Proposal for a Polysportive Framework with a Community Center Integrated in Petrópolis - Manaus-AM

Mariana Ribeiro Alves
mari.mra91@gmail.com
Centro Universitário FAMETRO - Brasil

Mazurkevs Matos dos Santos
mazurkevssantos@hotmail.com
Centro Universitário FAMETRO - Brasil

Igor Bezerra de Lima
igorblima@hotmail.com
Departamento de Engenharia do Centro Universitário FAMETRO - Brasil

David Barbosa de Alencar (Corresponding author)
david002870@hotmailcom
Instituto de Tecnologia e Educação Galileo da Amazônia – ITEGAM - Brasil

Abstract

The objective of this work is to propose a project of a multi-sport court with integrated community center for the community square of Petrópolis neighborhood, located at Marginal Street, without number, Manaus - Am. Being an important reference point in social inclusion and life promotion healthy, the proposal also aims to contribute to the valorization of the urban space. The community square of the Petrópolis neighborhood has no structure to practice multisport exercises. The purpose of the proposal is to provide a suitable place for physical activities, provide an environment for residents' meetings, especially encourage young people to practice sports, in order to keep them away from drugs and crime.

Keywords: Public Square; Structure; Revitalization;

1. Introduction

With the rapid growth of the population, there are many impacts on urban areas. Due to this growth, in some cases there are certain difficulties of public agencies in meeting the needs of a particular region. For this to happen, it is necessary to conduct surveys of public infrastructures in the neighborhoods, assess existing conditions and propose improvements.

Sport has been fundamental in the lives of people, not only young people, but also in the lives of the elderly and people with disabilities. The practice of sports brings numerous health benefits and improvements in

the quality of life of practitioners. However, there must be adequate facilities to perform these physical activities and in some situations people look for paid places, because they do not have in the vicinity of their proper place to practice sports.

Through the study and analysis of existing sites it is possible to plan and develop spaces that meet the expectations of the community of a given area.

The proposal of a multi-sport court with integrated community center adds value to the Petrópolis neighborhood square, besides being a space that can be explored in several ways. It is also important to mention that the population needs social interaction, needs a suitable place to meet friends and have fun. A multi-sport court can provide moments of leisure and fun, in addition to awakening people to exercise, which benefits directly in health. Proposing a new building for a community center meets the needs of the surrounding population, who need to hold meetings to discuss issues of interest to residents, as well as being a structure that can also be explored for social events, activities such as theater, capoeira, dance and even accomplishments of various courses.

2. Theoretical Foundation

2.1. The Sport

According to [1] around AD 83 the sport began to stand out in Greece and Rome, the modalities practiced at that time were gymnastics, races and fights. According to the information in this period arose the gyms and sports complexes, which were the areas intended for the practice of these competitions.

2.1.1. The Concept

The sport can be described as physical exercises that must follow rules for its performance and that aims to develop competition between the practitioners, and can be performed individually, or between two or more people on the same team. Depending on the sport there is no need to be practiced with equipment.

Leisure is directly linked to the free time that a person has, are activities performed in a non-compulsory way, may or may not be physical exercises. It is the time for recreation and relaxation, where the person has fun and ends up releasing the hormone "endorphin", which acts directly in reducing stress.

2.1.2. The Benefits

Playing sports directly influences the physical and mental well-being of the human being, also being of great importance for body development and health care. The sport goes further, through sports practices the person can understand and respect others, develops discipline and understands the importance of commitment to the team.

Among the many benefits that sports and exercise can provide the person we can mention: the development of the body's organic system, increased confidence, overcoming limitations, greater agility and flexibility, decreases the chances of developing chronic diseases and body strengthening.

The sport provides the practitioner with the release of energy, pleasurable and satisfying moments. It can also provide better physical conditioning and body strengthening.

The person who practices some sport tends to have a better quality of life, more willingness to perform

daily tasks. And if performed correctly and consistently, this practice increases the life expectancy of the individual.

However, it may also be mentioned the improvement of body posture, relief of muscle pain, combat diseases such as diabetes and osteoporosis, strengthens immunity and reduces the percentage of body fat.

