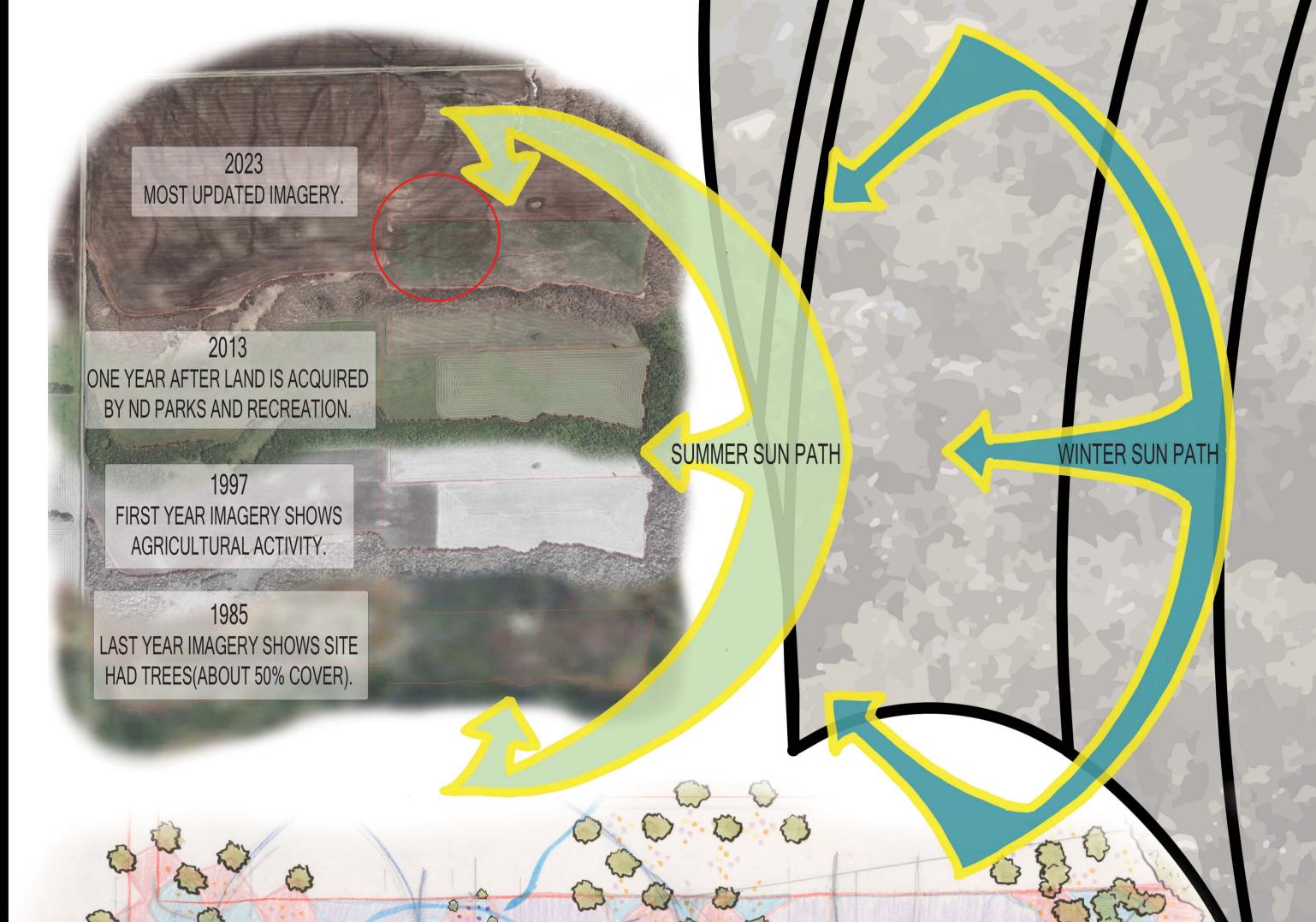
ANALYSIS

THE CURRENT SITE CONDITION ANALYSIS ON PREVAILING WINDS, SNOW DRIFTING, SUN EXPOSURE, SLOPE, AND DRAINAGE, ONLY ALLOW OPTIMUM PROTECTION AGAINST THE SUN AND PREVAILING WINDS ALONG THE ESTABLISHED OAK WOODLAND LOCATED WEST AND SOUTH OF PROJECT SITE. THE IMAGERY BELOW SHOWS THE CHANGES THE SITE HAS ENDURED FROM 1985 TO PRESENT. IN 1985 TREES COVERED ABOUT 50% OF THE SITE, 1997 EVIDENCE SHOWS THE CLEARING OF THE SITE, IN 2012 PARKS AND RECREATION ACQUIRED THE LAND AND HAS BEEN UNDERUTILIZED SINCE. THE 2023 IMAGE SHOWS SOIL EROSION CAUSED BY NATURAL ELEMENTS AND AGRICULTURAL PRACTICES, WITH THE THREE PROJECT GOALS IN MIND, THE ANALYSIS FURTHER VERIFIED THE NEED FOR A CAMPGROUND THAT RESTORES THE RESTORATIVE BENEFIT THE SITE HAS TO OFFER



PROJECT GOALS

THE ABOVE DRAWING IS THE BEGINNING CONCEPT GENERATED FROM THE PROJECT GOALS B

1. MICRO-CLIMATE DESIGN
-IMPLEMENTING A LICHEN INSPIRED PLANTING PATTERN THAT WORKS TOGETHER WITH THE SITES
