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Thomas R. Wood

"You employ stone, wood, and concrete, and with these materials you build houses and palaces. That is construction, ingenuity is at work.

"But suddenly, you touch my heart, you do me good, I am happy and I say: This is beautiful! that is architecture. Art enters in.

"My house is practical. I thank you, as I might thank Railway engineers, or the Telephone service. You have not touched my heart.

"But suppose that walls rise toward heaven in such a way that I am moved. I perceive our intentions. Your mood has been gentle, brutal, charming, or noble. The stones you have erected tell me so. You fix me to the place and my eyes regard it. They behold something which expresses a thought. A thought which reveals itself without word or sound, but solely by means of these shapes are such that they are clearly revealed in light. The relationships between them have not necessarily any reference to what is practical or descriptive. They are a mathematical creation of your mind. They are the language of Architecture. By the use of raw materials and starting from conditions more or less utilitarian, you have established certain relationships which have aroused my emotions. This is Architecture."

-Le Corbusier-



Cars have become a big part of everyone's live. They are a symbol of wealth status and perhaps a part of a person's character. From a trend that we thought would pass, the automobile industry has grown into one of the biggest businesses in the world. Buildings, cities and peoples' lives are planned around the use of the automobile. In a sense we have become slaves to the car and the automobile industry. Notwithstanding its indisputable importance, this industry is also one of the biggest offenders of environmental pollution in the world today. As a result, the Bush administration has proposed an energy plan that would force the automakers to start phasing in alternative fuels to cut down on the pollution by 1996. The era of the gas gulping big American cars is coming to an end and new automobile manufacturers such as Saturn is bringing the new era of automobile to America, American made cars of competitive quality to the world market.



Introduction

The Saturn corporation was formed as a wholly owned subsidiary of General Motors in January 1985. The Saturn project began in 1982 to innovatively design and manufacture automobiles in attempt to compete with foreign manufactures. To fulfill their mission, the founders of Saturn knew they had to think differently than anyone else has in the traditional past. They had to think creatively and find new ways to build an automobile that is efficient as well as stylish. They had to start with a clean slate and encourage employees to think in nontraditional ways. The people of Saturn had to become students of technology. The founders researched and visited many factories around the world to find out what worked, what didn't work and what could be improved. During these first few months experts representing all disciplines were told to take whatever time was necessary to come up with new ways of producing higher quality and lower cost vehicles. These experts determined that technology was only part of the equation. "Without the right people in the right positions given the right training to make the right decisions technology only enables us to make scrap faster." As Mies Van Der Rohe said, "technology not only promises greatness and power, but also involves dangers; that good and evil apply to it as to all human actions; that it is our task to make the right decisions." Where some auto makers rely only on technology, Saturn is built around the integration of people and technol-

"Without the right people in the right positions given the right training to make the right decisions, technology only enables us to make scrap faster."



ogy. The people of Saturn have researched techniques of manufacturing and business management and have improved them to integrate people and technology to optimize both resources.

The Saturn name refers to the Saturn rocket that carried Americans to the moon during the space race. To keep up with the on going race for new technology and better vehicles in the automotive industry, Saturn has decided to build a research and development center. The research done in this facility will be to create experimental cars as well as find new technologies, or improve existing technologies, in production techniques, business systems, and to produce a better car for the customer. A big part of the research will be devoted to finding energy efficient cars, cars that will be kinder on the environment. Electric, solar as well as alternate fuel cars will be some of the cars developed at this facility. "...It will be a place where memory, experience and intelligence are exchanged." The automobile industry has changed a lot since the beginning. New technology and production techniques have changed the industry, and as time goes on it will continue to change. The search for more fuel efficient cars is only one way the industry will benefit from new technology. By keeping up with and creating their own technology in production and marketing techniques Saturn will be the leaders in the automobile industry of the future.