2.1.3 Incentive Programs for Leisure Structures

The [2] was essential to regulate the State's duties regarding the modernization and adaptation of spaces for sports and leisure in all Brazilian municipalities. Being social right of the population to have access to public space to develop physical and sports activities.

With the creation of the city's Sport and Leisure Program (PELC) [3], the municipalities will be able to set up places for recreational and leisure sports, such as squares, courts, sports halls, soccer fields and social clubs.

Thus, the National Secretariat of Sport, Education, Leisure and Social Inclusion encourages the Government to invest in the construction of adequate structures for the practice of various physical activities and to promote the democratization and development of citizenship through sport and leisure.

2.2. Sport Practice

The extinct Ministry of Sport in 2013 conducted a survey to obtain information on sports and physical activity related to that year. The study pointed out that 45.9% of Brazilians did not practice any physical activity or sport, 28.5% were practitioners of physical activity and 25.6% were practitioners of sports [4].

According to the study Pnad 2015: Practice of Sport and Physical Activity, in 2015, over 100 million people did not practice any kind of sport during this period. One of the reasons cited for the absence of sports was the “lack of accessible or nearby sports facilities” [5].

2.3. The Place

Located in the south of Manaus, the Petrópolis neighborhood was founded in 1952 [6], its population was 41,210 inhabitants. The neighborhood is among one of the most dangerous regions of the capital, the high number of violence is linked to the lack of investment for development of the area, the implementation of social projects and monitoring with the health of families.

FIGURE 01: Neighborhood Location Map
Source: [7]

In 2016, Raimundo Vinhote Square, popularly known as Petrópolis Square, was reopened by the Manaus City Hall, after partial revitalization of the 800m². The revitalization included painting in the surroundings, accessibility for people with special needs and also the implementation of an outdoor gym containing 12 exercise equipment. However since the reopening there has been no maintenance and improvement in the public space of the square. [8]

The square has an extensive area that allows exploration for new infrastructure projects that may enhance the public space and provide new options for sports and leisure practices in the surrounding community.

FIGURE 02: Square Location Map
Source: Google Maps [9]

2.4. Constructive Steps

2.4.1. Workbook

The plaque serves to identify the work to be performed, as well as the data of the technicians responsible and must be installed in a visible place.

2.4.2. Tapume Installation

According to [10] the ground shall be insulated by a provisional fence made of sturdy structure, such as timber parts and galvanized steel parts. Must have a minimum height of 2.20 meters in relation to the ground level.

2.4.3. Demolitions and Withdrawn

Demolitions must be performed following the guidelines of [10] and should be planned and accompanied by a qualified professional. Prior to demolition, the mains and other facilities must be disconnected, protected and isolated. Soon after, fragile elements such as glass, frames and lamps should be removed.
The structure should be demolished with the utmost care, using appropriate tools and personal protective equipment as per [11].

2.4.4. Clearing Terrain

Before carrying out the lease of the work, it is necessary to remove the existing vegetation layer on the ground, thus preventing the inappropriate soil from causing damage during the work.

2.4.5. Works Lease

This step should be performed with the monitoring of the topographic professional, and there should be level checking, axis alignment, terrain markings and road alignment. All information should be as per project.

The jig is made with a wooden structure, obeying a minimum distance of 1.00 meters from the position of the side closing walls and a maximum height of 1.50 meters relative to the ground. It is important that the jig structure is level and with the correct square. With the use of the nylon line the wall segments should be marked, because from this information it will be possible to identify the alignments of the foundations and pillars.

2.4.6. Earth Movement

Trench excavations should follow the guidelines of NBR 9061: 2015 - Open pit excavation safety [12] and should be performed by qualified professionals using appropriate tools and safety precautions in accordance with [10]. During the excavation operation the stability of the ground walls must be maintained so that no accidents occur. In this case, it is essential to observe the acting loads, such as lateral thrust, accumulation of excavated material at the excavation edge and the traffic of machines and equipment.

