Tsartlip Soccer Field Development

Preliminary Design and Cost Estimate

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TSARTLIP FIRST NATION

Executive Summary

The WJOEP (Tsartlip) First Nation has a strategic plan from 2021 to 2026 for community infrastructure upgrades to which part of the long term plan is a new soccer field development at the existing field location at the intersection of Tsartlip Drive and Stelly's Cross Road in Brentwood Bay, BC. The project team travelled to the Tsartlip community to meet with Tsartlip's Director of Stewardship, William Morris, to discuss the project scope and begin a preliminary design and cost estimate. William Morris on behalf of the community expressed the goal to install an all-weather artificial turf field that also included the construction of new public washrooms, team changing rooms, a concession building, new playground, and an upgraded parking lot while considering a budget of approximately $2 million. The new field development is not only intended to be used by the local youth teams to host home games and tournaments, but also a place to hold larger community gatherings. The existing site location consists of a large grass area that covers the majority of the footprint that is used for the field today. A large sloped area consisting of trees, bushes, and shrubs spans the east side of the project footprint that is available to be cleared and used for the new development if necessary. A small gravel parking area exists on the south end and an old playground is located in the far northeast corner. Currently there are no public washrooms on site or any team changing rooms.The new field will be located at the north end of the footprint along the west edge and will consist of 3 fields in 1 with total dimensions of 315ft by 195ft. Two smaller fields will span the width of the large field for younger teams to use. The field will be surrounded by a 10ft out of bounds area followed by an enclosing vinyl coated galvanized steel chain link fence with fence heights increasing behind the nets. Outside the fence and around the field, a concrete walkway will be placed to provide a path to the 600 occupant capacity spectator bleachers located at midfield. A total of 4 stadium sized light fixtures will be installed on the east and west sides of the field to provide lighting in the evening. The existing parking lot will be expanded to a capacity of 63 parking stalls which includes 2 designated disabled parking zones. Upon entering the site from the parking lot, visitors will be welcomed into an open area with public washrooms, a concession, team changing rooms, and a relocated playground area. Conducting a cost estimate on the proposed layout while considering all aspects of the project scope, the final estimation value was $2,229,000 which includes a 15% contingency factor. Estimates were conducted using the DIAND Cost Manual 2004 adjusted to 2023, local contractor quotes, and online resources. To limit costs local contractors within the community can be sourced for project tasks within their respective fields. Additional funding can be applied for through Indigenous Services Canada, as well as grants through Gaming BC and Sport for Social Development for Indigenous Communities. In summary, we believe the proposed layout is the most efficient option to consider to optimize the use of the area. The total cost estimate excluding contingency does not exceed the project budget of $2 million while satisfying all aspects of the project scope. It was a pleasure to assist the Tsartlip community with the design of the new field, and we hope this report can act as a successful first step in the project timeline.

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1.0 Background Information

The W̱JOŁEŁP (Tsartlip) First Nation is located on the west coast of the Saanich Peninsula and is one of five communities apart of the W̱SÁNEĆ Nation [1]. The main community is located in Brentwood Bay as depicted on the left side of Figure 1.

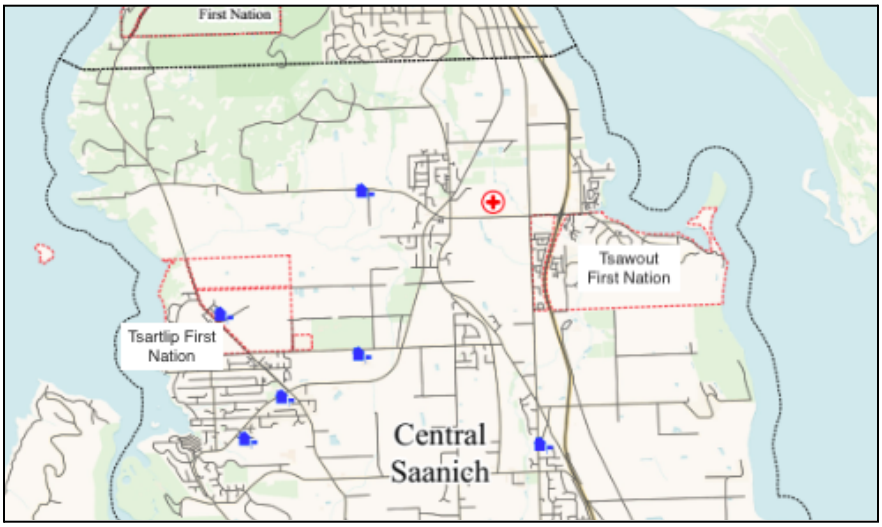

Figure 1: Tsartlip First Nation Map [2]

Currently there are roughly 1000 members that reside in the Tsartlip First Nation community. The community has a strong community infrastructure foundation which includes a Band Office, health centre, school, offices, a boat launch and recently opened a gas station and convenience store [3]. Don Tom, is the current chief of the Tsartlip First Nation and has provided leadership alongside his nine other council members since 2016 [1].

1.1 Community Engagement

The goal of community engagement is to provide the Tsartlip First Nation members a voice in the preliminary design of the soccer field project. The project team was contacted by the community to set up a meeting and discuss their plan for a new soccer field development. The team met with William Morris, Tsartlip's Director of Stewardship. After discussing with William, it was clear the community had goals to provide a new field for the youth to use year round and a place to hold larger scale community gatherings. To further involve the community in the design phase the project team provided the community with a rough layout design of the field with each aspect clearly laid out and asked for feedback and potential concerns. Involving the community is a large aspect of this project as we hope to provide a design that the community can use all year round and be able to host tournaments for youth sports. After sending out the layout of the new development for feedback to the community it was presumed that the layout was acceptable and the design would begin with the initial layout. Overall it was important to involve the community to ensure that they felt as if this was their project and they had a voice in the design. We hope and encourage William, Chief Don Tom, members of council, and members of

the community to review the final recommendations of the report and reach out to the project team with any feedback that they may have.

1.2 Project Scope

Tsartlip First Nation has a strategic plan for the years of 2021 to 2026 and within the plan there are goals that have been categorized into short, medium and long term. One of the long term goals is to provide a feasibility study for a new soccer field [1]. During preliminary project meetings with Director William Morris, it was discussed that the community's main goal is to produce a new all weather turf facility that can host future tournaments and large community gatherings. The field must also include new lights for evening use, an appropriate sized bleacher area, and fencing. It was also discussed to construct new public washrooms, a concession, team changing rooms, and a new playground. Given the upgrade of the area, it is anticipated the parking lot will need to be expanded and improved to account for the increase in expected visitors. The community is aiming to fulfill each aspect of the project scope for an estimated cost of $2 million. The project team will explore several different options for each aspect of the scope to provide the community with the most efficient layout for an acceptable cost.

1.3 Existing Conditions

Currently, on the reserve there is an existing soccer field that is made up of natural grass but in the rainy season the field consistently can become flooded due to lack of proper drainage. Seen in Figure 2 is the google earth view of the existing field, parking lot and playground.

Figure 2: Existing Location of the Soccer Field [4]

On the east side of the existing field is a sloped section that contains small trees, bushes and shrubs. The plan to eliminate costs was to not touch the slope and implement a drainage plan that would allow all the water that drains down the slope to be properly managed. The playground on the north side of the field is not suitable as it does not allow for parents to adequately keep an eye on their children due to the trees. The parking lot is currently made of gravel and is relatively small for the park. At the entrance of the parking lot there are two large trees and the plan is to preserve them to ensure that none of the original nature is not eliminated. Overall the existing field needs to be improved for the community to have a location where they can host games and events. Shown in Figure 3 below is a perspective of the field taken from eye level at the parking lot.

Figure 3: Existing Site Conditions

2.0 Layout

The proposed layout of the new field development is shown in Figure 4. The field will be located on the north end of the project footprint on the west side. The field is surrounded by a 10 yard out of bounds area which will be enclosed by the field fencing. A concrete walkway will be constructed around the perimeter of the field but outside of the field fencing to allow for spectator access to the bleachers located at midfield. High mast light poles will be installed in the locations shown to meet necessary lighting requirements. Positioning the field in the suggested location allows for enough room on the south end for the necessary buildings and expansion of the parking lot. The parking lot will be expanded further from the existing lot to accommodate the expected increase in visitors. The entrance into the field will be located in the northwest corner of the parking lot to which visitors will be welcomed into an open space area with access to concession and washrooms. The playground will move from the existing location

in the far northeast corner to the southeast corner so it can be more accessible to parents and children. Safety precautions will be required such as fencing or barriers around the parking lot and playground. As discussed in preliminary project meetings, the sloped area on the east side of the footprint is eligible to be remediated and used for the development. The team has elected to not perform any remediation to the sloped area due to the increase in cost the work will require on an already restricted project budget. The current footprint without the use of the sloped area provides sufficient space for all project requirements and allows for cost to be allocated to other areas.

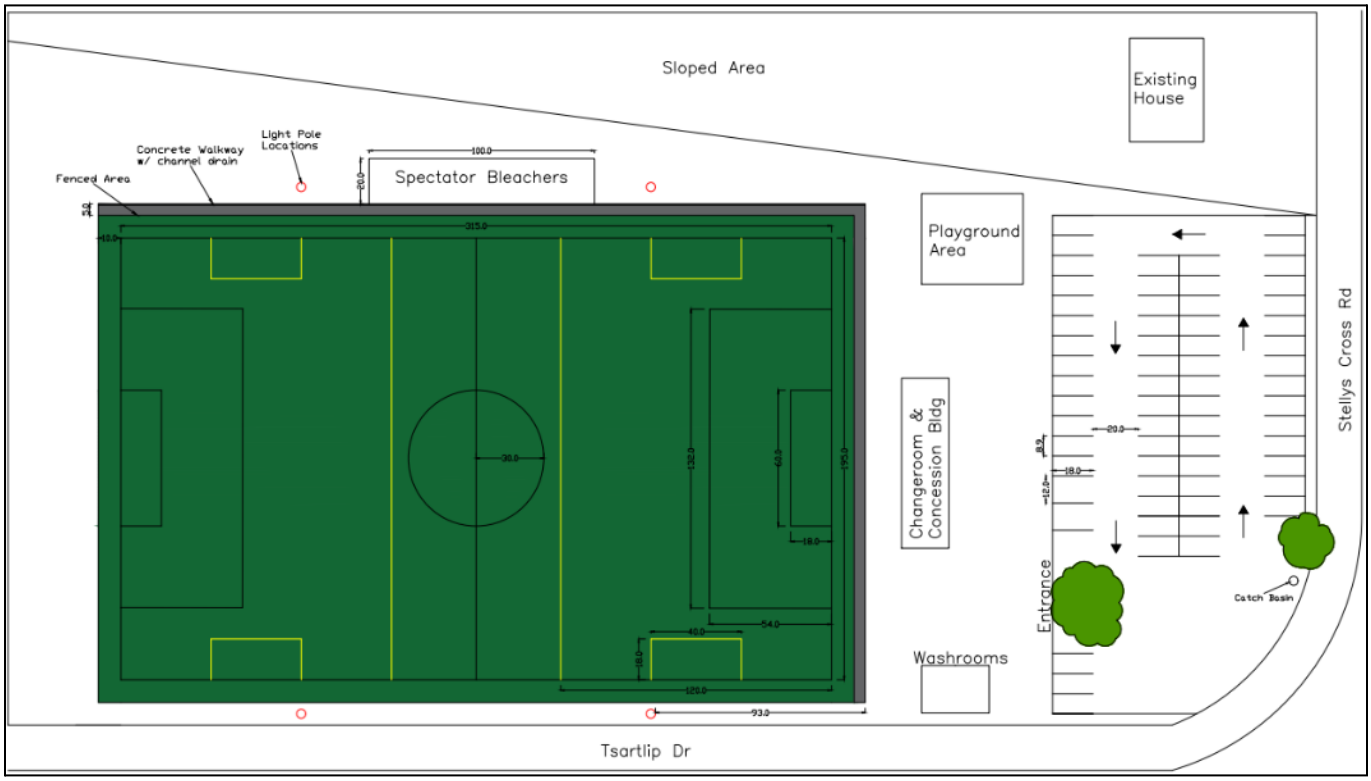

Figure 4: Proposed Layout

3.0 Project Details and Design

The following sections outline specific details about the proposed layout of the project. It is important to note that this is a preliminary design and the final design of each component would need to be further investigated by industry professionals in depth before any construction is to be completed.