DRAINAGE PATTERN, CREATING A VARIETY OF OUTDOOR ENVIRONMENTS AS THE PRECIPITATION FLOWS
DOWN THE SIGHTS KEY AREAS.

2. PUBLIC HOSPITALITY

-WITH PEOPLE(YOU) BEING THE MAIN CLIENT FOR THIS PROJECT, CREATING A PLACE OF ENJOYMENT IS KEY. MODERN, EQUESTRIAN AND PRIMITIVE CAMPING ARE THE THREE TYPES OF CAMPING THIS DESIGN IS FOCUSED ON. THEORETICALLY THIS CAMPGROUND TRAIL SYSTEM IS RANDOM, MOVING WITH THE REGENERATIVE LANDSCAPE. FOR THE PURPOSE OF THIS DESIGN A LICHEN INSPIRED TRAIL SYSTEM WAS USED, THIS IN TURN FURTHERS THE DESIGN LAYOUT REGARDING VIEWING AREAS AND FOCAL POINTS FOR USERS TO DISCOVER.

3. REGENERATIVE LANDSCAPES

UTILIZING A THREE PHASE PLANTING PLAN BASED OFF OF THE INFORMATION FOUND DURING THE SITE ANALYSIS PHASE, COMBINED WITH THE LICHEN INSPIRED WATER REGENERATIVE ELEMENTS WORK AS ONE- TOGETHER MOVING THE WATER THROUGHOUT THE LANDSCAPE RECHARGING THE LOCAL AQUIFERS, AND PROVIDING THE ESSENTIAL NEEDS FOR A HEALTHY REGENERATIVE AND SUSTAINABLE LANDSCAPE FOR GENERATIONS TO COME.