2.4.7. Foundations

According to NBR 6122: 2010 - Design and execution of foundations [13], load is transmitted to the ground through the foundation elements. Such as:

2.4.7.1. Fundations Base

It is the surface foundation element of reinforced concrete, can have in plant the square, rectangular or trapezoidal shape. They are interlocked by baldrames and must have a compressive strength of at least FCK 25 Mpa, and may vary according to structural design. Its function is to support the weight of the construction and distribute the loads to the ground [13].

2.4.7.2. Beam Baldrame

Made of reinforced concrete and rectangular in shape, the baldrames are defined with shallow support foundation, located below ground level and executed following the perimeter of all masonry. Assists in the weight distribution of the construction and performs the locking of the pillars. Like the shoes, they must have a compressive strength of at least FCK 25 Mpa. After the deforming procedure of the concrete element is completed, it is important to waterproof the faces of the rafters, so that the structure is protected against moisture and seepage [13].

2.4.8. Superstructure

They are reinforced concrete elements responsible for distributing the loads to the foundation elements. They must resist horizontal and vertical actions and their function is to ensure the stability of the structure. The superstructure consists of pillars, upper beams and slabs. Being these dimensioned and specified through Structural Projects.

3. Tools and Methods

To verify the need for a place to practice polysports and community center, a survey was conducted in the Petrópolis neighborhood, to verify what types of structures are available in the urban spaces of this region. Visits were made to the following blocks in the neighborhood that are for public use:

• Thomas Meireles Municipal School
• Valley of the Sun Court 2
• SOMAP court

A visit was also made to Petrópolis Square to evaluate the existing community center and to analyze the physical activities that can be developed in the square.

The research was developed through IN LOCO visit, a form was used to fill in the information related to the place such as: typology, description of the place, conditions of the existing structure and type of activities that can be developed in the space.

The proposal for a multi-sport court with integrated community center was prepared following the guidelines of ABNT standards, such as:

• NBR 6118: 2014 - Design of concrete structures - Procedures; [14]
• NBR 8800: 2008 - Design of steel structures and mixed steel and concrete structures of buildings; [15]
• NBR 6122: 2010 - Design and Execution of Foundations, [13]
• NBR 5626: 1998 - Cold water building installation, [16]
• NBR 8160: 1999 - Building sewage systems - Design and execution, [17]
• NBR 5410: 2004 Corrected Version: 2008 - Low voltage electrical installations. [18]

To prepare the budget worksheet, the costs presented by the worksheet SINAPI - National System for Research on Costs and Indices of Civil Construction, issued on 08/12/2019, were considered. [19]

4. Structural Calculation Methodology

The concrete volume calculation was performed using the ConstruCalc 2019 Program, the following measures were adopted:

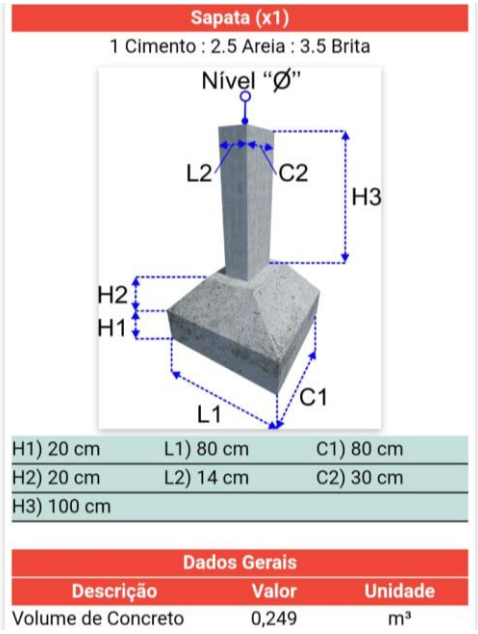

Figure 3 - base: 0.80 x 0.80
Source: [20]