*"It will be a place where memory, experience
and intelligence are exchanged."*

-Renzo Piano-

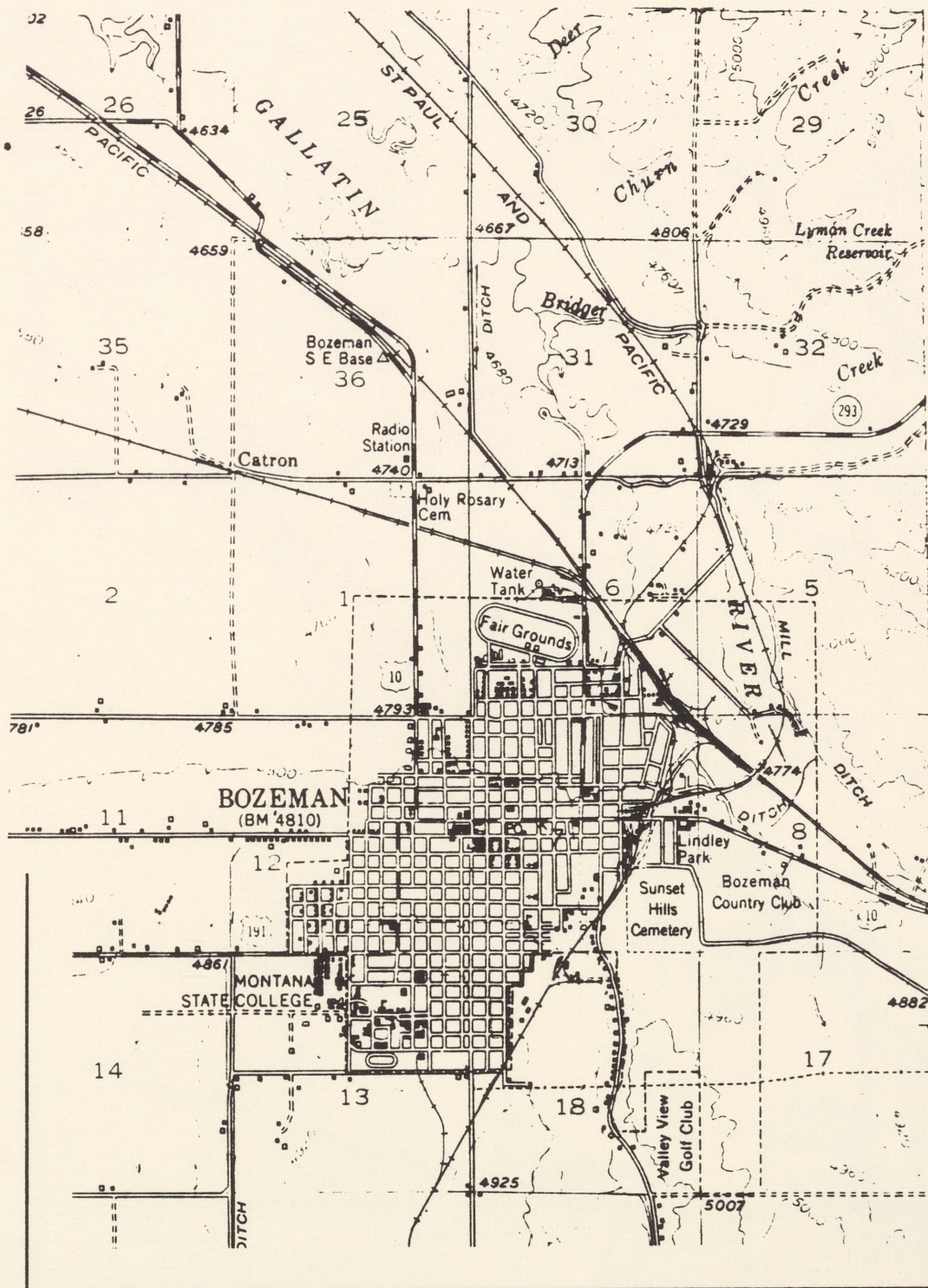


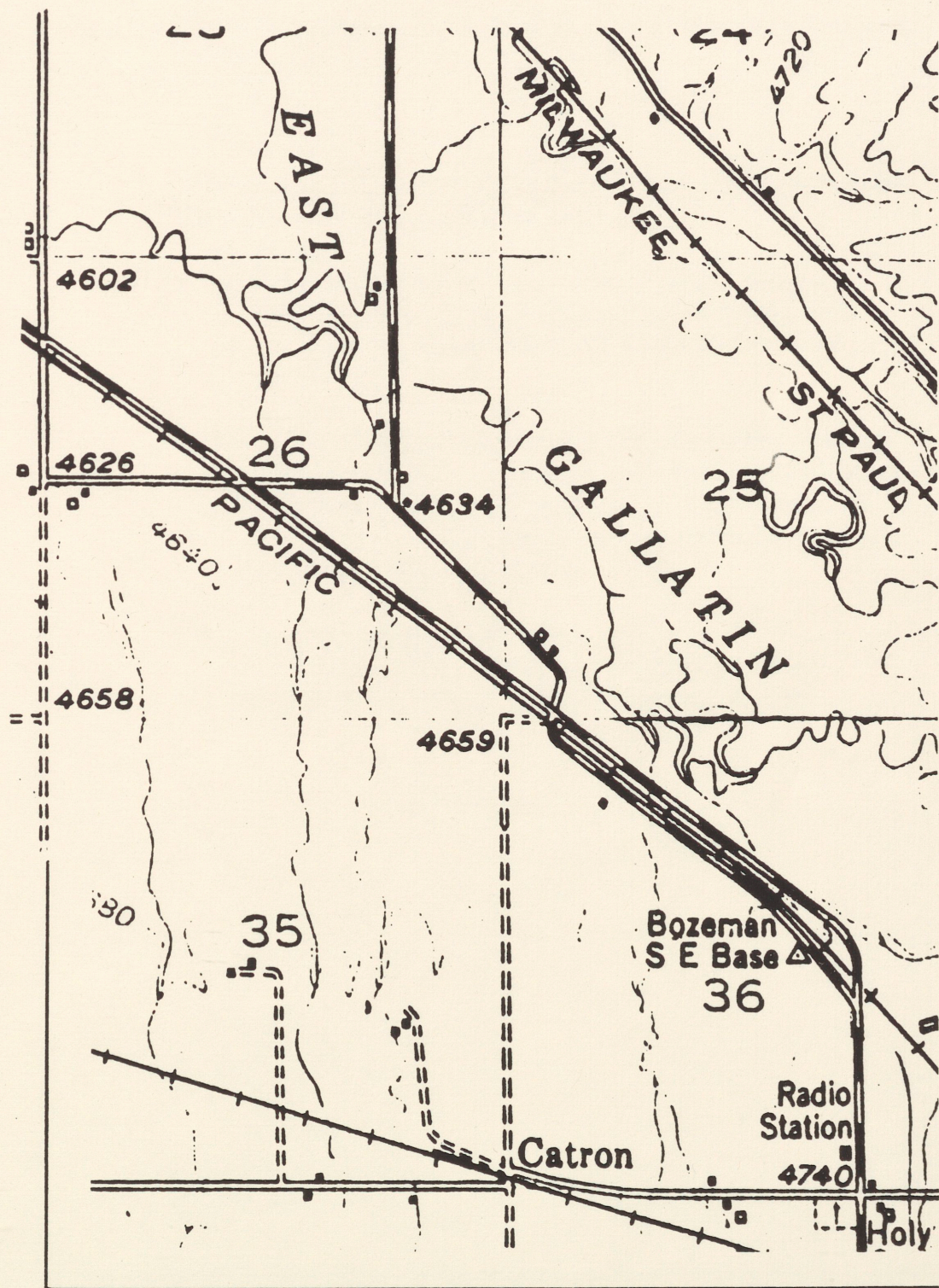
The site

The site Saturn has chose for the research and development facility is north of Bozeman, Montana. They chose this site because of it's location to the western states and western canada. Saturn wanted a location that was a good central location for this region that would let more people get to know the company. Saturn wanted a good friendly place where it's employees could raise their families. One major advantage to this site is; Bozeman already has a school of engineering and both Saturn and Montana State University will benefit from a mutual working relationship. Bozeman allows for seasonal year round testing for it's automobiles in development, so Saturn can test it's cars using real and not simulated climatic conditions. One more reason is the natural surroundings of the site would show that they cared about the environment both as a whole and that their employees lived and worked in.

The site sits at the base of the Bridger Mountain Range with the East Gallatin River running just to the east of the facility. Views from the complex are to the north-east, of the Bridger Mountain Range and to the South, back across the valley. To the north is the riverside country club golf course. Views should be allowed to the north, but views to the site as well as noise from the site should be blocked. The climate of the site is moderate. Temperatures range from 10 degrees in the winter to 80 degrees in the summer. Because of the interior dominated build-







ing that it is the sun should be block from the end of April to the beginning of october.

- The climate of the site is moderate averaging 75 degrees in the summer and 10 degrees in the winter

- Winds are usually calm and out of the west or southwest.

- Use the winds to help with ventilation design with windows that open. Create tall corridors for stack ventilation.

- Sun is 68 degrees on June 21 and 23 degrees on December 21

- Since this building is interior load dominated building should be spread out. Block the sun from the end of April till the end of september, most of building should be accessible to daylight year round.

- This area gets a lot of precipitation.

- Structure should be designed to withstand the precipitation. Sloped rooves are best in this area.

