : c_{ef} = 0.0 psf
Angle of friction struc.-soil : δ = 27.00 °
Saturated unit weight : γ_{sat} = 135.0 pcf

Backfill

Backfill is not considered.

Geological profile and assigned soils

No.	Thickness of layer t [ft]	Depth z [ft]	Assigned soil	Pattern
1	9.00	0.00 .. 9.00	Sandy Loam	
2	0.50	9.00 .. 9.50	Gravel Foundation	
3	-	9.50 .. ∞	Sandy Loam	

Terrain profile

Terrain behind the structure is flat.

Water influence

Ground water table is located below the structure.

Resistance on front face of the structure

Resistance on front face of the structure: at rest
Soil on front face of the structure - Sandy Loam
Soil thickness in front of structure h = 1.00 ft
Terrain in front of structure is flat.

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Earthquake

Factor of horizontal acceleration K_h = 0.1700
Factor of vertical acceleration K_v = 0.0000

Water below the GWT is restricted.

Settings of the stage of construction

Design situation : permanent
Reduction of soil/soil friction angle : do not reduce

Verification No. 1

Forces acting on construction

Name	F_{hor} [lbf/ft]	App.Pt. z [ft]	F_{vert} [lbf/ft]	App.Pt. x [ft]	Design coefficient
Weight - wall	0.0	-3.73	3627.9	3.06	1.000
Earthq.- constr.	619.3	-3.75	0.0	3.05	1.000
FF resistance	-27.5	-0.33	0.1	-0.25	1.000
Weight - earth wedge	0.0	-0.79	23.8	5.67	1.000
Earthquake - soil wedge	4.0	-0.79	0.0	5.67	1.000
Weight - earth wedge	0.0	-2.71	173.8	4.60	1.000
Earthquake - soil wedge	29.5	-2.71	0.0	4.60	1.000
Weight - earth wedge	0.0	-9.29	82.3	3.74	1.000
Earthquake - soil wedge	14.0	-9.29	0.0	3.74	1.000
Active pressure	863.8	-2.06	1203.2	5.26	1.000
Earthq.- act.pressure	628.1	-6.26	428.6	4.78	1.000

Verification of complete wall

Check for overturning stability
Resisting moment M_{res} = 20740.6 lbfft/ft
Overturning moment M_{ovr} = 8238.0 lbfft/ft

Safety factor = 2.52 > 1.50
Wall for overturning is SATISFACTORY

Check for slip
Resisting horizontal force H_{res} = 3649.74 lbf/ft
Active horizontal force H_{act} = 2131.23 lbf/ft

Safety factor = 1.71 > 1.50
Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Dimensioning No. 1

Forces acting on construction

Name	F_{hor} [lbf/ft]	App.Pt. z [ft]	F_{vert} [lbf/ft]	App.Pt. x [ft]	Design coefficient
Weight - wall	0.0	-3.67	3222.9	2.57	1.000
Earthq.- constr.	554.9	-3.65	0.0	2.56	1.000
FF resistance	-6.9	-0.17	0.0	0.00	1.000
Weight - earth wedge	0.0	-2.21	173.8	4.10	1.000

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Name	F_{hor} [lbf/ft]	App.Pt. z [ft]	F_{vert} [lbf/ft]	App.Pt. x [ft]	Design coefficient
Earthquake - soil wedge	29.5	-2.21	0.0	4.10	1.000
Weight - earth wedge	0.0	-8.79	82.3	3.24	1.000
Earthquake - soil wedge	14.0	-8.79	0.0	3.24	1.000
Active pressure	686.2	-1.95	804.4	4.49	1.000
Earthq.- act.pressure	549.0	-5.97	352.2	4.22	1.000

Verification of block No. 1

Check for overturning stability
Resisting moment M_{res} = 14363.4 lbfft/ft
Overturning moment M_{ovr} = 6830.0 lbfft/ft

Safety factor = 2.10 > 1.50
Joint for overturning stability is SATISFACTORY

Check for slip
Resisting horizontal force H_{res} = 3889.82 lbf/ft
Active horizontal force H_{act} = 1826.77 lbf/ft

Safety factor = 2.13 > 1.50
Joint for verification is SATISFACTORY

Bearing capacity of foundation soil

Design load acting at the center of footing bottom

No.	Moment [lbfft/ft]	Norm. force [lbf/ft]	Shear Force [lbf/ft]	Eccentricity [–]	Stress [psf]
1	4116.7	5539.73	2131.23	0.124	1227.3