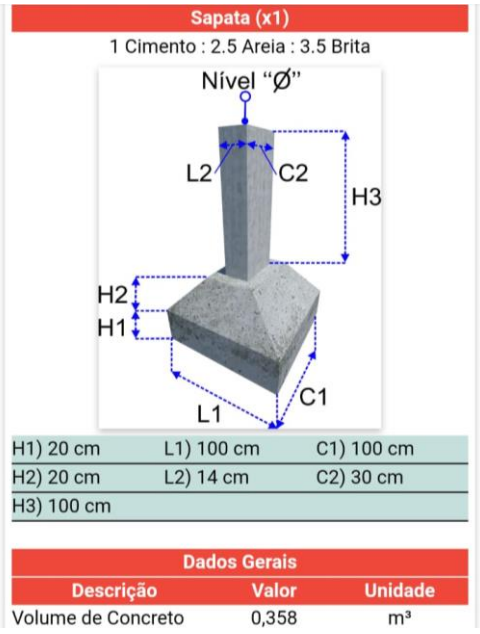

Figure 4 - base: 1.0 x 1.0
Source: [20]

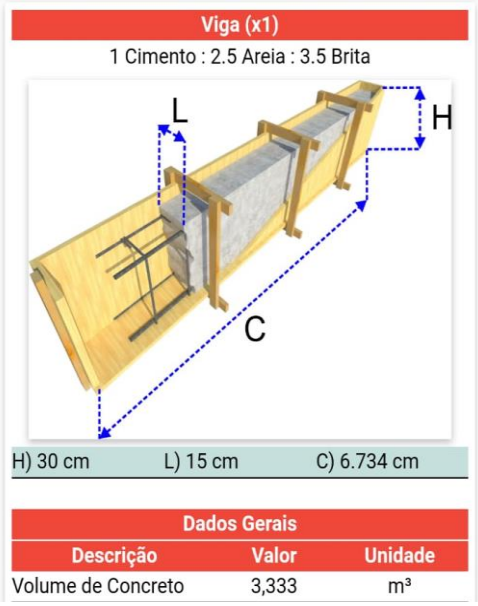

Figure 5 - Girder Community Center
Source: [20]

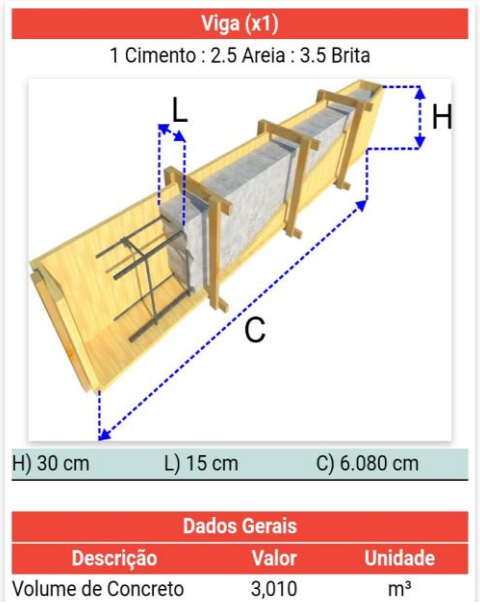

Figure 6 - Court beam
Source: [20]

For the survey of the steel quantity was adopted 91.68 kg / m3 and for formwork area was adopted 9.01 m2 / m3, according to Table 01 - Usual demand for the formwork, reinforcement and concreting services for the execution of 1m³ of structure of reinforced concrete. (TCPO 13th EDITION, p. 19) [21]

Table 01: Demand for 1.00 m³ of concrete.

DEMAND FOR 1.00 M³ CONCRETE				
SERVICE	UNITY	MIN.	MED.	MÁX.
Shapes	**M²**	**8,01**	**9,01**	**12,52**
Frame	**Kg**	**81,78**	**91,68**	**160,00**
Concreting	**M³**	**1,00**	**1,00**	**1,00**

Source: TCPO 13th Edition [21]

5. Results and Discussions

5.1. The Petrópolis Square Community Center

The existing community center has an area of 108.00sqm, however due to not receiving maintenance is in a state of degradation. The coverage structure presents several pathologies that endanger site users.

FIGURE 07: Community Center - Petrópolis Square
Source: Personal Archive

FIGURE 08: Community Center - Petrópolis Square
Source: Personal Archive

5.2. The Place For Polyportive Framework

The area chosen for the proposal regarding the multi-sport court is located next to the existing Community Center in square of Petrópolis, which is 20,00 meters long and 15,00 meters wide.