SUSTAINABLY SYMBIOTIC

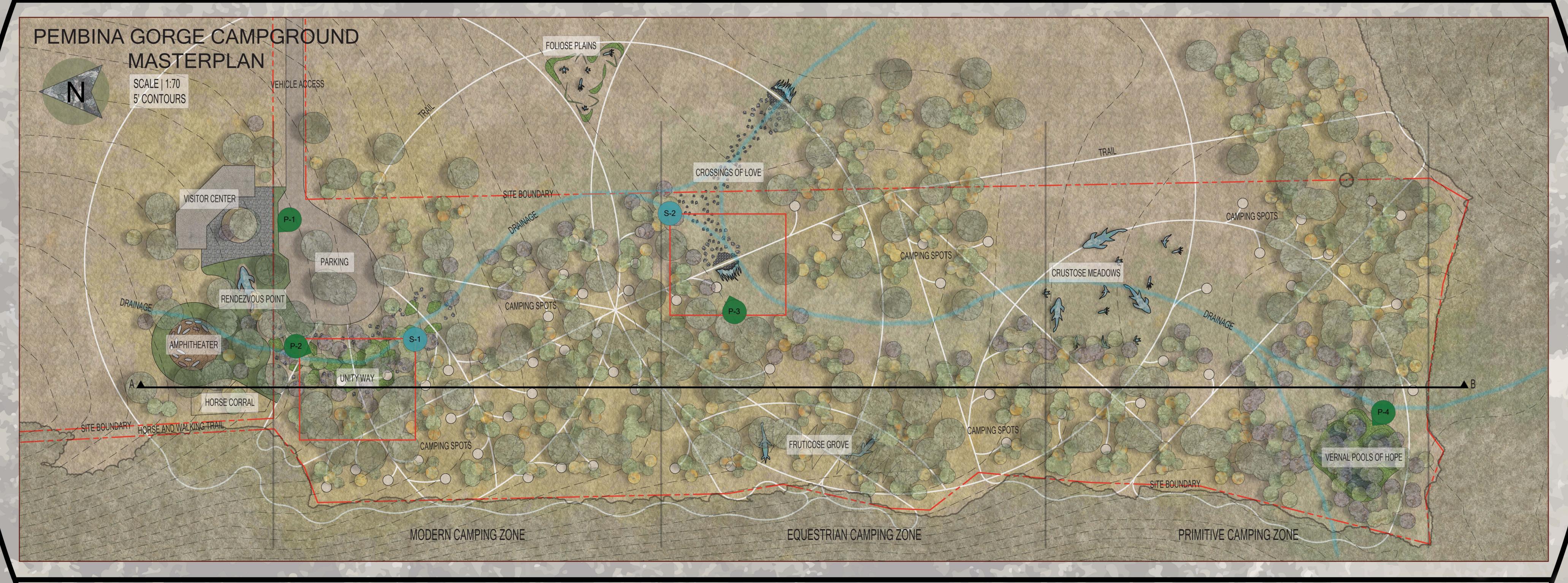
PEMBINA GORGE STATE RECREATION AREA, ND

COURSE INSTRUCTOR | JAY KOST | ASSISTANT PROFESSOR OF PRACTICE

Y ADVISOR | MATTHEW KIRKWOOD | ASSOCIATE PROFESSOR OF LANDSCAPE ARCHITECTURE

SUSTAINABLY SYMBIOTIC: A STUDY USING LICHEN BIOMIMICRY TO DESIGN A SUSTAINABLE MULTI- USE CAMPGROUND IN CAVALIER COUNTY, ND.

THIS THESIS PROJECT BEGAN WITH THE IDEA OF SELECTING UNDERUTILIZED STATE AGRICULTURE LAND AND RESTORING IT BACK INTO OAK WOODLANDS, LIKE WHAT IT WAS IN 1985. THE GOAL OF THIS THESIS IS TO DESIGN A SUSTAINABLE LICHEN INSPIRED MULTI-USE STATE CAMPGROUND IN THE PEMBINA GORGE AREA NEAR WALHALLA, ND, A HIDDEN GEM THAT'S A PART OF THE RENDEZVOUS REGION NORTHEAST DAKOTA SCENIC BACKWAY. CONSIDERING NATIVE LICHENS, CASE STUDIES, DESIGN FRAMEWORKS, PATTERNS, PROJECT GOALS AND ANALYSIS, IT'S MY HOPE TO COME TO A FINAL CAMPGROUND DESIGN THAT THE LOCALS AND ADVENTURERS CAN ENJOY AND LEARN. IF SUCCESSFUL, DESIGN STEPS TAKEN FOR THIS PROJECT SHOULD BE APPLICABLE TO ANY SCENARIO WITH MINOR CHANGES TO ALIGN WITH SITE AND DESIGNERS CHARACTER RECONNECTING MAN WITH NATURE, BETTER UNDERSTANDING THESE TWO, I BELIEVE FINDING A MUTUAL CONNECTION BETWEEN THEM CAN BRIDGE THE GAP OF (WHAT IF) FOOD SHORTAGES AND STILL PROVIDE AMPLE OUTDOOR SPACE FOR GENERATIONS TO EXPLORE. WITH THE AREAS RICH HISTORY CONNECTING TO PREHISTORIC LIFE, AN IDEA TO COMBINE OLD AND NEW USING SCULPTURES, LICHENS, AND IMPORTANT PROJECT GOALS SUCH AS MICRO-CLIMATE DESIGN, PUBLIC HOSPITALITY AND REGENERATIVE LANDSCAPES HAVE LED TO A DESIGN THESIS THAT MAY JUST WORK. IN THE END, IT'S UP TO THE COMMUNITY TO HELP ME EVALUATE IF DESIGNING A SUSTAINABLE MULTI-US CAMPGROUND USING BIO-INSPIRED DESIGN RELATING TO LICHEN COULD BENEFIT THE OVERALL CAMPING EXPERIENCE.