3.1 Artificial Turf Field

It was discussed in preliminary project meetings between Director of Stewardship William Morris and the project team that the new field is required to be an all-weather turf to be used in year-round conditions and that the dimensions of the field were not required to be of regulation

size. Typical fields are sized approximately 130-100 yards in length and 100-50 yards in width with regulation size college fields having dimensions of 120 yards by 75 yards [5]. Given the field will be used by the youth of the community and visiting teams, and not college level teams it was determined that a multi-field approach with shortened dimensions to fit a variety of different age groups would be appropriate.

The chosen field design option is a 3 in 1 approach that consists of 1 large field intended for older teams and 2 smaller fields that span the width of the large field intended for youth teams. We determined an appropriate size for the large field to be 105 yards by 65 yards which is 15 yards shorter and 10 yards less in width than the compared regulation field. The two small fields as mentioned will be split into both ends of the large field spanning 65 yards in length and 40 yards in width. The dimensions chosen for the smaller fields then allows for a 25-yard buffer between the two fields for an out of bounds area, any team foot traffic, and for parents and spectators to view the games closer than the designated bleacher area. The lengths and widths of the proposed field design is based on the length to width ratio of the compared regulation sized field which are summarized in Table 1.

Table 1: Field Dimensions

Field	Length (yds)	Width (yds)	Ratio (L/W)
Regulation	120	75	1.60
Proposed Large Field	105	65	1.62
Proposed Small Fields (2)	65	40	1.63

The area lines for the goal box, penalty area, centre circle on the field will remain unchanged from regulation size as these are typical dimensions for all sized fields [5]. The dimensions of these areas can be found summarized in Table 2 with field size and dimensions shown to scale in Figure 4.

Table 2: FIeld Line Dimensions

Area	Dimensions (yds)
Goal Box	6 x 20
Penalty Area	18 x 44
Centre Circle	10 (radius)

When considering an artificial turf field, one of the most important aspects is ensuring a reliable provider is used for the installation. For the installation of the new Tsartlip field we recommend outsourcing the field to FieldTurf, a trusted brand renowned for their durability, performance, and

safety. With over 25,000 artificial turf installed worldwide FieldTurf also recently installed the new field for Starlight Stadium in Langford, used by Pacific FC of the Canadian Premier League [6].

There are many well known concerns when considering an artificial turf field including the durability and most importantly the safety of the users. Turf fields have been subject to cause a larger number of injuries to players when compared to natural grass such as ACL and other ligament tears. A study at Penn State University concluded that FieldTurf provided a product that was most similar to natural grass when considering athletic footwear traction [7]. This study has been further supported by a 3-year study at the University of Montana concluding that FieldTurf systems led to 31% less ligament tears, 24% less high ankle sprains, and 21% less overall severe injuries compared to natural grass [8]. FieldTurf also guarantees a product that will be maintenance free for 8 years post install confirming excellent durability [6].

The grass layer of the existing field will need to be stripped down to the subgrade as the first part of the installation of the field. A geotextile base will be installed to prevent growth followed by a layer of 3” crush rock, which will be compacted to ensure proper drainage through the layers. Next, a polypropylene shock pad system will be assembled in interlocking panels covering the entirety of the field. The shock pad system will offer fast drainage and dimensional stability in varying conditions [6]. The dual-polymer fibers will extrude through the base layer and will be then filled with an infill material that consists of ground-up tires, sand, and cork. A cross section of the field assembly provided by FieldTurf is shown in Figure 5.

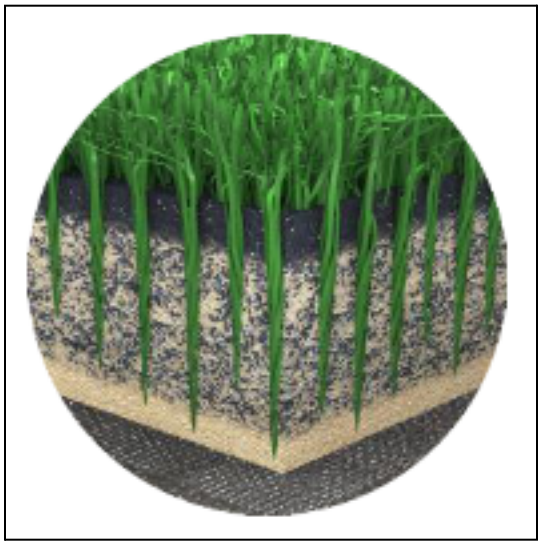

Figure 5: Artificial Turf Layers [6]

3.1.1 Lighting

A crucial aspect of any outdoor sports field is that it has adequate lighting installed so it can be used in the evenings. There are certain standards for lighting requirements based on the size of the field and the respective sports the field will be used for. In the case of the Tsartlip field, the applicable lighting standard is Illuminating Engineers Society (IES) RP-6 Class 3. To meet this standard, an LED lighting system provided by Musco Sports Lighting is recommended. This

system will provide high quality illumination with lower overall energy consumption, and lower maintenance costs compared to similar suppliers [9]. Musco systems are individually designed for each sporting venue to achieve the required lighting output. The design considerations include pole heights, quantity of fixtures, and optic type. Based on the dimensions of the field, these design considerations are critical to reduce the amount of direct glare that players will experience on the field. To reduce the amount of glare the lighting system needs to be optimized to maximize the number of luminaires that are vertically distributed compared to horizontally distributed across the playing surface [10]. Referring to the footcandle unit used by lighting engineers that measures the brightness of a given space [11], the IES RP-6 Class 3 standard recommends vertical illumination of 150 footcandles to 50 footcandles horizontally [12].

The lighting system recommended by Musco consists of 4-60 foot light poles, 2 installed on the east sideline and 2 on the west sideline. As shown in Figure 6, it is critical the lights are not installed in the shaded areas. As per IES, these zones are considered critical glare zones and installs in this area should be avoided. The lights will be installed 93 feet from the end sidelines as shown in Figure 4.

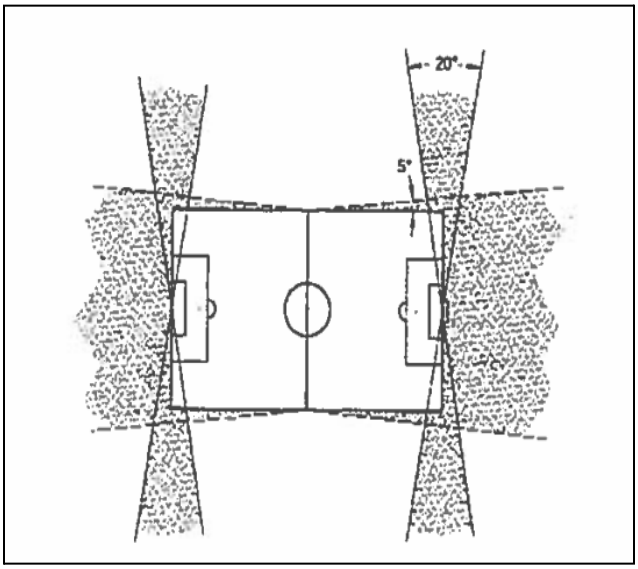

Figure 6: Critical Glare Zones [12]

The light foundation will be positioned at grade with the fixture type determining the mounting height [13]. The fixture configuration consists of two TLC-LED-900 and two TLC-LED-1200 using a LED 5700k-75 CR source. The two reasons to use different types of LED fixtures are that the TLC-LED-1200 provides more light than the TLC-LED-900, and the TLC-LED-900 is cheaper and uses less energy. By using the combination of fixtures the lighting requirements will be achieved and cost and energy use are optimized. Please refer to Appendix A for further lighting details.

3.1.2 Fencing

Fencing around the field is required primarily for safety and to keep the ball within bounds. Standard chain link fencing is typical for athletic fields due to durability and reasonable costs

[14]. Chain link fencing with vinyl coating is recommended as it adds an extra layer of protection to the galvanized steel improving durability as well as increasing the aesthetic appeal of the fence [14]. Figure 7 shows a typical fencing example that is recommended for the Tsartlip field.

Figure 7: Chain Link Fence around the Field [15]

Fencing will be installed around the entire perimeter of the field. As shown on Figure 4, the fencing will be installed at a distance of 10 feet past the boundary lines of the field. Along the east and west sides of the field the fence height will be installed at a typical height of 4 feet. The fence on the north and south ends will be increased to a height of 15 feet in an attempt to keep errant balls within the field area [16].

3.1.3 Player Benches

The player benches will be located on the west side of the field to separate the players side from the spectator side. Benches will have a capacity of 6-10 players and will be separated at a minimum distance of 2m as required by FIFA guidelines [17]. The bench locations are not specifically marked on the layout plan as the exact location along the sidelines is considered arbitrary. Benches are portable and have the ability to move in the case they need to be relocated while the smaller fields are in use. The benches are constructed using 4-inch 6005 T5 aluminum, making them highly stable. The benches are recommended to be 15 ft in length but are available in lengths up to 30 ft [18]. Given the weather on Vancouver Island, the benches are enclosed with plexiglass to shield players from the rain.

Figure 8: Player Bench Model [18]

3.1.4 Drainage

One of the most important aspects of the soccer field is the ability to effectively manage water. The field must be able to properly drain to maintain acceptable playing conditions year round. No specific drainage calculations have been completed within the scope of this project but a general design for the drainage system has been incorporated. The first process that will be implemented to reduce flooding of the field will be a 1% slope from the east and west sides to the center [19]. Adding a slope to the field is referred to as “crowing” and will allow for the field to induce the runoff of surface water [19]. Additionally, to effectively manage excess water coming off the field, the concrete walkway, and the large sloped area on the east side of the project, channel drains will be installed. These channel drains shown in Figure 9 will collect all the water that runs off the field and the water that runs down the slope on the eastern side of the field. The water that is collected in these drains will then be conveyed and connected to the nearest stormwater utility.

Figure 9: Channel Drains Example [20]

Furthermore, to reduce any groundwater that may cause flooding of the field, 4-inch diameter drainage pipes that will travel underneath the field. These pipes will allow for any water to be effectively drained underneath the field. The pipes will be placed every 10 feet to allow for lots of drainage [21] and have been assumed to be 6 inches in diameter and made with PVC. The drainage pipes will connect from the eastern channel drains to the western channel drains which will then drain to the nearest stormwater utility. Seen in the Figure below is a cross section of the field that will be implemented, with the slight change of the drainage pipe connecting to the channel drain and not a different drain running north-south.