FIGURE 09: Place for Proposal
Source: Personal Archive

5.2. Projects

5.2.1. Location and Location

Figure 03 presents the Situation and Location Project where it is possible to identify the area foreseen for the implementation of the proposal.

The place is 15,00 meters wide and 29,00 meters long, totaling 435,00m² of area that will suffer interference.

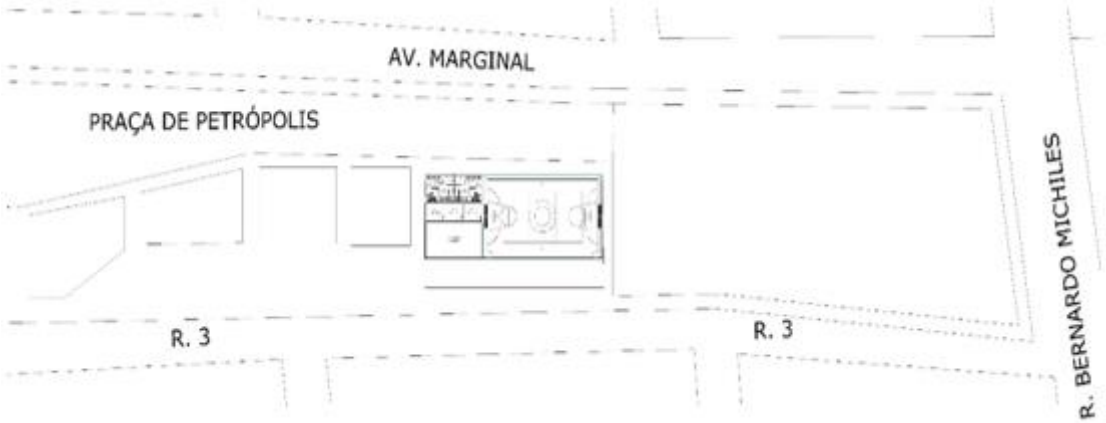

FIGURE 10: Situation and Location Project
Source: Personal Archive

5.2.2. Front Facade

The facade has a length of 28.66 linear meters. In figure 04 it is possible to understand how the installation of the Multi-Sport Court with integrated Community Center was designed.

FIGURE 11: Front Facade
Source: Personal Archive

5.2.3. Polyesportive Frame

For the multi-sport court, the dimensions of the masonry closures were estimated measuring 19.40 meters in length and 11.40 meters in width, totaling 221.16m² of built area, considering masonry with a ceiling height of 1.00 meters throughout the perimeter of the building. block and above this closure it was foreseen the installation of metallic structure for closing with a mesh screen.

Starting from the masonry level, the dimensions of the fence structure are respectively: 19.24m in lateral length, with right foot measuring 1.70m and 11.25m in bottom width and 3.20m in right foot. The valid games area is 18,00m long and 10,00m wide, totaling 180,00m².