UNITY WAY

SCALE | 1:20
1' CONTOURS

CROSSINGS OF LOVE
SCALE | 1:20
1' CONTOURS

WATER HOLDING CAPACITY NUMBERS
1' CONTOURS

57 WATER STORING BOULDER SCULPTURES 1,137 CUBIC FEET HOLDING CAPACITY.

104 WATER STORING BOULDER SCULPTURES 2,074 CUBIC FEET HOLDING CAPACITY.

23 WATER STORING POLYGON TRENCH SYSTEM 1,148 CUBIC FEET HOLDING CAPACITY.

2 WATER STORING BOULDER CROSSINGS 1,291 CUBIC FEET HOLDING CAPACITY. BOULDER SCULPTURES

FOR THESE TWO SITES ALONE AND EXCLUDING ADJACENT SOIL HOLDING CAPACITY NUMBERS, THE TOTAL HOLDING CAPACITY IS 5,650 CUBIC FEET OR 42263 GALLONS.

ENOUGH WATER TO FILL ONE 20' X 40' POOL AT A DEPTH OF SEVEN FEET.

CANADA BORDER

PEMBINA GORGE (SRA)

WALHALLA

GRAND FORKS

NORTH DAKOTA

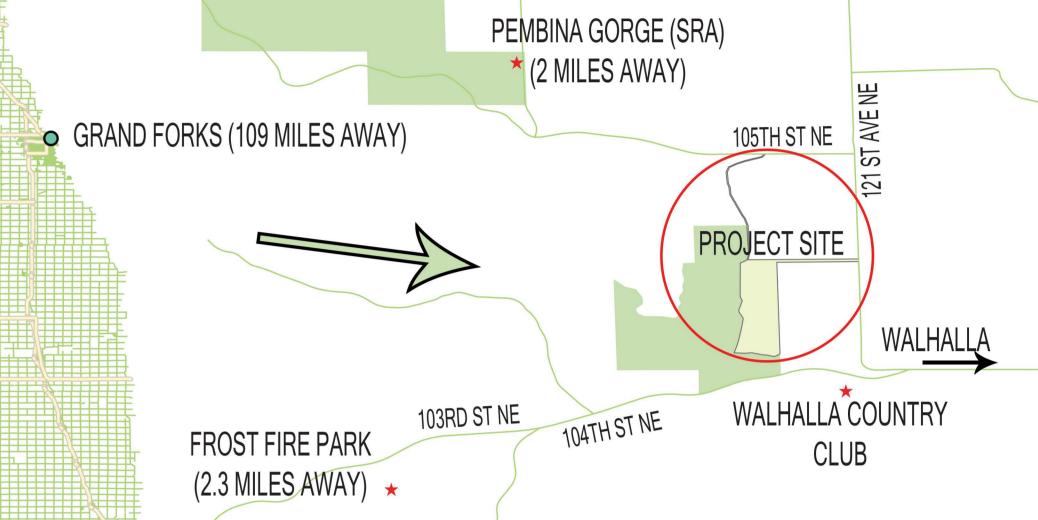
FARGO

CANADA BORDER

WALHALLA (5.8 MILES AWAY)

WBINA GORGE (SRA)

SITE LOCATION



FARGO (185 MILES AWAY)