Service load acting at the center of footing bottom

No.	Moment [lbfft/ft]	Norm. force [lbf/ft]	Shear Force [lbf/ft]
1	4116.7	5539.73	2131.23

Verification of foundation soil

Stress in the footing bottom : rectangle

Eccentricity verification
Max. eccentricity of normal force e = 0.124
Maximum allowable eccentricity e_{alw} = 0.333

Eccentricity of the normal force is SATISFACTORY

Verification of bearing capacity
Max. stress at footing bottom σ = 1227.3 psf
Bearing capacity of foundation soil R_d = 2000.0 psf

Safety factor = 1.63 > 1.50
Bearing capacity of foundation soil is SATISFACTORY

Overall verification - bearing capacity of found. soil is SATISFACTORY

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Slope stability analysis

Input data (Construction stage 1)

Project

Settings

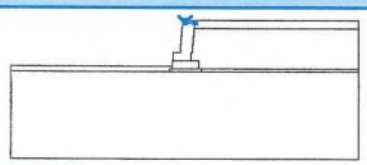
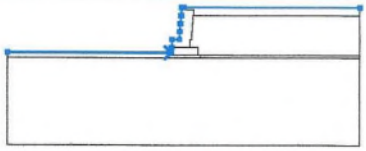
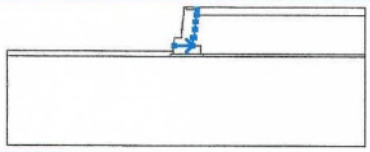
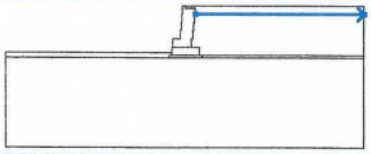
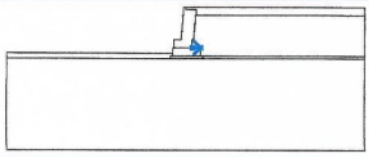
Standard - safety factors

Stability analysis

Verification methodology : Safety factors (ASD)
Earthquake analysis : Standard

Safety factors		
Permanent design situation		
Safety factor :	SF_s =	1.50 [–]

Interface

No.	Interface location	Coordinates of interface points [ft]					
		x	z	x	z	x	z
1		0.00	0.00	0.00	-0.42	1.92	-0.42
2		-32.80	-8.50	-2.34	-8.50	-2.34	-7.50
		-2.21	-7.50	-2.21	-6.00	-0.82	-6.00
		-0.82	-4.50	-0.69	-4.50	-0.69	-3.00
		-0.55	-3.00	-0.55	-1.50	-0.42	-1.50
		-0.42	0.00	0.00	0.00	32.80	0.00
3		-2.21	-7.50	1.17	-7.50	1.17	-6.00
		1.49	-6.00	1.49	-4.50	1.63	-4.50
		1.63	-3.00	1.76	-3.00	1.76	-1.50
		1.92	-1.50	1.92	-0.42		
4		1.92	-1.50	32.80	-1.50		
5		1.17	-7.50	2.66	-7.50		

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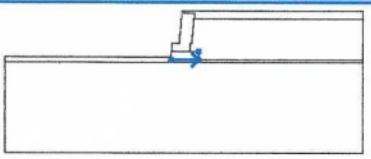
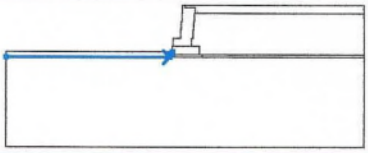
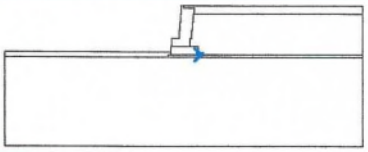
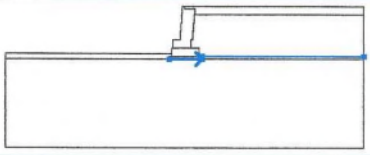
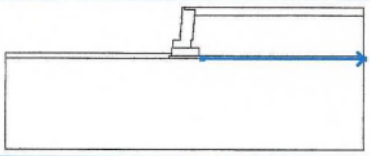
No.	Interface location	Coordinates of interface points [ft]					
		x	z	x	z	x	z
6		-2.34	-9.00	2.66	-9.00	2.66	-7.50
7		-32.80	-9.50	-2.84	-9.50	-2.84	-9.00
		-2.34	-9.00	-2.34	-8.50		
8		2.66	-9.00	3.16	-9.00		
9		-2.84	-9.50	3.16	-9.50	3.16	-9.00
		32.80	-9.00				
10		3.16	-9.50	32.80	-9.50		

Settings of the stage of construction

Design situation : permanent

Results (Construction stage 1)

Analysis 1

Circular slip surface

Slip surface parameters					
Center :	x =	-3.44 [ft]	Angles :	α_1 =	-29.43 [°]
	z =	3.92 [ft]		α_2 =	74.04 [°]
Radius :	R =	14.26 [ft]			
The slip surface after optimization.					