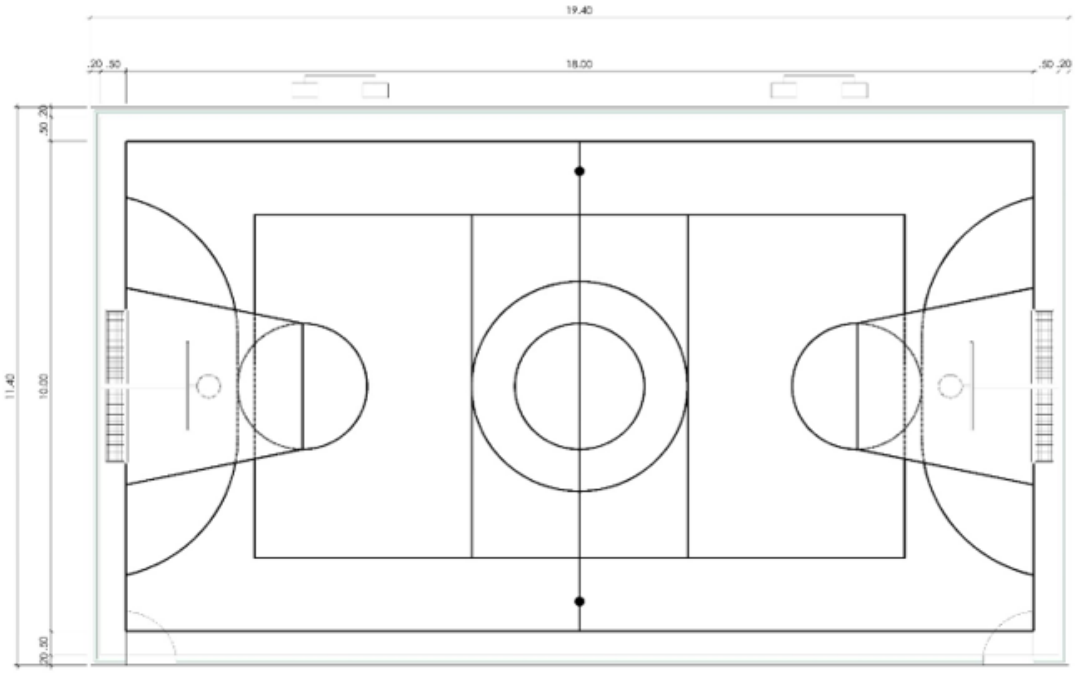

FIGURE 12: Floor Plan Multi-Sport Court
Source: Personal Archive

5.2.4. Community Center

The Community Center was designed with a width of 9.60 meters and a length of 11.40 meters, totaling a built area of 105.56m². The building has toilets for female and male use, rooms for administrative, didactic, warehouses and for purposes. It also has a lounge with an area of 42.12m² where various types of activities

can be performed, such as theater, capoeira, meetings and presentations.