NORTH DAKOTA

THE SITE TO BE USED IS 35 ACRES +/- OF OPEN LAND IN NORTHEAST NORTH DAKOTA LOCATED 5 MILLI SOUTH OF THE CANADIAN BORDER AND 185 MILES NORTH-NORTHWEST OF FARGO. THE SITE WAS CHOSEN FOR ITS LOCATION NEAR NATURE (WOODS) AND AGRICULTURAL (FIELDS) AND SHOWS POTENTIAL TAKING LICHEN DESIGN METHODOLOGY AND DESIGN RESEARCH INTO CONSIDERATION WALHALLA IS THE NEAREST CITY LOCATED EAST OF THE THESIS SITE. THE SITE SITS ON THE EDGE OF THE PEMBINA GORGE. THE AREA WAS ESTABLISHED AS THE PEMBINA GORGE STATE RECREATION ARE IN 2012 AND CONSIST BOTH OF PUBLIC (OVER 2,800 ACRES) AND PRIVATE OWNED LAND. THE PEMBING GORGE SRA OFFERS OVER 30 MILES OF TRAILS AND OPEN TO HORSEBACK RIDING, HIKING, MOUNTA BIKING, OFF-HIGHWAY VEHICLES (OHV), AND OTHER OUTDOOR ACTIVITIES LIKE CROSS COUNTRY SKII THE SITE AREA ALSO OFFERS OPPORTUNITIES FOR KAYAKING, SNOWBOARDING, AND GOLFING.

PROCESS

1. RESEARCHING NATIVE LICHEN AT MACRO AND MICRO PERSPECTIVES TO GAIN KNOWLEDGE OF STRUCTURES, FORMS AND PROCESSES. LATER UTILIZING THE LICHEN KNOWLEDGE THROUGH BIOMIMICI

2. CASE STUDIES OF SIMILAR CAMPGROUNDS WERE ESSENTIAL IN UNDERSTANDING THE PROGRAM ELEMENTS NEEDED FOR A SUCCESSFUL DESIGN. THE CASE STUDIES ALSO PROVIDED NEED TO KNOW INFORMATION REGARDING THE STRUCTURING OF THE THREE CAMPING ZONES BASED AROUND THE THREE PLANTING PHASES.

3. THE DESIGN FRAMEWORKS USED FOR THIS PROJECT WAS A COLLECTIVE EFFORT. BESIDES THE LICHEN AND CASE STUDIES FRAMEWORK, THE USE OF ALREADY ESTABLISHED PUBLIC INFORMATION SUCH AS CAMPGROUND DESIGN RULES AND REGULATION DOCUMENTS, SURVEYS AND EVEN A 2014 PEMBINA GORGE STATE RECREATIONAL MASTER PLAN.

4. THE FINAL FRAMEWORK NEEDED TO SOLIDIFY THE SUCCESS OF A SUSTAINABLE LANDSCAPE DESIGN IS

SITES V2, THE MOST COMPREHENSIVE SYSTEM FOR DEVELOPING SUSTAINABLE LANDSCAPES. A

CERTIFICATION SYSTEM THAT GRADES LANDSCAPES AND BUILDINGS BASED ON THE FOUR GOALS OF SITES:

-CREATE REGENERATIVE SYSTEMS AND FOSTER RESILIENCY

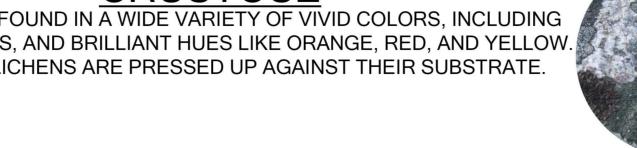
-ENSURE FUTURE RESOURCE SUPPLY AND MITIGATE CLIMATE.

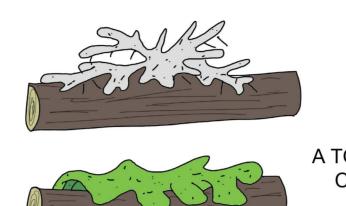
-ENSURE FUTURE RESOURCE SUPPLY AND MITIGATE CLIMATE.
-TRANSFORM THE MARKET THROUGH DESIGN, DEVELOPMENT, AND MAINTENANCE PRACTICES
AND LASTLY

-ENHANCE HUMAN WELL-BEING AND STRENGTHEN COMMUNITY.