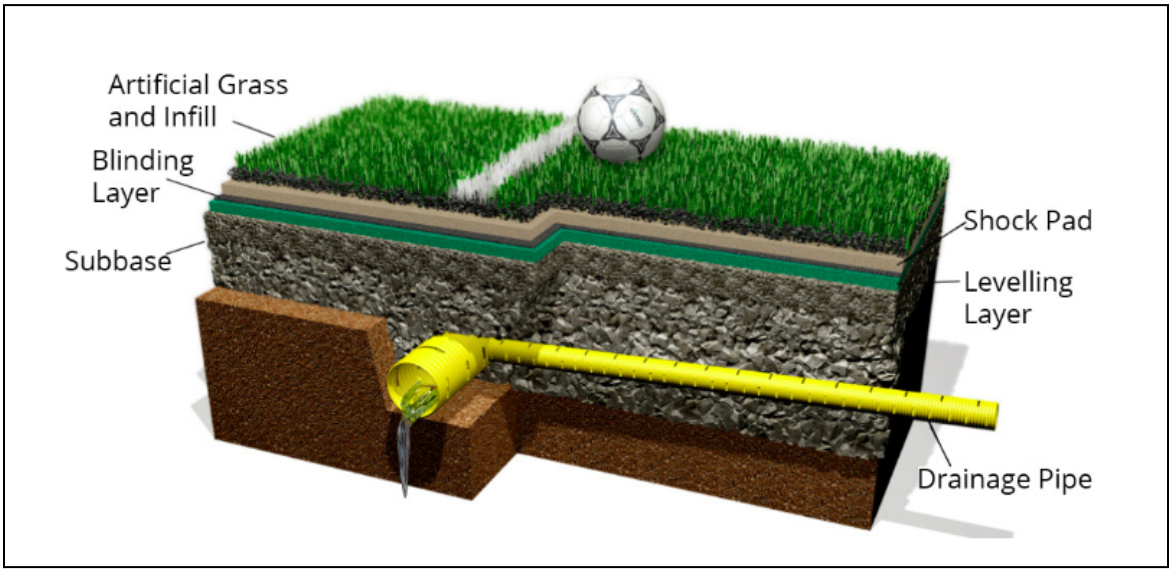

Figure 10: Drainage Cross Section [22]

Overall, the drainage of the field will be one of the most crucial aspects of the design as it affects the overall usage of the field. To determine the costs of the drainage it is broken down in the cost section of this report below.

3.2 Bleachers

On the eastern side of the field there will be two full size aluminum bleachers. These bleachers will be able to seat a total of 600 people at maximum capacity [23]. Having a large amount of capacity will allow for the community to host large tournaments or other big events. Having adequate seating provides a large attraction to the field as it provides an increased amount of accessibility and comfort for spectators. The bleachers would have one aisle that goes down the middle of each of the bleachers which provides easier access up and down the bleachers. A similar image of the two bleachers can be seen in the Figure below.

Figure 11: Bleachers [23]

For the foundation of the bleachers it is to be placed and bolted down on a concrete pad. The concrete pad would need to be placed on a minimum of 4 inches of compacted gravel or other approved subbase [24]. The concrete pad will need to be a minimum of 6 inches thick with wire reinforcement [24]. This would allow for the bleachers to be level and secured into place. The foundation will be an extension of the walkway around the field but the thickness would increase below grade to support the maximum possible load of 600 fans.

3.3 Walkways

There will be multiple walkways in the park that will allow users to easily access all the amenities. The main field walkway will be located along the east and south perimeter of the field, as these will have the highest amount of user traffic compared to the other sides of the field. The thickness of the walkway around the field will be 4 inches and will be placed with 32 MPa concrete [25]. Underneath the concrete will need to be a minimum of 4 inches of compacted granular subbase [25]. Using concrete along the east side of the field creates a more feasible construction method as it will allow for the required concrete pad under the bleachers to be merged with the sidewalk. The walkways between the change rooms, washroom and concession stand will be made with asphalt. The asphalt walkways will be 2 inches thick and will be supported with a minimum of 4 inches of compacted subbase. The use of asphalt compared to concrete will create cost savings on the project. Additionally, concrete and asphalt walkways will not be washed out during heavy rainfall compared to gravel walkways.

3.4 Parking Lot

The existing parking lot will be expanded to accommodate the new development. The existing is a gravel lot with approximate capacity of 20-24 vehicles located at the south end of the footprint to be expanded for a capacity of 60-64 parking stalls. The extra capacity will be required for hosting tournaments and community events. The expanded dimensions of the parking lot will span the width of the project footprint and will be approximately 115 ft in length from the south end. Two trees currently sit in the proposed parking lot area that were requested to remain in place. The entrance to the park will be located in the northwest corner of the parking lot next to one of the existing trees.

Parking stalls will be sized to City of Vancouver standards of 8.9ft by 18 ft with a required aisle width of 20 ft [27]. Two disability spaces with an increased width of 13ft will be located at the front entrance to the park. Parking lot dimension guidelines used are shown in detail in Appendix B from the City of Vancouver. The new designed lot will be paved with specifications as recommended by the BC Ministry for Transportation and Infrastructure. The parking lot is to be constructed with 4 separate layers for long standing durability that starts at the natural subgrade, followed by a selected granular subbase (SGSB), a crushed base course (CBC), then the finishing layer of asphalt (AP) [28]. Excavation and earthworks will be required to meet these requirements with the current site conditions. Table 3 shows suitable parking lot thickness and aggregate size for the described layers.

Table 3: Parking Lot Layers

Layer	Aggregate Size (mm)	Thickness (mm)
Natural Subgrade	N/A	N/A
SGSB	75	150
CBC	25	75
AP	N/A	25

The parking lot will be constructed using a recommended minimum slope of 2% as per the Asphalt Paving Association of Iowa [29] for proper drainage that will slope north to south with a second slope break from east to west to force excess water to flow to the south edge into an installed catch basin or towards the road. A suitable catch basin is shown in Appendix B that can be supplied by Langley Concrete Group designed specifically for Vancouver Island that is H20 load rated and designed to ASTM C478 specifications. Figure 12 shows a planned cross section of the proposed parking lot expansion.

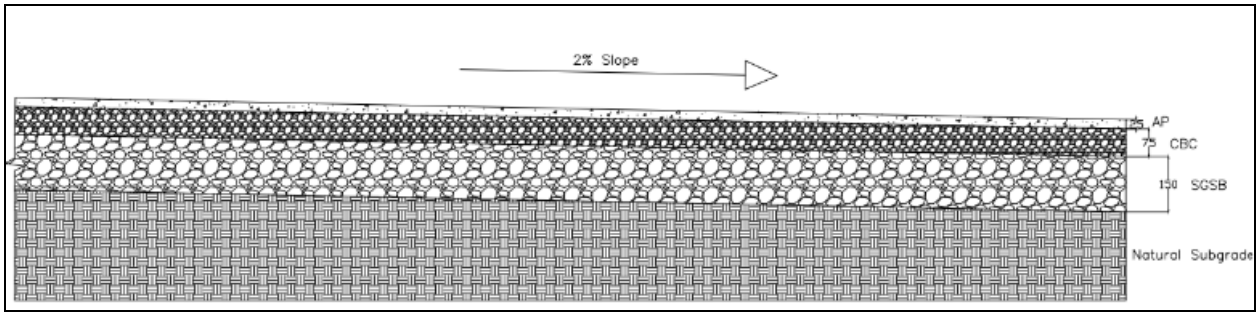

Figure 12: Parking Lot Cross Section

3.5 Change Room and Concession Building

The goal of the Tsartlip First Nation is to be able to host tournaments and have a park that they can be proud of. One aspect that was important to them was to be able to have a concession building where they could serve basic food and beverages to visitors during large events and games. Additionally, it was asked that there be a changeroom for the players to be able to prepare for games and have a safe space to get changed after the game. A layout of the changeroom and concession building can be seen in Appendix C. The change rooms are each 25 feet long, the concession room is 25 feet long and the boiler room is 5 feet long, for a total length of 80 feet. The total width of the building is 21 feet wide. Within each changeroom are multiple bathroom stalls and one accessible bathroom stall. Additionally, there are showers that will allow for players to clean themselves after a game. In between the two changerooms there is a boiler room and storage room that will provide hot water for the showers and will be able to store sporting equipment and other items. The concession area of the building will have multiple sinks, a stove, dishwasher, grilling station and all other needed amenities to provide basic food for a large crowd when needed. The building will follow all BC building code requirements and the exact details of each aspect of the design have been omitted in this report as it will follow the building code. Certain design elements such as the accessible bathroom and bathroom stalls follow the City of Vancouver specifications [30]. Overall the building will be able to provide a safe space for the community to support large gatherings and events.

3.6 Playground

The playground, located on the south side of the park, will be a safe place for children to play. The existing playground is surrounded by trees and does not allow adequate supervision for parents, therefore the new playground location was chosen to be near the concession and change rooms in an open area that allows parents to maintain proper visual supervision of their children. The playground was designed for children aged five to ten years old. All the playground equipment will be accessible and inclusive to all children regardless of ability and skill level. The primary consideration when designing a playground was the safety of the playground, so local laws regarding safety requirements were considered. The playground base is suggested to be nine inches thick of wood mulch (not CCA-treated) as tested to ASTM F1292 [31]. Using wood mulch will assist in safeguarding kids from potential falls while also reducing the cost of installing a rubber base. Overall the purpose of building and relocating the new

playground was to provide an accessible space for children closer to the other amenities while allowing for better parental supervision.

3.7 Public Washrooms

Due to the park being a new large facility there will potentially be numerous fans at the park watching games or attending events that the community would host. In order to meet the proper health requirement it is necessary to have a public washroom that meets the needs of the park. The washroom will consist of a men's, a women's and a single universal bathroom. The mens and womens bathroom will have at least two functioning stalls and multiple sinks. The size of the washroom will be 21 feet wide by 30 feet long and will be able to support a large crowd when needed. In the middle of the bathroom building there will be a storage and utility room that will allow for all the necessary equipment and cleaning supplies needed to maintain and operate the public washroom. An overall layout of the building can be seen in Appendix C below, the layout is a preliminary design and follows the City of Vancouver accessibility specifications for a public bathroom [30]. The layout of the washroom and the total number of toilets allows for the facility to service 180 people per hour, which will be more than enough for the soccer field [32]. Additionally, the public washroom will need to be connected to the watermain running along the road as well as connected to the main sanitary line. For this reason the public washroom was placed near Tsartlip Drive to eliminate as much trench excavation and pipe materials as possible.

4.0 Cost Estimate

A detailed cost estimate was completed for every aspect of the project. The majority of the pricing was taken from the DIAND 2004 cost manual and was converted to 2023 costs [26]. All other costs can be seen in Appendix D and were sourced from different suppliers and online resources [6, 33, 34, 35, 36, 37, 38, 39, 40]. There may be some cost savings that could be implemented into the cost estimate. It was mentioned that there were local contractors that may be able to aid in the construction phase of the project. Cost savings such as this would allow the community to become more involved in the project and create more room in the budget to be used elsewhere.