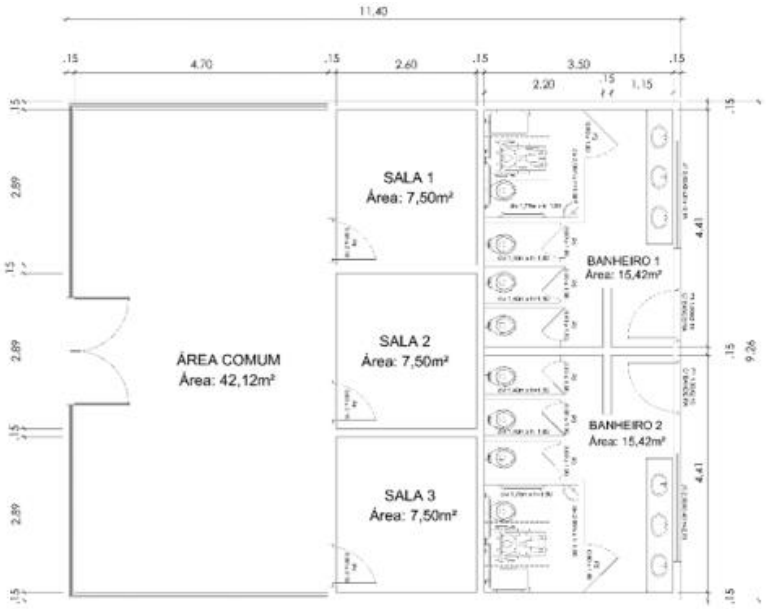

FIGURE 13: Floor Plan Community Center
Source: Personal Archive

5.3 Synthetic Budget Worksheet

TEM+A1:I7	DESCRIPTION OF SERVICES	TOTAL	
1.0	PRELIMINARY SERVICES	R$	30.666,48
	COMMUNITY CENTER	R$	115.238,72
2.0	FOUNDRY MOVEMENT FOR FOUNDATIONS (base and beams)	R$	738,93
3.0	FOUNDATIONS	R$	12.061,67
4.0	WATERPROOFING	R$	270,30
5.0	SUPERSTRUCTURE	R$	7.743,95
6.0	INTERNAL AND EXTERNAL VERTICAL SEALING SYSTEM (WALLS)	R$	21.150,35
7.0	INTERNAL AND EXTERNAL COATINGS	R$	19.218,13
8.0	INTERNAL AND EXTERNAL FLOOR SYSTEMS (PAVING)	R$	3.554,17
9.0	PAINTING	R$	9.037,41
10.0	SQUARES	R$	8.605,95
11.0	COVERING SYSTEMS	R$	24.896,82
12.0	TABLEWARE AND METALS	R$	3.063,68
13.0	HYDRAULIC FACILITIES	R$	730,08
14.0	SANITARY INSTALATION	R$	730,08
15.0	ELECTRICAL INSTALLATIONS	R$	3.437,20
	MULTISPORT COURT	R$	72.290,53
16.0	LAND MOVEMENT FOR FOUNDATIONS	R$	948,42
17.0	FOUNDATIONS	R$	12.291,26
18.0	SUPERSTRUCTURE	R$	30.692,93
19.0	INTERNAL AND EXTERNAL VERTICAL SEALING SYSTEM (WALLS)	R$	3.838,30
20.0	INTERNAL AND EXTERNAL COATINGS	R$	3.047,30
21.0	PAINTING	R$	4.121,67
22.0	ADDITIONAL SERVICES	R$	17.350,66
	TOTAL COST OF WORK		218.195,72
	BDI VALUE 23.15%		50.512,31
	GRAND TOTAL		268.708,03

FIGURE 14: Synthetic Budget Worksheet
Source: Personal Archive

The items for sealing masonry closures and roofing systems are the most costly of the Community Center. In all, 273,00sqm of masonry and 99,46sqm of coverage will be built with metal structure and aluminum tiles.

For the multi-purpose sports court the biggest cost will be to build the superstructure, this item contains the floor slab execution service that has an area of 209.00m².

For foundations, 0.80m x 0.80m and 1.00m x 1.00m shoes were considered, and 0.15m x 0.30m concrete beams with FCK 25 Mpa and 8mm and 10mm CA-50 steel.

The superstructures were dimensioned with pillars with the dimensions of 0.14m x 0.30m and upper beam of 0.15m x 0.25m. For the Community Center an 8cm-thick roof slab was designed with 8mm CA-50 10mm CA-50 steel positive and negative frames. For all elements, concrete concreting with FCK 25Mpa was considered.

The internal and external vertical sealing system (walls) was developed considering 9x19x19cm horizontally drilled ceramic blocks, with internal and external cladding and mortar plastering in a 1: 2: 8 stroke. For the bathrooms of the Community Center, the installation of ceramic tiles on all internal walls was considered.

The execution of the floors of the Community Center and Quadra Poliesportiva was designed with the application of 5cm thin concrete ballast, mounting of CA-50 steel frames of 8mm mesh 15cm x 15cm and concrete with FCK 25Mpa. Being the floor finish of the Community Center with ceramic tile and the finish of the floor of the court will be executed with own paint for floors.

The assembly of the Quadra Poliesportiva fence should be structured by galvanized steel tubes, with seam, din 2440 and 2 ”diameter. And its sealing should be performed with 5cm x 5cm mesh galvanized wire mesh. The entire fence structure should be finished with synthetic enamel paint.

Facade finishes should be performed initially with the application of acrylic putty on the walls, after two coats it is necessary to sand the surface, then apply two coats of acrylic latex paint.

6. Final Considerations

With the knowledge acquired through the research, it was possible to analyze the existing structures in the neighborhood of Petrópolis, understand what the residents' needs were, plan the construction stages of the project, following the guidelines of the Brazilian Regulatory Standards and develop the works cost spreadsheet.

Therefore, the purpose of the Proposal for a Multi-Sport Court with an integrated Community Center is to propose a suitable structure for sports and leisure, to propose a new Community Center, thus meeting the needs of the residents around Petrópolis Square.

7. Bibliographic References

[1] Duarte, O. História dos Esportes. São Paulo: Senac; 2003.