Total weight of soil above the slip surface: 10790.1 lbf/ft

Slope stability verification (Bishop)

Sum of active forces : F_a = 5344.2 lbf/ft

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Sum of passive forces : F_p = 8613.9 lbf/ft

Sliding moment : M_a = 76208.5 lbfft/ft

Resisting moment : M_p = 122834.4 lbfft/ft

Factor of safety = 1.61 > 1.50

Slope stability ACCEPTABLE

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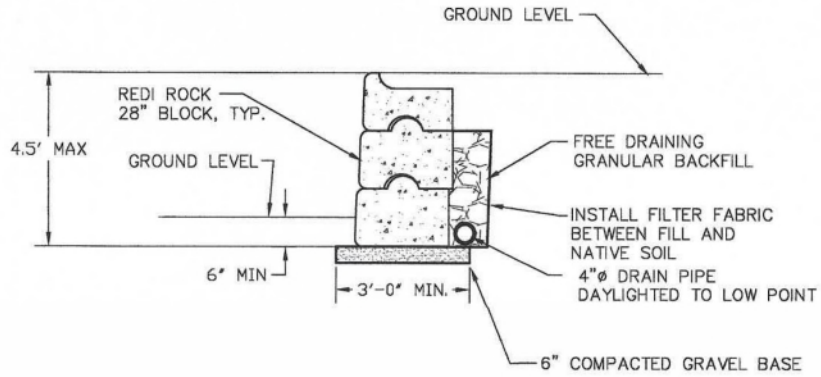

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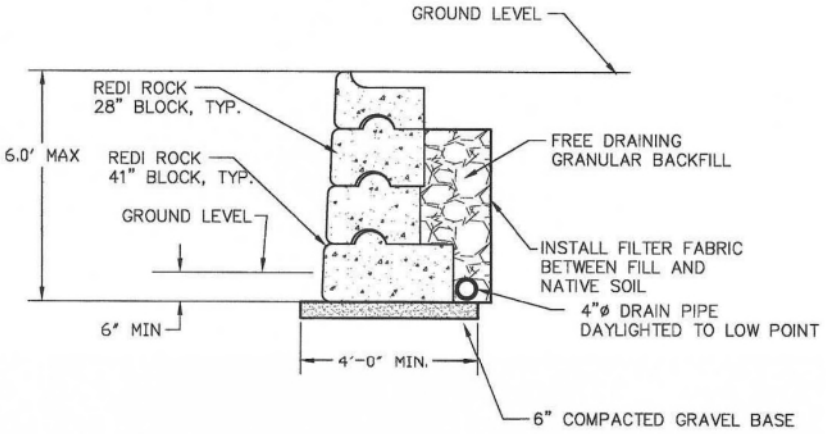
SCHNEIDER RESIDENCE
UPPER RETAINING WALL
4.5 FOOT SECTION

JOB #: 20-717
DATE: SEP 2023



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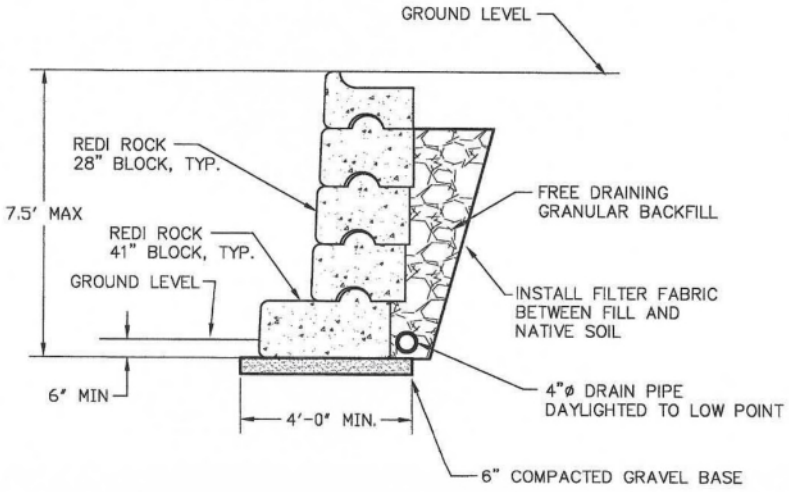
SCHNEIDER RESIDENCE
UPPER RETAINING WALL
6.0 FOOT SECTION