There were multiple costs that were excluded from the estimate. The first exclusion were any geotechnical assessments, as the community would need to complete this prior to conducting and sourcing out any contracts. The second exclusion was the structural design of the buildings. The main goal of the project was to build a soccer field with the possibility of including a washroom, change room and concession. Therefore all structural design was not included as the community would need to confirm the layouts of the buildings and involve a structural engineer. Additionally, all the utility tie-ins to the existing utilities were not included as there were no drawings given therefore it was difficult to price out a tie-in that did not have an exact location. Finally, all permit application costs were not considered and would be on the community to apply for prior to any construction.

After adding up all the costs the total budget price was $2,229,000. This price includes a 15% contingency allowance that will be able to cover unforeseen costs that may arise. This price comes close to the 2 million dollar budget that the community had hoped to achieve.

5.0 Funding

In order for Tsartlip First Nation to implement the soccer field project they need to ensure they have the proper funding. There are multiple possible funding options that the community can apply for such as equipment grants, capital project grants and federal government grants. The equipment grant that the community may be able to apply for that would help pay for all the soccer balls and nets is a grant provided by Indigenous Sport, Physical Activity and Recreation Council. The fund has a maximum grant amount of $3,000 and one of main criteria is that a large number of Indigenous people would benefit from the use of the equipment and in this case it would [41].

When considering locally sourced funding such as through the provincial government there is a fund that is called the Capital Project Grant which is provided through Gaming BC. This grant has provided funding for multiple soccer field projects in the Greater Victoria just in the last year such as the Gordon Head and Cordova Bay Soccer Club new turf field and Prospect Lake Soccer Club new turf field located in Saanich [42]. Each project received $250,000 towards the upgrade of their turf fields. The downside to this fund is that the total cost of the project must not exceed $1.25 million, therefore for this project there would need to be exclusions from the scope of work to fit the budget into that requirement. Additionally, for this fund to work the community would need to prove that they have the rest of the funding readily available to pay for the remaining costs.

The federal government has multiple potential grants that the community would be able to apply for. The first grant is called the Stream Two - Sport for Social Development for Indigenous Communities. This grant has multiple requirements that the Tsartlip community all meet such as being an Indigenous community, the project creates opportunities to participate in sports and it has the support from leadership. Through this grant there is $3.6 million available annually to provide Indigenous communities the opportunity to deliver meaningful sports activities [43]. The Stream Two grant has previously funded similar projects such as the Big River First Nation new artificial soccer turf in Debden, Saskatchewan, the grant provided them $486,000 towards the project. The second grant that the community would be able to apply for with the federal government would be the First Nation Infrastructure Fund Program. This grant is provided through Indigenous Services Canada (ISC). The community would submit to ISC their plan for the proposed soccer field and ISC would identify if they could provide funding for the project. For this particular fund it may be more difficult to achieve due to ISC focusing more on funding projects that are high needs for communities such as sewage systems or other high priority projects. Although the project does fall under the cultural and recreational facility category set out by ISC and would provide community members to adopt a healthier lifestyle by playing sports [44], therefore it would definitely be recommended to apply for this grant.

Considering all the possible grants that may be applied for, this project has a great chance of receiving funds from the provincial and federal government to help pay for the costs of the soccer field. Overall, applying to all the grants suggested is highly recommended to maximize the communities ability to construct exactly what they like and not have to make budget cuts due to lack of funds.

6.0 Recommendations

After meeting with the Tsartlip First Nation Community it was evident that their main goal was to build an all weather soccer field that the youth teams could use, and ultimately be proud to host games and tournaments. We recommend instead of installing more than one field to install one field with lines dividing the field into smaller sections for younger age groups to optimize the project area. The suggested drainage plan to crown the field and install PVC piping underneath the field is critical for the field to manage water and prevent any flooding and maintain the quality. The layout with the concession, changrooms, washrooms, and playground located at the entrance of the park will provide an open and welcoming area for visitors to be introduced to. Concrete and asphalt walkways around the park will create a more accessible and aesthetically pleasing space. We believe the proposed layout is the optimal design when considering the scope of the project. All scope requirements have been considered for a cost that slightly exceeds the budget while considering contingency. It was a pleasure working with the Tsartlip First Nation Community and hope this report allows them to take the next steps to build their new soccer field. Once again, we encourage members of the community to reach out to the project team with any comments or feedback regarding the project.

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Appendix A - Lighting Specifications

Typical Soccer Field

Victoria

Lighting System

Pole / Fixture Summary

Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Circuit
S1-S4	60'	60'	2	TLC-LED-1200	2.34 kW	A
		60'	2	TLC-LED-900	1.76 kW	A
4			***16***		***16.40 kW***	

Circuit Summary

Circuit	Description	Load	Fixture Qty
A	Soccer	16.4 kW	16

Fixture Type Summary

Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-LED-1200	LED 5700K - 75 CRI	1170W	150,000	>120,000	>120,000	>120,000	8
TLC-LED-900	LED 5700K - 75 CRI	880W	104,000	>120,000	>120,000	>120,000	8

Single Luminaire Amperage Draw Chart

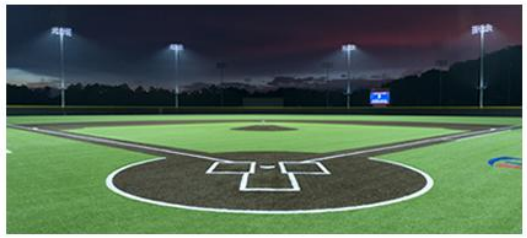
Driver (.90 min power factor)	Max Line Amperage Per Luminaire						
Single Phase Voltage	208 (0)	220 (0)	240 (0)	277 (0)	347 (0)	380 (0)	480 (0)
TLC-LED-1200	6.9	6.5	6.0	5.2	4.2	3.8	3.0
TLC-LED-900	5.2	4.9	4.5	3.9	3.1	2.9	2.3

Light Level Summary

Calculation Grid Summary

Grid Name	Calculation Metric	Illumination					Circuits	Fixture Qty
		Ave	Min	Max	Max/Min	Ave/Min		
Soccer Spill	Horizontal Illuminance	0	0	0.02	0.00		A	16
Soccer Spill	Max Candela Metric	486	63.3	1078	17.02	7.67	A	16
Soccer Spill	Max Vertical Illuminance Metric	0.01	0	0.04	75.67		A	16
Soccer	Horizontal Illuminance	33	23	38	1.62	1.44	A	16

From Hometown to Professional



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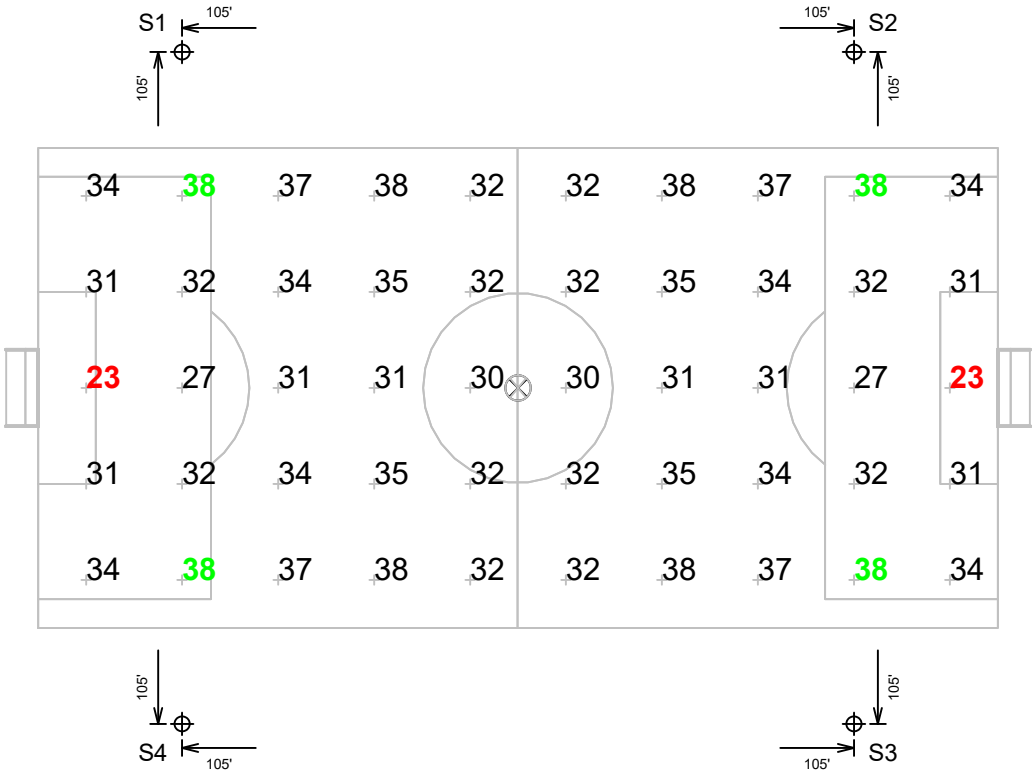
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1-S4	60'	-	60'	TLC-LED-900	2	2	0
				60'	TLC-LED-1200	2	2	0
4	TOTALS					16	16	0



SCALE IN FEET 1 : 60

0' 60' 120'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ENGINEERED DESIGN By: · File #SO3-3015-0912-4P_D · 12-Jan-23

PROJECT NAME (EDIT)

PROJECT LOCATION (EDIT)

GRID SUMMARY

Name:	**Soccer**
Size:	300' x 150'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**30**
Scan Average:	33.03
Maximum:	38
Minimum:	23
Avg / Min:	1.41
Guaranteed Max / Min:	**2.5**
Max / Min:	1.62
UG (adjacent pts):	1.32
CU:	0.73
No. of Points:	50

LUMINAIRE INFORMATION

Applied Circuits:	A
No. of Luminaires:	**16**
Total Load:	16.4 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1-S4	60'	-	60'	TLC-LED-900	2	2	0
				60'	TLC-LED-1200	2	2	0
4	TOTALS					16	16	0

PROJECT NAME (EDIT)

PROJECT LOCATION (EDIT)