LICHEN GROWTH FORMS USED IN BIOMIMICRY DESIGN PROCESS





CAN BE RIDGED AND BUMPY, VERY FLAT, LEAFY LIKE LETTUCE, O

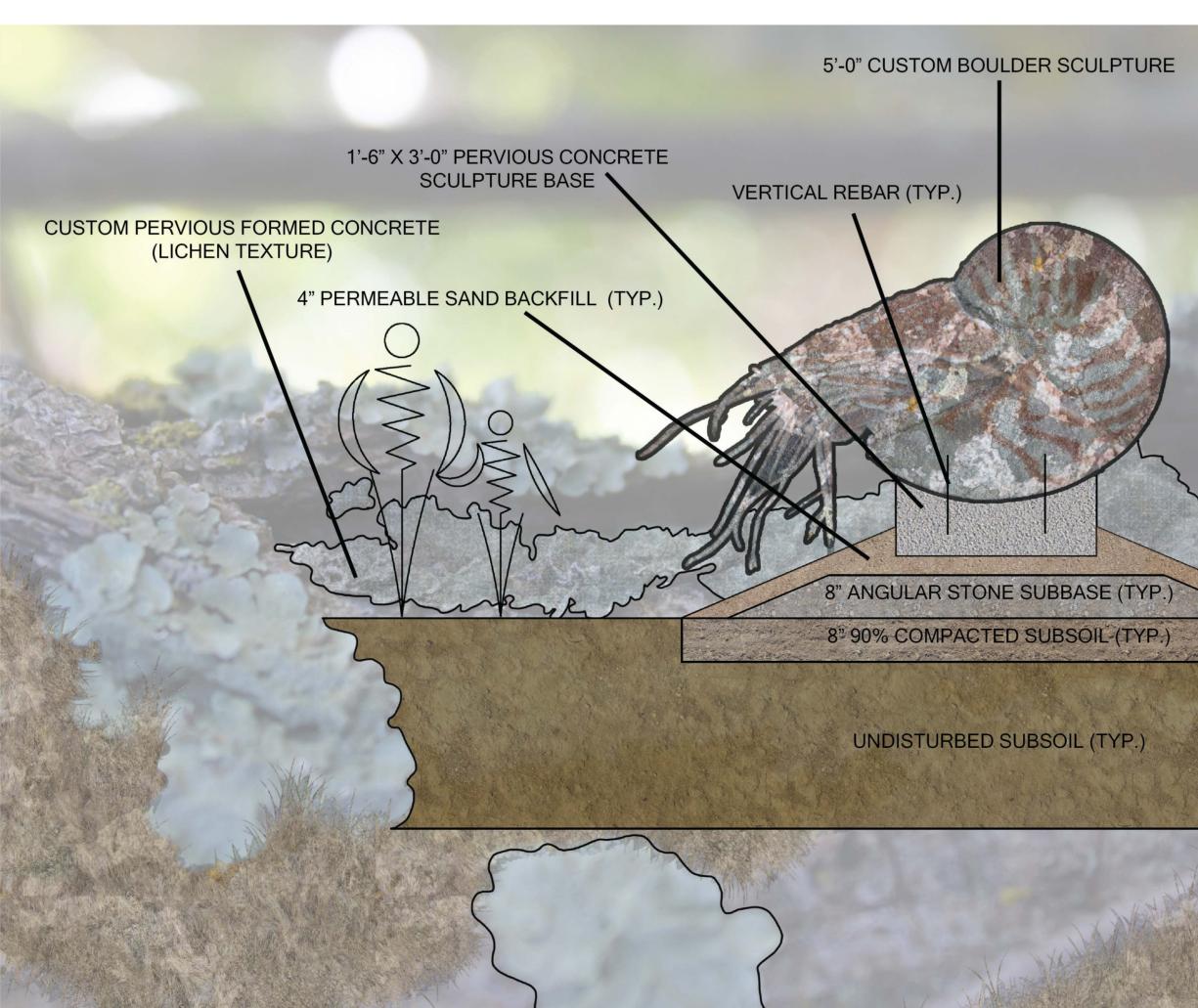


OTHER FRUTICOSE LICHENS HAVE FLAT BRANCHES THAT ENTWIN WITH ONE ANOTHER



NAUTILUS SCULPTURE

DAKOTA AND WAS INHABITED BY MARINE REPTILES SUCH AS MOSASAURS, PLESIOSAURS, AND TURTLES, FISH, AND SHARKS WERE ALSO FOUND IN THE AREA. PEMBINA GORGE IS CURRENTLY ONE OF FOUR FOSSIL DIG SITES IN USED IN THE MAKING OF ANIMAL SCULPTURES ARE FOUND LOCALLY AND CREATED BY LOCAL ARTIST.