JOB #: 20-717
DATE: SEP 2023



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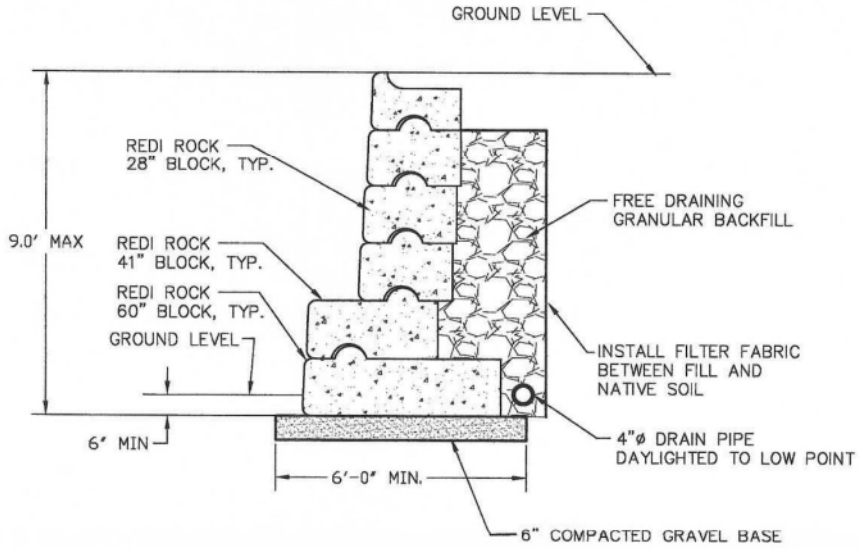
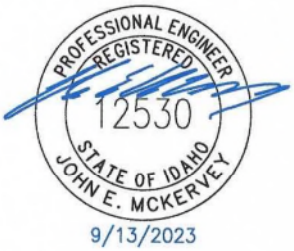
SCHNEIDER RESIDENCE
UPPER RETAINING WALL
7.5 FOOT SECTION

JOB #: 20-717
DATE: SEP 2023





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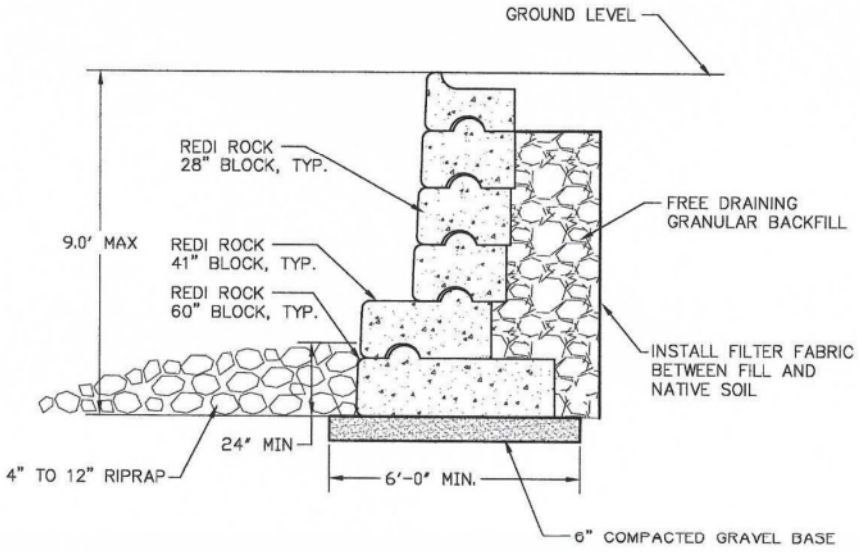
SCHNEIDER RESIDENCE
UPPER RETAINING WALL
9.0' RETAINING WALL

JOB #: 20-717
DATE: SEP 2023



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SCHNEIDER RESIDENCE
LAKEFRONT RETAINING WALL
9.0' RETAINING WALL

JOB #: 20-717
DATE: SEP 2023