GRID SUMMARY

Name:	**Soccer Spill**
Spacing:	30.0'
Height:	3.0' above grade

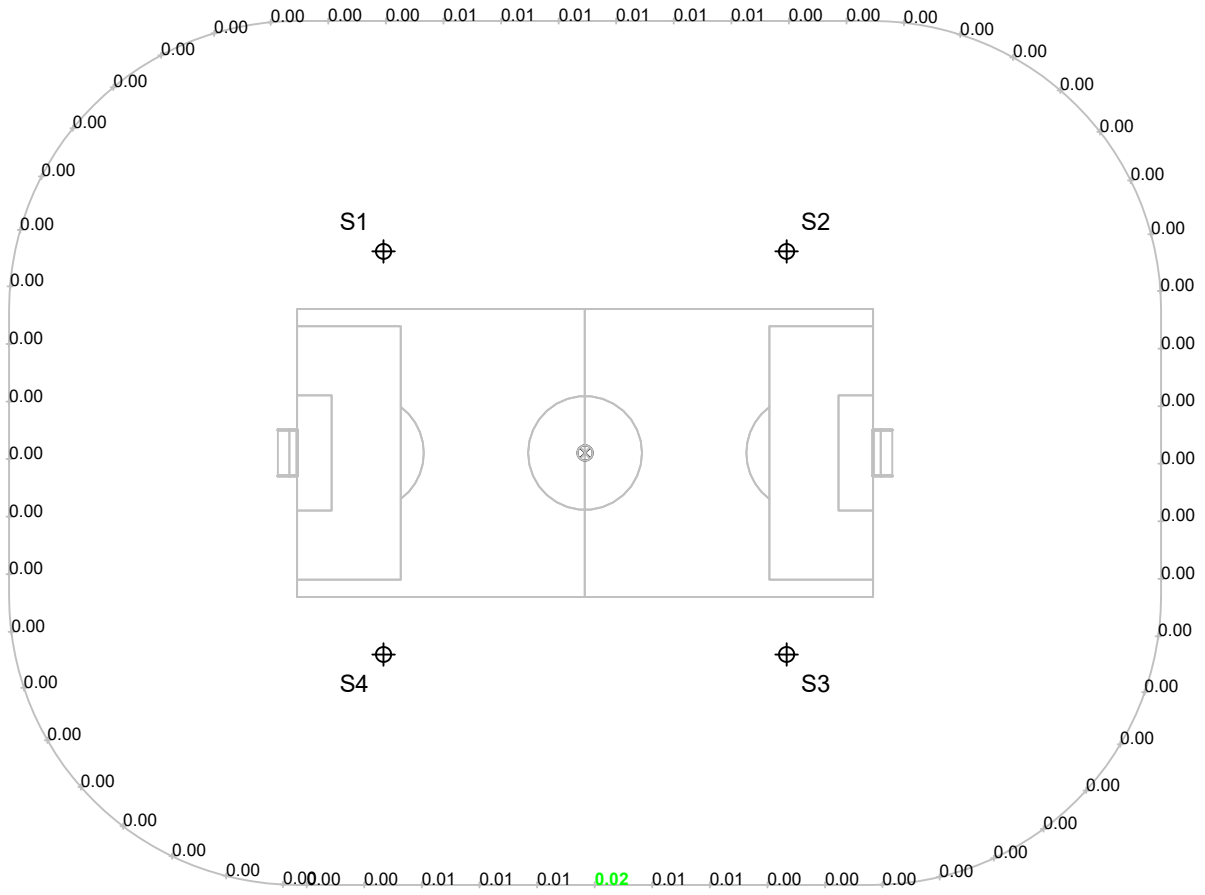
ILLUMINATION SUMMARY

HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	0.0025
Maximum:	0.02
Minimum:	0.00
No. of Points:	62

LUMINAIRE INFORMATION

Applied Circuits:	A
No. of Luminaires:	**16**
Total Load:	16.4 kW



SCALE IN FEET 1 : 100

0' 100' 200'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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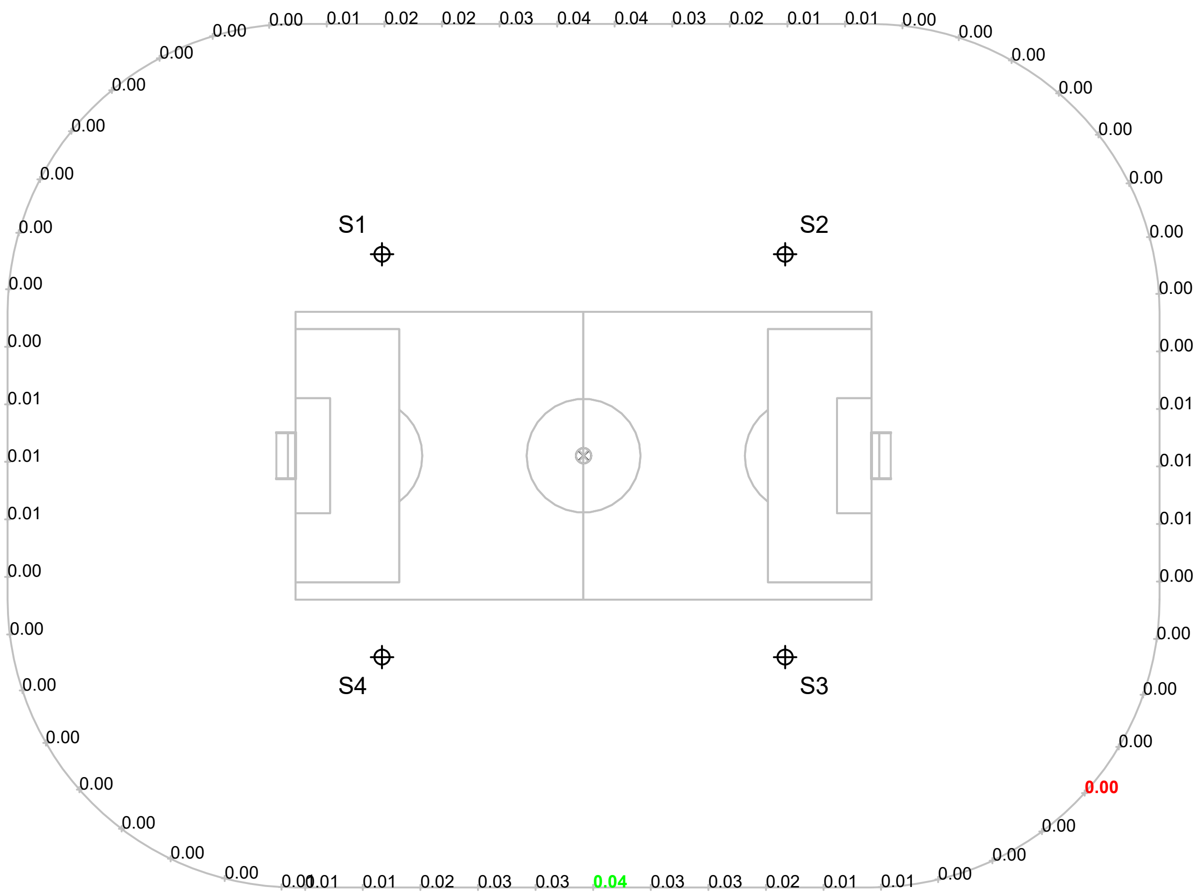
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1-S4	60'	-	60'	TLC-LED-900	2	2	0
				60'	TLC-LED-1200	2	2	0
4	TOTALS					16	16	0



SCALE IN FEET 1 : 100

0' 100' 200'

Pole location(s) ⌖ dimensions are relative to 0,0 reference point(s) ⊗

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PROJECT NAME (EDIT)

PROJECT LOCATION (EDIT)

GRID SUMMARY

Name:	**Soccer Spill**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAX VERTICAL FOOTCANDLES

	Entire Grid
Scan Average:	0.0092
Maximum:	0.04
Minimum:	0.00
No. of Points:	62

LUMINAIRE INFORMATION

Applied Circuits:	A
No. of Luminaires:	**16**
Total Load:	16.4 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1-S4	60'	-	60'	TLC-LED-900	2	2	0
				60'	TLC-LED-1200	2	2	0
4	TOTALS					16	16	0

PROJECT NAME (EDIT)

PROJECT LOCATION (EDIT)

GRID SUMMARY

Name:	**Soccer Spill**
Spacing:	30.0'
Height:	3.0' above grade

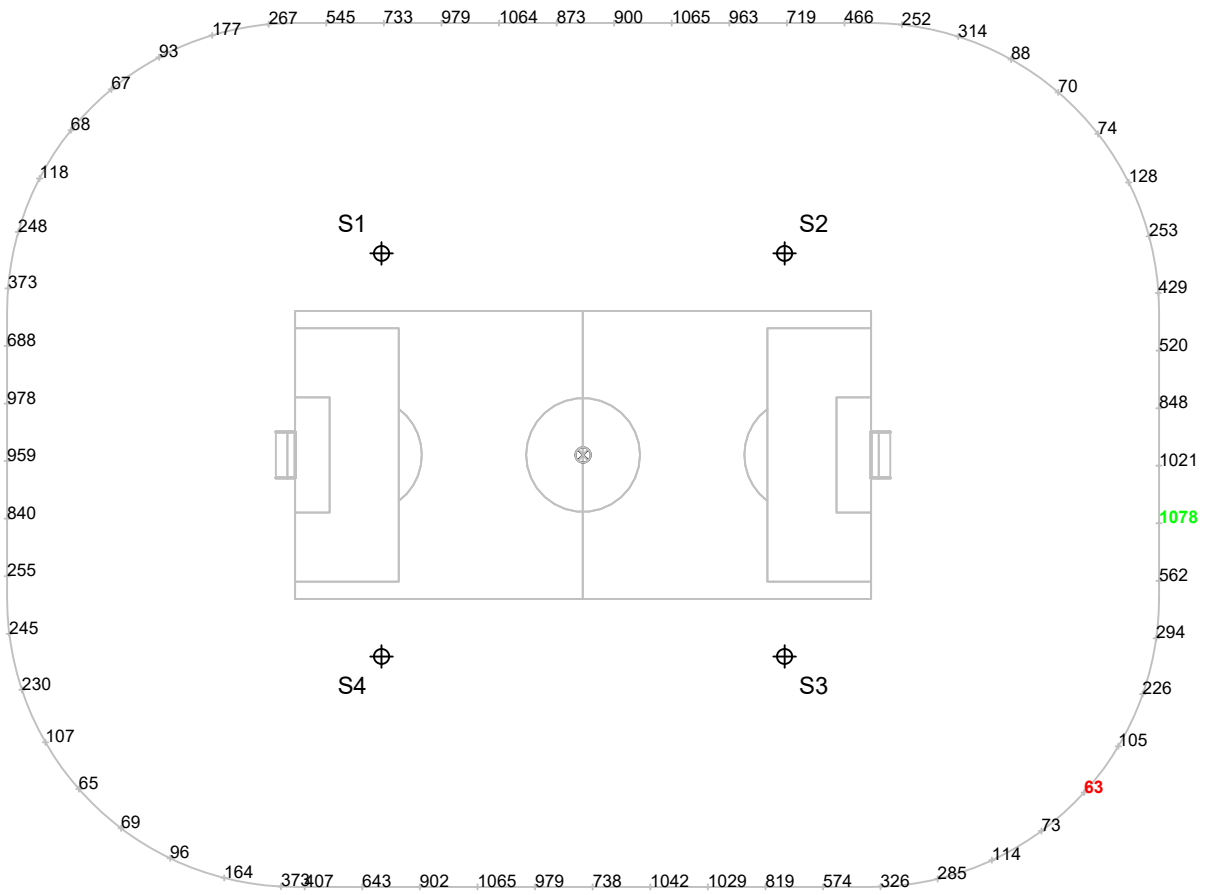
ILLUMINATION SUMMARY

CANDELA (PER FIXTURE)

	Entire Grid
Scan Average:	485.5291
Maximum:	1077.86
Minimum:	63.32
No. of Points:	62

LUMINAIRE INFORMATION

Applied Circuits:	A
No. of Luminaires:	**16**
Total Load:	16.4 kW



Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 100

0' 100' 200'

Pole location(s) ⌖ dimensions are relative to 0,0 reference point(s) ⊗

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PROJECT NAME (EDIT)

PROJECT LOCATION (EDIT)