ABOUT LICHEN

UTILIZING LICHEN TO THEORETICALLY FURTHER THIS PROJECT, IT WAS ESSENTIAL TO SPEND TIME RESEARCHING THIS ORGANISM AS A WHOLE. FOCUSING ON HOW LICHEN THRIVES IN THE MOST HARSH ENVIRONMENTS THE EARTH HAS TO OFFER. RESEARCH HAS CLARIFIED MY UNDERSTANDING OF LICHEN AND ITS DESIGN PURPOSE IN NATURE, THE POTENTIAL TO CONNECT LICHEN TO LANDSCAPE DESIGN HAS BECOME VAST AND ALMOST NEVER ENDING. FORCING THE CHANGE OF HOW I APPROACHED RESEARCH AND OF COURSE THE PROJECT

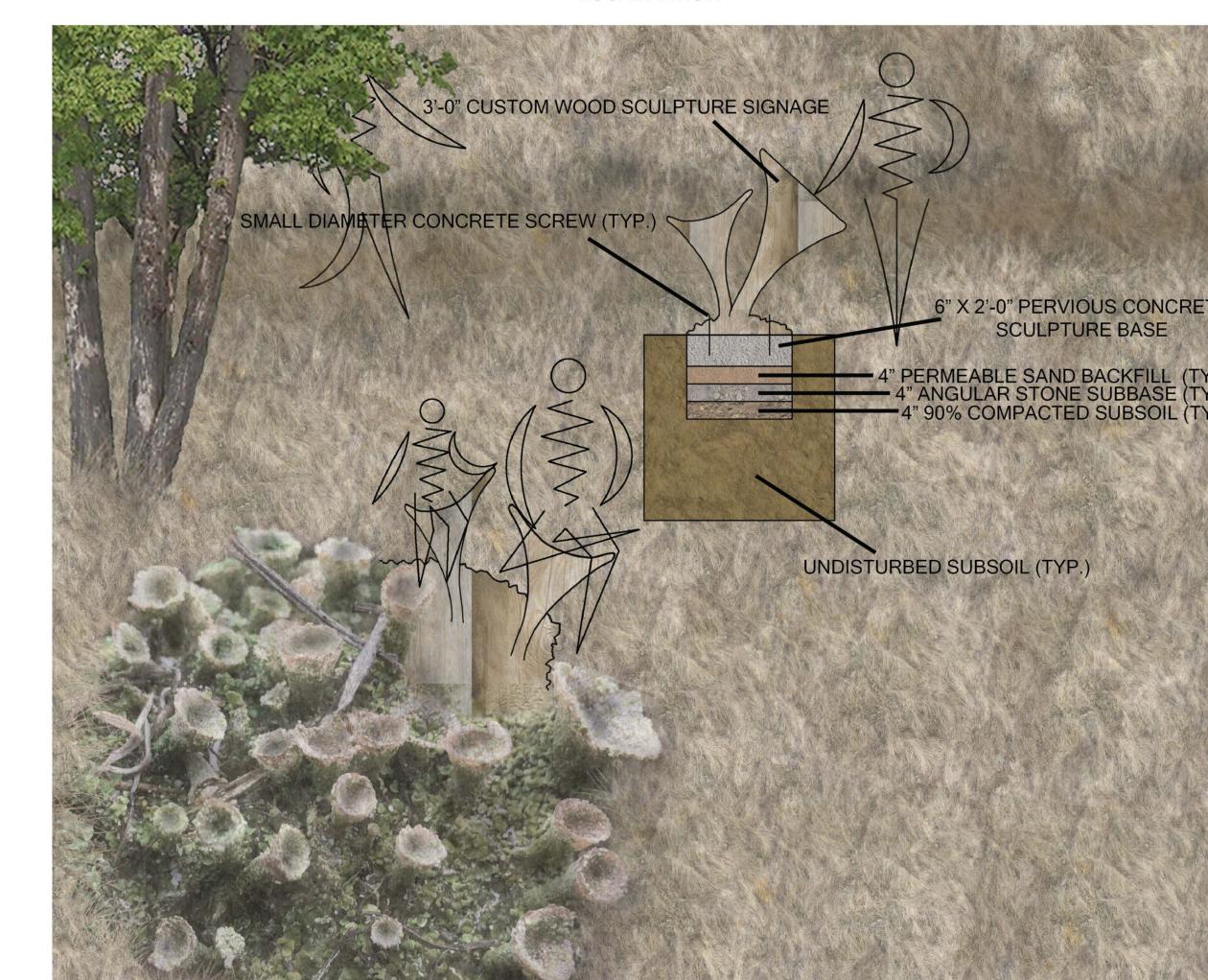
THE FIRST QUESTION THAT NEEDED TO BE ASKED IS, WHAT IS LICHEN? LICHEN IS A LIVING ORGANISM FOUND ALL OVER THE WORLD, WITH MORE THAN 3,600 DIFFERENT SPECIES IN NORTH AMERICA ALONE. THIS SMALL ORGANISMS CAN BE FOUND THRIVING ON SUBSTRATE SUCH AS BARE ROCKS, BARK, AND UNINHABITABLE SOILS. ACCORDING TO LEOPOLDO G SANCHO AND THE RESEARCH TEAM HE WORKED WITH, PROVED THAT SOME LICHEN WERE ABLE TO SURVIVE THE HARSH EFFECTS OF VARIOUS WAVELENGTHS OF EXTRATERRESTRIAL SOLAR UV RADIATION.