[2] Ministério do Esporte. Resoluções da III Conferência Nacional do Esporte. [acesso em 13 set 2019]. Disponível em: http://www2.esporte.gov.br/conferencianacional/resolucoesIIICNE.jsp

[3] Ministério do Esporte. Programa Esporte e Lazer da Cidade. [acesso em 13 set 2019]. Disponível em: http:www.esporte.gov.br/index.php/institucional/esporte-educacao-lazer-e-inclusao-social/esporte-e-lazer-da-cidade

[4] Ministério do Esporte. A prática do esporte no Brasil. [acesso em 09 set 2019]. Disponível em:

http://www.esporte.gov.br/diesporte/index.html
[5] Instituto Brasileiro de Geografia e Estatística. PNAD: Prática de Esporte e Atividade Física. Brasília. IBGE; 2015. [acesso em 09 set 2019]. Disponível em: https://biblioteca.ibge.gov.br/visualizacao/livros/liv100364.pdf
[6] Instituto Brasileiro de Geografia e Estatística. Dados Municipais de Manaus. [acesso em 09 set 2019]. Disponível em: https://cidades.ibge.gov.br/brasil/am/manaus/panorama
[7] Google Maps. Bairro Petrópolis. Manaus – AM. [acesso em 05 set 2019] Disponível em: https://www.google.com/maps/place/Petr%C3%B3polis,+Manaus+-+AM/@-3.1109489,-60.0007083,14.5z/data=!4m5!3m4!1s0x926c053031441c4f:0x7f62f9b1b6ea9524!8m2!3d-3.1088793!4d-59.9941528
[8] Araújo, O. Prefeitura abre espaço revitalizado no bairro de Petrópolis. Manaus: Amazonia na Rede; 1 maio 2016. [acesso em 05 set 2019]. Disponível em: https://amazonianarede.com.br/prefeitura-abre-espaco-revitalizado-no-bairro-de-petropolis/
[9] Google Maps. Praça de Petrópolis. Manaus – AM. [acesso em 05 set 2019]. Disponível em: https://www.google.com/maps/place/Petr%C3%B3polis,+Manaus+-+AM/@-3.1056032,-59.9909176,330m/data=!3m1!1e3!4m5!3m4!1s0x926c053031441c4f:0x7f62f9b1b6ea9524!8m2!3d-3.1088793!4d-59.9941528
[10] Ministério do Trabalho. Norma Regulamentadora - N° 18 – Condições e Meio Ambiente de Trabalho na Indústria da Construção. Brasília: MT; 2018. [acesso em 05 out 2019]. Disponível em: http://trabalho.gov.br/images/Documentos/SST/NR/NR18/NR-18.pdf
[11] Ministério do Trabalho. Norma Regulamentadora N° 6 – Equipamento de Proteção Individual – EPI. Brasília: MT; 2018. [acesso em 05 out 2019]. Disponível em: http://trabalho.gov.br/images/Documentos/SST/NR/nr-06-atualizada-2018.pdf
[12] Associação Brasileira de Normas Técnicas. NBR 9061 – Segurança de escavação a céu aberto. Rio de Janeiro: ABNT; 1985.
[13] Associação Brasileira de Normas Técnicas. NBR 6122 - Projeto e execução de fundações. Rio de Janeiro: ABNT; 1996.
[14] Associação Brasileira de Normas Técnicas. NBR 6118 – Projeto de estruturas de concreto. Rio de Janeiro: ABNT; 2004.
[15] Associação Brasileira de Normas Técnicas. NBR 8800 – Projeto de estruturas de aço e de estruturas mistas de aço e concreto de edifícios. Rio de Janeiro: ABNT; 2008.
[16] Associação Brasileira de Normas Técnicas. NBR 5626 - Instalação predial de água fria. Rio de Janeiro: ABNT; 1998.
[17] Associação Brasileira de Normas Técnicas. NBR 8160 - Sistemas prediais de esgoto sanitário - Projeto e execução. Rio de Janeiro: ABNT; 1999.
[18] Associação Brasileira de Normas Técnicas. NBR 5410 Versão Corrigida - Instalações elétricas de baixa tensão. Rio de Janeiro: ABNT; 2008.
[19] Caixa Econômica Federal. SINAPI - Sistema Nacional de Pesquisa de Custos e Índices da Construção Civil. Brasília: Caixa Econômica Federal; 2019.
[20] Tresium Soluções. ConstruCalc. Ipatinga: Tresium Soluções; 2019. [acesso em 05 out 2019].

Disponível em: http://www.tresium.com.br/index.html

[21] Pini. Tabelas de Composições de Preços para Orçamentos. 13. ed. São Paulo: Pini; 2008.