EQUIPMENT LAYOUT

INCLUDES:
· Soccer

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

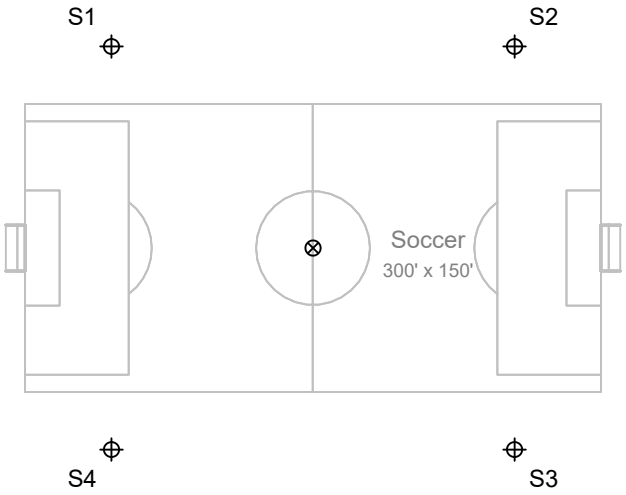
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires		
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE
4	S1-S4	60'	-	60'	TLC-LED-900	2
				60'	TLC-LED-1200	2
4	TOTALS					16

SINGLE LUMINAIRE AMPERAGE DRAW CHART

Driver (.90 min power factor)	Line Amperage Per Luminaire (max draw)						
Single Phase Voltage	208 (0)	220 (0)	240 (0)	277 (0)	347 (0)	380 (0)	480 (0)
TLC-LED-1200	6.9	6.5	6.0	5.2	4.2	3.8	3.0
TLC-LED-900	5.2	4.9	4.5	3.9	3.1	2.9	2.3



SCALE IN FEET 1 : 100

0' 100' 200'

Pole location(s) ⌖ dimensions are relative to 0,0 reference point(s) ⊗

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Appendix B - Parking Lot Details

CITY OF VANCOUVER, ENGINEERINGDEPARTMENT

A/ PARKING STALL GUIDELINES(MINIMUM STALL WIDTHS)

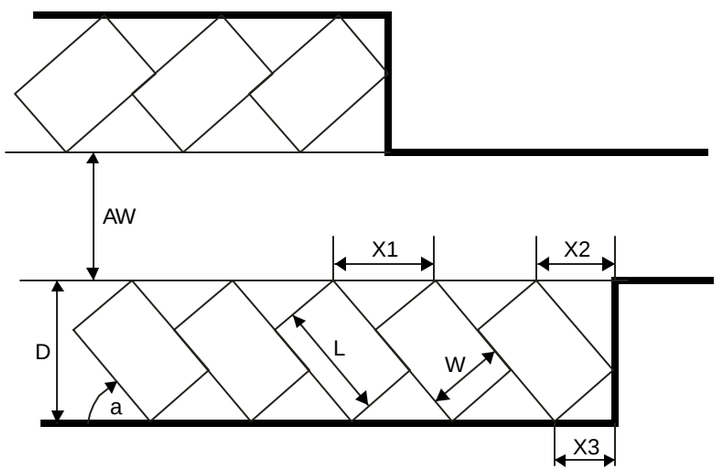
ANGLE PARKINGTABLE(alldimensionsinmetres)

PARKING ANGLE (degrees)	DEPTHOFSTALL(D)				REQ'D AISLE WIDTH
	SMALLCARS (W=...)		NORMALCARS (W=...)		
	2.30	2.60*	2.50	2.70*	
PARALLEL	-	-	**SEENOTE**		3.6
20	3.73	4.02	4.23	4.42	3.6
25	4.03	4.30	4.59	4.77	3.6
30	4.29	4.55	4.92	5.09	3.6
35	4.52	4.77	5.20	5.37	3.6
40	4.72	4.95	5.45	5.60	3.6
45	4.88	5.09	5.66	5.80	3.6
50	5.00	5.20	5.82	5.95	3.9
55	5.09	5.26	5.94	6.05	4.2
60	5.13	5.28	6.01	6.11	4.5
65	5.14	5.27	6.04	6.13	4.8
70	5.11	5.21	6.02	6.09	5.1
75	5.04	5.12	5.96	6.01	5.4
80	4.93	4.98	5.85	5.89	5.8
85	4.78	4.81	5.70	5.71	6.2
90	4.60	4.60	5.50	5.50	6.6

ANGLE PARKINGTABLE(alldimensionsinfeet)

PARKING ANGLE (degrees)	DEPTH OFSTALL (D)				REQ'D AISLE WIDTH
	SMALLCARS (W=...)		NORMALCARS (W=...)		
	7.55	8.53*	8.20	8.86*	
PARALLEL	-	-	**SEENOTE**		11.8
20	12.3	13.2	13.9	14.5	11.8
25	13.2	14.1	15.1	15.7	11.8
30	14.1	14.9	16.1	16.7	11.8
35	14.8	15.6	17.1	17.6	11.8
40	15.5	16.2	17.9	18.4	11.8
45	16.0	16.7	18.6	19.0	11.8
50	16.4	17.0	19.1	19.5	12.8
55	16.7	17.3	19.5	19.9	13.8
60	16.8	17.3	19.7	20.1	14.8
65	16.9	17.3	19.8	20.1	15.8
70	16.8	17.1	19.8	20.0	16.7
75	16.5	16.8	19.6	19.7	17.7
80	16.2	16.3	19.2	19.3	19.0
85	15.7	15.8	18.7	18.8	20.3
90	15.1	15.1	18.0	18.0	21.7

*Theseincreasedwidthsmayberequired(seesection II. PARKING AREA A. Note1:)



NOTE:
Parallelparking stalls shall be2.5mx 6.4mwith3.6maislewidth

PARKINGSTALLLAYOUT

(1)SELECT
W=parkingstallwidth
L = parkingstalllength
a=parkingangle(degrees)

(2)LOOKUPINTABLES:
D=depthofparkingstalls
AW = required minimumaisle width

(3)ADDITIONALLAYOUTINFORMATION
X1=spacebetweenstalls=W/sin(a)
X2=Lcos(a)
X3=Wsin(a)

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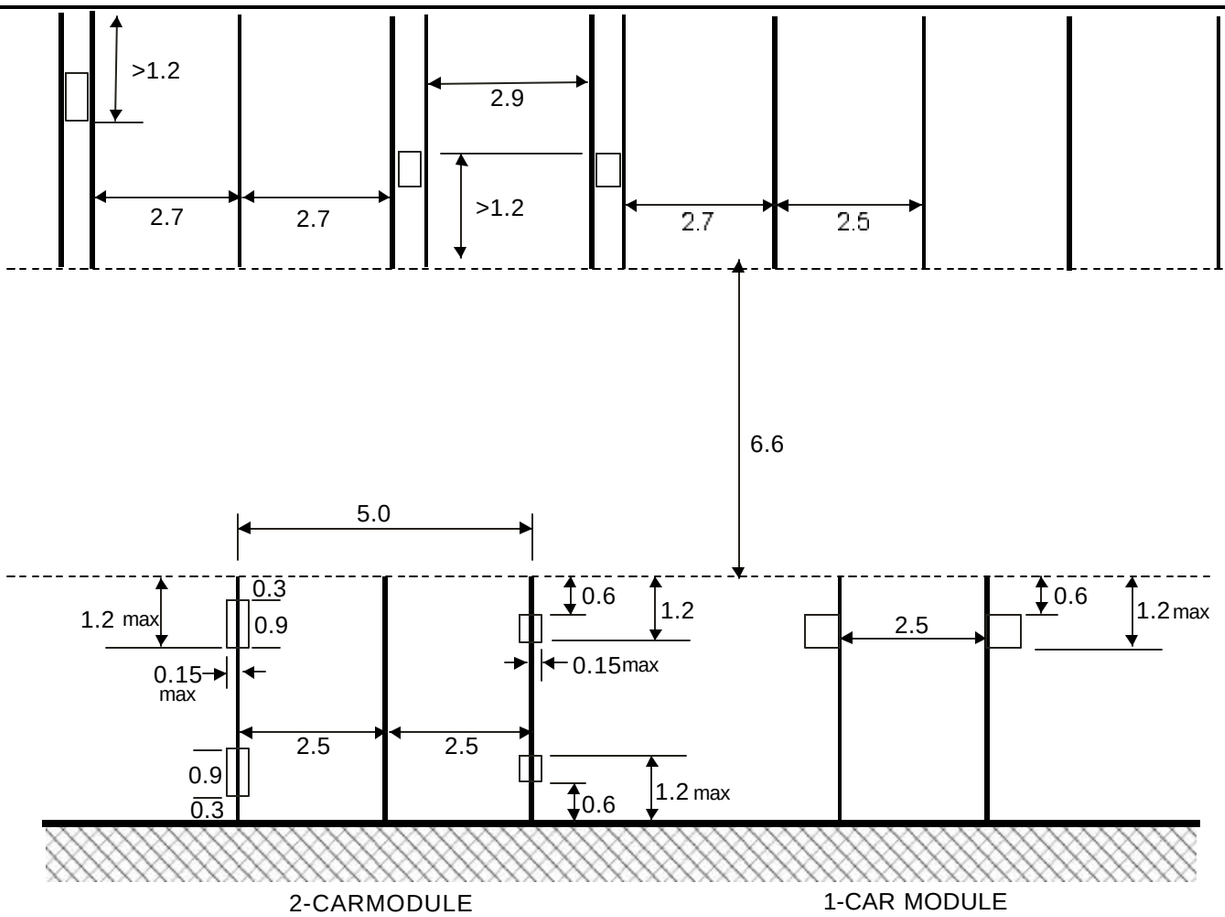
B/GUIDELINESFORWIDENINGSTALLWIDTHSTOMINIMIZEAISLEWIDTHS(alldimensionsinmetres)

Aislewidth(AW)maybedecreasedtoaminimumof6.1m(20ft)byincreasingstallwidthsabovetheminimum requirement. Decreasedaisle widthcanbedeterminedbytakingtheaisle widthforagivenminimumstall widthandapplyingtoitthefactorlistedbelowinthesecondcolumn. Thefactorthatmaybeuseddependson the size of the increased stall width as listed below in the first column. Thissixcolumns on the right are examplesofdecreasedaislewidthsthatcanbeobtainedusingthesefactors.