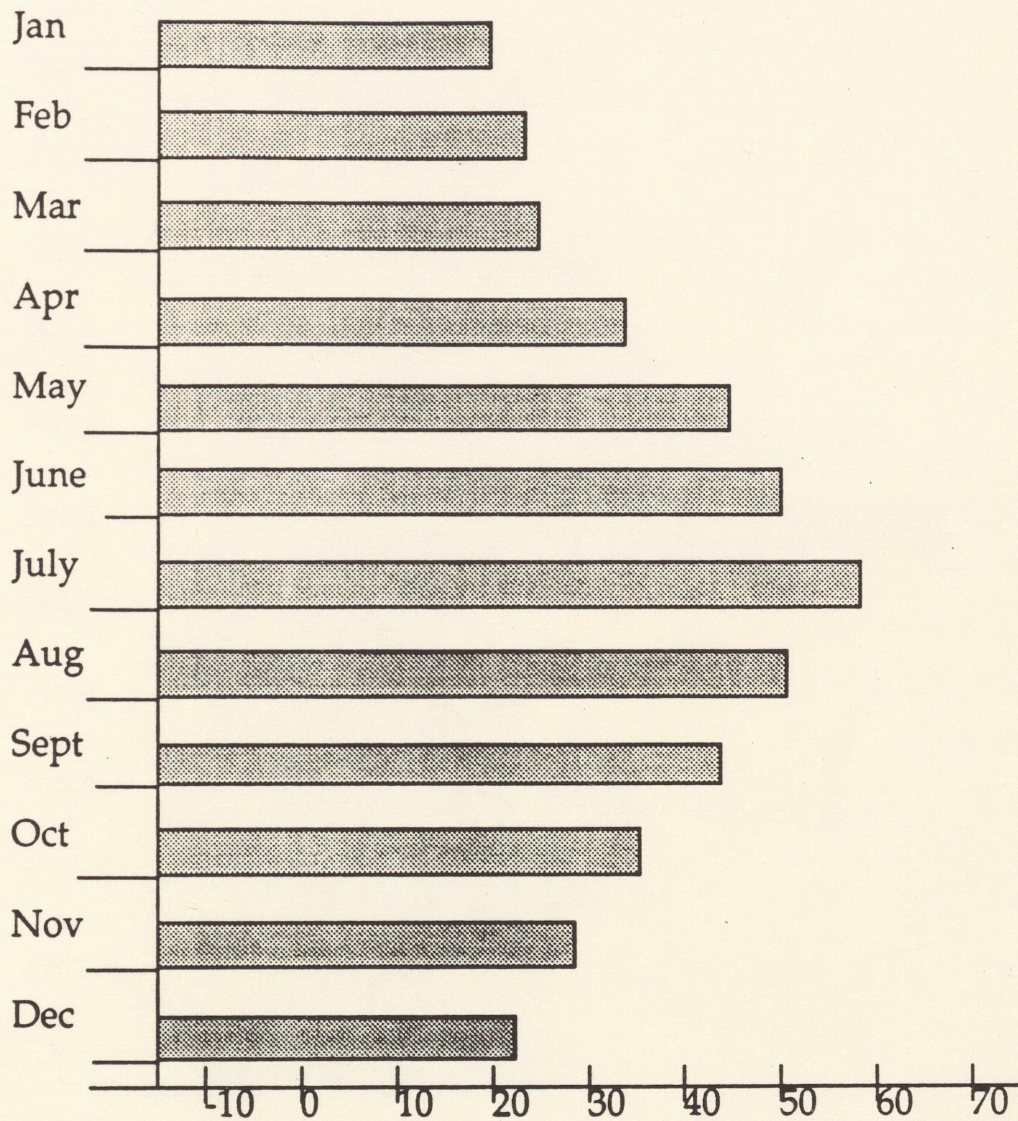
"Structure is the giver of light"

"The choice that you make of the element of structure you want should be also the type of light you want."