WHAT MAKES LICHEN SO ADAPTABLE? THE ANSWER IS COLLABORATION, LICHEN IS NOT LICHEN WITHOUT THE SYMBIOTIC RELATIONSHIP OF FUNGI AND ALGAE. TYPICALLY ONE WITHOUT THE OTHER SURVIVAL RATES ARE LOW TO NONE, TOGETHER THEY ARE LICHEN- A KEYSTONE SPECIES IN MOST ECOSYSTEMS, PROVIDING A FOOD SOURCE AND HABITAT FOR MANY ANIMALS IN THE DEER, BIRD, AND RODENT FAMILY.

COLLABORATION IS ESSENTIAL IN ALL ASPECTS OF LIFE, AND IN THIS CASE IT'S LICHEN AND

INFORMATIONAL LICHEN SCULPTURE

AS BIRD BATHS. ALL MATERIALS USED IN THE MAKING OF LICHEN SCULPTURES ARE FOUND LOCALLY AND CREATED BY





VERNAL POOLS OF HOPE THIS AREA OF THE CAMPGROUND IS LOCATED AT THE MOST SOUTHERN PART OF THE DESIGN, IN THE PRIMITIVE CAMPING AREA. THE VERNAL POOLS OF HOPE IS ANOTHER KEY ELEMENT IN THE WATER REGENERATIVE DESIGN AND THE SITES LAST DEFENSE TO STORE LARGE AMOUNTS OF PRECIPITATION. THIS AREA OF THE DESIGN IS MOST PRIMITIVE AND IN A SENSE MOST MAGICAL. IN THIS PERSPECTIVE THE USE OF THE LICHEN INSPIRED WOOD SCULPTURES FOR INFORMATIONAL SIGNAGE AND SEATING SEEMS TO ADD TO THE MAGIC, ALLOWING USERS THE OPTION TO RELAX, PONDER, AND ABSORB THE RESTORATIVE BENEFITS THE POOLS OF HOPE HAVE TO OFFER. WITH THIS AREA OF THE CAMPGROUND SEEING LESS HUMAN ENGAGEMENT, ANIMAL ACTIVITY WILL BE MOST ABUNDANT ALLOWING VISITORS TO EXPERIENCE THE PEMBINA GORGE WILDLIFE AND A CHANCE TO BECOME ONE WITH NATURE.

NORTH SOUTH CAMPGROUND CENTERLINE SECTION EAST FACING NO SCALE