VALUESFORDECREASING AISLE WIDTHS		EXAMPLES OF VARIOUS MINIMUMAISLEWIDTHSAPPLIEDTOFACTORS					
STALLWIDTH	FACTOR	90degrees 6.6m**	80degrees 5.8m**	70degrees 5.1m**	60degrees 4.5m**	50degrees 3.9m**	45degrees(orless) 3.6m**
2.30-2.54*	1.00	6.60	5.80	5.10	4.50	3.90	3.60
2.55-2.59	.985	6.50	5.71	5.02	4.43	3.84	3.55
2.60-2.64	.970	6.40	5.63	4.95	4.37	3.78	3.49
2.65-2.69	.955	6.30	5.54	4.87	4.30	3.72	3.44
2.70-2.74	.939	6.20	5.45	4.79	4.23	3.66	3.38
2.75+	.924	6.10	5.34	4.71	4.16	3.60	3.35

* upto2.54misconsideredtobenoincreaseaboveminimumstallwidth.
**minimumaislewidthforminimumstallwidth(2.54morless)

C/COLUMNENCROACHMENTREQUIREMENTS (alldimensions inmetres)



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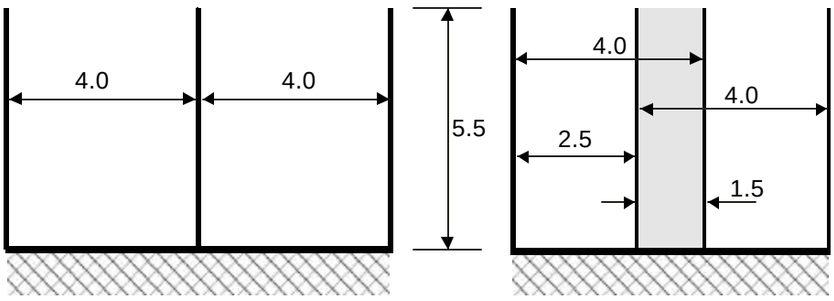
D/DISABILITYSPACES(alldimensionsinmetres)

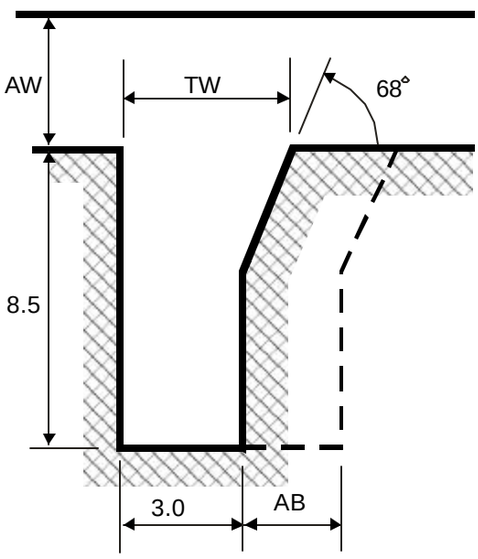


INDEPENDENT
(STANDARD)

SHARED
(ACCEPTABLE)

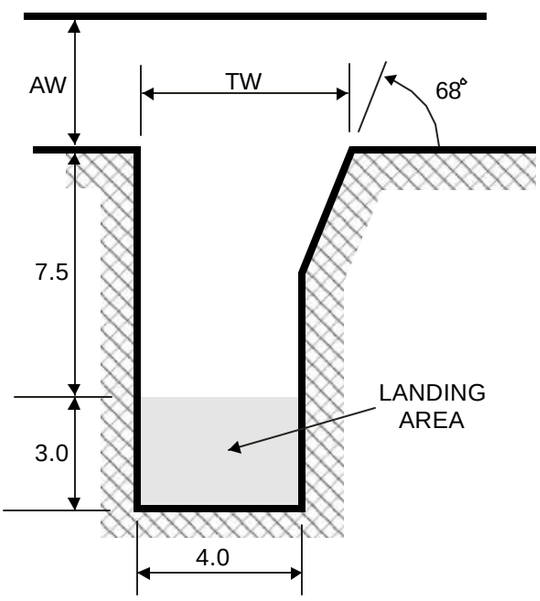
E/LOADINGSPACE(CLASSB)ANDPASSENGERSPACE(CLASSB)(alldimensionsinmetres)

LOADINGSPACE,CLASSB



CLASSBLOADINGSPACETABLE		
AISLE WIDTH (AW)	THROAT WIDTH (TW)	ADDITIONAL BAY WIDTH (AB)
6.1	4.6	3.8
6.4	4.4	3.7
6.7	4.1	3.5
7.0	4.0	3.4
7.3	3.8	3.2
7.6	3.7	3.0
7.9	3.5	3.0
8.2	3.3	3.0
8.5	3.0	3.0

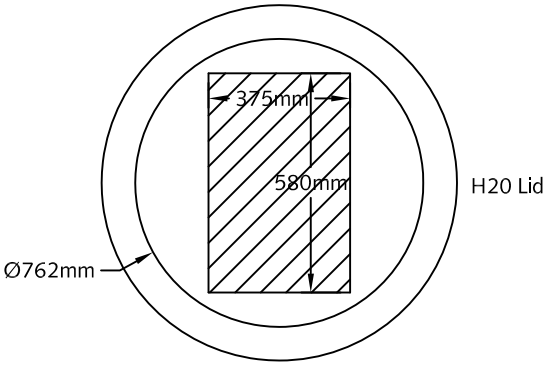
PASSENGER SPACE,CLASSB

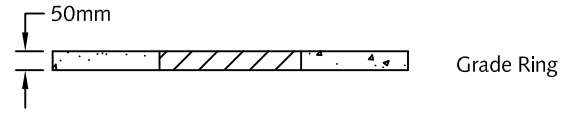


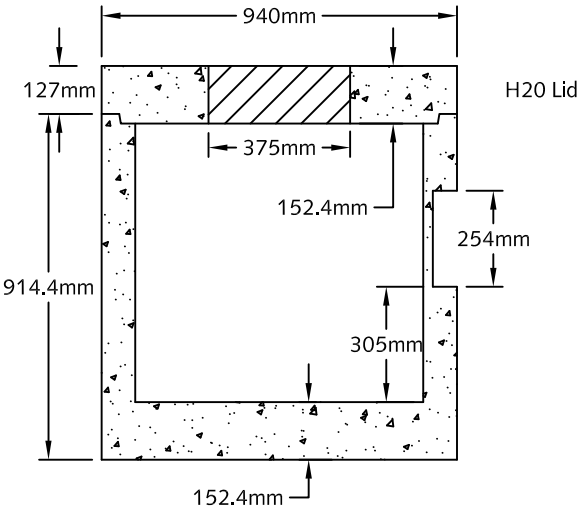
PASSENGER SPACE TABLE*	
AISLE WIDTH (AW)	THROAT WIDTH (TW)
6.1	4.6
6.4	4.4
6.7	4.1
7.0	4.0
7.3	4.0
7.6	4.0

*seeSectionIII.B.regardinglengthfor ClassBspacessubsequenttofirst onerequired.

MINISTRY OF HIGHWAYS
750 mm CATCH BASIN



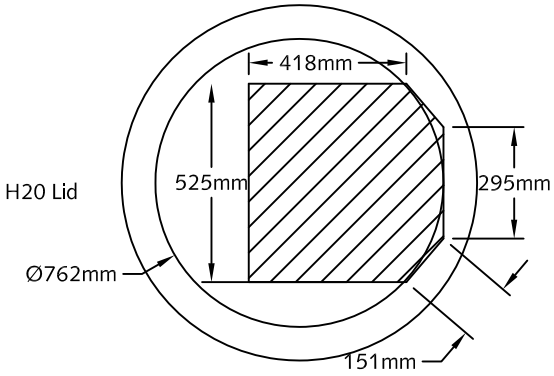


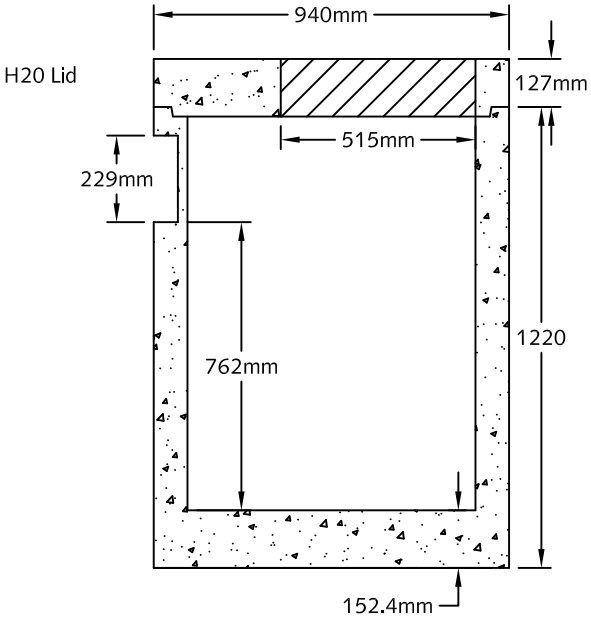


WEIGHTS

SUMP	765 kgs
H20 LID	170 kgs
GRADE RING	60 kgs

750 mm SIDE INLET
CATCH BASIN





WEIGHTS

SUMP	960 kgs
H20 LID	160 kgs
GRADE RING	46 kgs

Notes:

1. Sections are manufactured to ASTM C478 specifications
2. Lids and Sumps are interchangeable

Quality Assurance of products manufactured by The Langley Concrete Group has been verified by the following third party certification programs:

The Langley Concrete Group
The LANGLEY CONCRETE Group of Companies
www.langleyconcretegroup.com

DESCRIPTION:

Catch Basin Details
Vancouver Island

DRAWN BY: WED	JOB NO.: N/A
CHK BY:	DWG NO: CBV-2
DATE: April 1998	REV. BY:
SCALE: 1:20	

LCG Products are held to the governing ASTM, and CSA specification & tolerances.

LANGLEY (604) 533-1656 VICTORIA (250) 478-9581 CHILLIWACK 1-800 667-9600

Appendix C - Drawings

General Notes

- Sloped Area is excluded from project footprint
- Divided smaller field lines shown in yellow
- Refer to sheet 2 for changeroom and concession building details
- Refer to sheet 3 for washroom details
- Refer to sheet 4 for parking lot details
- Max. Bleacher Capacity: 600
- Parking Lot Capacity: 60 stalls, 2 disability stalls
- Refer to report for details on: fencing, channel drains, lights. catch bain
- All dimensions shown in feet

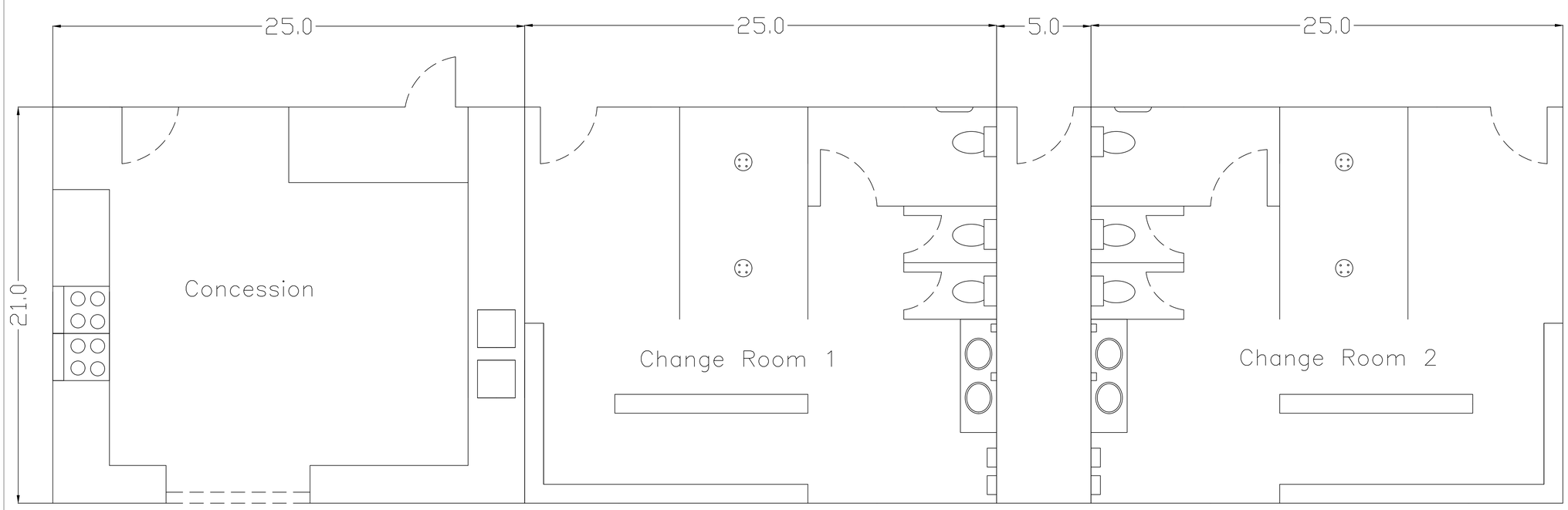
No.	Revision/Issue	Date

Firm Name and Address

Project Name and Address

Tsartlip Soccer Field Development
CIVE412 Final Project
Group 3
RN, DP, AS

Project: Fleld Layout	Sheet: 01
Date: March 28, 2023	
Scale: As Noted	



General Notes

- All dimensions shown in feet
- Each changeroom to have wheelchair accessible toilet
- Dimensions to City of Vancouver specifications
- All finishing and structural requirements designed to BC Building Code
- Utility connections to meet City of Saanich guidelines