-Louis Kahn-



Average Monthly Temperature

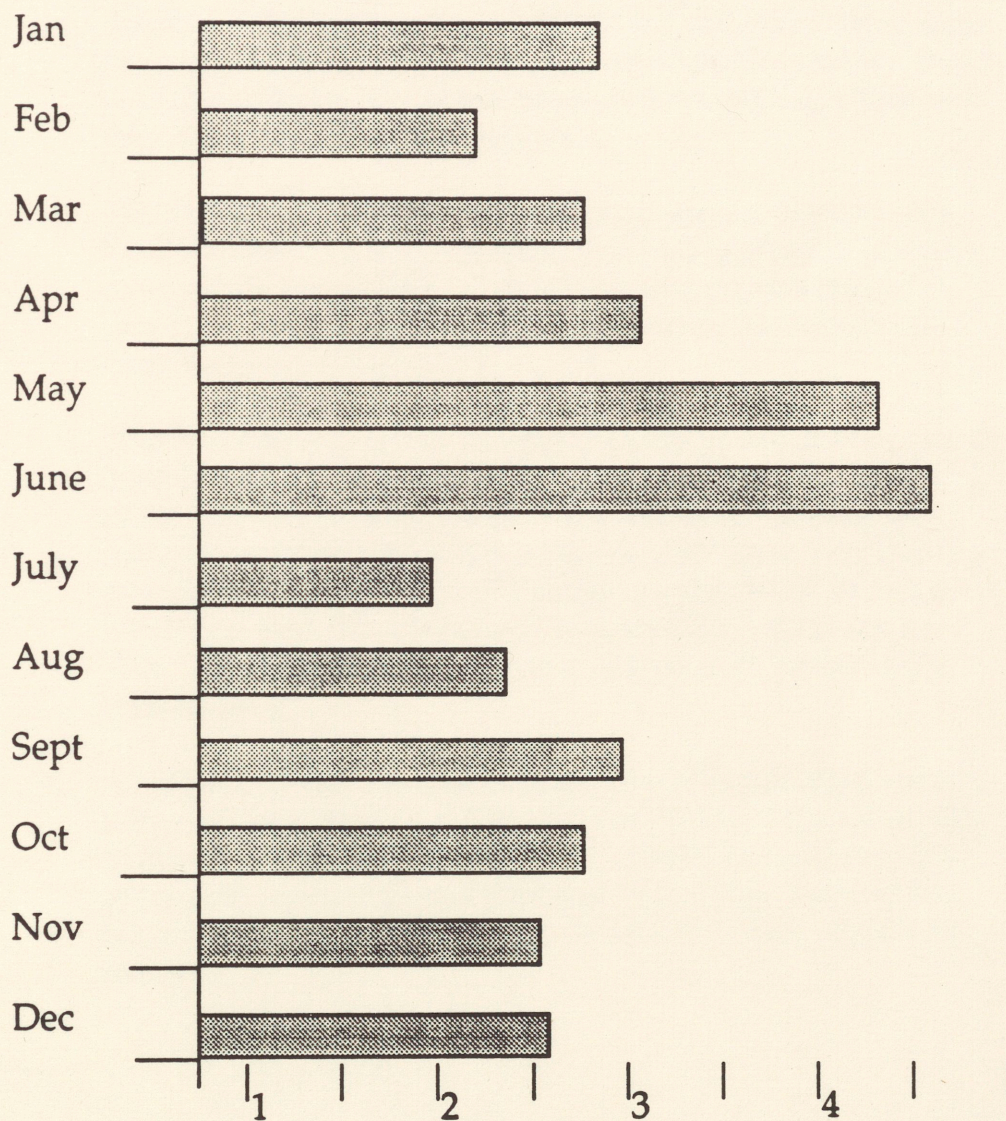


Record High- 95 degrees

Record Low - -45 degrees



Average Monthly Percipitation



-Utilize the site for views and climatic responses

-Keep scale to appropriate size express a difference between automobile scale and human scale, but don't make the employee's feel uncomfortable.

-Express both a human and technological building. Using natural or organic forms to express the nature and humanity. Detailing helps to bring a human element to the building, which will keep the scale of the building down.

-Given the bad image that the american automobile industry has I wanted to design a building that was expressive of a new company with new ideas. I didn't want to express the old factory with it's smoke stacks and no respect for the environment that it was placed in.

-The building is dug into the ground so to fit into the flat site. It doesn't force it's way into the site but it is nestled into the land so the land becomes the walls of the building. Relating the building to the nature creates a human element to the building as well as expressing a good attitude toward the environment. To protect the environment and conserve natural resources. This will also relate the building to Montana, "The naturally inviting state."

-California has passed a bill that says by 1996 2% of the automobiles sold must emit no pollutants. The future of the automobile in America is heading toward environmentally safe cars. By expressing nature and an awareness in building it shows that Saturn is looking toward the future but also aware of the environment.

*"A mature and totally new balance between
Technology and nature, machine and man,
the future and tradition."*

-Renzo Piano-



- To express the integration of people and technology. (People and machine working together to build a better car.)
- To design a building that invites people to explore Saturn as a company. I want people to become interested in Saturn.
- To express the reliability of a Saturn car which is American made and that it is affordable, energy efficient and built with high quality.
- To express advanced technology through architecture.
- To express the importance of the automobile in attempt to give American automobile industry a better image
- To express Saturn's goals and philosophy.
- Design a building to fit the site climatically and physically.
- To build an environment which will express creativity and nurture the creative process. (build a creative environment)

"Architecture is a way to describe things for which words are inappropriate or inaccurate and to speak about the culture from which it comes."

-Tom Mayne/Michael Rotondi-



Saturn's Philosophy

We, the Saturn Team, in concert with the UAW (United Auto Workers) and General Motors, believe that meeting the needs of customers, saturn members, suppliers, dealers and neighbors is fundamental to fulfilling our mission.

To meet our customers needs:

Our products and services must be world leaders in value and satisfaction.

To meet our members needs:

-We will create a sense of belonging in an environment of mutual trust , respect and dignity.
-We believe that all people want to be involved in decision that affect them, care about their jobs and each other, take pride in themselves and in their contributions and want to share in the success of their efforts.

-We will develop the tools, training and education for each member, recognizing individual skills and knowledge.

-We believe that creative, motivated, responsible team members who understand that change is critical to success are Saturn's most important asset.

To meet our suppliers and dealers needs:

-We will strive to create real partnerships with them.
-We will be open and fair in our dealings, reflection trust, respect and their importance to Saturn.
-We want dealers and suppliers to feel ownership in Saturn's mission and philosophy as their own.