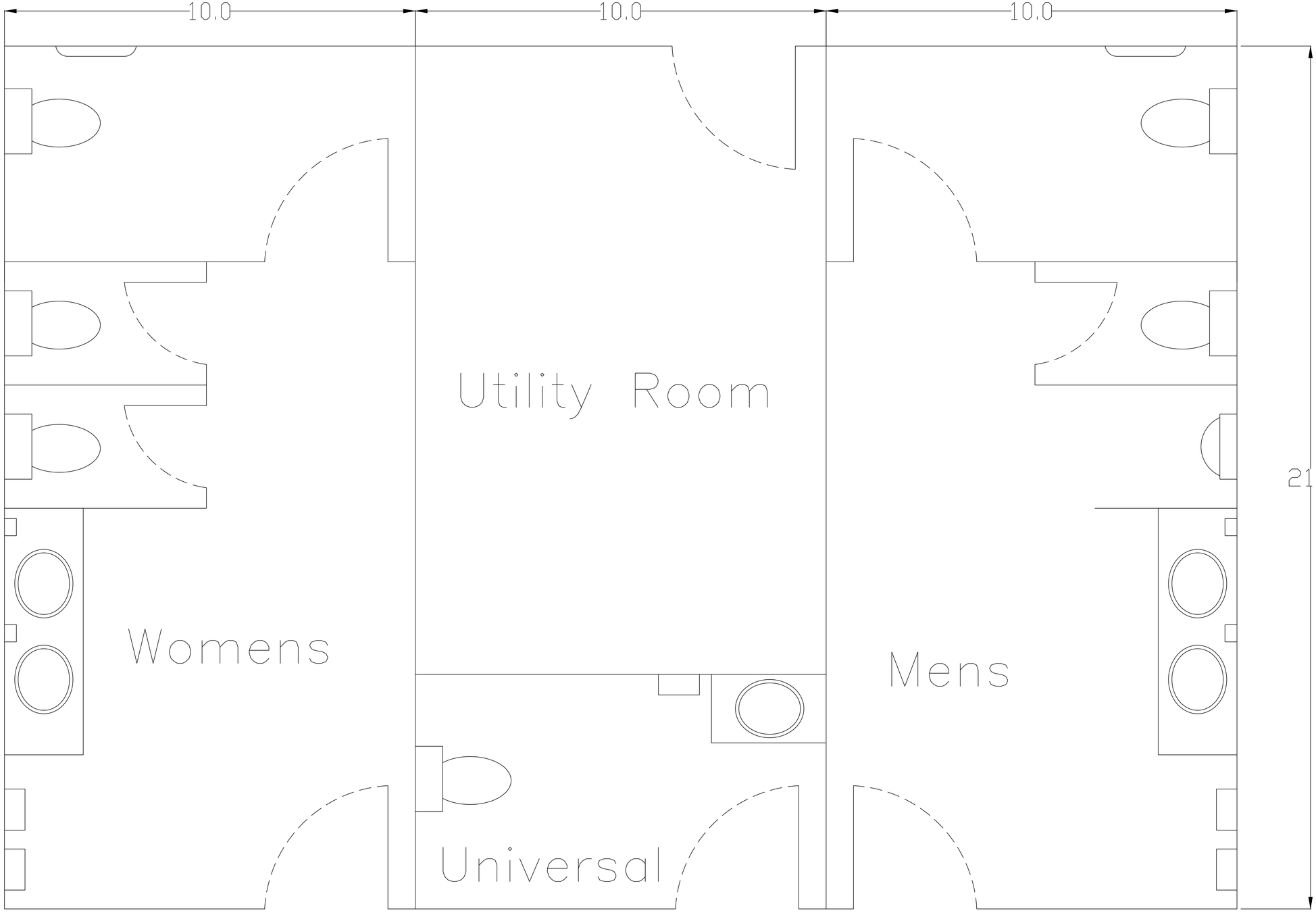
No.	Revision/Issue	Date

Firm Name and Address

Project Name and Address

Tsartlip Soccer Field Development
CIVE 412 Final Project
Group 3
RN, DP, AS

Project	Sheet
Changerooms	02
Date: March 28. 2023	
Scale: As Noted	



General Notes

- All dimensions shown in feet
- Each bathroom to have wheelchair accessible toilet
- Dimensions to City of Vancouver specifications
- Utility connections to meet City of Saanich guidelines
- All finishing and structural requirements to be designed to BC Building Code

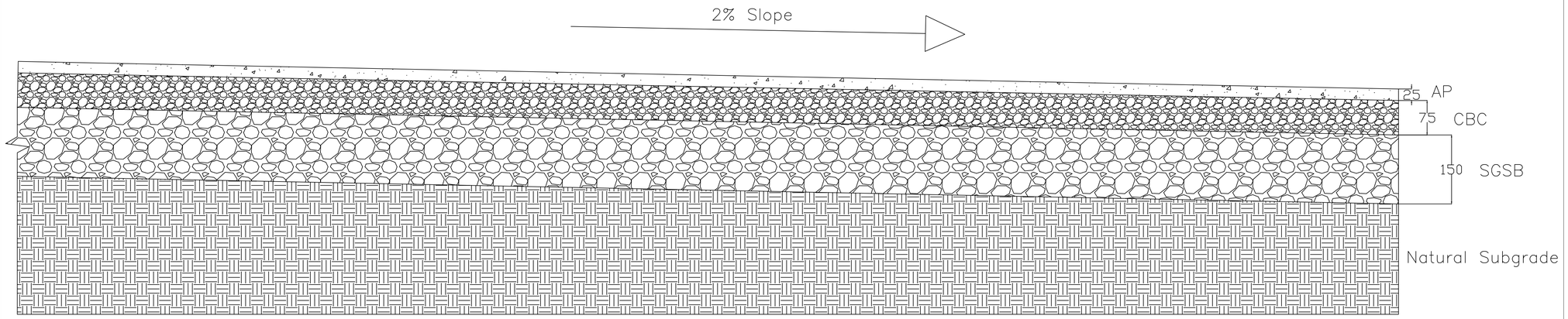
No.	Revision/Issue	Date

Firm Name and Address

Project Name and Address

Tsartlip Soccer Field Development
CIVE412 Final Project
Group 3
RN, DP, AS

Project	Sheet
Washrooms	03
Date: March 28, 2023	
Scale: As Noted	



General Notes

- Dimensions shown in mm
- Refer to report for aggregate specifications

No.	Revision/Issue	Date

Firm Name and Address

Project Name and Address

Tsartlip Soccer Field Development
CIVE 412 Final Project
Group 3
RN, DP, AS

Project: Parking Lot Section

Date: March 28, 2023

Scale: As Noted

Sheet: 04

Appendix D - Cost Estimate

Cost Estimate Breakdown for Tsartlip Soccer Field Development				
Item	Description	Quantity	Unit Cost	Amount
Section 1 - Earthworks				
1.1	Stripping and Clearing	962.8 m3	$7.0/m^3	CA$6,739.60
1.2	Disposal	962.8 m3	$30/m3	CA$28,884.00
			Subtotal:	**CA$35,623.60**
Section 2 - Hardscape				
2.1	Asphalt Walkways	125m2	$37/m^2	CA$4,625.00
2.2	Concrete Walkways	250.8m2	$90/m^2	CA$22,572.00
2.3	Bleacher Foundation	28m^3	$275/m^3	CA$7,700.00
2.4	Bike Rack	1 ea	$729/ea	CA$729.00
2.5	Trash Bins	3 ea	$950/ea	CA$2,850.00
2.6	Benches	2 ea	$1,250/ea	CA$2,500.00
2.7	Picnic Tables	2 ea	$732/ea	CA$1,464.00
2.8	Park Main Entrance Sign	1 ea	$4200/ea	CA$4,200.00
			Subtotal:	**CA$46,640.00**
Section 3 - Field Structures				
3.1	Fencing Around Field (1.2m high)	204 LM	$55/LM	CA$11,220.00
3.2	Fencing Around Field (4.5m high)	432 LM	$248/LM	CA$107,136.00
3.3	Players Benches	2 ea	$15,000/ea	CA$30,000.00
3.4	Fan Bleachers	2 ea	$16,804/ea	CA$33,608.00
3.5	Soccer Nets	6 ea	$4,800/ea	CA$28,800.00
			Subtotal:	**CA$210,764.00**
Section 4 - Turf Field Drainage				
4.1	Supply and Install Pipe under Field	655 LM	$132/LM	CA$86,040.00
4.2	Supply and Install Channel Drains	672 LM	$160/LM	CA$112,224.00
			Subtotal:	**CA$198,264.00**
Section 5 - Artificial Turf				
5.1	Base Preparation	ea	CA$320,000.00	CA$320,000.00
5.4	Supply and Install of Artificial Turf	ea	CA$400,000.00	CA$400,000.00
5.5	Painted Lines and Markings	1 ea	$5,000/ea	CA$5,000.00
			Subtotal:	**CA$725,000.00**
Section 6 - Field Lighting				
6.1	Supply and Install New Light Poles	4 ea	$20,000/ea	CA$80,000.00
			Subtotal:	**CA$80,000.00**
Section 7 - Playground				
7.1	Supply and Install Playground	1 ea	$46,000/ea	CA$46,000.00
			Subtotal:	**CA$46,000.00**
Section 8 - Buildings				
8.1	Public Washroom	1 ea	$175,000/ea	CA$175,000.00
8.2	Concession and Changeroom	156 m^2	$1,917/m^2	CA$299,052.00
			Subtotal:	**CA$474,052.00**
Section 9 - Parking Lot				
9.1	Strip to Natural Subgrade	475 m3	$7/m3	CA$3,325.00
9.2	Supply and Install Subbase	298.9 t	$12.00/t	CA$3,586.80
9.3	Supply and Install Crushed Base Course	149.4 t	$9.50/t	CA$1,424.05
9.4	Supply and Install Asphalt	21840 ft2	$3.34/ft2	CA$74,911.20
9.5	Asphalt Sealing	21840 ft2	$0.35/ft2	CA$7,644.00
9.6	Pavement Line Markings	1304 l.ft	$1/l.ft	CA$1,304.00
9.7	Wooden Fence around Parking Lot	161 LM	$123/LM	CA$19,803.00
9.8	Parking Lot Lights	2 ea	$4,840/ea	CA$9,680.00
			Subtotal:	**CA$121,678.05**
			Total =	**CA$1,938,021.65**
			Contigency Allowance (15%)	**CA$290,703.25**
			Total Estimated Cost =	**CA$2,228,724.90**