To meet the needs of our neighbors, the communities in which we live and operate:

-We will be good citizens, protect the environment and conserve natural resources.
-We will seek to cooperate with government at all levels and strive to be sensitive, open and candid in all our public statements.

"We believe that creative, motivated, responsible team members who understand that change is critical to success are Saturn's most important assets."



Program

Reception and Display- To show and answer any questions the public will have about Saturn the company

Executive Offices-To manage the facility

Design Space- A place where ideas are developed.

Design Labs- A place where ideas can be tested

Library- A place where ideas are researched

Cafe- A lounge or place to take breaks and eat lunches

Vehicle Systems- spaceframe and chassis marriage
installation of interior and exterior vehicle
components final
vehicle assembly

Body Systems- polymer and steel exterior panel production
spaceframe fabrication
painting of panels and spaceframe

Powertrain- lost foam and die casting of powertrain
components
machining and assembly of powertrain

Interior systems- production of interior components

Testing facilities- noise, vibration and harshness
aerodynamic wind tunnel
environmental tests

Foundry-A place where new parts can be cast using the lost
foam technique (other parts will be shipped to the site)

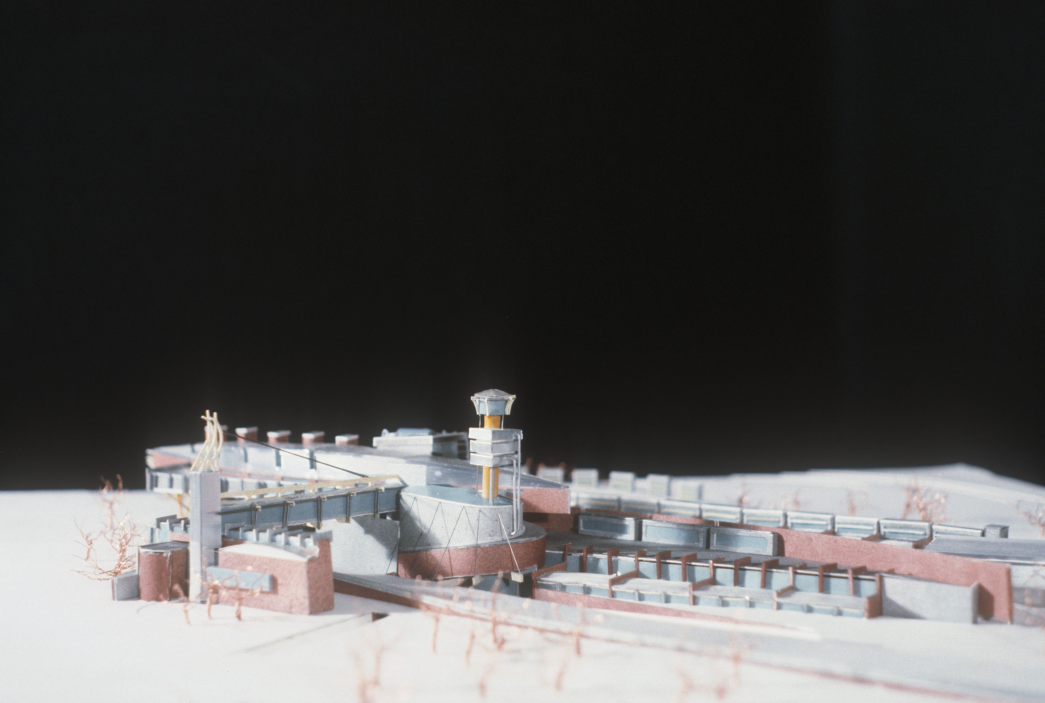


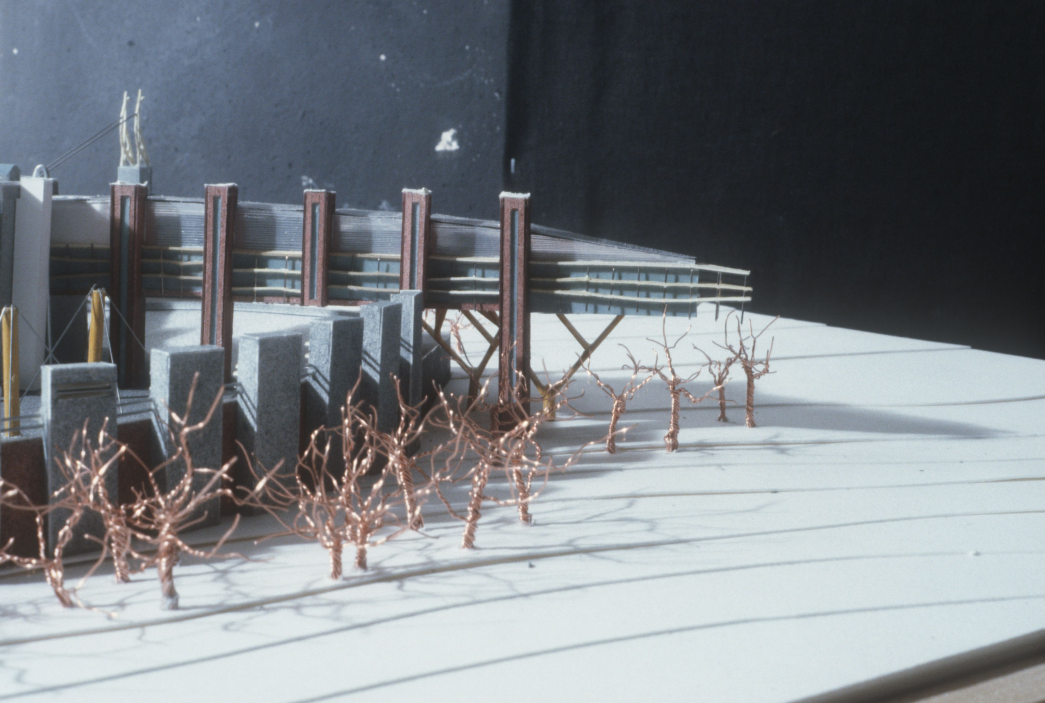
public spaces		total
Reception and display	3500	
Cafe	6000	
Observation tower	100	
Executive offices (10 @ 150)	1500	
Conference room	600	
Multi purpose space	750	
		12450
research spaces		
Library	6400	
Design space	6000	
Design labs (10@1000)	10000	
		22400
production spaces		
Powertrain	25600	
Body systems	30000	
Vehicle systems	23000	
Interior systems	10000	
Foundry	6000	
Painting	7500	
Showers (2@700)	1400	
		102800
testing facilities		
Noise, vibration and harshness	3000	
Aerodynamic wind tunnel	3000	
Environmental tests	3000	
Shop	3000	
		12000
3/4 mile test track		

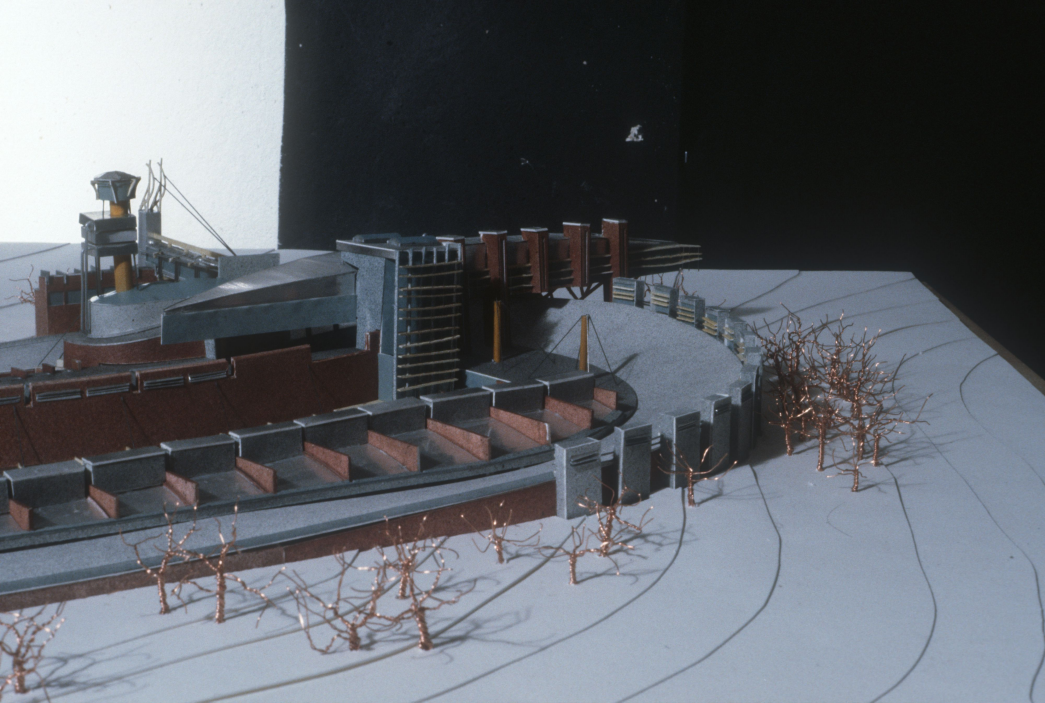


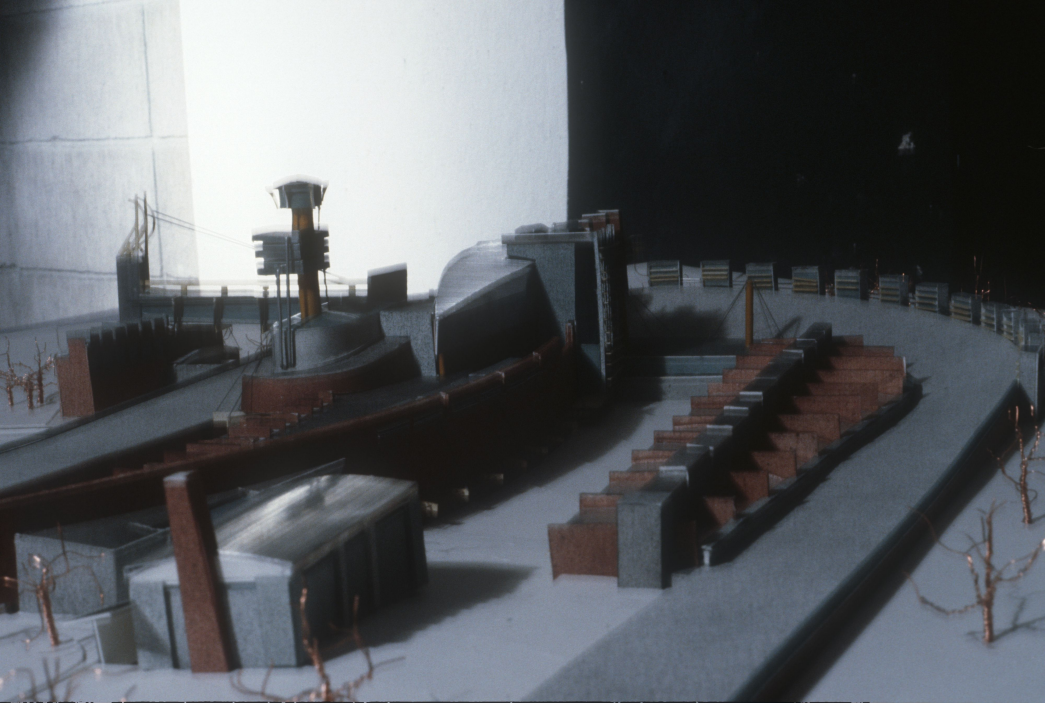




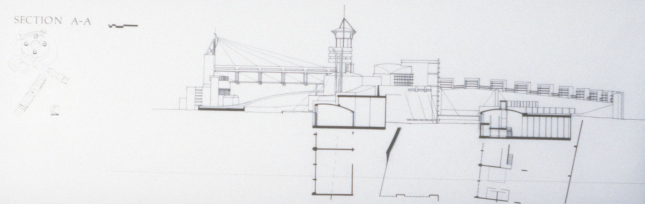




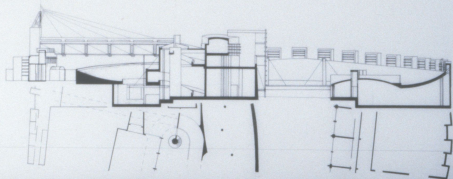




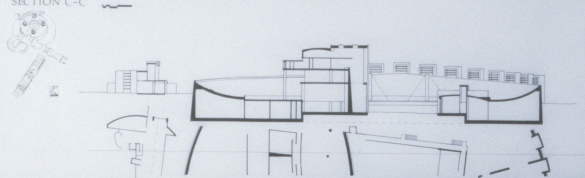
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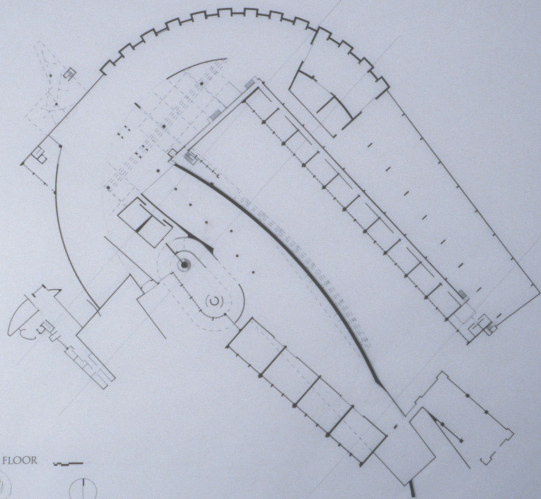


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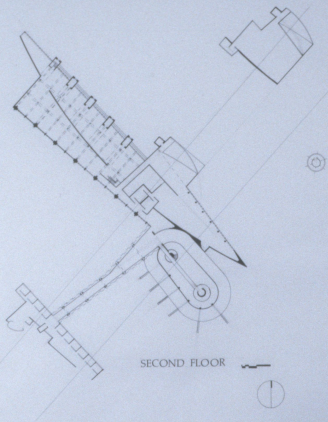
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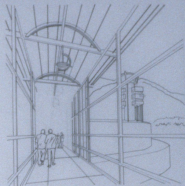


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